Appendix A

Biodiversity Assessment Report

GUNNEDAH SECOND ROAD OVER RAIL BRIDGE

Biodiversity Assessment

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Limitations Statement

The sole purpose of this report and the associated services performed by Kellogg Brown & Root Pty Ltd (KBR) is to provide Biodiversity Assessment in accordance with the scope of services set out in the contract between KBR and Roads and Maritime Services – Northern Division ('the Client'). That scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

KBR derived the data in this report primarily from visual inspections, examination of records in the public domain, interviews with individuals with information about the site. The passage of time, manifestation of latent conditions or impacts of future events may require further exploration at the site and subsequent data analysis, and re-evaluation of the findings, observations and conclusions expressed in this report.

In preparing this report, KBR has relied upon and presumed accurate certain information (or absence thereof) relative to **the site** provided by government officials and authorities, the Client and others identified herein. Except as otherwise stated in the report, KBR has not attempted to verify the accuracy or completeness of any such information.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between KBR and the Client. KBR accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

Revision History

Revision	Date	Comment	Signatures		
			Originated by	Checked by	Approved by
A	27/11/14	Issue for Client Review	R. Harrison	L. Crickmore	D. Shooter
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1	16/04/2015	Issue for Use	R. Harrison	L. Crickmore	D. Shooter per L. Crickmore

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Executive Summary

The Roads and Maritime Service (Roads and Maritime) is proposing to construct the Gunnedah second road over rail bridge to replace the existing New Street level crossing.

The key features of the proposed second road over rail bridge works include the upgrade of the Oxley Highway roundabout, the construction of a new bridge over the rail line west of the Gunnedah Maize Mill, the construction of a new intersection to provide access to Barber Street where the new route meets Warrabungle Street, and the closure of the New Street level crossing.

The site and adjacent study area have been extensively modified and are currently represented in the landscape as urban parkland that has the characteristics of a maintained open grassy woodland. This parkland is immediately adjacent to Blackjack Creek, which within the study area has also been subject to extensive modification and is now more representative of a flood mitigation channel than a natural creek.

Field surveys were undertaken in March 2013 and April 2014 to identify Threatened Species Conservation Act 1995, Fisheries Management Act 1994 and/or Environment Protection and Biodiversity Conservation Act 1999 listed species, populations and ecological communities, which had been previously recorded or were predicted to occur in the locality. Literature reviews of previous reports and database searches were also carried out, with an assessment of the likelihood of occurrence of the species recorded in the study area or identified in the data base searches completed.

The likelihood of occurrence assessment identified seven threatened fauna species listed under listed under the *Threatened Species Conservation Act 1995* and/or *Environment Protection and Biodiversity Conservation Act 1999* as possible occurrences within the study area.

One ecological community, *White Box – Yellow Box – Blakely's Red Gum Woodland* (Box Gum Woodland), listed as an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995* was also confirmed as present within the study area.

One threatened fauna species, the Koala (*Phascolarctos cinereus*) listed as vulnerable under the *Threatened Species Conservation Act 1995* and/or *Environment Protection and Biodiversity Conservation Act 1999*, was confirmed as present within the study area.

Approximately 0.61 hectare of Box Gum Woodland, would be impacted by the proposal. The majority of vegetation clearing, is located within the urban parkland. An assessment of significance for impacts upon this EEC was undertaken and determined that given the modified condition of the EEC, the small area to be cleared and the rehabilitation measures proposed the proposed works would not result in a significant effect to the EEC within the local area surrounding Gunnedah.

Clearing as part of the proposal would also result in the loss of approximately 0.61 hectare of marginal habitat for seven threatened fauna species considered to possibly occur within the study area. An assessment of impact for these species determined the proposal was unlikely to result in any significant impact or effect due to the presence of alternative and more viable breeding and foraging habitat to the south of the study area and throughout the locality and the minimal amount of habitat to be potentially affected.

The results of the '7-Part Tests' (*Threatened Species Conservation Act 1995)* completed for the Box Gum Woodland EEC and the listed threatened fauna species indicated that the proposal is unlikely to significantly affect the EEC or the threatened species habitats and therefore no Species Impact Statements are considered necessary for these species or community. As an assessment against the significant impact assessment guidelines in accordance with the *Environmental Protection and Biodiversity and Conservation Act 1999* for the listed threatened fauna also revealed no significant impact to listed species. This suggests that based on the assessments undertaken for the listed species identified it would not be necessary to refer the proposal.

The proposal could also potentially remove approximately 0.61 hectare of structurally modified parkland habitat that is periodically utilised by the koala as an opportunistic food and sheltering resource when moving between more preferential habitats. Only 26 mature koala feed trees (17 Yellow Box and 9 Blakely's Red Gum) would need to be removed. The koala habitat that occurs in the study area has been assessed in accordance with the appropriate State and Federal guidelines with the results determining no significant effect as a result of the proposal to this species.

Given the modified urban setting in which the proposal is to be located, the small area of anticipated clearing and the avoidance and mitigation measures proposed, the proposal is not expected to significantly impact upon any of the known/potentially occurring threatened or endangered species or their habitats within the site or in the study area.

1 Introduction

1.1 BACKGROUND

The Roads and Maritime Service (Roads and Maritime) is proposing to construct the Gunnedah second road over rail bridge to replace the existing New Street level crossing (the proposal).

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

With major coal development in the Gunnedah basin, the length and frequency of coal trains has been increasing, causing extended delays at the nearby level crossings. With delays expected to continue and increase into the future, Roads and Maritime and the Gunnedah Shire Council are committed to identifying a grade separated crossing that will improve local and through traffic efficiency.

The Abbott Street Bridge was constructed in 1941 and is restricted for use by Higher Mass Limit (HML) freight vehicles, thus pressuring the transport network through Gunnedah. The provision of a second road over rail bridge in Gunnedah will facilitate a HML route that takes pressure off the transport network through Gunnedah.

The key objectives of the proposal have been established by Roads and Maritime in collaboration with key stakeholders for this project. These objectives include:

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

Figure 1.1
LOCAL CONTEXT

1.2 STUDY AREA

The study area for this assessment is located in the township of Gunnedah in northern New South Wales and is typical of an urban environment. It is surrounded by linear infrastructure including the Oxley Highway, ancillary roads and the Hunter Valley Rail corridor. It is also adjacent to open space parklands, industrial and residential development, as shown on Figure 1.2.

The study area has been extensively modified since European settlement and is currently represented in the landscape as urban parkland that is representative of a maintained open grassy woodland. This parkland is immediately adjacent to Blackjack Creek, which has also been subject to extensive modification and within the site is now more representative of a flood mitigation channel than a natural creek.

Based on observations recorded during the field surveys, this areas was considered likely to have been planted with native and exotic tree species, the majority of which are approximately 20 to 30 years of age, with a few that may be approximately 40 to 50 years (OzArk 2013). The understorey is dominated by exotic grass species, the majority of which is regularly maintained by means of mowing and slashing. No distinct patches of remnant vegetation remain in the study area.

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

Overall the study area has been heavily impacted by urban development including rail and road infrastructure as well as light industry. Beyond the study area, the wider locality, as shown on Figure 1.1, becomes a mix of rural residential development and agricultural land, along with areas of native vegetation, such as Porcupine Reserve. The Namoi River runs east to west and is immediately to the north of Gunnedah.

1.3 DESCRIPTION OF THE PROPOSAL

The proposal connects the existing Oxley Highway roundabout with Warrabungle Street via a road over rail bridge. The proposal alignment is shown in Figure 1.3.

The key features of the second road over rail bridge proposed works include:

- upgrade of the Oxley Highway roundabout
- construction of a new bridge over the rail line west of the Gunnedah Maize Mill
- construction of a new intersection to provide access to Barber Street where the new route meets Warrabungle Street
- construction of a new roundabout at the intersection of Warrabungle and Conadilly Streets
- closure of the New Street level crossing.

Figure 1.2
STUDY AREA

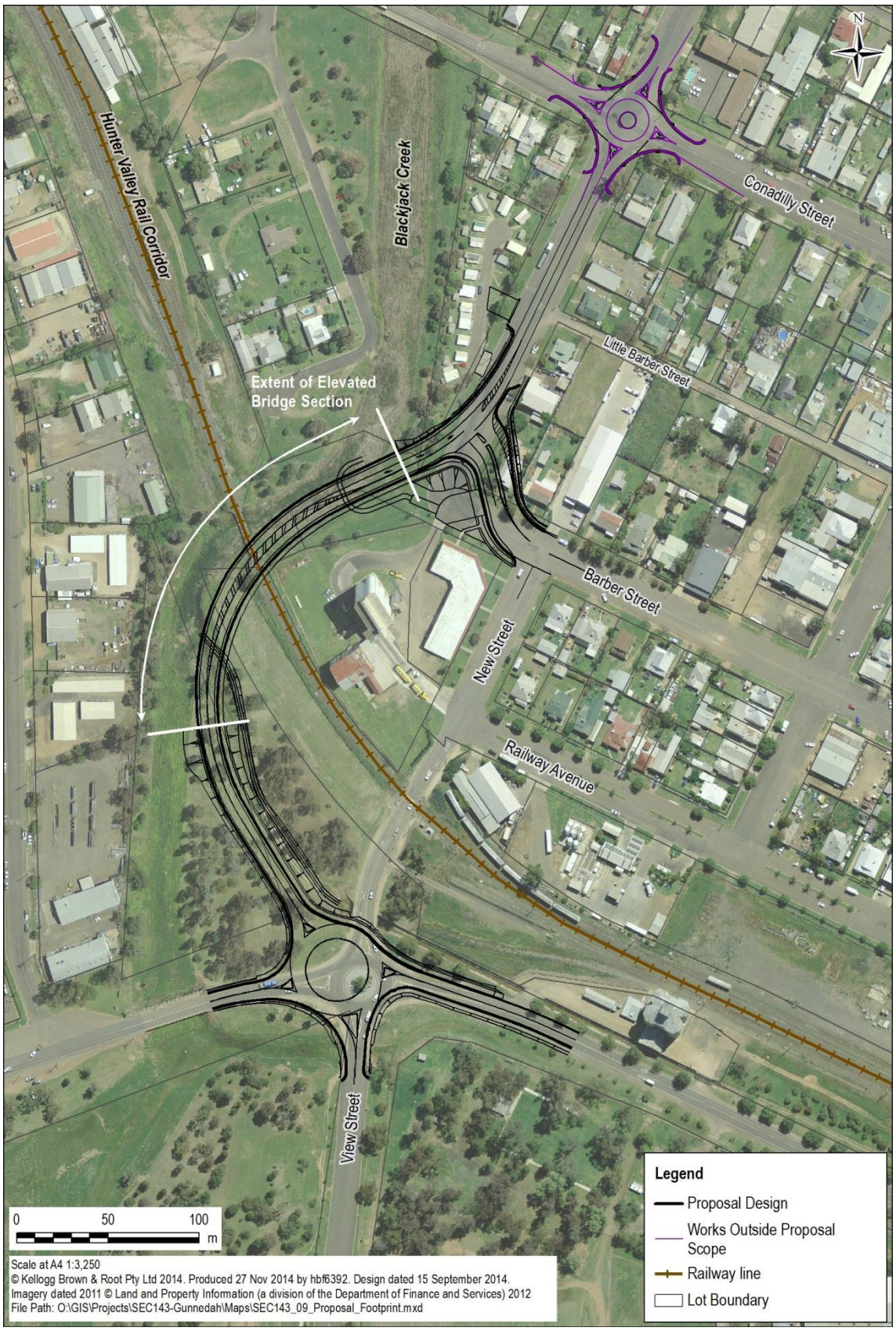

Figure 1.3
PROPOSED ALIGNMENT AND LAYOUT

The proposed roundabout at the intersection of Warrabungle and Conadilly Streets is outside the scope of this process and will be assessed separately.

The relative areas of interest for this assessment are:

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

1.4 LEGISLATIVE CONTEXT

This assessment forms part of a Review of Environmental Factors being prepared for Roads and Maritime for determination as required under Part 5 of the New South Wales *Environmental Planning and Assessment Act 1979.*

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.

Under Part 5 of the NSW *Environmental Planning and Assessment Act 1979*, the State Environmental Planning Policy No.44 (Koala Habitat Protection) does not apply to the proposal as it only applies to development requiring consent by the local government. However, the provisions for conservation of koalas are considered and acknowledged under Section 111 of the *Environmental Planning and Assessment Act 1979* as part of the duty to consider the environmental impact of an activity.

The impact assessment for this proposal has been undertaken in accordance with Section 5A of the *Environmental Planning and Assessment Act 1979*, as amended by the *Threatened Species Conservation Act 1995*, which in turn has been amended by the *Threatened Species Conservation Legislation Amendments Act 2002* (Assessment of Significance '7-Part Test'); and the *Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999* – Matters of National Environmental Significance (MNES) Significant impact guidelines 1.1.

In accordance with the *Environment Protection and Biodiverity Conservation Act 1999* the *EPBC Act referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory*) (DoE, 2014) (Referral Guideline for the Koala) and the Significant Impact Assessment Guidelines have been used to determine if a significant impact to Koala species is likely to occur. Specifically it has been used to determine if habitat critical to the survival of species would be impacted as a result of the proposal and or if the impacts could substantially interfere with the recovery of the species.

As the construction of the bridge is likely to require earthworks, excavation and fill to be imported within and on the banks of Blackjack Creek, notification is required to the Department of Primary Industries (Fisheries) as per section 199 of the *Fisheries Management Act 1994*. Blackjack Creek is located within a Key Fish Habitat (as described in the *Fisheries Management Act 1994*).

2 Methodology

2.1 PERSONNEL

The initial field survey of the study area conducted in March 2013 was carried out by two OzArk EHM (OzArk) ecologists. An additional field survey was conducted in April 2014 by one of KBR's ecologists. This Biodiversity Assessment report has been prepared by KBR's Brisbane Ecology team. Table 2.1 provides the details of the personnel involved in the preparation of this assessment.

Table 2.1 Assessment personnel and respective roles

Personnel	Role	Qualifications	Experience
Senior Ecologist	Technical input and review	Master of Environmental Management	9 years
		Bachelor of Ecological Agriculture	
Senior Environmental Scientist	Lead author	Bachelor of Engineering in Environmental Engineering and Bachelor of Science	8 years
Ecologist	Assistant author	Bachelor of Environmental Management	2 years
Senior Ecologist	Field survey		

2.2 LITERATURE REVIEW AND DATABASE SEARCHES

The previous reports reviewed include:

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

Databases searched, including dates accessed and search areas are listed in Table 2.1. Minimum search areas of 10 kilometres have been applied.

Table 2.2 Ecological desktop database and website searches

Databases or websites searched	Date searched	Type of search
Department of the Environment EPBC Act Protected Matters Search Tool	25 September 2014	Polygon search of site with a 10 km buffer (coordinates: -30.977, 150.24248)
NSW BioNet Atlas of NSW Wildlife	1 October 2014	Polygon search of site with a 10 km buffer (North: -30.92, South: -31.02, West: 150.19, East: 150.29)

Databases or websites searched	Date searched	Type of search
Department of Primary Industries Noxious Weeds Database	1 October 2014	Area search of Gunnedah LGA
Department of Primary Industries (Fishing and Aquaculture) Threated and Protected Species Record Viewer	1 October 2014	Area search of Gunnedah LGA
Department of the Environment Register of Critical Habitat	3 October 2014	National search
Office of Environment and Heritage Critical Habitat Register	3 October 2014	State search
Office of Environment and Heritage Key Threatening Processes	3 October 2014	TSC Act Key Threatening Processes website search
Department of the Environment Key Threatening Processes	3 October 2014	EPBC Act Key Threatening Processes website search
Department of Primary Industries (Fishing and Aquaculture) Threatened Species Conservation	3 October 2014	FM Act Key Threatening Processes and Endangered Ecological Communities website search

The Atlas of NSW Wildlife search results have been provided as Appendix A with the Department of the Environment's *Environmental Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool results provided in Appendix B.

2.3 FIELD SURVEY

The study area was initially surveyed by OzArk ecologists over two days in March 2013. This survey was focussed on three proposed alignment options, including the one which is now proposed. OzArk's investigation aimed at identifying *Threatened Species Conservation Act 1995 Fisheries Management Act 1994*, and *Environment Protection and Biodiversity Conservation Act 1999* listed species, populations and ecological communities that have been recorded or are predicted to occur in the locality. It focussed on the identification of ecological constraints and potential impacts associated with each of the alignment options (OzArk, 2013).

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

2.3.1 Flora surveys

OzArk performed detailed flora surveys at selected survey points. Attention was given to the identification of threatened flora species that were revealed in the Atlas of NSW Wildlife database and/or the *Environment Protection and Biodiversity Conservation Act 1999* Protected Matters Search Tool. These surveys focussed on habitats that had the potential to support these species.

Vegetation community identification was also undertaken as part of the flora surveys at selected points. This data was then used in conjunction with aerial imagery to map the vegetation communities present within the study area.

KBR expanded on OzArk's surveys and focused more directly on the site immediately adjacent to the proposal. A key focus of this survey was to inform an assessment of

potential koala habitat impacts. This involved the identification and the measuring of the stem diameter of koala feed trees within and adjacent to the site.

2.3.2 Fauna surveys

The fauna survey methods used by OzArk (2013) were based on the descriptions provided in the publications listed below:

- Threatened Biodiversity Survey and Assessment: Guidelines for developments and activities, Working Draft (DEC, 2004)
- Field Survey Methods (DECCW, 2009)
- Survey guidelines for Australia's threatened birds (DEWHA, 2010a)
- Survey guidelines for Australia's threatened bats (DEWHA, 2010b)
- Survey guidelines for Australia's threatened mammals (DEWHA, 2010c)
- Survey guidelines for Australia's threatened frogs (DEWHA, 2010d).

The surveys were also developed in consideration of relevant recovery and threat abatement plans.

OzArk's 2013 fauna surveys included general habitat searches and targeted surveys for threatened fauna species and included the following:

- identification of scats, diggings, tracks and other traces
- direct observation: i.e. bird surveys
- ground, leaf litter and other refuge searches
- call identification
- searches for indirect evidence of mammals (vocalisation, tracks, scats, burrows, etc.)
- echolocation (Anabat detection)
- call playback for the following species
  - Koala (*Phascolarctos cinereus*)
  - Booroolong Frog (*Litoria booroolongensis*)
  - Powerful Owl (*Ninox strenua*)
  - Masked Owl (*Tyto novaehollandiae*)
  - Barking Owl (*Ninox connivens*)
  - Eastern Grass Owl (*Tyto longimembris*).
- Koala Spot Assessment Technique (SAT).

KBR (2014) also performed SAT surveys around each of the koala feed trees identified within and adjacent to the site.

2.4 SURVEY EFFORT

OzArk's flora and fauna surveys were conducted over two days and one night on 12 and 13 March 2013, whilst KBR's survey was performed over one day on 16 April 2014.

Nocturnal assessments were carried out on the night of 12 March 2013. Overall the weather conditions were fine, clear and warm and ideal for assessments (OzArk, 2013).

The study area was assessed on foot where native vegetation was present, and by vehicle and on foot in urban areas. All trees, native planted or non-native were assessed for evidence of koala use. Fallen logs and ground debris were inspected for mammals and reptiles. The waterways were inspected for frogs, fish and tell tail macro-invertebrates (OzArk, 2013).

Diurnal assessments (flora surveys, bird surveys, waterway inspections etc.) were performed over six hours, two hours after dawn and four onwards from mid-morning.

Nocturnal assessments (spotlighting, call playback, waterway assessments etc.) were performed over two hours, half an hour at dusk and an hour and a half from 10 pm (OzArk, 2013).

Because of the highly modified and ephemeral nature of Blackjack Creek, apart from a general assessment of the waterway, no formal aquatic surveys were deemed necessary. In consideration of this and the potential direct or indirect impacts of the proposal upon Blackjack Creek being very minor, no formal assessment of aquatic ecology has been undertaken in this assessment.

2.5 SURVEY LIMITATIONS

Ecological surveys are inherently limited in their ability to fully identify all species which may be likely to occur on-site and within the study area based on the time of day or year the survey is completed and the other activities occurring on or near the site (i.e. mowing of parkland, road works). The ecological surveys conducted as part of the proposal were undertaken during both day and night, and seasonality is not considered an issue for those species considered likely to occur on-site.

2.6 LIKELIHOOD OF OCCURRENCE CRITERIA

A likelihood of occurrence assessment was performed for all species that were identified in database search results. This assessment was based on known records of the species within a 10 kilometre radius of the site and their habitat requirements in respect to the habitat features present within the study area.

Site specific information gathered during ecological surveys undertaken by OzArk (2013) and KBR (2014) was utilised to indicate the presence of habitat features and establish the likelihood of occurrence as:

- Unlikely: a species has not been recorded within 10 kilometres of the site, and the study area does not provide suitable habitat attributes for the species

- Possible: a species has been recorded within 10 kilometres of the site, and the study area may provide habitat attributes that may be used periodically by the species when moving between more preferential habitats elsewhere
- Likely: a species has been recorded within 10 kilometres of the site, and the study area provides habitat attributes that are of specific importance to the species, (i.e. foraging, sheltering or breeding habitat)
- Known to occur: a species has been recorded in the study area and the study area is therefore considered to provide habitat attributes that are actively used by the species.

The likelihood of occurrence assessment is provided in Appendix C.

The potential impact of the proposal was assessed using the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999* assessment guidelines for those species considered either possibly or likely to occur, or known to occur within the study area.

In accordance with the threatened species assessment guidelines under the *Threatened Species Conservation Act 1995*, an assessment of significance ('7-Part Tests') has been completed for one endangered ecological community and eight threatened fauna species (Section 5).

Significant impact assessments in accordance with the MNES Significant impact guidelines 1.1 under the *Environment Protection and Biodiversity Conservation Act 1999* have been completed for five threatened fauna species.

The 7-Part Tests and significant impact assessments are presented in Section 5.

3 Existing environment

3.1 LANDSCAPE CONTEXT

The locality is situated within the Liverpool Plains sub-region of the Brigalow Belt South Bioregion in northern NSW. Within the sub-region, the study area is located within the Liverpool Alluvial Plains Mitchell Landscape. This landscape is characterised by Quaternary alluvial plains and outwash fans derived from Tertiary basalts with Permian and Triassic quartz sandstones and minor basalt caps. The landscape also consists of undulating hills and sloping plains with alluvial channels and floodplains (DECCW, 2002).

Soils within the landscape are extensive black earths on low angle slopes with brown cracking clays. Alluvial soils and red or brown texture contrast soils exist on slopes below sandstone. Native vegetation across the landscape consists of open grasslands comprising Plains Grass (*Austrostipa aristiglumis*), Panic Grass (*Panicum* sp.), Windmill Grass (*Chloris truncate*) and Blues Grass (*Dichanthium sericeum*) on the black earths, with occasional Myall (*Acacia pendula*), White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Bimble Box (*Eucalyptus populnea*) and Wilga (*Geijera parviflora*) present as open grassy woodlands. River Red Gum (*Eucalyptus camaldulensis*) commonly occurs as riparian vegetation along streams (DECCW, 2002).

The proposal is located within the Namoi Catchment Management Area, which comprises the Namoi River, Barwon River, Manilla River and Peel River. One waterway, Blackjack Creek, traverses the study area before connecting to the Namoi River to the north of the study area.

3.2 LAND USE AND DISTURBANCE HISTORY

Historical urban development and agricultural land use has resulted in extensive disturbance and clearing of native vegetation within the study area with no pre-European remnant vegetation remaining. Blackjack Creek has also been heavily modified and within the study area is now more representative of a flood mitigation channel rather than a natural creek.

The Hunter Valley Rail corridor crosses Blackjack Creek and its associated fencing dissects the study area. This piece of linear infrastructure substantially minimises wildlife corridor values for native fauna within the study area.

The study area is urban parkland, which takes the form of a regularly maintained open grassy woodland. The study area is adjacent to open space parklands, industrial development, residential development and recreational areas.

3.3 FLORA

3.3.1 Vegetation communities

There are six vegetation types that have been mapped across the study area that are within or close to areas of potential disturbance, including:

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

These broad vegetation types are depicted on Figure 3.1.

The native vegetation of particular interest to this assessment is the parkland/ woodland and riparian woodland, both of which have moderate to poor condition and biodiversity value. This native vegetation was observed in the field to contain typical features which would suggest it has been planted and/or has been extensively modified with no remnant pre-European vegetation remaining in these areas.

The vegetation is characterised by exotic and native trees species planted approximately 20 to 30 years ago, with a few that may be approximately 40–50 years of age. The ground cover is predominately exotic with 15 exotic species and nine native species present. Apart from a small area of Cumbungi (*Typha* sp.), Blackjack Creek does not possess any other aquatic vegetation. The associated riparian vegetation has been highly modified by heavy machinery sculpting the Blackjack Creek drainage channel.

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

The approximately 100 planted native trees within the study area are predominately Yellow Box, with some Blakely's Red Gum, River Oak, Cooba, Silver-leaf ironbark, Kurrajong and *Casuarina pauper*. One-off individuals of Myall (*Acacia pendula*), Silky Oak (*Grevillea robusta*), Scribbly Gum (*Eucalyptus signata*) and the exotic Pepper Tree (*Schinus molle*) are also present. Individual planted populations of River Red Gum (*Eucalyptus camaldulensis*), were identified during the 2013 OzArk survey area however, no individuals were confirmed to be present as part of the field investigations in 2014 which focused specifically on the site and the adjacent areas.

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

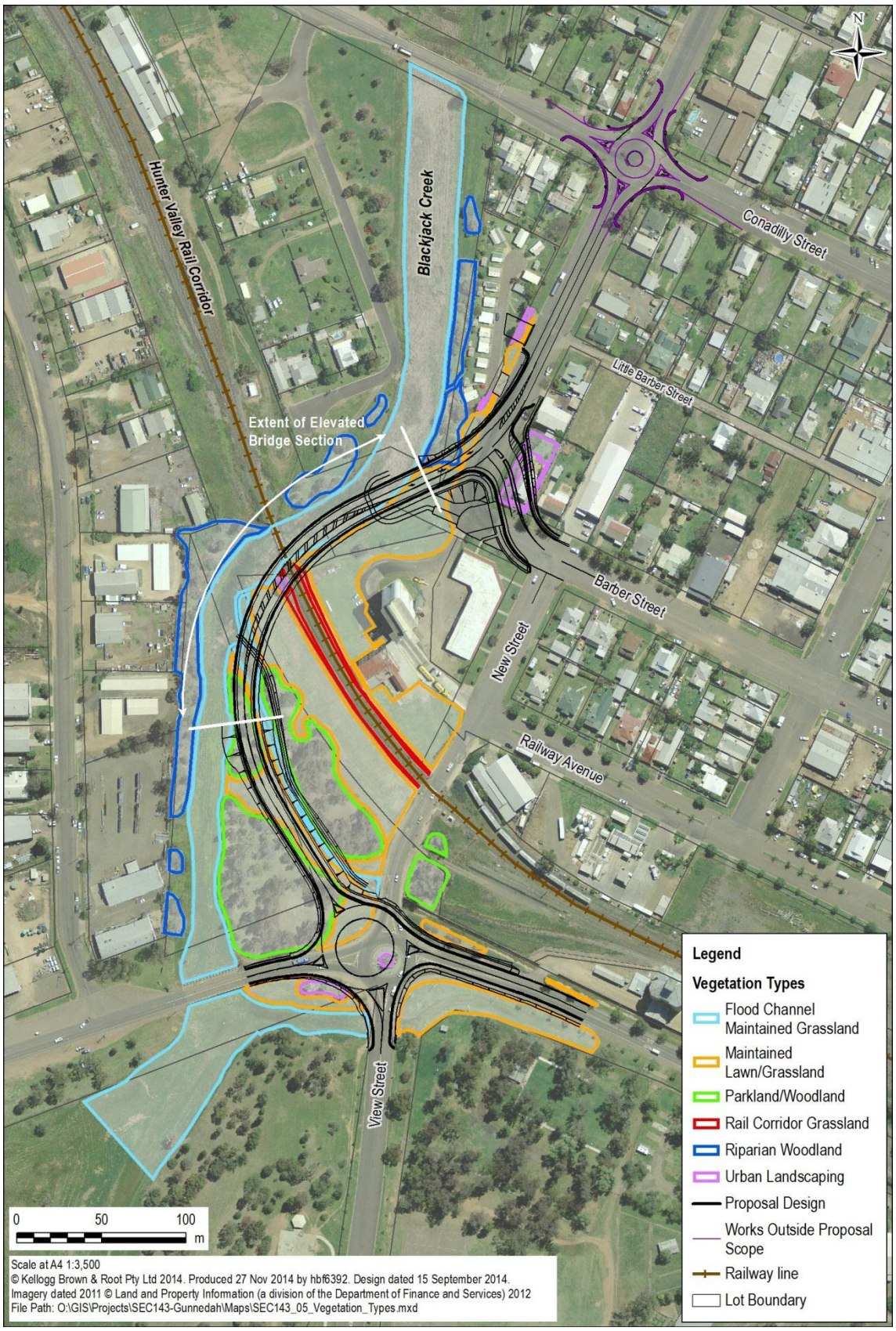

Figure 3.1
MAPPED VEGETATION TYPES

3.3.2 Threatened flora species

The database searches identified seven Commonwealth and four State threatened flora species as potentially occurring within a 10 kilometre radius of the site, as listed in Table 3.1.

Table 3.1 Database results of threatened flora species

Species	Common name	TSC Act Status	EPBC Act Status
Cadellia pentastylis	Ooline	Vulnerable	Vulnerable
Euphrasia arguta	Eyebrights	-	Critically Endangered
Philotheca ericifolia	-	-	Vulnerable
Prasophyllum sp. Wybong	A Leek-orchid	-	Critically Endangered
Swainsona murrayana	Slender Darling-pea	Vulnerable	Vulnerable
Thesium australe	Austral Toadflax	Vulnerable	Vulnerable
Tylophora linearis	-	Vulnerable	Endangered

An assessment on the likelihood of these threatened flora species occurring within the study area was undertaken. This assessment was based upon known habitat requirements and habitat features present within the study area. The complete likelihood assessment is provided in Appendix C. As the study area is highly modified, it does not provide preferred habitat for any of the threatened flora species listed above. A field survey undertaken by OzArk (2013) did not identify any threatened flora species present within the study area.

As all of the threatened flora species identified through the Commonwealth and State databases searches are unlikely to occur within the study area, no impact assessments are required.

3.3.3 Ecological communities of conservation significance

The Commonwealth and State database searches identified five ecological communities of conservation significance as potentially occurring within a 10 kilometre radius of the site. An assessment on the likelihood of these ecological communities occurring within the study area was undertaken. This assessment was based upon the assemblage of flora species present within the study area against the floristic descriptions and definitions for each ecological community. The complete likelihood of occurrence assessment is provided in Appendix C.

Threatened Ecological Communities

A summary of the *Environment Protection and Biodiversity Conservation Act 1999* Threatened Ecological Communities (TEC) that may occur within the study area is provided below in Table 3.2.

Table 3.2 Threatened ecological communities likelihood of occurrence assessment

Threatened ecological community	EPBC Act Status	Present within study area?
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	No – species assemblage within the study area is not representative of this TEC
Grey Box (*Eucalyptus microcarpa*) grassy woodlands and derived native grasslands of south-eastern Australia	Endangered	No – species assemblage within the study area is not representative of this TEC
Weeping Myall Woodlands	Endangered	No – species assemblage within the study area is not representative of this TEC
Natural Grassland on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland	Critically Endangered	No – species assemblage within the study area is not representative of this TEC
White Box-Yellow Box-Blakely's Red Gum grassy woodland and derived native grassland	Critically Endangered	No – Overstorey species present within the study area, however the patches of this vegetation within the study area does not constitute the definition under the EPBC Act Policy Statement for this TEC.

For a woodland community to constitute the definition of *White Box-Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grasslands* TEC under the *Environment and Biodiversity Conservation Act 1999*, specific criteria must be met. The *EPBC Act Policy Statement: White Box-Yellow Box-Blakely's Red Gum grassy woodlands and derived native grasslands*, contains a flowchart that is used to determine the lowest condition at which patches constitute the definition of this TEC (and would therefore be the listed TEC).

An assessment against the flowchart criteria determined that the vegetation within the study area does not constitute the definition of the *White Box-Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland* TEC and it is therefore not present in the study area.

Endangered Ecological Communities

A summary of the *Threatened Species Conservation Act 1995* Endangered Ecological Communities (EEC) that may occur within the study area is provided below in Table 3.3.

Table 3.3 Endangered ecological communities likelihood of occurrence assessment

Endangered ecological community	TSC Act Status	Present within study area?
Coolibah - Black Box Woodlands of the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	Endangered Ecological Community	No – species assemblage within the study area is not representative of this EEC
Inland Grey Box Woodland in the Riverina; NSW South Western Slopes; Cobar Peneplain; Nandewar and Brigalow Belt South Bioregions	Endangered Ecological Community	No – species assemblage within the study area is not representative of this EEC

Endangered ecological community	TSC Act Status	Present within study area?
Myall Woodland in the Darling Riverine Plains; Brigalow Belt South; Cobar Peneplain; Murray-Darling Depression; Riverina and NSW South Western Slopes bioregions	Endangered Ecological Community	No – species assemblage within the study area is not representative of this EEC
Native Vegetation on Cracking Clay Soils of the Liverpool Plains	Endangered Ecological Community	No – species assemblage within the study area is not representative of this EEC
White Box Yellow Box Blakely's Red Gum Woodland	Endangered Ecological Community	Yes – planted vegetation within the study area is representative of this EEC.

The New South Wales Scientific Committee Final Determination broadly defines the location and species assemblage of *White Box Yellow Box Blakely's Red Gum Woodland* EEC (Box Gum Woodland). The NSW National Parks and Wildlife Service provides identification guidelines for Box Gum Woodland for use in determining if the EEC exists on a site. The conservative guidelines present five components of the EEC and where doubt exists over a component it is recommended to use a precautionary approach that assumes the community is present.

The five components of the guidelines have been applied to the vegetation present within the study area.

1. *The site is in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands or NSW South Western Slopes Bioregion*

As per the Final Determination of Box Gum Woodland the EEC is confined to specific bioregions. Vegetation with a similar assemblage of flora species to the EEC that occurs at a location outside of these bioregions is not classified as Box Gum Woodland.

The study area is located within the Brigalow Belt South Bioregion.

2. *There are no native species in the understorey, and the site is unlikely to respond to assisted natural regeneration*

Remnant areas of Box Gum Woodland are often highly degraded, with few or no native species present in the understorey. However these areas may respond to assisted natural regeneration as they still contain the natural soil and associated seed bank of the EEC. If the remnant vegetation does not respond to assisted natural regeneration the site does not contain Box Gum Woodland.

If the understorey does contain native species then the next component of the guidelines is assessed. The vegetation present within the study area has an understorey consisting of native species, including native grass species.

3. *The site has trees or if the site is treeless it is likely to have supported White Box, Yellow Box or Blakely's Red Gum prior to clearing*

Similar to the above component, areas of Box Gum Woodland may be disturbed and lacking in the characteristic tree species of the EEC. However the site may still have at

one point been able to support the growth of these species prior to them being removed.

If the site has trees the next component of the guidelines is assessed. The vegetation within the study area consists of a number of planted Yellow Box and Blakely's Red Gum and may have supported these tree species prior to European settlement.

4. *White Box, Yellow Box or Blakely's Red Gum, or a combination of these species, area or were present*

The characteristic trees of the EEC are White Box, Yellow Box or Blakely's Red Gum. In areas where the species have been removed and the overstorey is now dominated by other species, the EEC still exists due to the acceptance that sites containing the EEC will often be degraded.

The planted tree species present within the study area includes both Yellow Box and Blakely's Red Gum.

5. *The site is predominantly grassy*

The Final Determination of Box Gum Woodland states that grass species generally characterise the ground layer with shrubs usually sparse or absent. Shrubby woodlands are not classified as part of the EEC.

The vegetation of the study area is predominately grassy. The groundcover of the study area consists of grass species including Red Grass (*Bothriochloa marca*), which is listed in the Final Determination of the EEC under the assemblage of species. Based on these guidelines, planted vegetation within the site meets the description of Box Gum Woodland, as shown on Figure 3.2.

As the proposal has the potential to impact an area containing an endangered ecological community, an assessment of significance '7-Part Test' is required under Section 94 of the *Threatened Species Conservation Act 1995*. This assessment of significance is provided in Section 5.

Aquatic Ecological Communities

Aquatic ecological communities of conservation significance are listed as endangered ecological communities under Schedule 4, Part 3 of the *Fisheries Management Act 1994*. These listings are determined by the New South Wales Fisheries Scientific Committee and include ecological communities that face a very high risk of extinction in the near future due to impacts of a threatening process, resulting in a large reduction in ecological function.

The entire Darling River system (including all tributaries of Blackjack Creek) is mapped as part of the *Aquatic ecological community in the natural drainage system of the lowland catchment of the Darling River* which is categorised as an endangered ecological community under Part 3, Schedule 4 of the Fisheries Management Act. Excluded from the definition of this endangered ecological community are man made artificial canals, water distribution and drainage works, farm dams and off-stream reservoirs.

The section of Blackjack Creek which runs through the western extent of the study area has been extensively modified within the site is now more representative of a

flood mitigation channel than a natural creek. As such, the section of the creek can be excluded from the endangered ecological community definition.

Furthermore a field assessment of the section of Blackjack Creek which is adjacent to the proposal identified that the assemblages of native species representative of this aquatic ecological community are not present. Therefore the aquatic ecological community does not occur within the study area.

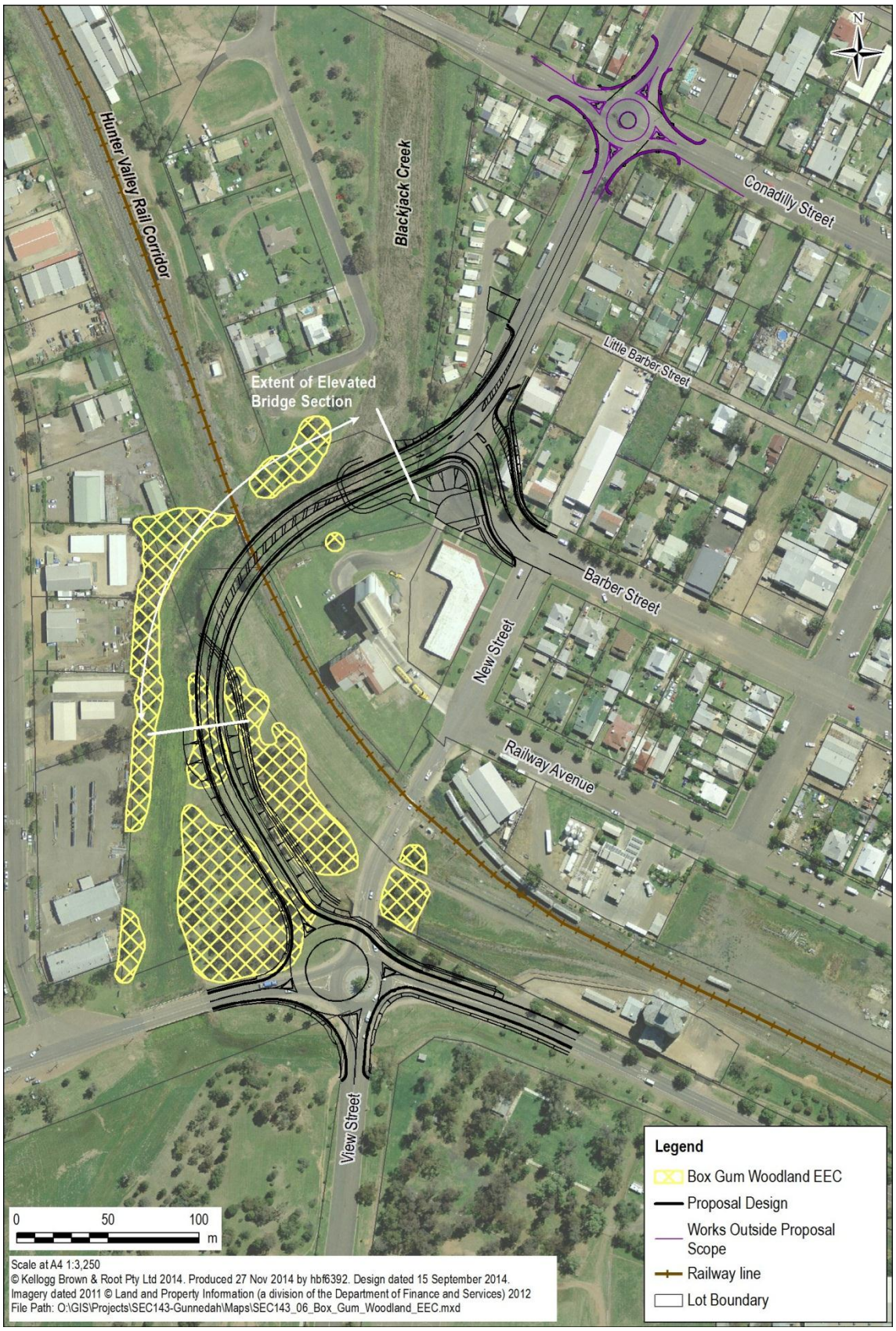

Figure 3.2
EXTENT OF BOX GUM WOODLAND

3.3.4 Noxious weeds and Weeds of National Significance

A search of the Department of Primary Industries Noxious Weeds Database identified 109 noxious weeds declarations for the Gunnedah local government area, with 25 of those declarations concerning Weeds of National Significance (WoNS).

The State and Commonwealth database searches identified that 157 exotic flora species have been recorded within a 10 kilometre radius of the site. Of these species, 15 are listed as noxious weeds under Section 7 of the *Noxious Weeds Act 1993*. The 15 noxious weeds are listed in Table 3.4.

Table 3.4 Database results of noxious weeds

Species	Common name	Weeds class	Weed of National Significance
Argemone ochroleuca subsp. ochroleuca	Mexican Poppy	5	No
Cestrum parqui	Green Cestrum	3	No
Cuscuta campestris	Golden Dodder	5	No
Cylindropuntia spp.	Prickly Pear	4	Yes
Echium plantagineum	Patterson's Curse	4	No
Echium vulgare	Viper's Bugloss	4	No
Lycium ferocissimum	African Boxthorn	4	Yes
Opuntia spp.	Prickly Pear	4	No
Rubus fruticosus aggregate	Blackberry, European Blackberry	4	Yes
Salix spp.	Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow	4	Yes
Senecio madagascariensis	Fireweed	4	Yes
Sorghum halepense	Johnson Grass	4	No
Tamarix aphylla	Athel Pine, Athel Tree	5	Yes
Xanthium occidentale	Noogoora Burr	4	No
Xanthium spinosum	Bathurst Burr	4	No

A field survey undertaken by OzArk (2013) identified the presence of 58 exotic flora species within the study area, making up approximately 55% of the 104 flora species recorded. The noxious weeds located in the study area, including one WoNS, are listed in Table 3.5.

Table 3.5 Noxious weeds recorded in study area (OzArk 2013)

Species	Common name	Weeds class	Weed of National Significance
Cestrum parqui	Green Cestrum	3	No
Echium plantagineum	Patterson's Curse	4	No
Echium vulgare	Viper's Bugloss	4	No
Heliotropium amplexicaule	Blue Heliotrope	4	No
Lycium ferocissimum	African Boxthorn	4	Yes
Sorghum halepense	Johnson Grass	4	No

The proposal has the potential to create favourable conditions that could exacerbate weed problems within the study area.

3.4 FAUNA

3.4.1 Fauna habitat assessment

One hollow bearing Bimble Box (*Eucalyptus populnea*) is located in the south-eastern corner of the study area, which may provide habitat resources for listed microbats and birds. Flowering eucalypts (Blakely's Red Gum, River Red Gum and Yellow Box) observed in the study area are a feeding resource for a number of bird species. The individual Bimble Box and the individual Scribbly Gum (*Eucalyptus signata*) recorded in the study area are both SEPP44 Koala Feed Tree Species. A number of listed threatened species are also predicted to potentially occur in the study area based on potential foraging, nesting, roosting and/or sheltering resources that were documented during the field survey.

No rocky outcrops were observed in the study area. No amphibians were heard calling or detected in waterways during the survey, which may be an indication that creek conditions do not provide ideal habitat for amphibians.

The proposal will result in the disturbance of habitat utilised by a selection of bird and mammal species.

3.4.2 Threatened fauna

The Commonwealth and/or State database searches identified 30 threatened fauna species as potentially occurring within a 10 kilometre radius of the site, as listed in Table 3.6. The species included:

- 16 birds
- 2 fish
- 1 frog
- 8 mammals
- 3 reptiles.

Table 3.6 Database results of threatened fauna species

Species	Common Name	TSC Act Status	EPBC Act Status
Birds			
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Endangered
Circus assimilis	Spotted Harrier	Vulnerable	-
Climacteris picumnus	Brown Treecreeper	Vulnerable	-
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	-
Glossopsitta pusilla	Little Lorikeet	Vulnerable	-
Grantiella picta	Painted Honeyeater	Vulnerable	-
Hamirostra melanosternon	Black-breasted Buzzard	Vulnerable	-
Hieraaetus morphnoides	Little Eagle	Vulnerable	-
Lathamus discolour	Swift Parrot	Endangered	Endangered

Species	Common Name	TSC Act Status	EPBC Act Status
Lophoictinia isura	Square-tailed Kite	Vulnerable	-
Neophema pulchella	Turquoise Parrot	Vulnerable	-
Oxyura australis	Blue-billed duck	Vulnerable	-
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable
Pyrrholaemus saggitatus	Speckled Warbler	Vulnerable	-
Rostratula australis	Australian Painted Snipe	Endangered	Vulnerable
Tyto novaehollandiae	Masked Owl	Vulnerable	-
Fish			
Bidyanus bidyanus	Silver Perch	-	Critically Endangered
Maccullochella peelii peelii	Murray Cod	-	Vulnerable
Frogs			
Litoria booroolongensis	Booroolong Frog	Endangered	Endangered
Mammals			
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable
Dasyurus maculatus maculatus	Spotted-tail Quoll	Vulnerable	Endangered
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable
Petaurus norfolcensis	Squirrel Glider	Vulnerable	-
Petrogale penicillata	Brush-tailed Rock-wallaby	Endangered	Vulnerable
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	-
Reptiles			
Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable	Vulnerable
Hoplocephalus bitorquatus	Pale-headed Snake	Vulnerable	-
Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	Vulnerable	Vulnerable

The study area is a highly modified parkland environment, which it does not provide suitable habitat for the majority of the species identified by Commonwealth and State database searches. The 2013 field survey identified one threatened fauna species, the Koala (*Phascolarctos cinereus*) listed as vulnerable under both the *Threatened Species Conservation Act 1995* and *Environmental Protection and Biodiversity Conservation Act 1999*, was confirmed as occurring within the study area. This was confirmed through the identification of a koala scat at the base of a number of known koala feed tree. No individuals of the species or scats were recorded during the 2014 survey.

A likelihood of occurrence assessment for threatened fauna species was undertaken in reference to known habitat requirements and habitat features present within the study area. The complete likelihood of occurrence assessment is presented in Appendix C. This assessment determined that eight threatened fauna species may possibly occur periodically within the study area, as detailed in Table 3.7.

Table 3.7 Threatened fauna species considered to possibly occur within the study area

Species	Common Name	TSC Act Status	EPBC Act Status
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Endangered
Glossopsitta pusilla	Little Lorikeet	Vulnerable	-
Lathamus discolour	Swift Parrot	Endangered	Endangered
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	-
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable

Assessments of significance '7-Part Tests' under the *Threatened Species Conservation Act 1995* and significant impact assessments under the *Environment Protection and Biodiversity Conservation Act 1999*, have been completed as relevant for the seven above listed threatened fauna species that may possibly occur and for the Koala that was confirmed to occur.

The findings of the assessments are provided in Section 5.1 and 5.2.

3.4.3 Migratory species

The database searches identified that nine migratory species may possibly occur periodically within the study area, as listed in Table 3.8.

Table 3.8 Database results of migratory species

Species	Common Name	TSC Act Status	EPBC Act Status
Apus pacificus	Fork-tailed Swift	-	Migratory
Ardea alba	Great Egret	-	Migratory
Ardea ibis	Cattle Egret	-	Migratory
Gallinago hardwickii	Latham's Snipe	-	Migratory
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	Migratory
Hirundapus caudacutus	White-throated Needletail	-	Migratory
Merops ornatus	Rainbow Bee-eater	-	Migratory
Myiagra cyanoleuca	Satin Flycatcher	-	Migratory
Rostratula benghalensis s. lat.	Painted Snipe	-	Migratory

Based on the likelihood of occurrence assessment provided in Appendix C three migratory species were identified as having potential to be recorded in the study area based on habitat features; the Great Egret, Cattle Egret and Rainbow Bee-eater.

A likelihood assessment was undertaken for the migratory species and is provided in Appendix C.

There is only marginal potential habitat for migratory species within the study area. The species assessed are highly mobile and may only occur in the study area as vagrant seasonal occurrences. Based on the minimal level of impact of the proposal

and the anticipated sporadic use of the study area by these migratory species, it is highly unlikely that the proposal would affect any of these migratory species. Therefore, these species have not been assessed any further as part of this assessment.

3.4.4 Endangered populations

There are over 40 endangered populations listed in NSW under the *Threatened Species Conservation Act 1995*. Endangered populations are populations of plant or animal species that are facing a realistic and high risk of extinction in NSW due to a large reduction in population size or a restricted distribution and a severely fragmented habitat. None of the 40 endangered populations are known to occur in the study area.

3.4.5 Critical habitat

Critical habitat is land crucial to the survival of particular threatened species, populations or ecological communities. There are currently four critical habitats listed under the *Threatened Species Conservation Act 1995* one listed under the *Fisheries Management Act 1994* and five listed under the *Environmental Protection and Biodiversity Conservation Act 1999*. None of these critical habitats are located within the study area.

3.4.6 Wildlife corridors

The information available indicates that native fauna species may occasionally move through the study area as part of wider dispersal patterns.

The fragmented vegetation and habitats along Blackjack Creek is intersected by linear infrastructure elements within the study area, including the Oxley Highway, Kamilaroi Highway and the Hunter Valley Rail corridor, restrict fauna movement along Blackjack Creek as follows:

- The Kamilaroi Highway to the north of the study area, restricts effective and safe fauna movement along Blackjack Creek.
- Oxley Highway within the study area, restricts effective and safe fauna movement from the south to the north along Blackjack Creek.

New Street between the rail level crossing and the Oxley Highway roundabout within the study area restricts effective and safe fauna movement from the east of New Street to Blackjack Creek.

The design of these long-standing infrastructure elements did not include measures for effective fauna movement along the fragmented Blackjack Creek corridor. However, native fauna may move under the Hunter Valley Rail corridor at the location of the rail crossing of Blackjack Creek, as they may be directed this way by the obstruction created by the fenced off rail corridor. The effectiveness of this pathway is limited though, due to the periodic ponding in the creek and areas of tall dense grasses and rushes.

The rail culvert which is now in place was constructed in 2012 (to replace the long standing low rail bridge) and includes some dry passage cells. Associated with this, some regrading and slashing of some of the creek area was carried out, resulting in

some reduction of obstructions to movement. Thus enabling an increased level of fauna movement than what was available prior to 2012.

In consideration of these historical factors and the limited corridor functionality of Blackjack Creek, the design of the proposal is such that it will not affect or alter the current situation.

3.4.7 Koala habitat assessment

In reference to the *Approved Recovery Plan: Recovery plan for the koala (Phascolarctos cinereus*) (DECC, 2008), the Gunnedah local government area is recognised as having an important koala population and Gunnedah is located in Koala Management Area (KMA) 6: Western Slopes and Plains. Database records revealed that the koala has been previously recorded in the study area, and there is also a record immediately adjacent to the southern extent of the study area south of the Oxley Highway (OzArk, 2013). The proposal does not impact this section of the study area.

The Approved Recovery Plan (2008) categorises feed tree species according to different KMAs across NSW. According to the recovery plan, the Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Bimble Box *(Eucalyptus populnea*) are recognised as secondary koala feed tree species in the western slopes and plains KMA. No primary koala feed tree species occur within or directly adjacent to the site, but are found more abundantly throughout the locality. One primary Koala feed tree species (River Red Gum) was identified during the 2013 OzArk survey area however, no individuals were confirmed to be present as part of the field investigations in 2014 which focused specifically on the site and the adjacent areas.

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

The Koala habitat assessment tool in the *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory*)(DoE, 2014) was used to determine the sensitivity, value and quality of the proposal area.

A summary of the habitat assessment using the tool is included in Table 3.9.

Table 3.9 Koala habitat assessment summary for the proposal area

Attribute	Score	Assessment against inland habitat characteristics
Koala occurrence	+2 (high)	Evidence of one or more koalas recorded within the last 5 years
Vegetation composition	+2 (high)	Open woodland in a parkland environment with 2 or more known koala feed tree species in the canopy. No shrub layer present.
Habitat connectivity	0 (low)	Area is not part of a contiguous landscape. In reference to the draft *Gunnedah CKPM* (2013), the study area is not mapped as containing koala habitat. The study area is fragmented along Blackjack Creek,

Attribute	Score	Assessment against inland habitat characteristics
		with larger and more favourable habitats located to the west, north and south.
Key existing threats	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present.
Recovery value	0 (low)	Approximately 0.61 ha of fragmented koala habitat which inlcudes twenty six koala feed trees along small part of Blackjack Creek and its alluvial terraces will be subject to impacts as a result of the proposal. The corridor function of Blackjack Creek will be retained post construction. Blackjack Creek provides a degree of soil and koala feed tree moisture, which may potentially provide a refuge for the koala during drought and periods of extreme heat, but is far less of a drought and extreme heat refuge than the Namoi River riparian corridor, which is more likely to draw in the local koala population during harsh times. Therefore, based upon the existing amount of fragmented habitat and minimal number of trees to be impacted by the proposal, the Blackjack Creek corridor function being retained and the presence of more preferential habitat in the Namoi River corridor, the recovery value of the habitat to be impacted is 'low'. Even though the study area contains secondary koala feed trees and is part of a fragmented linkage between areas of more suitable habitat to the north and south, it is not mapped as koala habitat in the draft Gunnedah CKPM (2013), inferring it is not habitat critical to the survival of the species in the local and regional context. Therefore, in the inland context the 0.61 ha of habitat which includes twenty six Koala feed trees to be impacted by the proposal is unlikely to be important for achieving the interim recovery objectives and the recovery value is 'low'.
Summary	+4	Is not considered to contain habitat critical to the survival of the koala.

In reference figure 2 on page 30 of the EPBC Act referral guidelines for the koala, a habitat score of ≤ 5 indicates that the potentially impacted area does not constitute habitat critical to the survival of the koala.

SEPP 44 – Koala Habitat Protection

Where proposed works are a State Significant Development or are to be approved under Part 5 of the *Environmental Planning and Assessment Act 1979* by a determining authority other than local council, SEPP 44 Koala Habitat Protection does not apply. However as the proposal is likely to have some impact on koala habitat, the provisions for conservation of koalas are considered and acknowledged under Section 111 of the *Environmental Planning and Assessment Act 1979* as part of the duty to consider the environmental impact of an activity.

SEPP 44 applies to each LGA listed under Schedule 1 of the provision, which includes the Gunnedah LGA. Development control is exerted over these LGAs, with development consent on land greater than one hectare subject to the consent authority determining if the land can be classified as 'potential koala habitat' or 'core koala habitat' under the SEPP 44 definitions.

Potential koala habitat is defined as:

> *'…areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% 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 population of koalas, evidence by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.'*

Two of the koala feed tree species listed in Schedule 2 are known to occur in the study area, an individual Scribbly Gum (*Eucalyptus signata*) and an individual Bimble Box (*Eucalyptus populnea*). As described previously individual planted specimens of River Red Gum were identified during the 2013 OzArk survey which are also listed under Schedule 2 however, no individuals of this species were confirmed to be present as part of the field investigations in 2014 which focused specifically on the site and the adjacent areas.

The 2014 koala tree and habitat assessment was undertaken to evaluate and quantify the number of koala feed trees and amount of possible koala habitat that may be directly or indirectly impacted by the proposal. This assessment found that in reference to SEPP 44, the habitat in the study area does not meet the definition of 'potential koala habitat' as it does not contain at least 15 per cent of Bimble Box in the upper or lower strata of the tree canopy. Nor does it constitute 'core koala habitat', as there is no evidence that a resident population of koalas, as attributed by breeding females (that is, females with young), and that there is no evidence of a population permanently residing in the study area or its immediate surrounds. The evidence available is that the study area is only likely to be used periodically by transient koalas moving and dispersing throughout the locality.

Gunnedah LGA (Part) Comprehensive Koala Plan of Management (draft)

In reference to the draft Gunnedah LGA (Part) Comprehensive Koala Plan of Management (CKPM) 2013 (GSC, 2013), the study area is not mapped as Primary Koala Habitat, 2A Secondary (Class A) Koala Habitat, 2B Secondary (Class B) Koala Habitat or 2A/2B Secondary combination Koala Habitat. The study area is also outside of the 46% high activity contour areas that are associated with more heavily vegetated ridgelines and low rises located to the south and west, which essentially provide contiguous habitat for the species.

3.4.8 Pest animals

The database search results revealed that 21 introduced fauna species (10 birds and 11 mammals) may potentially occur within a 10 kilometre radius of the study area, as listed in Table 3.10.

Table 3.10 Database results of introduced fauna species

Species	Common Name	Significant pest animal
Birds		
Acridotheres tristis	Indian Myna	-
Alauda arvensis	Skylark	-
Anas platyrhynchos	Mallard	-
Carduelis carduelis	European Goldfinch	-
Columba livia	Rock Pigeon	-
Passer domesticus	House Sparrow	-

Species	Common Name	Significant pest animal
Streptopelia chinensis	Spotted Turtle-Dove	-
Sturnus vulgaris	Common Starling	-
Sturnus tristis	Common Myna	-
Turdus merula	Common Blackbird	-
Mammals		
Bos taurus	Cattle	-
Canis lupus familiaris	Wild Dog	Yes
Capra hircus	Feral Goat	Yes
Cervus sp.	Feral Deer	Yes
Felis catus	Feral Cat	Yes
Lepus capensis	Brown Hare	-
Mus musculus	House Mouse	-
Oryctolagus cuniculus	European Rabbit	Yes
Rattus rattus	Black Rat	Yes
Sus scrofa	Feral Pig	Yes
Vulpes vulpes	Red Fox	Yes

The 2013 ecological survey identified the presence of five introduced fauna species in the study area, including Brown Hare, House Sparrow, Common Starling, Common Myna and Common Blackbird. No significant pest animals have been recorded in the study area. The proposal is not expected to increase the presence of significant pest animals within the study area. The management measures for pest animals are outlined in Section 6.1.

3.5 GROUNDWATER DEPENDANT ECOSYSTEMS

Groundwater dependent ecosystems are classified by the NSW Department of Primary Industries, as any ecosystem that uses groundwater at any time or for any duration in order to maintain its composition and condition. A search was made of the study area on the National Atlas of Groundwater Dependent Ecosystems (GDE Atlas) for groundwater values that may be present.

The nearest GDEs are mapped as all riparian vegetation along the Namoi River to the north of the site, which has low to moderate potential for groundwater interaction. No groundwater dependent ecosystems were identified within the study area associated with Blackjack Creek riparian vegetation. Therefore, the proposal is unlikely to have any significant impact on any groundwater dependent ecosystems.

4 Potential biodiversity impacts

4.1 IMPACT AVOIDANCE

Measures have been applied were possible to avoid unnecessary impacts upon vegetation and habitats. This has been achieved through refining the design (footprint) of the proposal and through the potential application of tree protection measures.

4.1.1 Design refinements

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

4.1.2 Tree protection

The assessment of koala feed tree impact avoidance and mitigation involved determining the Tree Protection Zone (TPZ) of each koala feed tree within and immediately surrounding the site. This assessment was undertaken in accordance with the Australian Standard *AS 4970-2009 Protection of trees on development sites*.

The TPZ assessment determined the number of trees to be potentially affected by earthworks and machinery/vehicle movement. It also determined the number of trees that can be avoided and the mitigation measures required to protect these retainable trees from potential impacts.

The results of the TPZ assessment determined that the smallest TPZ is 2 metre (a Yellow Box); whilst the largest TPZ is 14 metre (a Bimble Box). The average TPZ for the 85 koala feed trees surveyed is 4 metre as derived from an average stem Diameter at Breast Height (DBH) of 35 centimetres. The TPZ assessment is presented in Appendix D.

4.2 VEGETATION CLEARING

The majority of vegetation clearing, is located within the urban parkland. Box Gum Woodland is listed as an EEC under the *Threatened Species Conservation Act 1995*. It is estimated that the proposal may result in the clearing of approximately 0.61 hectare of *White Box – Yellow Box – Blakely's Red Gum Woodland* 'Box Gum Woodland' which includes the permanent loss of approximately 0.39 hectare and a possible short-term impact of approximately 0.22 hectare, as shown on Figure 4.1. The area of short-term impacts is a conservative estimate and is likely to be less as a result of the avoidance and tree protection measures proposed. The impacts are considered

short-term as vegetation will be reinstated post construction with woodland species typical of this EEC.

No threatened flora species listed under the *Threatened Species Conservation Act 1995* will be permanently or temporarily impacted by the proposal. An assessment of significance '7 Part Test' for impacts upon this EEC has been undertaken and is presented below in Section 5.1.

The proposal is unlikely to have a significant impact on the areas of Box Gum Woodland EEC contained within the study area. This minor impact will not result in the local occurrence of the EEC being placed at risk of extinction.

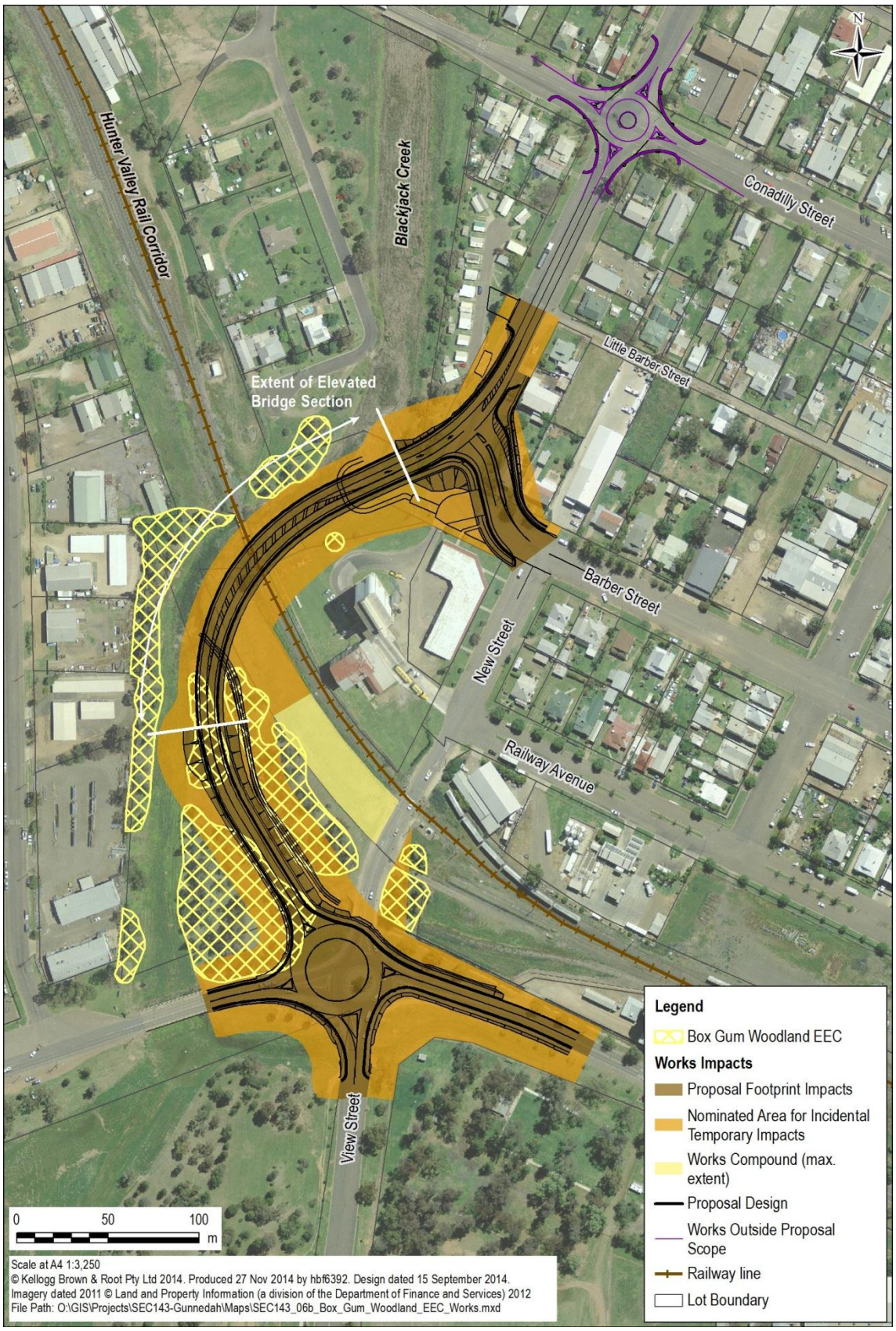

Figure 4.1
POTENTIAL IMPACTS TO BOX GUM WOODLAND

Both native and exotic flora species would be impacted by the proposal.

No TECs or threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* would be permanently or temporarily impacted by the proposal.

4.2.1 Tree protection zone impacts

Earthworks and machinery/vehicle movements can damage the root zone of trees, which can in turn lead to dieback and tree mortality. Potential root zone impacts include:

- soil compaction root damage that can result from machinery and vehicle movement within the construction area
- above ground damage that can result from incidental machinery and vehicle movements (e.g. damage to branches and trunk).

Measures to mitigate potential impacts upon trees and their root zones through the application of TPZs are discussed further in Section 6.2.

4.3 HABITAT LOSS

The Koala, listed as vulnerable under the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*, has been previously recorded in the study area as revealed by *Atlas of NSW Wildlife* database records.

No other threatened or migratory fauna species listed under the *Threatened Species Conservation Act 1995* and/or *Environment Protection and Biodiversity Conservation Act 1999* are likely to be impacted by the proposal. Assessments in accordance with the *Threatened Species Conservation Act 1995* and *Environment Protection and Biodiversity Conservation Act 1999*, have been undertaken as relevant for 8 threatened fauna species and 3 migratory species that are considered possible occurrences in the study area, for which potential habitat impacts are possible. These assessments have been undertaken and are provided in Section 5.

The loss of habitat from the study area would principally be limited to that associated with the urban parkland, where potential foraging, roosting, sheltering, nesting and possibly breeding habitats are currently available for native fauna species. Birds, micro-bats and the Koala are the most likely opportunistic users of these resources.

4.3.1 Koala habitat

The koala habitat that occurs in the study area has been assessed in accordance with the appropriate guidelines. An assessment against the Referral Guideline for the Koala determined that the study area did not contain habitat critical to the survival of the Koala. An assessment against SEPP 44 determined that the koala habitat in the study area does not constitute 'potential koala habitat' or core koala habitat' as defined under the SEPP. Moreover, the study area is not mapped as Primary Koala Habitat, 2A Secondary (Class A) Koala Habitat, 2B Secondary (Class B) Koala Habitat or 2A/2B Secondary combination Koala Habitat, under the draft Gunnedah LGA (Part) Comprehensive Koala Plan of Management (CKPM) 2013. However, due to the

presence of potential koala habitat and recognised koala feed trees within the study area, potential impacts upon this habitat have been quantified.

The amount of koala habitat to be permanently impacted by the proposal is approximately 0.39 hectare. The amount of koala habitat to be disturbed to facilitate construction activities and access within estimated areas of incidental disturbance is approximately 0.22 hectare. No koala feed trees will be removed within the area of incidental disturbance however this area would be subject to minor disturbances such as ground disturbance including the removal of ground cover and the establishment of tree protection measures.

4.3.2 Koala feed tree impacts

In the Approved Recovery Plan (2008), Gunnedah is located in the Koala Management Area (KMA) 6: Western Slopes and Plains. According to the recovery plan, the Yellow Box, Blakely's Red Gum and Bimble Box are recognised as secondary koala feed tree species in the western slopes and plains KMA. No primary koala feed tree species occur within the study area.

The proposal would result in the removal of 26 secondary koala feed trees within the site area, as shown on Figure 4.2. Twenty-three trees would be retained and protected from areas of incidental disturbance as a result of construction activities and access requirements. Measures to mitigate potential impacts upon koala feed trees are discussed further in Section 6.2.

The assessment of koala feed tree avoidance and mitigation, and impact is summarised in Table 4.1.

Table 4.1 Assessment of koala feed tree impact and avoidance

Koala feed tree impact assessment	SEPP 44 Schedule 2 feed trees	Secondary koala feed trees (State Approved Recovery Plan)
Number of trees to be removed in permanent footprint	0	8 (3 Yellow Box and 5 Blakely's Red Gum)
Number of trees requiring removal within estimated areas of incidental disturbances to allow for construction activities and access	0	18 (14 Yellow Box and 4 Blakely's Red Gum)
Number of trees within estimated areas of incidental disturbances for which impacts can be avoided and mitigated	1 Bimble Box	22 (11 Yellow Box and 11 Blakely's Red Gum)

4.4 HABITAT MODIFICATION

The design of the proposal, has as far as practicable, limited the extent of potential permanent impacts upon the study area's habitat values for native flora and fauna species. This has been achieved by refining the horizontal alignment and by increasing the length of the bridge section.

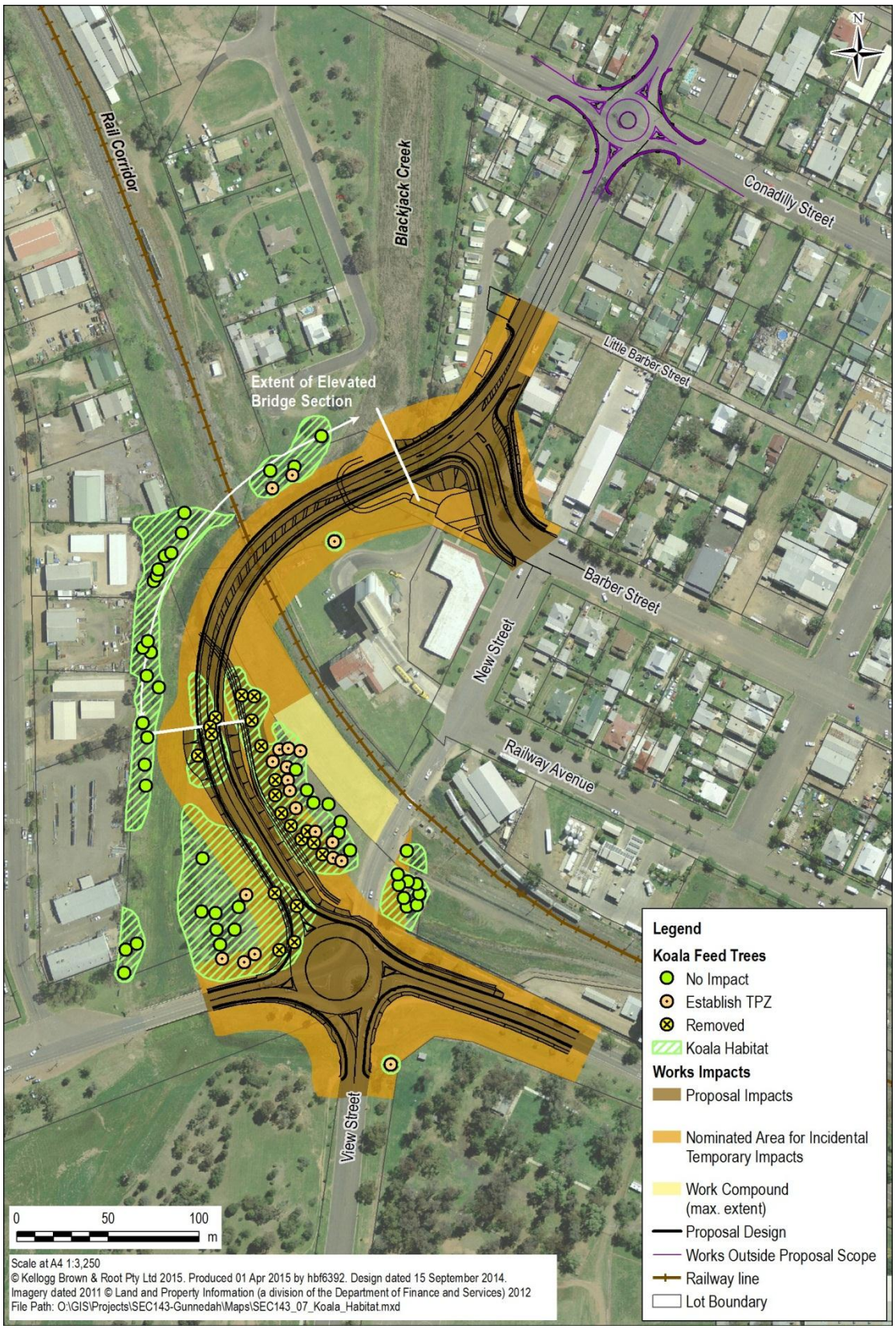

Figure 4.2
POTENTIAL IMPACTS TO KOALA HABITAT

The proposal is unlikely to modify habitats to the extent that it would reduce the current use of the study area by native fauna species. The minor loss of some marginal sheltering, foraging and potential roosting habitat for listed bird, micro-bat species and the local koala population is unlikely to result in impacts that would be of the magnitude to cause local populations to decline. Nor is the proposal likely to impact habitat that is critical to the long-term viability of populations of these respective species or impact habitat that is important for ensuring the breeding success of these species.

Therefore the minor extent of habitat modification that may result from the proposal is unlikely to result in adverse effects to threatened and/or migratory fauna species that are found or may potentially utilise the study area's habitats.

Small opportunistic bird and micro-bat species may potentially make use of micro-habitats that may be created with the elevated bridge structure, i.e. gaps between concrete bridge structures that may provide roosting habitats for micro-bat species and potentially locations for small bird species to build nests (e.g. swallows).

4.4.1 Habitat fragmentation

Although the alignment of the proposal further divides two patches of open grassy woodland within the urban parkland, this is mitigated by the elevated section of bridge. This additional partial fragmentation of habitat resulting from the proposal is unlikely to affect the ability of native fauna species to continue using both patches as one area of habitat.

4.4.2 Corridor connectivity

The design of the proposal has avoided Blackjack Creek as far as is practicable and is unlikely to restrict or reduce any use of this creek line as a wildlife movement corridor which may exist. The proposal would remove some koala feed trees from the study area, but is unlikely to reduce the current movement of koalas through this area, which is relatively small in contrast to the movement of koalas that occurs across the locality and throughout the township of Gunnedah.

4.5 INJURY AND MORTALITY

Injury and mortality risk to fauna during the construction of the proposal is considered to be low, as the proposal has been refined to avoid core fauna habitat such as the Wandobah Reserve. The removal of remnant mature trees and the operation of machinery and plant throughout the site present the greatest risk of injury or mortality to fauna. This risk is considered to be low, in line with risk rates of urban roads.

The operational phase of the proposal is not expected to increase the risk of animal injury or mortality as a result of vehicle interaction. The provision koala signage and 50 kilometre per hour speed limits would mitigate the risk of vehicle strikes.

Suitable mitigation and management measures will be implemented during the construction and operation of the proposal. These measures are explained in more detail in Section 6.2.

4.6 WEEDS

The weeds identified in the study area during database searches and field surveys were Class 3 Regionally Controlled Weeds, Class 4 Locally Controlled Weeds or Class 5 Restricted Plants under Section 8 of the *Noxious Weeds Act 1993*.

The characteristics of each class are:

- Class 3: noxious weeds are plants that pose a serious threat to primary production or the environment of an area to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.
- Class 4: noxious weeds are plants that pose a threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.
- Class 5: noxious weeds are plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.

In order to reduce the risk of increasing weed problems, control plans and measures must be implemented. The noxious weeds declarations for Gunnedah Local Government Area impose legal requirements for the management of weeds:

- Class 3: the plant must be fully and continuously suppressed and destroyed
- Class 4: the growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed.
- Class 5: the requirements in the *Noxious Weeds Act 1993* for a notifiable weed must be complied with.

Measures to mitigate the potential spread of weeds are discussed further in Section 6.2.

The implementation of control plans and measures during the construction phase would mean that the operation of the proposal is unlikely to exacerbate weed problems.

4.6.1 Weeds of National Significance

Weeds of National Significance are noxious weeds that are identified as particularly problematic due to their:

- invasive tendencies
- potential for spread
- environmental, social and economic impacts.

One WoNS (African Boxthorn) was identified in the study area during the 2013 ecological survey. African Boxthorn is an aggressive invader of roadsides, reserves, remnant bushland and waterways, with its growth inhibiting movement of stock and providing haven for feral animals. Control methods for this weed will depend on the infestation size and location, with methods generally more effective and economical if conducted when the plants are young.

Management of this weed during the construction and operation phase of the proposal will be undertaken in accordance with methods put in place for the other potential noxious weeds on-site. Measures to mitigate weeds are discussed further in Section 6.2.

4.6.2 Edge effects

During the construction and site rehabilitation, the proposal has the potential to create favourable conditions for the invasion and spread of noxious and environmental weed species within the study area where disturbance is to occur, which could potentially lead to an increase of existing weed populations, especially along the edges of the site. The control and spread of noxious and environmental weeds in accordance with the prescribed mitigation measures should lessen edge effect weed invasion.

4.7 PESTS AND PATHOGENS

Several pest flora and fauna species were identified in the study area through database searches and field surveys. The risk of increasing any pest problems on the site or within the locality during the construction or operation of proposal is considered to be low, providing that suitable mitigation and management measures are implemented.

There are several pathogens in NSW that have the potential to cause adverse impacts on the environment and biodiversity. They may be introduced and spread during the construction of road projects and roadside maintenance works (RTA 2011). The pathogens include:

- Phytophthora (*Phytophthora cinnamomi*)
- Chytrid fungus (*Batrachochytrium dendrobatidis*)
- Myrtle rust (*Uredo rangelli*)
- Fusarium wilt/Panama disease (*Fusarium oxysporum*)

No signs of these pathogens were observed during field surveys; however it may be necessary to establish hygiene procedures to prevent the potential introduction and spread of pathogens. These procedures are discussed further is Section 6.2.

4.8 CHANGED HYDROLOGY

Given the proposed design of the proposal, it is unlikely to significantly alter the study area's existing surface or groundwater hydrology, both either the construction and operation of the proposal.

4.9 GROUNDWATER DEPENDANT ECOSYSTEMS

No groundwater dependent ecosystems were identified within the study area associated with Blackjack Creek riparian vegetation. The proposal is unlikely to impact groundwater aquifers or result in groundwater drawdown. Therefore, potential impacts upon groundwater dependant ecosystems are unlikely.

4.10 SOIL EROSION AND SEDIMENTATION

The proposal requires earthworks as part of construction activities within close proximity to Blackjack Creek, which is an ephemeral stream. The proposed earthworks will involve the excavation of footings, the grading and compaction of road base materials, and the removal and stockpiling of soil. If not effectively mitigated, earthwork activities may pose a soil erosion risk and lead to the sedimentation of Blackjack Creek and reduce the water quality of aquatic habitats in downstream receptors, such as the Namoi River.

4.11 NOISE, VIBRATION AND LIGHT

The proposal is located in an urban area that already experiences varying degrees of noise and vibration. The construction and operational phases of the proposal is not likely to substantially increase the level of noise and vibration that is already present in the study area. The proposal is unlikely to degrade existing habitat values or reduce fauna habitat usage. Therefore, adverse impacts to native fauna are unlikely.

Artificial light will be installed during construction and used during operation, however it is not expected to result in any adverse impacts to fauna that utilise habitat within the area of the site, as the species present are already adapted to high light levels associated with the urban environment. Additional lighting associated with the elevated bridge structure may result in habitat and feeding resources for small opportunistic bird and micro-bat species that have an ability to roost in man-made structures.

4.12 KEY THREATENING PROCESSES

A threatening process is defined under the *Threatened Species Conservation Act* 1995 and *Environment Protection and Biodiversity Conservation Act 1999* as *'a process that threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community'*. Threatening processes that adversely affect threatened species, populations or ecological communities, or possibly cause others that are not currently threatened, to become threatened are listed as key threatening processes (KTPs).

There are currently 37 listed under the *Threatened Species Conservation Act 1995*, eight under the *Fisheries Management Act 1994 and* 21 KTPs listed under the *Environment Protection and Biodiversity Conservation Act 1999*. The KTPs relevant to the proposal are outlined in Table 4.2.

Table 4.2 KTPs relevant to proposal

Key Threatening Process	Description of Process	Relevance to the proposal
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners (*Manorina melanocephala*)	The Noisy Miner is a native honeyeater that aggressively defends habitat resulting in the exclusion of smaller birds from favoured habitat. A range of threatened woodland and forest bird species listed under the TSC Act are impacted by abundant Noisy Miners via active exclusion from favoured habitat. This exclusion limits feeding, breeding and dispersal opportunities, ultimately impacting on population size and persistence.	Unlikely to be an effect. Three individuals of the aggressive native bird species Noisy Miner were observed during the 2014 field survey. There was very little evidence of Eucalypt dieback as a result of the species presence. The results of the survey did not indicate that the Noisy Miners are excluding other bird species. The proposal is unlikely to facilitate this KTP in the study area.
Alteration to the natural flow of regimes of rivers and streams and their floodplains and wetlands	Alteration of natural flow regimes is recognised as major factor contributing to loss of biological diversity in aquatic ecosystems, including floodplains. Alteration refers to a number of processes including changing the frequency, duration, magnitude, timing, predictability and variability of flow events. These alterations can threaten species, population and ecological communities that rely on river flows for their short and long-term survival. Three anthropogenic processes have caused alteration: building of dams, diversion of flows by structures of extraction and alteration of flows on floodplains with the construction of levee banks and other structures (e.g. road and bridges).	Unlikely to be an effect. Due to the design of the proposal, it is unlikely to cause an alteration to the study area's existing surface or groundwater hydrology, either during the construction or operation of the proposal.
Infection of native plants by *Phytophthora cinnamomi*	*Phytophthora cinnamomi* is a soil-borne fungus that spreads in plant roots in warm, moist conditions and causes tree death (dieback) where infestation occurs. Infected soil/root material may be dispersed by vehicles (e.g. earth moving equipment) and can occur as a result of road building and maintenance. Infection can occur as a direct result of transporting infected soil or road-building material to vulnerable uninfected areas.	Unlikely to be an effect. The construction of the proposal will be subject to environmental management measures to reduce the risk of transporting *Phytophthora cinnamomi* throughout the site.
Clearing of native vegetation	Clearing of any native vegetation, including area less than 2 hectare in extent, may have significant impacts on biological diversity and is recognised as a major factor contributing to loss of biological diversity. The impacts as a result of clearing native vegetation include destruction of habitat causing loss of biological diversity, fragmentation of populations and disturbed habitat which may permit the establishment and spread of exotic species.	Likely to be a minor effect. The proposal would result in the loss of approximately 0.61 hectare of native vegetation. The majority of the vegetation to be cleared is associated with the urban parkland. Approximately 26 koala feed trees would be removed as part of the vegetation clearing. The post-construction revegetation and rehabilitation of the study area should over the long-term commensurate the short-term impact on native vegetation.

Key Threatening Process	Description of Process	Relevance to the proposal
Invasion of native plant communities by exotic perennial grasses	Some exotic perennial grass species display vigorous growth, abundant seed production and effective seed dispersal enabling them to compete strongly with or displace native vegetation, causing significant adverse impacts on biodiversity. Exotic perennial grasses of special concern include Coolatai Grass (*Hyparrhenia hirta*), Pampas grasses (*Cortaderia* spp.), Giant Parramatta Grass (*Sporobolus fertilis*), Chilean Needlegrass (*Nassella neesiana*), Serrated Tussock (*Nassella trichotoma*) and African Lovegrass (*Eragrostis curvula*).	Likely to be a minor effect. The only exotic perennial grass recorded during a flora survey was African Lovegrass, with the other species of concern unlikely to exist within the study area. Several noxious and environmental weeds exist within the site and study area. The proposal has the potential to allow for the invasion and spread of these weeds in areas of disturbance. This is particularly likely to occur along the edges of the site. The prescribed weed mitigation measures should prevent the further facilitation of the KTP in the study area.
Loss of hollow-bearing trees	Tree hollows are cavities formed in the trunk or braches of a living or dead tree and are usually more characteristic of older, mature trees. Hollows occur primarily in eucalypts tree and are uncommon in many other native and introduced species. Clearing of vegetation contributes significantly to the ongoing loss of hollow-bearing trees. Hollow-bearing trees offer habitat, with a large number of NSW terrestrial vertebrate species including mammals, birds, reptiles and frogs being reliant on these hollows for shelter and nests.	Unlikely to be an effect. The large Bimble Box tree is the only hollow bearing tree in the study area. Impacts upon this tree are being avoided and mitigated.

It is unlikely the proposal would result in any significant increase to any of the KTP's outline in Table 4.2, providing that appropriate environmental management measures are implemented during the proposed works. Management measures are discussed in Section 6.

4.13 CUMULATIVE IMPACTS

The proposal would result in the permanent removal of a relatively small area of native and exotic vegetation from within the urban parkland which makes up the majority of the site. Vegetation and habitat cleared as part of the construction activities and access requirements would be replaced with site stabilisation and landscape planting activities post construction with species endemic of the site.

Given the urban setting in which the proposal is located, the small area of vegetation to be removed, the mitigation measures propsoed and the post-construction rehabilitations of the site, potential cumulative biodiversity impacts are not considered likely as a result of the proposal.

5 Assessments of significance

The proposal will result in the clearing of approximately 0.61 hectare of Box Gum Woodland EEC and the minor loss of potential habitat resources for eight threatened fauna species, including:

- Regent Honeyeater (*Anthochaera phrygia*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Swift Parrot (*Lathamus discolour*)
- Superb Parrot (*Polytelis swainsonii*)
- Large-eared Pied Bat *Chalinolobus dwyeri*)
- Corben's Long-eared Bat (*Nyctophilus corbeni*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
- Koala (*Phascolarctos cinereus*)

Assessments of significance '7-Part Tests' under the *Threatened Species Conservation Act 1995* have been completed as relevant for the Box Gum Woodland EEC and the eight above listed threatened fauna species. Due to like species and habitat requirements, some species have been grouped together into the one assessment. These assessments are presented below in Section 5.1.

Significant impact assessments under the *Environment Protection and Biodiversity Conservation Act 1999*, have been completed for five of the above listed threatened fauna species, Regent Honeyeater, Swift Parrot, Superb Parrot, large-eared Pied-bat and Corben's Long-eared Bat. Some of these species have the same EPBC Act conservation status and similar habitat requirements and have been grouped together into the one assessment. These assessments are presented below in Section 5.2.

5.1 ASSESSMENT OF SIGNIFICANCE (7-PART TESTS)

5.1.1 Endangered ecological community - White Box Yellow Box Blakely's Red Gum Woodland

Assessment of significance '7-Part Test' criteria

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.

Not applicable.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable.

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

Approximately 0.61 hectare of this artificial representation of this EEC is likely to be cleared as a result of the proposal. The development would not significantly reduce the extent of this EEC within the local area surrounding Gunnedah. Site rehabilitation and revegetation would include the replanting of tree species that are representative of this EEC. Therefore, the local occurrence of this EEC is not likely to be placed at risk of extinction.

(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.

This EEC has been planted and is maintained as urban parkland. It is therefore an artificial representation of this EEC, which unlike naturally occurring patches; it is in a structurally modified state. The proposal may potentially remove a relatively small proportion (approximately 0.61 ha) of this EEC from the study area. The proposal may lead to the removal of 17 Yellow Box and 9 Blakely's Red Gum trees, all of which are a planted representation of this EEC. The proposal is unlikely to further modify the composition of the EEC where it is to be retained and protected from potential indirect impacts (i.e. tree protection zones, exclusion fencing and weed control).

The proposal is unlikely to further modify the composition of this EEC, beyond the scope of alteration that already occurred due to past and ongoing parkland maintenance. Therefore the proposal is unlikely to significantly reduce the local occurrence of this EEC or place it at risk of extinction.

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 result in the clearing of approximately 0.61 hectare of this EEC, which occurs in a modified parkland habitat. In terms of the study area's parkland that is currently sustaining this EEC, the biotic factors that would typically allow for the natural recruitment, spread and development of this community are under constant parkland maintenance. As a result, the understorey is in a constant cycle of removal and modification. The minor clearing and subsequent site revegetation and rehabilitation measures are unlikely to further remove or modify this EEC's habitat.

(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 Oxley Highway already fragments the parkland EEC from a more extensive patch that is located to the south in Wandobah Reserve. This level of fragmentation or isolation should not increase as a result of the proposal.

The EEC was planted in the parkland into three distinct patches. The road alignment has been refined as far as is practicable to pass through a strip of open area between these patches. This has not only limited the amount of potential vegetation clearing required for the proposal, but has significantly limited any additional fragmentation between these patches. The proposed revegetation and rehabilitation of the site to occur post-construction should increase the level of connectivity between the two patches of EEC located on the western side of the proposal. Therefore, the proposal is unlikely to further fragment or further isolate these already fragmented patches of EEC.

(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 area of this planted EEC to be removed is limited in extent and subject to ongoing disturbances associated with parkland maintenance. Its overall habitat value for this EEC is minimal due to ongoing disturbance (i.e. mowing), which is restricting the effective recruitment, spread and development of this ecological community.

This area is relatively small in contrast to similar habitats in the locality that also contain this EEC, where the species composition maybe greater and less structurally modified, and as a result much better representations of this EEC. However, in consideration of the post-construction revegetation and rehabilitation, this planted EEC is likely to be improved in contrast to its current condition, species composition and structural diversity. The minimal amount of habitat that may be removed or modified by the proposal is not likely to be important for the long-term survival of this ecological community 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 is registered for this EEC.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The NSW Department of Environment Climate Change and Water (2010) now OEH, prepared a national recovery plan for this EEC. The primary objective of the recovery plan is to minimise the risk of extinction of this EEC through:

- Achieving no net loss in extent and condition of the ecological community throughout its geographic distribution.
- Increasing protection of sites in good condition.
- Increasing landscape functionality of the ecological community through management and restoration of degraded sites.
- Increasing transitional areas around remnants and linkages between remnants.

- Bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box-Gum Grassy Woodland.

Only a very small proportion of this planted and structurally modified EEC, would be permanently and temporarily lost from the locality. The areas of this planted EEC that are to be retained are to be protected and some weed control should occur, as part of the proposed WMP. Furthermore, the proposed revegetation and rehabilitation of the site and parts of the study area should result in improvements to the structural diversity and overall condition and biodiversity value of this EEC.

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

There are currently 37 key threatening processes (KTP's) listed under the *Threatened Species Conservation Act 1995*. The most relevant ones to this proposal and the White Box Yellow Box Blakely's Red Gum Woodland are the invasion of native plant communities by exotic perennial grasses and the clearing of native vegetation.

The study area's parkland already contains exotic grass species (approximately 60–70 %) that are routinely maintained and suppressed through mowing. This KTP is already present and the proposal is unlikely to increase the adverse effect of this KTP through the implementation of a WMP.

The proposal would result in the potential removal of approximately 0.61 hectare of planted EEC. The loss of this relatively small amount of structurally modified EEC is unavoidable in light of the proposal's objectives and is unlikely to result in the decline of this EEC in the locality. Provided the proposed TPP, WMP and EMP are appropriately administered, the proposal should not result in the operation of, or increase the impact of exotic grass invasion or vegetation clearing.

In reference to the above considerations, the proposal would not result in a significant increase in the operation of any KTPs of relevance to White Box Yellow Box Blakely's Red Gum Woodland.

Conclusion

Based upon the responses to the above criteria, the proposal is unlikely to significantly affect the listed endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland or its habitat and therefore a Species Impact Statement is not considered necessary for this community.

5.1.2 Threatened bird species - Regent Honeyeater, Little Lorikeet, Swift Parrot and Superb Parrot

Assessment of significance '7-Part Test' criteria

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.

The proposal may lead to the clearing of approximately 0.61 hectare of parkland habitat that provides potential foraging and roosting resources for these threatened bird species. Of this 0.43 ha of parkland would be reinstated post construction with species endemic to the area. The Little Lorikeet may use the limited amount of tree hollows in the study area for breeding. The Superb Parrot breeds further south in the southern slopes and Riverina regions of NSW, whilst the Swift Parrot breeds specifically in Tasmania. In NSW the Regent Honeyeater only breeds in the Capertree Valley and Bundarra-Barraba regions of the state.

Only one large hollow bearing tree, a Bimble Box, has been identified in the study area, which may provide potential breeding habitat for the Little Lorikeet. The proposal is avoiding the removal of this tree and tree protection zone measures should prevent any potential indirect impacts.

The woodland habitat to the south of the study area in Wandobah Reserve provides similar habitat values as the parkland habitats within the study area. These nomadic or regionally migratory bird species are highly mobile with large home ranges and are able to utilise these surrounding habitats, as well as the potential habitats that should remain in the study area during the construction and post-construction phases of the proposal.

It is therefore unlikely that the proposal would have an adverse effect on the life cycle of these threatened bird species and place them at risk of extinction.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

There are currently no endangered population listings under the *Threatened Species Conservation Act 1995* for these threatened bird species within the study area.

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

(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.

This factor does not apply to threatened species.

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

(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

(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 may result in the removal of approximately 0.61 hectare of parkland habitat from the study area, which provides only limited habitat values in contrast to naturally occurring woodlands throughout the locality. Of this approximately 0.43 ha of parkland would be reinstated post construction with species endemic to the area. The loss of a small proportion of potential habitat that may only be used periodically by these highly mobile bird species when moving between larger and more preferential habitat is unlikely to adversely affect the long-term persistence of these threatened bird species in the local area.

The Oxley Highway already fragments the parkland habitat from more substantial areas of habitat located to the south in Wandobah Reserve. This level of fragmentation or isolation should not increase as a result of the proposal. The road alignment has been strategically located to pass through a strip of open area where woodland habitat is partially absent. The limited amount of potential habitat loss that may result from the proposal is unlikely to isolate or fragment the remaining habitat from similar adjacent habitats as a result of the proposal.

The small area of parkland habitat to be removed by the proposal is in a modified state and possesses minimal habitat values for native fauna. However, it has been identified as potential roosting and foraging resource for these threatened bird species that may only use these habitats periodically. Adjacent and relatively extensive woodland and grassland habitats surrounding the study area and throughout the locality provide more viable roosting and foraging resources than those contained in the study area.

Due to the presence of alternative and more viable breeding and foraging habitat to the south of the study area and throughout the locality, the minimal amount of habitat to be potentially affected by the proposal is not likely to isolate these highly mobile bird species from such habitats. Therefore, the proposal is unlikely to have an adverse effect on the long-term survival of the species in a local context.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

There is no critical habitat listed for these species on the register of critical habitat.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

National recovery plans are in place for the Regent Honeyeater, Superb Parrot and Swift Parrot. There is no recovery plan or priority action statement for the Little Lorikeet.

In general each recovery plan instils similar objectives and actions to recover the decline of these threatened bird species, some of which are of specific relevance to the proposal, these include:

- Retain large old trees, especially those that are hollow-bearing and protect them from potential indirect impacts
- Ensure recruitment of trees into the mature age class so that there is not a lag period of decades between the death of old trees and hollow formation in younger trees
- Protect large flowering Eucalyptus trees throughout the habitats frequented by these species. Manage woodlands and forest for recovery of old-growth characteristics

- Where natural tree recruitment is inadequate, replant local species to maintain foraging habitat and to potentially create future breeding sites.

The EMP aims to re-establish vegetation within areas of disturbance and the study area. The intention is that this vegetation would in part be designed to mimic the Box Gum Woodland EEC that is to be potentially impacted by the proposal. In doing so the rehabilitated vegetation is likely to have a higher level of floristic diversity and develop old-growth characteristics over the long-term than that of the parkland that currently occurs in the study area. In this regard over the short to long-term a viable woodland habitat of greater habitat value than the parkland currently in the study area may be created and become an important foraging and breeding resource for these threatened bird 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

There are currently 37 key threatening processes (KTP's) listed under the *Threatened Species Conservation Act 1995*. The most relevant KTPs to the proposal and these threatened bird species include the clearing of native vegetation, loss of hollow bearing trees and the invasion of native plant communities by exotic perennial grasses.

The proposal would potentially remove approximately 0.61 hectare of potential habitat for these threatened bird species. Of this approximately 0.43 ha of parkland would be reinstated post construction with species endemic to the area. The loss of this relatively small amount of habitat is unavoidable in light of the objectives of the proposal and is very unlikely to result in the decline of these species in the locality.

Tree protection zone measures should ensure that a minimal amount of trees are impacted, thus allowing these already mature trees to further develop into hollow bearing trees.

The study area's parkland habitat contains exotic grass species (approximately 60–70 %) that are routinely maintained and suppressed through mowing. This KTP is already present and the proposal is unlikely to increase the adverse effect of this KTP through the implantation of a WMP.

Provided the proposed TPP, WMP and EMP are appropriately administered, the proposal is unlikely to result in a net loss of habitat and may, over the long-term, provide additional foraging, roosting and breeding resources for these species in the study area.

Conclusion

Based upon the responses to the above criteria, the proposal is unlikely to significantly affect these threatened bird species or their habitats and therefore Species Impact Statements are not considered necessary for these species.

5.1.3 Threatened microbat species – Large-eared Pied Bat, Corben's Long-eared Bat and Yellow-bellied Sheathtail-bat

Assessment of significance '7-Part Test' criteria

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.

The proposal would lead to the clearing of 0.61 hectare of parkland habitat that provides potential foraging and roosting resources for these threatened microbat species. Of this 0.43 ha of parkland would be reinstated post construction with species endemic to the area. The study area provides potential foraging resources above Blackjack Creek and open grassland and parkland habitats for these insectivorous bats. The Yellow-bellied Sheathtail-bat may use the limited amount of tree hollows in the study area for breeding. Corben's Long-eared Bat requires large tree cavities where it is believed the species forms breeding groups; such tree cavities are not present in the study area. The Large-eared Pied Bat only breeds in caves or cave like structures, such as mine shafts.

There is only one large hollow bearing tree, a Bimble Box, identified in the study area that may provide potential breeding habitat. The proposal is avoiding the removal of this tree and tree protection zone measures should prevent any potential indirect impacts.

The woodland habitat to the south of the study area in Wandobah Reserve provides similar habitat values as the parkland habitats to be potentially impacted within the study area. These microbat species are highly mobile species with large home ranges and are able to utilise these surrounding habitats, as well as those that should remain in the study area during the construction and post-construction phases of the proposal. Viable local populations of these species would be maintained in the locality.

It is therefore unlikely that the proposal would have an adverse effect on the life cycle of these microbat species and place them at risk of extinction.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

There are currently no endangered population listings under the *Threatened Species Conservation Act 1995* for these threatened microbat species within the study area.

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

(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.

This factor does not apply to threatened species.

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

(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

(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 result in the removal of approximately 0.61 hectare of parkland habitat from the study area, which provides only limited habitat values in contrast to naturally occurring woodlands throughout the locality. Of this approximately 0.43 ha of parkland would be reinstated post construction with species endemic to the area. The loss of a small proportion of potential foraging and roosting habitat that may only be used periodically by these highly mobile microbat species when moving between larger and more preferential habitats, is unlikely to adversely affect the long-term persistence of these species in the local area.

The Oxley Highway already fragments the parkland habitat from more substantial areas of habitat located to the south in Wandobah Reserve. This level of fragmentation or isolation should not increase as a result of the proposal. The road alignment has been strategically located to pass through a strip of open area where woodland habitat is partially absent. The limited amount of potential habitat loss that may result from the proposal is unlikely to isolate or fragment the remaining habitat from similar adjacent habitats as a result of the proposal.

The small area of parkland habitat to be potentially removed by the proposal is in a modified state and possesses minimal habitat values for native fauna. However, it has been identified as providing potential roosting and foraging resource for these threatened microbat species that may only use these habitats periodically as part of a larger home range. Adjacent and relatively extensive woodland, grassland and riparian habitats surrounding the study area and throughout the locality provide more viable roosting and foraging resources than those contained in the study area.

Due to the presence of alternative and more viable roosting, foraging and breeding (Yellow-bellied Sheathtail-bat) habitat to the south of the study area and throughout the locality, the minimal amount of habitat to be potentially affected by the proposal is not likely to isolate these mobile microbat species from such habitats. Therefore, the proposal is unlikely to have an adverse effect on the long-term survival of the species in a local context.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

There is no critical habitat listed for these microbat species on the register of critical habitat.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

There is a national recovery plan in place for the Large-eared Pied Bat and a draft national recovery plan for Corben's Long-eared Bat, whilst there is no recovery plan for the Yellow-bellied Sheathtail-bat. There is numerous priority actions listed for these threatened microbat species within the priority action statement. The most relevant high priority action to the proposal is to encourage the retention of the largest hollow bearing trees. This is of specific relevance to the Yellow-belied Sheathtail-bat and possibly Corben's Large-eared Bat.

The large Bimble Box located in the study area provides hollows that may be utilised by these species for roosting and potentially breeding. The proposal avoids direct impacts upon this tree and the TPP would ensure that a tree protection zone is established around this tree to prevent any potential indirect impacts. In this regard the proposal and its associated mitigation measures are consistent with the objectives of relevant recovery plans and priority actions for these 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

There are currently 37 key threatening processes (KTP's) listed under the *ThreateneSpecies Conservation Act 1995*. The most relevant KTPs to the proposal and these threatened microbat species include the clearing of native vegetation and loss of hollow bearing trees.

The proposal may potentially remove approximately 0.61 hectare of potential foraging habitat for these threatened microbat species. The loss of this relatively small amount of habitat is unavoidable in light of the objectives of the proposal and is very unlikely to result in the decline of these species in the locality.

Tree protection zone measures should protect the hollow bearing Bimble Box tree. These measures should also ensure that a minimal amount of trees are impacted by the proposal, thus allowing these already mature trees to further develop into hollow bearing trees.

Provided the proposed TPP and EMP are appropriately administered, the proposal is unlikely to result in a net loss of habitat and may, over the long-term, provide additional foraging, roosting and breeding resources for these species in the study area.

Conclusion

Based upon the responses to the above criteria, the proposal is unlikely to significantly affect these threatened microbat species or their habitats and therefore Species Impact Statement are not considered necessary for these species.

5.1.4 Threatened mammal species – Koala

7-Part Test Criteria

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.

The proposal would remove approximately 0.61 hectare of structurally modified parkland habitat that is periodically utilised opportunistically by the Koala as a food and sheltering resource when moving between more preferential habitats. Only 26 mature koala feed trees (17 Yellow Box and 9 Blakely's Red Gum) are to be removed.

The koala habitat that occurs in the study area has been assessed in accordance with SEPP 44. This assessment has determined that the study area does not support potential koala habitat or core koala habitat as defined under the SEPP. Therefore, this habitat is not important for the maintenance of a local population of the koala and the proposal is unlikely to have an adverse effect on the life cycle of the Koala such that the local population of the species would be placed at risk of extinction.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

There is no endangered population for this species currently listed on the *Threatened Species Conservation Act 1995* within the study area.

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

(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.

This factor does not apply to threatened species.

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 result in the removal of approximately 0.61 hectare of koala habitat and approximately 26 koala feed trees, which occur in a modified parkland environment. The minor clearing and subsequent site revegetation and rehabilitation measures are unlikely to further remove or modify this parkland habitat that is periodically used by the koala.

(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 Oxley Highway already fragments the parkland koala habitat from a more extensive patch of koala habitat that is located to the south in Wandobah Reserve. This current level of fragmentation or isolation should not increase as a result of the proposal.

The koala habitat was planted in the parkland and occurs as three distinct patches of habitat that contains foraging and sheltering resources for the koala. The road alignment has been refined to pass through a strip of open area between these patches. This has not only limited the amount of potential habitat clearing required for the

proposal, but has significantly limited any additional fragmentation between these patches. The proposed revegetation and rehabilitation of the site to occur post-construction should increase the level of connectivity between the two patches of koala habitat located on the western side of the proposal.

The proposal is unlikely to further fragment or further isolate these already fragmented patches of koala habitat to such a degree that the species would no longer be able to periodically move between these patches

(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 area of this planted habitat to be potentially removed by the proposal is limited in extent and subject to ongoing disturbances associated with parkland maintenance. Its overall habitat value for the koala is minimal due to ongoing disturbance (i.e. mowing), which is restricting the effective recruitment and development of additional feed tree species and shelter.

This area of potential impact is small in contrast to similar habitats in the locality that also contain koala habitat that is larger, more contiguous and of greater value to the local population of the species. However, in consideration of the post-construction revegetation and rehabilitation, this planted koala habitat is likely to be improved in contrast to its current level of habitat value and koala usage. The minimal amount of habitat that may be removed or modified by the proposal is not likely to be important for the long-term survival of the local koala population.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

There is no critical habitat listed for this species on the register of critical habitat.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

The NSW Department of Environment and Climate Change (2008), now OEH, prepared a recovery plan for the Koala, which outlines specific objectives to help conserve the Koala and its habitat. Ten current threats to Koalas are identified in the recovery plan.

Habitat loss and fragmentation, habitat degradation and road kills are the most relevant of these threats to the proposal. Although the proposal is not entirely consistent with the objectives of the recovery plan, in particular habitat loss, it is assessed that there would be no negative impact on the long-term persistence and recovery of this species.

The similar, more preferred habitat associated within the locality, maintains the existing level of connectivity and provides habitat linkages with the study area.

The minor amount of habitat to be potentially lost is small in comparison to like habitats immediately to the south in Wandobah Reserve. The study area would not be further fragmented as a result of the proposal. The proposed revegetation and rehabilitation measures that are to occur post-construction as part of the EMP, would

be planted with native tree species, including koala food trees to avoid or reduce adverse effects to the local koala 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

There are currently 37 key threatening processes (KTP's) listed under the *Threatened Species Conservation Act 1995*. The most relevant one to this proposed activities and the Koala is the clearing of native vegetation.

The proposal may result in the loss of approximately 0.61 hectare of this species habitat that contains 26 koala feed trees (17 Yellow Box and 9 Blakely's Red Gum) from the study area. The loss of this relatively small amount of habitat is unavoidable in light of the objectives of the proposal and is unlikely to result in the decline of this species in the locality.

Provided the proposed TPP and EMP are appropriately administered, the proposal is unlikely to result in a net loss of koala habitat and may, over the long-term, provide additional foraging and sheltering resources for this species in the study area.

Conclusion

Based upon the responses to the above criteria, the proposal is unlikely to significantly affect the koala or its habitat and therefore a Species Impact Statement is not considered necessary for this species.

5.2 MNES SIGNIFICANT IMPACT ASSESSMENT

5.2.1 Koala significant impact assessment

A koala habitat assessment was undertaken for the study area in accordance with the Koala Habitat Assessment Tool described in the *EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE, 2014)* (Referral Guideline for the Koala). This assessment tool was developed for the purpose of determining the quality of the koala habitat within a specified area. Based on the Koala habitat assessment tool the study area contains koala habitat with a quality score of 4 (KBR, 2014). As described in the assessment the flow chart in the Referral Guideline for the Koala, an impact area with a habitat score of ≤ 5 or less than 2 hectare in size is not considered to constitute habitat critical to the survival of the koala. As the project area habitat quality score was 4 and the loss only of 0.61 hectare of koala habitat it is considered unlikely the proposal would impact on habitat that is critical to the koala and is unlikely to be important for the recovery of the species over the long-term. An assessment has also been undertaken with accordance with the Significant Impact Guidelines and is presented below.

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 Koala habitat which may be potential impacted by the proposal has been assessed in accordance with the Referral Guideline for the Koala. While this assessment

determined that the study area has a habitat quality score of 4 and therefore is not considered habitat that is critical to the Koala the presence of koala feed trees in the study area, infers that habitat is present within the study area. However given the fragmented nature of the habitats within the study area and it's limited habitat values in comparison to larger and more favourable habitats in the surrounding landscape that are further removed from the built up urban areas of Gunnedah this area is only likely to be used periodically by transient koalas moving and dispersing throughout the locality. Therefore it is likely that this habitat is not important for the maintenance of a local population of the koala and the proposal is unlikely lead to a long-term decrease in the size of the local population.

reduce the area of occupancy of an important population

As described above, assessments in accordance with the Referral Guideline for the Koala determined that the habitat within the study area is not critical habitat. The proposal would only result in the loss of approximately 0.61 hectare of structurally modified parkland habitat that is periodically utilised opportunistically by the Koala as a food and sheltering resource when moving between more preferential habitats. The small area is minor and of limited habitat value marginal in comparison to the availability of more preferential habitat within the wider locality, including the nearby Wandobah Reserve. Therefore the proposal is unlikely to reduce the overall area of occupancy for the local population that may only use the study area's marginal habitats periodically as part of a larger habitat range.

fragment an existing important population into two or more populations

The Oxley Highway already fragments the parkland koala habitat from a more extensive patch of koala habitat that is located to the south in Wandobah Reserve. This current level of fragmentation or isolation should not increase as a result of the proposal.

The koala habitat was planted in the parkland and occurs as three distinct patches of habitat that contains foraging and sheltering resources for the koala. The road alignment has been refined to pass through a strip of open area between these patches. This has not only limited the amount of potential habitat clearing required for the proposal, but has significantly limited any additional fragmentation between these patches. The proposed revegetation and rehabilitation of the site to occur post-construction should increase the level of connectivity between the two patches of koala habitat located on the western side of the proposal.

The proposal is unlikely to further fragment or further isolate these already fragmented patches of koala habitat to such a degree that the species would no longer be able to periodically move between these patches

adversely affect habitat critical to the survival of a species

In accordance with the Referral Guideline for the Koala, critical habitat is areas that score five or more using the habitat assessment tool. Using this tool it was determined that the study area has a habitat quality score of 4 and therefore is not considered to be habitat critical to the survival of the Koala.

The proposal would only result in the loss of approximately 0.61 hectare of habitat that is of limited habitat value marginal in comparison to the availability of more

preferential habitat within the wider locality, including the nearby Wandobah Reserve. The proposal is unlikely to adversely affect any habitat critical to the survival of the Koala.

disrupt the breeding cycle of an important population

The Referral Guideline for the Koala does not have a definition of what constitutes breeding habitat for the Koala. The SEPP 44 definition of core habitat makes mention of breeding females as evidence of a resident population of Koalas within an area.

Field assessments undertaken within the study area did not find any evidence of breeding females and no evidence of a population permanently residing in the study area or its immediate surrounds. Therefore the study area is unlikely to contain important breeding habitat for the Koala and the proposal is unlikely to disrupt the breeding cycle of the local population.

modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposal would result in the removal of approximately 0.61 hectare of koala habitat and approximately 26 koala feed trees, which occur in a modified parkland environment. The minor clearing and subsequent site revegetation and rehabilitation measures are unlikely to further remove, modify, destroy or isolate this low quality parkland habitat that is periodically used by the Koala.

Furthermore the study area is small and of lower quality in comparison the surrounding habitat available in the locality of the study area, including the nearby Wandobah Reserve. The minimal impact to the marginal habitat present within the study area is unlikely to cause a decline in the local Koala population.

result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

There are no known invasive species present in the study area that are potentially harmful to the Koala and the proposal is unlikely to result in the introduction of an invasive species that may be potentially harmful.

All invasive species, including pest animals and noxious weeds that may be present within the study area would be managed in accordance with a weed management plan. Therefore the proposal is unlikely to result in invasive species becoming established in the study area.

introduce disease that may cause the species to decline, or

There are no known signs of any pathogens or diseases present in the study area that is potentially harmful to the Koala and the proposal is unlikely to result in the introduction of a disease that may be potentially harmful. .

Hygiene procedures would be established during the construction and operation of the proposal to prevent the potential introduction and spread of pathogens. Therefore the proposal is unlikely to result in the introduction of a disease that would cause the local Koala population to decline.

interfere substantially with the recovery of the species.

The Referral Guideline for the Koala outlines impacts which are likely to interfere with the recovery of the koala, including;

- increasing fatalities in habitat critical to the survival of the koala due to dog attacks or vehicle strikes
- facilitating the introduction or spread of disease or pathogens to habitat critical to the survival of the koala
- creating a barrier to movement to, between or within habitat critical to the survival of the koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the koala.

As previously described, an assessment conducted using the referral guideline's habitat assessment tool determined that the study area is not habitat critical to the survival of the koala. As described above the proposal is unlikely to facilitate the introduction of any diseases.

The minor amount of habitat to be potentially lost is small in comparison to like habitats immediately to the south in Wandobah Reserve. The study area would not be further fragmented as a result of the proposal. In consideration of the post-construction revegetation and rehabilitation, this planted Koala habitat is likely to be improved in contrast to its current level of habitat value and Koala usage.

The minimal amount of habitat that may be removed or modified by the proposal is not considered to be important for the long-term survival of the local Koala population. The proposal is unlikely to substantially interfere with the recovery of the Koala.

The assessment above determined that the proposal would not have a significant impact on the Koala and therefore it is not considered necessary to refer the proposal based its impacts to this species.

5.2.2 Endangered species – Regent Honeyeater and Swift Parrot

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

lead to a long-term decrease in the size of a population

Although these two highly mobile bird species may possibly occur periodically in the project area, there is no indication that they rely on the marginal habitat values it supports (potential foraging and roosting resources). It is unlikely that the limited disturbance caused by the proposed project would result in a long-term decline in the size of each species respective population within the local or bioregional context.

reduce the area of occupancy of the species

The small area of potential habitat that is to be removed for the Project is minor in comparison to the availability of more preferential habitat within the wider locality. Therefore the proposed Project is unlikely to reduce the overall area of occupancy for these highly mobile species.

fragment an existing population into two or more populations

Given that these bird species are highly mobile, the nature and limited extent of the proposed Project is such that it is highly unlikely to fragment existing populations of these bird species into two or more populations.

adversely affect habitat critical to the survival of a species

The marginal habitat to be removed by the proposed Project is not habitat critical to the long-term survival of these two species.

disrupt the breeding cycle of a population

Even if they are to occur in the project area, the project area does not contain important breeding habitat for these two species. Therefore, the proposed Project is highly unlikely to disrupt the breeding cycle of either population.

modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The potential habitat available for these two species in the project area is marginal and of low value to both species. Therefore, the loss of this marginal habitat is unlikely to lead to a decline of either species.

result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

There are no known invasive species present in the project area that are potentially harmful to these two species and the proposed Project is unlikely to result the introduction of an invasive species that may be potentially harmful.

introduce disease that may cause the species to decline, or

The proposed Project is not likely to result in the introduction of a harmful disease that would result in a decline of either species.

interfere with the recovery of the species.

The loss of potential habitat is minimal and the proposed action is unlikely to interfere with the recovery of either species even if they were to occur in the project area or wider locality.

The assessment above determined that the proposal would not have a significant impact on these species and therefore it is not considered necessary to refer the proposal based its impacts to these species.

5.2.3 Vulnerable species – Superb Parrot, Large-eared Pied-bat and Corben's Long-eared Bat

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

Even those these highly mobile bird and micro-bat species may possibly occur periodically in the project area, they are unlikely to constitute the definition of important populations, as the project area's marginal habitat values (potential foraging and roosting resources) are unlikely to be used for breeding or dispersal and are unlikely to be important for maintaining genetic diversity. None of these three species are at the or near the limit of their known range. Therefore, it is unlikely that the proposed Project would result in a long-term decline in the size of each species respective population.

reduce the area of occupancy of an important population

The small area of potential habitat that is to be removed by the Project is minor and of limited habitat value marginal in comparison to the availability of more preferential habitat within the wider locality. Therefore the proposed Project is unlikely to reduce the overall area of occupancy for these highly mobile species that may only use the project area's marginal habitats periodically as part of a larger home range.

fragment an existing important population into two or more populations

The loss of the small area of potential habitat within the project disturbance footprint that may be used periodically by these highly mobile species is unlikely to fragment existing populations into two or more populations.

adversely affect habitat critical to the survival of a species

The habitat to be removed by the proposed project is not habitat critical to the long-term survival of these three species.

disrupt the breeding cycle of an important population

Even if they are to occur in the project area's potential foraging and roosting resources, the project area does not contain important breeding habitat for any of these three species and the proposed Project is unlikely to disrupt the breeding cycle of their respective populations.

modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The potential habitat available for these three species in the project area is marginal and of low value to these species. Therefore, the loss of this marginal habitat is unlikely to lead to a decline of any of these three species.

result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

There are no known invasive species present in the project area that are potentially harmful to these three species and the proposed Project is unlikely to result the introduction of an invasive species that may be potentially harmful.

introduce disease that may cause the species to decline, or

It is not likely that the proposed action would result in the introduction of a harmful disease that would result in a decline of these species.

interfere substantially with the recovery of the species.

The loss of potential habitat is minimal and the proposed action is unlikely to substantially interfere with the recovery of these species even if they were to occur in the project area or wider locality.

The assessment above determined that the proposal would not have a significant impact on these species and therefore it is not considered necessary to refer the proposal based its impacts to these species.

5.3 SUMMARY

Overall it is considered that the proposal is unlikely to have a significant impact upon the Box Gum Woodland EEC or any threatened fauna species listed under the *Threatened Species Conservation Act 1994* that occur or have the potential to occur within the study area and as a result no Species Impact Statements are considered necessary for the species assessed.

Also based on our assessment of the proposal against the significant impact guidelines in accordance with the and/or *Environmental Protection and Biodiversity Conservation Act 1999* the proposal is not anticipated to result in a significant impact to listed threated species considered and therefore it is not considered necessary to refer the proposal based it's impacts to these species.

6 Managing potential impacts upon biodiversity

The management of potential impacts upon biodiversity arising from the proposal should apply the hierarchy of avoid, minimise, mitigate and offset.

Specific measures have been incorporated into the proposed design of the proposal to avoid and minimise impacts on biodiversity values within the site and study area.

Measures have been proposed to effectively avoid, minimise and mitigate short-term incidental impacts that may result during the construction phase of the proposal, some of which can be further mitigated during the post-construction phase of the proposal.

The proposal's potential impacts upon biodiversity values and their habitats are concentrated where permanent impacts are to occur. These unavoidable residual impacts are unlikely to impose a significant negative effect on local populations of native flora and fauna species and ecological communities, and their habitats that occur within the study area or locality, including those that are listed as threatened or migratory species or EECs under the *Threatened Species Conservation Act 1995* and/or *Environment Protection and Biodiversity Conservation Act 1999*. As deemed necessary any significant residual impacts upon any of these ecological values of conservation significance would need to be further considered in terms of requiring offsets.

6.1 ENVIRONMENTAL MANAGEMENT

Measures to avoid, minimise and mitigate potential impacts upon biodiversity should be applied through the provisions of a Construction Environmental Management Plan (CEMP). These measures would ensure that all reasonable efforts are being administered to potentially limit the amount of residual impacts upon biodiversity and the general environment of the site and study area.

A CEMP should be prepared for the proposal and should include the following components.

6.1.1 Tree protection

A Tree Protection Plan (TPP) should be prepared to protect native tree species, in particular Yellow Box and Blakely's Red Gum species, which are important components of the Box Gum Woodland EEC. The TPP would also protect known koala feed trees (Bimble Box, Yellow Box, Blakely's Red Gum and Red River Gum) from unnecessary impacts. The TPZ assessment results provided in Appendix D should be used to guide the requirements of the TPP.

The requirements of this environmental safeguard are detailed further in Section 6.2.

6.1.2 Erosion and sediment control

To manage potential soil erosion risks it would be necessary to prepare an Erosion and Sediment Control Plan (ESCP). The ESCP should be developed and implemented before, during and after the proposed earthworks to protect soils and prevent erosion after rainfall events and wind erosion 'dust', particularly for earthworks, especially where earthworks are proposed along the top of bank and within the bed of Blackjack Creek. Sediment and erosion control structures, which conform to relevant guidelines, such as the *Managing urban stormwater: soils and construction – Volume 1* 'the Blue Book', should be appropriately installed where major components of the proposal are located e.g. bridge pillars and earthen embankments.

The positioning of the works compound and stockpiles should be in locations that are currently cleared or already disturbed, such as the location indicated on Figure 4.1. The location of the works compound and stockpiles, avoids the need to clear areas of open woodland vegetation within the urban parkland.

6.1.3 Weed control

A Weed Management Plan (WMP) should be developed in the design phase of the proposal prior to works commencing and implemented before, during and after the works are completed, so as to prevent the spread of noxious weeds and WoNS through edge effects. The WMP would encompass the areas where construction is to occur, including the works compound and stockpile area, along access roads, excavation areas and any other ancillary road works where edge effects are likely to facilitate the invasion and spread of weeds.

6.1.4 Fauna management

A Fauna Management Plan (FMP) should be prepared to avoid, mitigate or minimise any potential impacts upon native fauna and their habitats. As a minimum the FMP would include the following management measures:

- Temporary exclusion fencing should be established to delineate exclusions zones. The exclusion fencing should be designed to limit the possibility of native fauna (e.g. koalas) from entering the works areas, whilst also preventing inadvertent damage to habitats that are to be retained.
- Pre-clearance surveys should be undertaken by suitably qualified ecologists 24 hours before clearing to identify any specific habitat features, such as active bird nests and tree hollows that may be harbouring native fauna (e.g. micro-bats).
- The handling of fauna should be avoided where possible and in circumstances where fauna need to be handled, only suitably qualified ecologists or licensed wildlife carers with specific animal handling experience should be used.
- Develop an unexpected threatened species find procedure, should a threatened fauna species be identified during pre-clearing surveys.
- In the event fauna become injured or deceased as a result of clearing and construction activities, then the nominated local animal rescue agency/wildlife care group or veterinarian should be contacted.

The requirements of this environmental safeguard are detailed further in Section 6.2.

6.1.5 Pathogen management

It may be necessary to establish hygiene procedures to prevent the potential introduction and spread of pathogens, Phytophthora (*Phytophthora cinnamomi*) and Chytrid fungus (*Batrachochytrium dendrobatidis*). Phytophthora is a soil-borne fungus that can cause tree dieback, whilst Chytrid fungus is a water-borne fungus, which is potentially harmful to amphibians.

The requirements of this environmental safeguard are detailed further in Section 6.2.

6.1.6 Site revegetation and rehabilitation

It may be necessary to prepare a Revegetation and Rehabilitation Management Plan (RRMP). This plan will focus on the revegetation and rehabilitation of the site where incidental disturbances may occur. The RRMP would be guided by the following principles:

- Re-establish native vegetation that is representative of the vegetation and habitats that may be temporarily disturbed by the proposal. This would specifically involve revegetation plantings of Yellow Box and Blakely's Red Gum, as well other native species that occur in the study area.
- Develop a planting program that achieves a density of trees representative of an open woodland and a patch size similar in extent to what may be potentially cleared.
- Reinstate vegetation so that it may in the future provide the same level of wildlife corridor functionality as that which is to be potentially cleared.

6.1.7 Biodiversity offsets

In accordance with the RMS *Guideline for Biodiversity Offsets November 2011* (RMS, 2011), as the proposal would result in the clearing of less than 1 hectare of White Box Yellow Box Blakely's Red Gum Woodland EEC no offsets are required to be provided.

6.2 SAFEGUARDS AND MANAGEMENT MEASURES

Table 6.1 presents the proposed safeguards and management measures for the proposal.

Table 6.1 Proposed safeguards and management measures for the proposal

Impact	Environmental safeguards	Responsibility	Timing
Vegetation clearing	Tree Protection Zones should be established around the trees that have been identified in the tree protection assessment (refer Appendix D). Tree protection measures should be in accordance with the management measures outlined in the TPP. Pre-clearance surveys should be performed to ensure that threatened flora species that have been assessed as likely occurrences are not present within the site. Develop a threatened species finds procedure.	RMS	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	If a threatened flora species is identified, the threatened species finds procedure should be applied.		
	Exclusion zone fencing should be established prior to the commencement of clearing activities to protect retained vegetation from inadvertent clearing activities.	RMS	Pre-construction
	Vegetation clearing should be limited to the extent required to construct the proposal. Vegetation clearing within the areas of incidental disturbance should be limited to the extent required to establish machinery/vehicle access and the works compound. Trees should be felled directionally away from vegetation and habitat that is to be retained. Where possible retain any tree stumps that are within the riparian zone of Blackjack Creek (10 m from top of bank). Any trees requiring pruning, should be pruned in accordance with the Australian Standard *AS 4373 Pruning of amenity trees*. Stockpiles of cleared vegetation should be kept under two metres high in accordance with RMS's *Stockpile Site Management Guideline*. Vegetation clearing should be undertaken in a manner that prevents the mixing of topsoil with woody vegetation debris. Non-woody vegetation (groundcovers) should be incorporated into the topsoils as organic nutrients for use in rehabilitation activities. Document the outcomes of vegetation clearing process.	RMS	Construction
Habitat loss and modification	Koala feed trees and hollow bearing trees should be identified and clearly marked. Exclusion zone fencing should be established prior to the commencement of clearing activities to protect retained habitat from inadvertent clearing activities.	RMS	Pre-construction
	Pre-clearance surveys should only be undertaken by licensed wildlife carers and/or ecologists 24 hours before clearing commences. Surveys should focus on the potential presence of the koala threatened fauna species that have been assessed as likely occurrences. Tree hollows should be inspected for micro-bats and arboreal mammals (e.g. possums). Koala feed trees should be inspected for individuals of the species. If a koala is identified in a tree, the tree should be re-inspected the next day to see if the koala has moved on. If still present after three days, measures may need to be undertaken to safely remove the individual from the tree. If a threatened fauna species is identified, the threatened species finds procedure should be applied. Any captured fauna species should be released into a pre-determined habitat for fauna release.	RMS	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	Site inductions should include making all staff aware of ecology issues. Licensed wildlife carer and/or ecologist should be on-site for all clearing activities. Habitat removal should be staged when removing hollow bearing trees and koala feed trees. Hollow bearing trees should be dismantled in sections and examined for the presence of fauna species. If a threatened fauna species is identified, the threatened species finds procedure should be applied. Any captured fauna species should be released into a pre-determined habitat for fauna release. Any relocated habitat features, such as large woody debris and hollows should be relocated to a pre-determined location (i.e. local wildlife reserve) under the guidance of an ecologist. Document the outcomes of habitat clearing and the details of hollow bearing tree removal.	RMS	Construction
	Site revegetation and rehabilitation should aim at reinstating a similar level of future wildlife corridor functionality as that to be potentially cleared and would be described in the Landscape plan.	RMS	Post-construction
Injury and mortality	The exclusion fencing should be designed to minimise the possibility of native fauna from entering the works areas.	RMS	Pre-construction
	Speed zones of 50km/hr should be established around the site for the duration of construction to reduce the change of injury or mortality from road strikes. Adequate signage indicating the presence of fauna should be erected around the site to alert motorists to take care.	RMS	Construction
	If any fauna is located in an area of high risk of injury or mortality measures may need to be undertaken to safely remove the individual from the area. Any captured fauna species should be released into a pre-determined habitat for fauna release. If any fauna is injured contact a nominated animal rescue agency/wildlife care group or vet to collect and treat the individual. Report any injury or death of a threatened species to environmental staff.	RMS	Construction

Impact	Environmental safeguards	Responsibility	Timing
Weeds	Site assessments should be undertaken by an ecologist or person trained in weed management to identify, describe and map weed infested areas, including WoNS, National Environmental Alert Weeds and/or noxious weeds within the site and adjacent areas. Areas infected with weeds should be marked with exclusion zone fencing and signage to limit access by personnel and vehicles. Develop a weed management plan.	RMS	Pre-construction
	Site inductions should include making all staff aware of weed management measures on-site. Marked infestations should be managed during construction with a combination of mechanical control methods (slashing or mowing) as well as a range of herbicides. Infested areas should be mowed/slashed before the weeds seed in order to reduce the propagation of new plants. Construction works should move from least to most weed infested areas.	RMS	Construction
	Machinery, vehicles and personnel should be restricted to designated tracks, trails and parking areas. All work activities should begin with clean machinery and vehicles. Machinery, vehicles and footwear should be cleaned at designated wash-down areas before moving to a new location. Any weed-contaminated material should be removed immediately onto suitable trucks without stockpiling on-site. Vehicle loads should be securely covered to prevent weed plant material falling or blowing off vehicles. All weed plant material and topsoil containing weed plant material should be disposed of at an appropriate waste management facility.	RMS	Construction
	Weeds should be separated from native vegetation if native vegetation is to be used for mulch during revegetation and rehabilitation. Any topsoil imported onto the site for revegetation and rehabilitation should be tested to ensure it contains no weed seeds or propagules.	RMS	Post-construction

Impact	Environmental safeguards	Responsibility	Timing
Pests and pathogens	Site assessments should be undertaken by an ecologist or suitably qualified person to identify any areas within the site and adjacent areas that show any sign of pest species or pathogen infection. A soil or water test by a NATA approved laboratory should be undertaken to test for the presence of pathogens such as *Phytophthora* and *Chytrid* fungus. Areas contaminated with pest flora species or pathogens should be marked with exclusion fencing and signage to limit access by personnel and vehicles. Exclusion fencing should be established around sensitive areas within the site to exclude pest fauna species.	RMS	Pre-construction
	Site inductions should include making all staff aware of pest and pathogen management measures on-site. The risk of spreading pathogens and on-site mitigation measures required should be communicated regularly to staff during toolbox talks. Construction works should move from uninfected to infected areas.	RMS	Construction
	Machinery, vehicles and personnel should be restricted to designated tracks, trails and parking spaces. All work activities should begin with clean machinery and vehicles. Machinery, vehicles and footwear should be cleaned at designated wash-down areas before moving to a new location. Works should be minimised or postponed during excessively wet conditions and works should avoid wet or muddy areas. Any potentially infected materials should be retained within the contamination area and separated to avoid spread and potential contamination of uninfected areas. All material containing any pathogens should be disposed of at an appropriate waste management facility.	RMS	Construction
	Any soil or plants imported onto the site for revegetation and rehabilitation should be sourced from a certified supply and/or tested to ensure that it does not contain any pathogens.	RMS	Post-construction
Noise, vibration and light	Site inductions and toolbox talks should include making staff aware of minimising and avoiding unnecessary noise, vibration and use of light. The community should be informed of the approximate duration of the construction works.	RMS	Construction

Impact	Environmental safeguards	Responsibility	Timing
	All works should be conducted within daylight hours from Monday to Saturday. If works occur on a Sunday or beyond daylight hours the community should be informed. All machinery should be well maintained and effectively muffled as per the manufacturer's specification. Machinery should not be left idling for long periods of time. A record of any complaints received should be kept. Details of the complaint should include date, time and duration of nuisance.		

7 Conclusions

The proposal is to be located within highly modified urban parkland which resembles an open grassy woodland and possesses limited and marginal habitat values for native flora and fauna species.

The likelihood of occurrence assessment identified no threatened flora species or threatened ecological communities as likely to occur within the study area. The assessment did however identify seven threatened fauna species as possibly occurring within the study area with one threatened species (Koala) and one endangered ecological community (White Box Yellow Box Blakely's Red Gum Woodland) as confirmed as present.

The results of the assessments of significance '7-Part Tests' under the *Threatened Species Conservation Act 1995* which were completed for the Box Gum Woodland EEC and the eight listed threatened fauna species indicated that the proposal is unlikely to significantly affect the EEC or the threatened species habitats and therefore no Species Impact Statements are considered necessary for the species and communities assessed.

An assessment against the significant impact assessment guidelines in accordance with the *Environmental Protection and Biodiversity and Conservation Act 1999* also revealed no significant impact to listed species which were assessed it is not considered necessary to refer the proposal based it's impacts to these species.

Given the modified urban setting in which the proposal is to be located, the small area of anticipated clearing and the avoidance and mitigation measures proposed the proposal is not expected to significantly impact upon any of the known/potentially occurring threatened or endangered species or their habitats within the site or in the study area.

8 References

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FSC (2005). Recommendation – Degradation of native riparian vegetation along New South Wales water courses, Fisheries Scientific Committee, NSW.

KBR (2014). Gunnedah Second Road Over Rail Bridge – Koala Tree and Habitat Assessment Report. Report prepared for Roads and Maritime Services – Northern Region, NSW.

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Roads and Traffic Authority (2011). Biodiversity Guidelines – Protecting and managing biodiversity on RTA projects, RTA Environment Branch, NSW.

9 Terms and acronyms

CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
DPI	Department of Primary Industries (NSW)
EEC	Endangered Ecological Community
EP&A	Environment Planning and Assessment Act 1979 (NSW)
EPBC	Environment and Biodiversity Conservation Act 1999 (Commonwealth)
ESCP	Erosion and Sediment Control Plan
FM	Fisheries Management Act 1994 (NSW)
FMP	Fauna Management Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage (NSW)
RRMP	Revegetation and Rehabilitation Management Plan
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
TPZ	Tree Protection Zone
TSC	Threatened Species Act 1995 (NSW)
WMP	Weed Management Plan
WoNS	Weeds of National Significance

Appendix A

ATLAS OF NSW WILDLIFE SEARCH RESULTS

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions.
Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°).

Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) ,Commonwealth listed ,CAMBA listed ,JAMBA listed or ROKAMBA listed Entities in selected area [North: -30.92 West: 150.19 East: 150.29 South: -31.02] returned a total of 288 records of 25 species.
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Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records	Info
Animalia	Reptilia	Gekkonidae	2139	*Underwoodisaurus sphyrurus*	Border Thick-tailed Gecko	V,P	V	1	
Animalia	Reptilia	Pygopodidae	2144	*Aprasia parapulchella*	Pink-tailed Legless Lizard	V,P	V	2	
Animalia	Reptilia	Elapidae	2675	*Hoplocephalus bitorquatus*	Pale-headed Snake	V,P		1	
Animalia	Aves	Anatidae	0216	*Oxyura australis*	Blue-billed Duck	V,P		1	
Animalia	Aves	Apodidae	0335	*Apus pacificus*	Fork-tailed Swift	P	C,J,K	1	
Animalia	Aves	Accipitridae	0218	*Circus assimilis*	Spotted Harrier	V,P		1	
Animalia	Aves	Accipitridae	0231	*^^Hamirostra melanosternon*	Black-breasted Buzzard	V,P,3		1	

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records	Info
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*	Little Eagle	V,P		3	
Animalia	Aves	Accipitridae	0230	*^^Lophoictinia isura*	Square-tailed Kite	V,P,3		1	
Animalia	Aves	Scolopacidae	0168	*Gallinago hardwickii*	Latham's Snipe	P	C,J,K	1	
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*	Little Lorikeet	V,P		3	
Animalia	Aves	Psittacidae	0309	*^^Lathamus discolor*	Swift Parrot	E1,P,3	E	1	
Animalia	Aves	Psittacidae	0302	*^^Neophema pulchella*	Turquoise Parrot	V,P,3		1	
Animalia	Aves	Tytonidae	0250	*^^Tyto novaehollandiae*	Masked Owl	V,P,3		1	
Animalia	Aves	Meropidae	0329	*Merops ornatus*	Rainbow Bee-eater	P	J	1	
Animalia	Aves	Climacteridae	8127	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		1	
Animalia	Aves	Acanthizidae	0504	*Chthonicola sagittata*	Speckled Warbler	V,P		3	
Animalia	Aves	Meliphagidae	0598	*Grantiella picta*	Painted Honeyeater	V,P		1	
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*	Varied Sittella	V,P		1	
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	7	

Kingdom	Class	Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records	Info
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*	Koala	V,P	V	248	
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*	Squirrel Glider	V,P		1	
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		3	
Animalia	Mammalia	Vespertilionidae	T315	*Nyctophilus corbeni*	Corben's Long-eared Bat	V,P	V	1	
Plantae	Flora	Surianaceae	6161	*Cadellia pentastylis*	Ooline	V,P	V	2	

Appendix B

EPBC ACT PROTECTED MATTERS SEARCH TOOL RESULTS

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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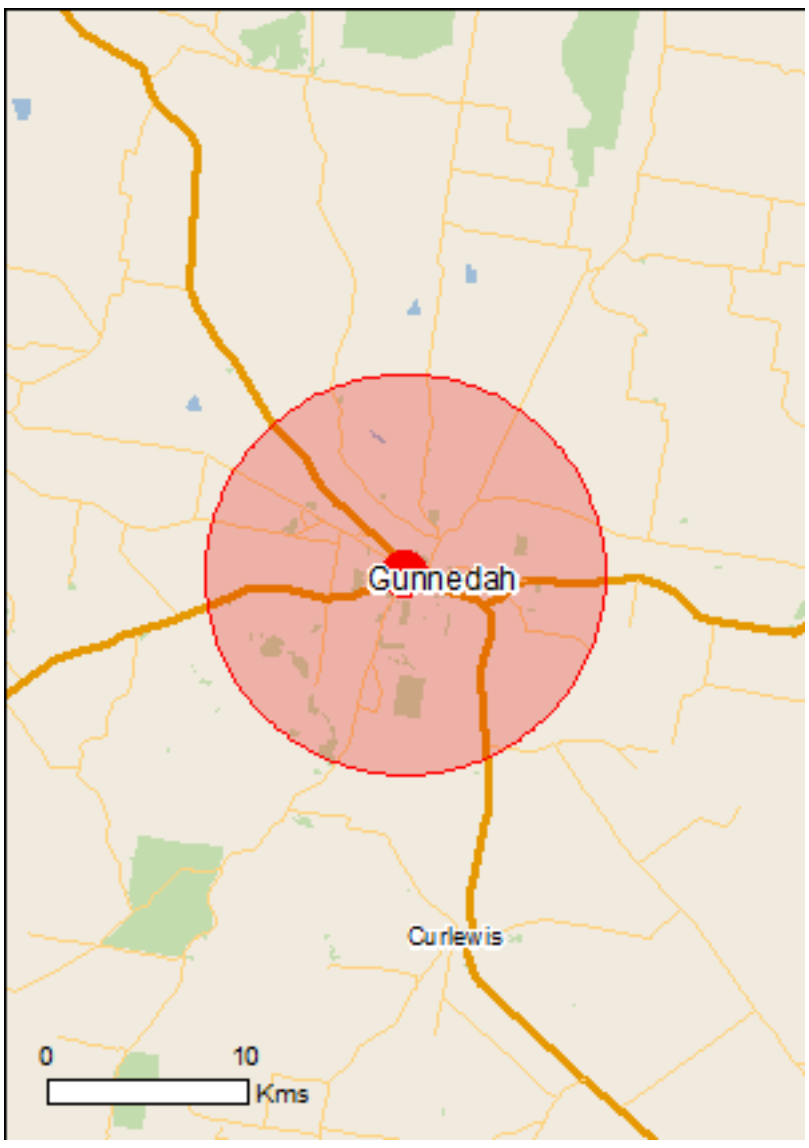

Coordinates

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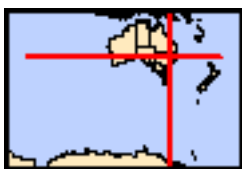

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	19
Listed Migratory Species:	9

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
	None
	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

_____	5
_____	None
_____	None
_____	28
_____	None
_____	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities _____

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Endangered	Foraging, feeding or related behaviour may occur within area
Lathamus discolor		
Swift Parrot [744]	Endangered	Species or species habitat may occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Bidyanus bidyanus		
Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat may occur within area
Maccullochella peelii		
Murray Cod [66633]	Vulnerable	Species or species

Name		
		habitat may occur within area
[Litoria booroolongensis](#)		
Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area
[Chalinolobus dwyeri](#)		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
[Dasyurus maculatus maculatus (SE mainland population)](#)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
[Nyctophilus corbeni](#)		
South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat known to occur within area
[Petrogale penicillata](#)		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
[Cadellia pentastylis](#)		
Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
[Euphrasia arguta](#)		
[4325]	Critically Endangered	Species or species habitat may occur within area
[Philotheca ericifolia](#)		
[64942]	Vulnerable	Species or species habitat likely to occur within area
[Prasophyllum sp. Wybong (C.Phelps ORG 5269)](#)		
a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
[Swainsona murrayana](#)		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
[Thesium australe](#)		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
[Tylophora linearis](#)		
[55231]	Endangered	Species or species habitat may occur within area
[Aprasia parapulchella](#)		
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat known to occur within area
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area

Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land - Australian Telecommunications Commission

Commonwealth Land - Commonwealth Bank of Australia

Apus pacificus Fork-tailed Swift [678]	Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]	Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]	Species or species habitat likely to occur within area

Name		
[Hirundapus caudacutus](#) White-throated Needletail [682]		Species or species habitat may occur within area
[Lathamus discolor](#) Swift Parrot [744]	Endangered	Species or species habitat may occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat may occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Note that not all Indigenous sites may be listed.

[Black Jack Sill](#)	NSW	Registered
[Gunnedah General Cemetery](#)	NSW	Indicative Place
[Ruvigne Homestead Complex](#)	NSW	Indicative Place
[Gunnedah Courthouse](#)	NSW	Registered
[Gunnedah Railway Station](#)	NSW	Registered

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

[Acridotheres tristis](#) Common Myna, Indian Myna [387]	Species or species habitat likely to occur within area
[Alauda arvensis](#) Skylark [656]	Species or species habitat likely to occur within area
[Anas platyrhynchos](#) Mallard [974]	Species or species habitat likely to occur within area

Name	
Carduelis carduelis European Goldfinch [403]	Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]	Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]	Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]	Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]	Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]	Species or species habitat likely to occur within area
Bos taurus Domestic Cattle [16]	Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]	Species or species habitat likely to occur within area
Capra hircus Goat [2]	Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]	Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]	Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]	Species or species habitat likely to occur within area
Mus musculus House Mouse [120]	Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]	Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]	Species or species habitat likely to occur within area
Sus scrofa Pig [6]	Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]	Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]	Species or species habitat likely to occur

Name	
	within area
[Lycium ferocissimum](#) African Boxthorn, Boxthorn [19235]	Species or species habitat likely to occur within area
[Opuntia spp.](#) Prickly Pears [82753]	Species or species habitat likely to occur within area
[Pinus radiata](#) Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]	Species or species habitat may occur within area
[Rubus fruticosus aggregate](#) Blackberry, European Blackberry [68406]	Species or species habitat likely to occur within area
[Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii](#) Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]	Species or species habitat likely to occur within area
[Senecio madagascariensis](#) Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]	Species or species habitat likely to occur within area
[Tamarix aphylla](#) Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]	Species or species habitat likely to occur within area

Coordinates

-30.977 150.24248

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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Appendix C

LIKELIHOOD OF OCCURRENCE ASSESSMENT

Table C1 Likelihood of Occurrence of Threatened Flora and Fauna Species, Populations and Ecological Communities within the Study Area

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Flora					
Cadellia pentastylis (Ooline)	V	V	Occurs in vine thickets or dry rainforest, and more rarely woodlands. It is a relict rainforest species and tends to favour upper and mid slope positions, often with a northerly aspect. It forms a closed or open canopy mixing with Eucalypt and Cypress Pine species and commonly occurs on sandy-loam to clay soils of low to medium fertility.	Unlikely. Database searches revealed that Ooline has been recorded twice within 10km of the site. The species was not identified during field surveys.	This conspicuous species does not occur in the study area, as confirmed by flora surveys. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Euphrasia arguta (Eyebrights)	-	CE	This species has only been recorded in relatively few sites located in the Nandewar Bioregion of northern NSW, in the south-east section of Namoi NRM region. The distribution of the species is very restricted with the extent of occurrence being less than 100km^2. The current known populations are located in the Nundle State Forest (south-east of Tamworth) in eucalypt forest with a mixed grass and shrub understorey.	Unlikely. Database searches revealed that Eyebrights may occur within 10km of the site. The species was not identified during field surveys.	This species does not occur in the study area due to the study area being outside of known distribution. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Philotheca ericifolia	-	V	The species occurs in several NRM regions including Namoi. Occurs in dry sclerophyll forest and heath on damp sandy flats and gullies. It has been collected from a variety of habitats including heath, open woodland, dry sandy creek beds, and rocky ridge and cliff tops. This species distribution overlaps with the Brigalow and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TECs.	Unlikely. Database searches revealed that Philotheca ericifolia may occur within 10km of the site. Potential habitat is present in the study area along Blackjack Creek drainage channel; however the species was not identified during field surveys. This is due to the modified and regularly maintained parkland environment of the study area preventing it from being present or establishing.	Although potential habitat is present in the study area, the species has not been identified during flora surveys, due to the modified parkland environment preventing its presence or establishment. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Prasophyllum sp. Wybong (A Leek-orchid)	-	CE	The species occurs within several NRM regions including Namoi. The species is generally found in shrubby and grassy habitats in dry to wet soil and seven populations are known to occur in open eucalypt woodland and grassland in NSW. This species distribution overlaps with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC.	Unlikely. Database searches revealed that A Leek-orchid may occur within 10km of the site. The vegetation within the study area is open eucalypt woodland but does not contain native grass or shrub understorey that could provide habitat for A Leek-orchid. The species was not identified during field surveys.	There is a lack of preferred habitat for the species within the study area and it was not identified during flora surveys. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Swainsona murrayana (Slender Darling-pea)	V	V	The species grows in heavy grey or brown clay, loam or red cracking clays. It is known to occur in a variety of vegetation types including open Black Box woodland, herbland and grassland communities on level plains, floodplains and depressions. It is often found with low chenopod shrubs (*Maireana* spp.), wallaby-grass (*Austrodanthonia* spp.) and spear grass (*Austrostipa* spp.). This species distribution overlaps with the Brigalow and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derive Native Grassland TECs.	Unlikely. Database searches revealed that Slender Darling-pea may occur within 10km of the site. The vegetation within the survey area is eucalypt woodland but does not contain native grass or shrub understorey that could provide habitat for Slender Darling-pea. The species was not identified during field surveys.	There is a lack of preferred habitat for the species within the study area and it was not identified during flora surveys. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Thesium austral (Austral Toadflax)	V	V	The species is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It occurs in grasslands or grassy woodlands and is often found in damp sites in association with Kangaroo Grass (*Themeda australis*). This species distribution overlaps with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland and Natural grassland on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland TECs.	Unlikely. Database searches revealed that Austral Toadflax may occur within 10km of the site. The ground cover and shrub species present within the study area are unlikely to provide habitat values for Austral Toadflax. The species was not identified during field surveys.	There is a lack of preferred habitat for the species within the study area and it was not identified during flora surveys. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Tylophora linearis	V	E	The species has rarely been collected and is known localities in the Dubbo area and Mt Crow in NSW. It typically grows in dry scrub and open forest *Melaleuca uncinata*, *Eucalyptus fibrosa*, *E. sideroxylon*, *E. albens*, *Callitris endlicheri*, *C. glaucophylla*, *Allocasuarina luehmannii*, *Acacia hakeoides*, *A. lineata*, *Myoporum* spp., and *Casuarina* spp. This species distribution overlaps with Brigalow and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TECs.	Unlikely. Database searches revealed that Tylophora linearis may occur with 10km of the site. Suitable habitat is not present within the survey area and the species was not identified during field surveys.	There is a lack of preferred habitat for the species within the study area and it was not identified during flora surveys. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
TSC Act and/or EPBC Act - Ecological Communities					
TSC Act - Coolibah - Black Box Woodlands of the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions EPBC Act - Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	EEC	E	The distribution of this ecological community includes the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions. This ecological community represents occurrences of one type of eucalypt woodland where (Coolibah, Coolabah (*Eucalyptus coolabah* subsp. *coolabah*) and/or Black Box (*Eucalyptus largiflorens*) are the dominant canopy species and where the understorey tends to be grassy. This community is found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The main tree species in the canopy of the woodland are Coolibah (*Eucalyptus coolabah* subsp. *coolabah*) and/or Black Box (*Eucalyptus largiflorens*). Other trees that may be present include: *Acacia salicina* (Cooba), *Acacia stenophylla* (River Cooba), *Casuarina cristata* (Belah), *Eremophila bignoniiflora* (Eurah), *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus populnea* (Bimble Box, Poplar Box).	Unlikely. Database searches revealed that this EEC/TEC may occur within 10km of the site. The assemblage of flora species identified during field surveys was not representative of this EEC/TEC.	This TEC/EEC is not present in the study area. Therefore, potential impacts upon this EEC/TEC are negligible. No further assessment it required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
TSC Act - Inland Grey Box Woodland in the Riverina; NSW South Western Slopes; Cobar Peneplain; Nandewar and Brigalow Belt South Bioregions EPBC Act - Grey Box (*Eucalyptus microcarpa*) grassy woodlands and derived native grasslands of south-eastern Australia	EEC	E	This ecological community occurs predominately within the Riverina and South West Slopes regions of NSW down to the Victorian border. It also extends across the slopes and plains in Central and Northern NSW up to the Queensland Border. Inland Grey Box Woodland includes those woodlands in which the most characteristic tree species, *Eucalyptus microcarpa* (Inland Grey Box), is often found in association with *E. populnea* subsp. bimbil (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box), and sometimes with *E. albens* (White Box). A variable ground layer of grass species is present at most sites, but may be absent at severely disturbed sites. The community generally occurs as an open woodland 15–25m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey.	Unlikely. Database searches revealed that this EEC/TEC may occur within 10km of the site. The assemblage of flora species identified during field surveys was not representative of this EEC/TEC.	This EEC/TEC is not present in the study area. Therefore, potential impacts upon this EEC/TEC are negligible. No further assessment it required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
TSC Act - Myall Woodland in the Darling Riverine Plains; Brigalow Belt South; Cobar Peneplain; Murray-Darling Depression; Riverina and NSW South Western Slopes bioregions EPBC Act - Weeping Myall Woodlands	EEC	E	This ecological community occurs in inland alluvial plains west of the Great Dividing Range in NSW and Queensland, scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. It occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Brigalow Belt North, Murray-Darling Depression, Nandewar and Cobar Peneplain Bioregions. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present.	Unlikely. Database searches revealed that this EEC/TEC may occur within 10km of the site. The assemblage of flora species identified during field surveys was not representative of this EEC/TEC.	This EEC/TEC is not present in the study area. Therefore, potential impacts upon this EEC/TEC are negligible. No further assessment it required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
TSC Act - Native Vegetation on Cracking Clay Soils of the Liverpool Plains EPBC Act – Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland	EEC	CE	This ecological community occurs from the Darling Downs in Queensland to Dubbo in NSW and incorporates the Liverpool and Moree Plains. Within this broad geographic extent, the distribution is concentrated in three major occurrences in the Darling Downs west of Toowoomba, the Liverpool Plains around Gunnedah and the Moree Plains north-west of Moree. It is mainly a native grassland community which includes a range of small forb and herb species. The main grass species include Plains Grass (*Austrostipa aristiglumis*), Queensland Bluegrass (*Dichanthium sericeum*) and Coolibah Grass (*Panicum queenslandicum*). It also contains scattered and patchy shrubs and trees, including Weeping Myall (*Acacia pendula*), Rough-barked Apple (*Angophora floribunda*), Fuzzy Box (*Eucalyptus conica*), Bimble Box (*E. populnea*) and Yellow Box (*E. melliodora*). In wetter locations rushes and sedges are common.	Unlikely. Database searches revealed that this EEC/TEC may occur within 10km of the site. The assemblage of flora species identified during field surveys was not representative of this EEC/TEC.	This EEC/TEC is not present in the study area. Therefore, potential impacts upon this EEC/TEC are negligible. No further assessment it required.
TSC Act - White Box Yellow Box Blakely's Red Gum Woodland EPBC Act - White Box-Yellow Box-Blakely's Red Gum grassy woodland and derived native grassland	EEC	CE	This ecological community occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria. It 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 (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E. blakelyi*). Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs.	**Known to occur.** Database searches revealed that this EEC/TEC is likely to occur within 10km of the site. Planted vegetation within the study area has an assemblage of flora species that constitutes the TSC Act definition for this EEC. The planted vegetation within the study area does not constitute the EPBC Act definition for this TEC.	Due to the confirmed presence of this EEC, an assessment of significance'7-Part Test' has been undertaken for this EEC in Section 5 of the report. The vegetation in the study area does not constitute the EPBC Act definition for this TEC; therefore no further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Fish					
Bidyanus bidyanus (Silver Perch)	-	CE	The species are endemic to the Murray-Darling system including all states and sub-basins. It is commonly described as a lowland species that is not found in the cooler upper reaches of rivers. It is generally found in faster-flowing water, including rapids and races, and more open sections of river, throughout the Murray-Darling Basin	Unlikely. Database searches revealed that the Silver Perch may occur with 10km of the site. Field surveys determined that Blackjack Creek does not provide suitable habitat to support fish species.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Maccullochella peelii peelii (Murray Cod)	-	V	The species occurs naturally in waterways of the Murray-Darling Basin. It is found in a range of flowing and standing waters from clear rocky streams on the inland slopes and uplands of the Great Diving Range to slow flowing, turbid rivers and billabongs of the inland plains of the Murray-Darling Basin. It is usually found near large rocks, snags, overhanging vegetation and other woody structures.	Unlikely. Database searches revealed that the Murray Cod may occur within 10km of the site. Field surveys determined that Blackjack Creek does not provide suitable habitat to support fish species.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Amphibians					
Litoria booroolongensis (Booroolong Frog)	E	E	The species is restricted to tablelands and slopes in NSW and north-east Victoria. Several populations have recently been recorded in the Namoi catchment. Found along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses and occurs in a wide range of stream types from small flowing creeks to large rivers.	Unlikely. Database searches revealed that the Booroolong Frog may occur within 10km of the site. Blackjack Creek is unlikely to provide habitat for Booroolong Frog as it is ephemeral and the species is only known to inhabit permanent streams. Field surveys did not identify the species or potential habitat within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Reptiles					
Aprasia parapulchella (Pink-tailed Legless Lizard)	V	V	The species is only known from the Central and Southern Tablelands and the South Western Slopes. It occurs in a patchy distribution along the foothills of the western slopes of the Great Dividing Range, between Bendigo in Victoria and Gunnedah in NSW. Favours sloping open woodland areas with native grassland (particularly Kangaroo Grass) and rocky outcrops or scattered, partially buried rocks. Commonly found beneath small, partially-embedded rocks.	Unlikely. Database searches revealed that the Pink-tailed Legless Lizard has been recorded twice within 10km of the site. The lack of preferred habitat features and potential foraging and sheltering resources within the parkland environment makes the study area unfavourable for the species. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Hoplocephalus bitorquatus (Pale-headed Snake)	V	-	The species occurs in a patchy distribution from north-east Queensland to the north-eastern quarter of NSW. Found mainly in dry Eucalypt forests and woodlands, Cypress woodland and occasionally in rainforest or moist Eucalypt forest. Favours streamside areas, particularly in drier habitats. It seeks shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees.	Unlikely. Database searches revealed that the Pale-headed Snake has been recorded once within 10km of the site. The lack of preferred habitat features and potential foraging and sheltering resources within the parkland environment makes the study area unfavourable for the species. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Underwoodisaurus sphyrurus (Border Thick-tailed Gecko)	V	V	The species only occurs on the northern slopes and tablelands of NSW and is most commonly found on granite in the New England area. Its distribution overlaps with Brigalow and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TECs. Favours forest and woodland areas on steep rocky or scree slopes, with boulders, rock slabs, fallen timber and deep leaf litter.	Unlikely. Database searches revealed that the Border Thick-tailed Gecko has been recorded once within 10km of the site. The lack of preferred habitat features and potential foraging and sheltering resources within the parkland environment makes the study area unfavourable for the species. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Birds					
Anthochaera phrygia (Regent Honeyeater)	CE	E	In NSW the distribution is very patchy and mainly confined to the two main breeding areas, Capertee Valley and the Bundarra-Barraba region, and surrounding fragmented woodlands. Occurs in dry eucalypt woodland and open forest, woodland, rural and urban areas with mature eucalypts. It favours ironbark-box associations, including White Box (*Eucalyptus sideroxylon*), Yellow Box (*E. albens*), Swamp Mahogany (*E. melliodora*) and River Oak (*Casuarina cunninghamiana*) in riparian forest, which generally comprise large trees that are reliable nectar producers.	**Possible.** Database searches revealed that the Regent Honeyeater may occur within 10km of the site. Open woodland is present within the study area and may provide some habitat and foraging resources for the Regent Honeyeater. However due to the modified nature of the woodland and exotic understorey, the vegetation within the study area provides marginal habitat values in contrast to more preferential habitat values that occur throughout the locality. Field surveys did not identify the species within the study area.	This species may possibly occur periodically within the study area. An assessment of significance '7-Part Test' has been undertaken in for this species in Section 5 of the report. A significant impact assessment in accordance with EPBC Act significant impact guideline 1.1 has been undertaken in for this species in Section 5 of the report.
Circus assimilis (Spotted Harrier)	V	-	The species occurs throughout the Australian mainland. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Unlikely. Database searches revealed that the Spotted Harrier has been recorded once within 10km of the site. However, it is not often recorded in urban areas, preferring open agricultural landscapes and extensive native vegetation where prey is more abundant. The study area's parkland environment provides limited if not negligible habitat values for this highly mobile species. Field surveys did not identify the species within the study area.	This highly mobile species is unlikely to utilise the study area's limited habitat values. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Climacteris picumnus (Brown Treecreeper eastern subspecies)	V	-	The species is endemic to eastern Australia and occurs in eucalypt forests and woodland of inland plains and slopes of the Great Dividing Range. The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands. Mainly inhabits woodlands dominated by stringybarks or other rough-barked Eucalypts, usually with a grassy understorey. Fallen timber is an important habitat component for foraging.	Unlikely. Database searches revealed that the Brown Treecreeper has been recorded once within 10km of the site. It is unlikely to occur due to a lack of rough barked trees and fallen woody debris within the study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Daphoenositta chrysoptera (Varied Sittella)	V	-	The species inhabits most of mainland Australia, except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Occurs in eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland.	Unlikely. Database searches revealed that the Varied Sittella has been recorded once within 10km of the site. It is unlikely to occur due to a lack of rough barked trees and fallen woody debris within the study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Glossopsitta pusilla (Little Lorikeet)	V	-	The species is distributed widely across the coastal and Great Divide regions of eastern Australia. NSW provides a large portion of the species core habitat. Forages primarily in the canopy of open Eucalypt forest and woodland. Riparian habitats are particularly used, due to higher soil fertility. It is also found in isolated flowering trees in open country, e.g. paddocks and roadside remnants. It nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts.	**Possible.** Database searches revealed that the Little Lorikeet has been recorded three times within 10km of the site, including one record in the Wandobah Reserve located adjacent to the study area. The study area supports potential foraging resources and temporary roosting sites that may be used by this locally nomadic species. Limited hollow bearing tree nest sites are present in the study area. Field surveys did not identify the species within the study area.	The potential minor loss of Eucalypt trees that support potential roosting, foraging and nesting resources across the study area is relatively insignificant in the local area context. The overall degree of impact upon potential habitat for the Little Lorikeet is considered to be relatively low. However, due to the possibility of the species periodically occurring within the study area an assessment of significance '7-Part Test' has been undertaken in Section 5 of the report.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Grantiella picta (Painted Honeyeater)	V	-	The greatest concentration of the species and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree, Brigalow and Box-Gum woodlands and Box-Ironbark forests, feeding on the fruits of mistletoes growing on woodland Eucalypts and Acacias.	Unlikely. Database searches reveal that the Painted Honeyeater has been recorded once within 10km of the study area. Preferred habitat is not available in the study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as no suitable habitat occurs in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Hamirostra melanosternon (Black-breasted Buzzard)	V	-	The species is found sparsely in north-western NSW in areas of less than 500mm rainfall. Lives in a range of habitats, especially along timbered watercourses which is the preferred breeding habitat. It also hunts over grasslands and sparsely timbered woodlands.	Unlikely. Database searches revealed that the Black-breasted Buzzard has been recorded once within 10km of the site. However, it is not often recorded in urban areas, preferring open agricultural landscapes and extensive native vegetation where prey is more abundant. The study area's parkland environment provides limited if not negligible habitat values for this highly mobile species. Field surveys did not identify the species within the study area.	This highly mobile species is unlikely to utilise the study area's limited habitat values. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Hieraaetus morphnoides (Little Eagle)	V	-	The species is found throughout the Australian mainland except in the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occurs in open eucalypt forest, woodland or open woodland. *Acacia* woodlands and riparian woodlands of interior NSW are also used. It nests in tall living trees within a remnant patch.	Unlikely. Database searches revealed that the Little Eagle been recorded three times within 10km of the site. The study area's parkland environment provides limited if not negligible habitat values for this highly mobile species. Field surveys did not identify the species within the study area.	This highly mobile species is unlikely to utilise the study area's limited habitat values. Therefore, potential impacts upon this species are unlikely.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Lathamus discolour (Swift Parrot)	E	E	The species occurs as a single migratory population that breeds in Tasmania during the summer months and spend the remainder of the year in south-eastern mainland Australia. Inhabits eucalypt forests and woodlands, plantations and banksias; street trees, parks and gardens. On mainland Australia, they mainly inhabit dry open eucalypt forests and woodlands, usually box–ironbark communities, especially those with Red Ironbark, Mugga Ironbark, Grey Box, White Box and Yellow Gum. Swift Parrots also often occur in urban areas.	**Possible.** Database searches revealed that the Swift Parrot has been recorded once within 10km of the site. Open woodland is present within the study area and may support potential foraging and roosting resources for the species. However due to the modified nature of the woodland, the vegetation within the study area is unlikely to provide core habitat value and is considered to provide marginal habitat values in context of habitat availability within the broader area. In addition the Swift Parrot breeds in Tasmania and does not have breeding habitat on the Australian mainland and subsequently does not have breeding habitat within the study area. Field surveys did not identify the species within the study area.	The potential minor loss of Eucalypt trees that support potential foraging and roosting resources across the study area is relatively insignificant in the local area context. The overall degree of impact upon potential habitat for the Swift Parrot is considered to be relatively low. However, due to the possibility of the species periodically occurring within the study area an assessment of significance '7-Part Test' has been undertaken in for this species in Section 5 of the report. A significant impact assessment in accordance with EPBC Act significant impact guideline 1.1 has been undertaken in for this species in Section 5 of the report.
Lophoictinia isura (Square-tailed Kite)	V	-	In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is found in a variety of habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.	Unlikely. Database searches revealed that the Square-tailed Kite been recorded once within 10km of the site. The study area's parkland environment provides limited if not negligible habitat values for this highly mobile species. Field surveys did not identify the species within the study area.	This highly mobile species is unlikely to utilise the study area's limited habitat values. Therefore, potential impacts upon this species are unlikely.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Neophema pulchella (Turquoise Parrot)	V	-	The species range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. It lives on edges of Eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Unlikely. Database searches reveal that the Turquoise Parrot has been recorded once within 10km of the site. It is unlikely to occur due to a lack of favourable foraging habitat as a result of ongoing parkland maintenance (mowing). Limited nesting resources (tree hollows) are present. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Oxyura australis (Blue-billed duck)	V	-	The species is endemic to south-eastern and south-western Australia, being widespread in NSW but most common in the southern Murray-Darling Basin area. It is completely aquatic and prefers deep water in permanent wetlands and swamps with dense aquatic vegetation.	Unlikely. Database searches revealed that the Blue-billed duck has been recorded once within 10km of the site. It is unlikely to occur due to a lack of permanent wetland and swamp habitats in the study area that are preferred by the species. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Polytelis swainsonii (Superb Parrot)	V	V	The species is endemic to inland south-eastern Australia, where it occurs from south-eastern Queensland through the inland slopes and plains of New South Wales west of the Great Dividing Range. Mainly inhabits forest and woodlands dominated by eucalypts, especially River Red Gums, Yellow Box or Grey Box. The species also seasonally occurs in box-pine and Boree woodlands. Nests in small colonies in the hollows of large trees, mainly in tall riparian River Red Gum forest or woodland.	**Possible.** Database searches revealed that the Superb Parrot is known to occur within the Gunnedah local government area. The open woodland within the study area could potentially support roosting and foraging resources for the Superb Parrot. Therefore, the species may possibly occur periodically when moving between larger more preferential habitats. Field surveys did not identify the species within the study area.	The potential minor loss of Eucalypt trees that support potential foraging and roosting resources across the study area is relatively insignificant in the local area context. The overall degree of impact upon potential habitat for the Superb Parrot is considered to be relatively low. However, due to the possibility of the species periodically occurring within the study area an assessment of significance '7-Part Test' has been undertaken in for this species in Section 5 of the report.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
					A significant impact assessment in accordance with EPBC Act significant impact guideline 1.1 has been undertaken in for this species in Section 5 of the report.
Pyrrholaemus saggitatus (Speckled Warbler)	V	-	The species has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria. It is most frequently reported from the hills and tableland of the Great Dividing Range. Lives in a wide range of Eucalypt dominated communities that have a grassy understorey and often on rocky ridges or in gullies. Typical habitat includes 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.	Unlikely. Database searches revealed that the Speckled Warbler has been recorded three times within 10km of the site. The disturbed nature of the study area does not provide favourable habitat for the species. Therefore it is unlikely to occur in the study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Rostratula australis (Australian Painted Snipe)	E	V	The species is endemic to Australia and has been recorded at wetlands in all states and territories. It is most common in eastern Australia at scattered locations through much of Queensland, NSW and Victoria. Inhabits well-vegetated shallows and margins of wetlands, dams, sewage ponds and other water courses; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub and open timber.	Unlikely. Database searches revealed that the Australia Painted Snipe may occur within 10km of the site. Potential habitat (wetlands, natural or constructed) is not present within the study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Tyto novaehollandiae (Masked Owl)	V	-	In NSW the species extends from the coast where it is most abundant to the western plains. There is no seasonal variation in its distribution. Roosts and breeds in moist Eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. It lives in dry Eucalypt forests and woodlands.	Unlikely. Database searches revealed that the Masked Owl has been recorded once within 10km of the site. Preferred habitat is not present in the study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Mammals					
Chalinolobus dwyeri (Large-eared Pied Bat)	V	V	The species current distribution is poorly known, but much of the known distribution is within NSW, with scattered records from the New England Tablelands and North West Slopes. Requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. It roosts in caves, crevices in cliffs, old mine workings and disused Fairy Martin (*Hirundo ariel*) nests, frequenting dry open forest and woodland close to these features.	**Possible.** Database searches revealed that the Large-eared Pied Bat may occur within 10km of the site. The open woodland may provide temporary roosting sites for the species. Blackjack Creek and associated open woodland provides a foraging resource for the Large-eared Pied Bat, but is only a minor part of such habitats within the locality. Field surveys did not identify the species within the study area.	The minor loss of potential roost sites is unlikely to adversely affect this species. However, due to the possibility of the species periodically roosting and foraging within the study area, a**n** assessment of significance '7-Part Test' has been undertaken in for this species in Section 5 of the report. A significant impact assessment in accordance with EPBC Act significant impact guideline 1.1 has been undertaken in for this species in Section 5 of the report.
Dasyurus maculatus maculatus (Spotted-tail Quoll)	V	E	The species has historically been recorded in a wide range of habitat types including dry and moist sclerophyll forests and woodlands, rainforest, coastal heathland, and riparian forest, however it is now generally regarded as rare to uncommon in most of these habitats. In NSW the species records are generally confined to within 200km of the coast and range from the Queensland border to Kosciuszko National Park. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves. Individuals also require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage.	Unlikely Database searches revealed that the Spotted-tail Quoll has been recorded seven times within 10km of the site. Preferred habitat is not present in study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Nyctophilus corbeni (Corben's Long-eared Bat)	V	V	Its distribution coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct area for the species. Inhabits a variety of vegetation types, including mallee, bulloke (*Allocasuarina leuhmanni*) and box eucalypt dominated communities, but it is distinctly more common in inland woodland vegetation types, including box, ironbark and cypress pine woodlands. Foraging activities are concentrated around patches of trees in the landscape. Individuals appear to have defined foraging areas which they return to.	**Possible.** Database searches revealed that the Corben's Long-eared Bat has been recorded once within 10km of the site. The open woodland may provide temporary roosting sites for the species. Blackjack Creek and associated open woodland provides a foraging resource for the species and is only a minor part of such habitats within the locality. Field surveys did not identify the species within the study area.	The minor loss of potential roost sites is unlikely to adversely affect this species. However, due to the possibility of the species periodically roosting and foraging within the study area, an assessment of significance '7-Part Test' has been undertaken in for this species in Section 5 of the report. A significant impact assessment in accordance with EPBC Act significant impact guideline 1.1 has been undertaken in for this species in Section 5 of the report.
Petaurus norfolcensis (Squirrel Glider)	V	-	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	Unlikely. Database searches revealed that the Squirrel Glider has been recorded once within 10km of the site. Preferred habitat is not present in study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Petrogale penicillata (Brush-tailed Rock-wallaby)	E	V	The species range roughly follows the line of the Great Dividing Range. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Habitat critical to the survival of the species includes rocky refuge habitat, foraging habitat and commuting routes between the two. It occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. The species browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.	Unlikely. Database searches revealed that the Brush-tailed Rock-wallaby may occur with 10km of the site. Preferred habitat is not present in study area Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Potential for Impact
Phascolarctos cinereus (Koala)	V	V	In NSW the highest densities of the species in occur on the North Coast and Central Coast. There are also some dense occurrences of the Koala in the Pilliga region and in the Gunnedah and Walgett local government areas, on the north-western slopes and plains Habitat is influenced by altitude, temperature and leaf moisture. It inhabits Eucalypt woodlands and forests, spending most of its time in trees. It feeds on the foliage of more than 70 Eucalypt and 30 non-Eucalypt species.	**Known to occur.** Gunnedah is well known for supporting a large population of the Koala. The study area is an area where the species is known to occur periodically when moving between more preferential habitats. Secondary koala feed trees species are present within the study area. Koala scats were identified below one of these feed trees in the study area.	The removal of mature Eucalypt species may reduce the foraging and sheltering resources for the Koala within the local area. However the habitat within the study area is of low quality and is unlikely to provide core habitat values for this species. In addition high quality habitat is present within close proximity to the study area throughout the broader landscape. An assessment of significance '7-Part Test' has been undertaken in for this species in Section 5 of the report. A significant impact assessment in accordance with EPBC Act significant impact guideline 1.1 has been undertaken in for this species in Section 5 of the report.
Saccolaimus flaviventris (Yellow-bellied Sheathtail-bat)	V	-	The species is wide-ranging found across northern and eastern Australia. There are scattered records of the species across the New England Tablelands and North West Slopes. Roosts in tree hollows and buildings. If there are no trees within an area, it is known to occupy mammal burrows. It forages in most habitats across its range, with or without trees.	**Possible.** Database searches revealed that the Yellow-bellied Sheathtail-bat has been recorded three times within 10km of the site. The open woodland may provide temporary roosting sites for the species. Blackjack Creek and associated open woodland provides a foraging resource for the species and is only a minor part of such habitats within the locality. Field surveys did not identify the species within the study area.	The minor loss of potential roost sites is unlikely to adversely affect this species. However, due to the possibility of the species periodically roosting and foraging within the study area, an assessment of significance'7-Part Test' has been undertaken in for this species in Section 5 of the report.

Sources: EPBC Act and TSC Act

Key: CE: Critically Endangered, E: Endangered, V: Vulnerable,

Note: This table excludes migratory species.

Table C2 Likelihood of Occurrence of Migratory Fauna Species in the Study Area

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Likely Level of Impact
Apus pacificus (Fork-tailed Swift)	-	M	The species is recorded in all regions of NSW, with many records occurring east of the Great Divide and a few populations located west of the Great Divide. Almost exclusively aerial and mostly occurs over dry or open habitats including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. The species can occur over a wide range of open country, from semi-deserts to coasts, islands and sometimes forests and cities.	**Possible.** Database searches revealed that the Fork-tailed Swift has been recorded once within 10km of the site. May possibly occur periodically within the study area. No important habitat for the Fork-tailed Swift is present within the study area. Field surveys did not identify the species within the study area.	Even though this species is a possible occurrence, the proposed activities are unlikely to impact habitat of importance to this highly mobile nomadic species. No further assessment is required.
Ardea alba (Great Egret)	-	M	The species are widespread in Australia, occurring in all areas across the mainland. Colonies are known in the Darling Riverine Plains regions of NSW and the Riverina region of NSW and Victoria. Reported in a wide range of wetland habitat including inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial. The species usually frequents shallow waters.	Unlikely. Database searches revealed that the Great Egret may occur within 10km of the site. No key habitat values (wetlands, natural or constructed) are present within the study area. Potential vagrant visitor to the broader area. No important habitat is present within study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Ardea ibis (Cattle Egret)	-	M	The species occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass - it avoids low grass pastures. It is commonly associated with the habitats of farm animals, particularly cattle, but also pigs, sheep, horses and deer.	**Possible.** Database search results revealed that the Cattle Egret may occur within 10km of the site. No open wet grasslands or wetlands are present within the study area. Potential vagrant visitor to the broader area. No important habitat is present within study area. Field surveys did not identify the species within the study area.	Even though this species is a possible occurrence, the search is unlikely to impact habitat of importance to this highly mobile nomadic species. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Likely Level of Impact
Gallinago hardwickii (Latham's Snipe)	-	M	The species is a non-breeding visitor to south-eastern Australia with its range extending inland over the eastern tablelands in south-eastern Queensland and to west of the Great Dividing Range in NSW. Occurs in permanent and ephemeral wetlands up to 200m above sea level and usually inhabits open freshwater wetlands with low, dense vegetation. It favours soft wet ground or shallow water with tussocks with other green or dead growth, wet parts of paddocks, seepage below dams, irrigated areas, scrub or open woodland from sea level to alpine bogs over 2000m, samphire on salt marshes, mangrove fringes.	Unlikely. Database searches revealed that the Latham's Snipe has been recorded once within 10km of the site. No key habitat values (wetlands, natural or constructed) are present within the study area. Potential vagrant visitor to the broader area. No important habitat is present within study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Haliaeetus leucogaster (White-bellied Sea-Eagle)	-	M	The species is found along the coastline of Australia and also extends inland along some of the larger waterways, particularly in eastern Australia. Habitats occupied by the species are characterised by the presence of large areas of open water (larger rivers, swamps, lakes). Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and some urban areas.	Unlikely. Database searches revealed that the White-bellied Sea-Eagle may occur within 10km of the site. No habitat or foraging resources for this species are present within the study area. Potential vagrant or overhead visitor of the broader area. No important habitat is present within study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Hirundapus caudacutus (White-throated Needletail)	-	M	The species is widespread in eastern and south-eastern Australia. It occurs in coastal regions in Queensland and NSW, extending inland to the western slopes of the Great Divide. Almost exclusively aerial from heights of less than 1 m up to more than 1000 m above the ground. It is most often recorded above wooded areas, including open forest and rainforest, and is also commonly recorded over heathland and coastal cliffs.	Unlikely. Database searches revealed that the White-throated Needletail may occur within 10km of the site. May be observed overhead and is a potential vagrant visitor to the broader area. No important habitat is present within study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Species	TSC Act Status	EPBC Act Status	Habitat	Likelihood of Occurrence	Likely Level of Impact
Merops ornatus (Rainbow Bee-eater)	-	M	The species is distributed across much of mainland Australia and occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats. It usually occurs in open, cleared or lightly-timbered areas sometimes in close proximity to permanent water. It also occurs in inland and coastal dune systems, and in mangroves in northern Australia.	**Possible** Database searches revealed that the Rainbow Bee-eater has been recorded once within 10km of the site. The study area could potentially provide habitat and foraging resources for the Rainbow Bee-eater, however in context of habitat and foraging availability in the broader area it is of minimal value to this species. Potential vagrant visitor to the broader area. No important habitat is present within study area. Field surveys did not identify the species within the study area.	Even though this species is a possible occurrence, the proposed activities are unlikely to impact habitat of importance to this highly mobile nomadic species. No further assessment is required.
Myiagra cyanoleuca (Satin Flycatcher)	-	M	The species is widespread in eastern Australia, with widespread distribution in NSW east of the Great Divide and sparsely scattered on the western slopes. Inhabits heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occurs in coastal forests, woodlands, mangroves and drier woodlands and open forests. It mainly inhabits eucalypt forests, often near wetlands or watercourses and also occurs in eucalypt woodlands with open understorey and grass ground cover.	Unlikely Database searches revealed that the Satin Flycatcher may occur within 10km of the site. No key habitat values for the Satin Flycatcher are present within the study area. Potential vagrant visitor to the broader area. No important habitat is present within study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.
Rostratula benghalensis s. lat. (Painted Snipe)	-	M	The species is endemic to Australia and has been recorded at wetlands in all states and territories. It is most common in eastern Australia at scattered locations through much of Queensland, NSW and Victoria. Inhabits well-vegetated shallows and margins of wetlands, dams, sewage ponds and other water courses; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub and open timber.	Unlikely. Database searches revealed that the Painted Snipe may occur within 10km of the site. No key habitat values (wetlands, natural or constructed) are present within the study area. Potential vagrant visitor to the broader area. No important habitat is present within study area. Field surveys did not identify the species within the study area.	This species is unlikely to occur, as preferred habitat does not occur in the study area. Therefore, potential impacts upon this species are unlikely. No further assessment is required.

Sources: EPBC Act and TSC Act.

Key: CE: Critically Endangered, M: Migratory

Appendix D

TREE PROTECTION ZONE ASSESSMENTS

Table D1 Tree Protection Zone Assessment

Tree No.	Impacted or protection required?	Tree species	Primary or Secondary feed tree	Height (m)	Health/condition	Diameter at Breast Height (cm)	Tree Protection Zone (m)	Easting	Northing
1	Establish TPZ	Blakely's Red Gum	Secondary	9	Good	31	3.72	236681.732	6569820.466
2	Impacted	Blakely's Red Gum	Secondary	13	Good	19	2.28	236630.833	6569735.969
3	Impacted	Blakely's Red Gum	Secondary	14	Good	25	3.00	236637.469	6569735.420
4	Impacted	Yellow Box	Secondary	13	Very good	33	3.96	236636.308	6569722.286
5	Impacted	Blakely's Red Gum	Secondary	16	Good	23	2.76	236641.337	6569708.187
6	Establish TPZ	Blakely's Red Gum	Secondary	16	Very good	34	4.08	236651.374	6569706.265
7	Establish TPZ	Blakely's Red Gum	Secondary	14	Very good	34	4.08	236656.415	6569706.668
8	Establish TPZ	Blakely's Red Gum	Secondary	12	Good	20	2.40	236662.966	6569705.334
9	Establish TPZ	Yellow Box	Secondary	15	Very good	45	5.40	236647.910	6569699.567
10	Establish TPZ	Yellow Box	Secondary	18	Good	43	5.16	236655.400	6569696.546
11	No	Yellow Box	Secondary	14	Very good	33	3.96	236660.454	6569695.329
12	Establish TPZ	Blakely's Red Gum	Secondary	14	Good	35	4.20	236655.913	6569689.327
13	Impacted	Yellow Box	Secondary	13	Very good	38	4.56	236649.144	6569689.349
14	Impacted	Yellow Box	Secondary	14	Good	39	4.68	236649.246	6569681.229
15	Establish TPZ	Blakely's Red Gum	Secondary	13	Good	28	3.36	236657.184	6569683.674
16	No	Blakely's Red Gum	Secondary	15	Very good	41	4.92	236666.488	6569684.000
17	Impacted	Blakely's Red Gum	Secondary	13	Good	39	4.68	236652.546	6569671.317
18	Establish TPZ	Blakely's Red Gum	Secondary	14	Good	31	3.72	236660.437	6569673.974
19	No	Blakely's Red Gum	Secondary	18	Very good	38	4.56	236669.934	6569677.022
20	No	Blakely's Red Gum	Secondary	5	Very good	8	9.60	236678.316	6569676.313
21	Impacted	Yellow Box	Secondary	18	Very good	38	4.56	236657.724	6569664.303
22	Impacted	Yellow Box	Secondary	16	Very good	44	5.28	236663.371	6569657.059
23	Impacted	Blakely's Red Gum	Secondary	14	Poor	26	3.12	236666.866	6569661.454
24	Establish TPZ	Blakely's Red Gum	Secondary	14	Good	38	4.56	236671.109	6569661.047
25	Impacted	Yellow Box	Secondary	19	Good	40	4.80	236670.432	6569654.944
26	No	Blakely's Red Gum	Secondary	15	Very good	48	5.76	236684.903	6569666.654
27	No	Yellow Box	Secondary	15	Very good	39	4.68	236683.940	6569660.527
28	Establish TPZ	Yellow Box	Secondary	16	Good	36	4.32	236680.532	6569655.260
29	Impacted	Yellow Box	Secondary	13	Good	35	4.20	236674.923	6569648.612
30	Establish TPZ	Yellow Box	Secondary	12	Moderate	39	4.68	236680.809	6569646.805
31	Establish TPZ	Yellow Box	Secondary	14	Very good	24	2.88	236685.557	6569645.142
32	No	Blakely's Red Gum	Secondary	17	Very good	54	6.48	236690.147	6569650.855

Tree No.	Impacted or protection required?	Tree species	Primary or Secondary feed tree	Height (m)	Health/condition	Diameter at Breast Height (cm)	Tree Protection Zone (m)	Easting	Northing
33	Impacted	Blakely's Red Gum	Secondary	13	Very good	37	4.44	236659.603	6569600.713
34	Impacted	Yellow Box	Secondary	17	Very good	59	7.08	236651.379	6569596.237
35	Establish TPZ	Yellow Box	Secondary	15	Very good	47	5.64	236637.796	6569593.886
36	Establish TPZ	Yellow Box	Secondary	16	Good	63	7.56	236632.075	6569589.549
37	Establish TPZ	Yellow Box	Secondary	14	Very good	31	3.72	236620.095	6569591.384
38	No	Yellow Box	Secondary	14	Moderate	22	2.64	236618.878	6569599.194
39	No	Yellow Box	Secondary	15	Moderate	24	2.88	236617.038	6569607.363
40	No	Yellow Box	Secondary	20	Good	70	8.40	236626.947	6569607.399
41	Impacted	Yellow Box	Secondary	20	Very good	73	8.76	236660.862	6569620.260
42	Impacted	Yellow Box	Secondary	16	Good	40	4.80	236648.747	6569627.420
43	No	Yellow Box	Secondary	18	Very good	50	6.00	236629.069	6569619.885
44	No	Yellow Box	Secondary	18	Good	49	5.88	236616.500	6569616.528
45	No	Blakely's Red Gum	Secondary	10	Very good	20	2.40	236608.622	6569617.375
46	Establish TPZ	Blakely's Red Gum	Secondary	19	Very good	35	4.20	236633.110	6569626.353
47	No	Yellow Box	Secondary	18	Good	31	3.72	236609.369	6569646.569
48	Impacted	Yellow Box	Secondary	15	Very good	34	4.08	236606.799	6569703.008
49	Establish TPZ	Bimble Box	Primary	21	Very good	118	14.16	236712.476	6569533.535
50	Impacted	Yellow Box	Secondary	16	Good	36	4.32	236721.284	6569620.236
51	Establish TPZ	Yellow Box	Secondary	14	Very good	42	5.04	236726.764	6569620.817
52	Establish TPZ	Yellow Box	Secondary	15	Dead stag	45	5.40	236728.242	6569626.958
53	Impacted	Yellow Box	Secondary	15	Very good	38	4.56	236719.479	6569624.807
54	Establish TPZ	Yellow Box	Secondary	8	Very good	26	3.12	236726.364	6569632.596
55	Impacted	Yellow Box	Secondary	13	Good	40	4.80	236721.801	6569633.807
56	Impacted	Yellow Box	Secondary	6	Good	30	3.60	236716.708	6569632.060
57	Impacted	Yellow Box	Secondary	6	Poor	20	2.40	236716.254	6569637.765
58	Impacted	Yellow Box	Secondary	5	Dead stag	33	3.96	236721.295	6569650.616
59	No	Blakely's Red Gum	Secondary	5	Poor	19	2.28	236566.437	6569583.738
60	No	Blakely's Red Gum	Secondary	5	Poor	17	2.04	236567.261	6569596.443
61	No	Blakely's Red Gum	Secondary	13	Moderate	35	4.20	236573.188	6569599.687
62	No	Yellow Box	Secondary	15	Poor	30	3.60	236578.185	6569686.319
63	No	Blakely's Red Gum	Secondary	10	Poor	29	3.48	236577.611	6569697.905
64	No	Blakely's Red Gum	Secondary	12	Moderate	21	2.52	236579.024	6569712.841
65	No	Blakely's Red Gum	Secondary	12	Moderate	19	2.28	236576.532	6569720.829
66	No	Blakely's Red Gum	Secondary	12	Moderate	20	2.40	236585.230	6569740.386

Tree No.	Impacted or protection required?	Tree species	Primary or Secondary feed tree	Height (m)	Health/condition	Diameter at Breast Height (cm)	Tree Protection Zone (m)	Easting	Northing
67	No	Yellow Box	Secondary	14	Good	30	3.60	236578.636	6569746.627
68	No	Yellow Box	Secondary	13	Good	29	3.48	236580.890	6569759.578
69	No	Yellow Box	Secondary	15	Very good	28	3.36	236576.612	6569761.974
70	No	Yellow Box	Secondary	18	Very good	40	4.80	236579.172	6569765.781
71	No	Yellow Box	Secondary	14	Very good	31	3.72	236582.657	6569798.741
72	No	Yellow Box	Secondary	14	Very good	30	3.60	236584.148	6569801.678
73	No	Yellow Box	Secondary	14	Good	29	3.48	236585.169	6569804.973
74	No	Yellow Box	Secondary	12	Very good	14	2.00	236588.506	6569812.494
75	No	Yellow Box	Secondary	16	Good	36	4.32	236592.273	6569814.008
76	No	Yellow Box	Secondary	20	Very good	26	3.12	236598.040	6569825.045
77	No	Blakely's Red Gum	Secondary	14	Good	23	2.76	236599.247	6569836.175
78	Impacted	Blakely's Red Gum	Secondary	11	Moderate	19	2.28	236616.360	6569723.743
79	Impacted	Blakely's Red Gum	Secondary	14	Very good	28	3.36	236613.440	6569718.676
80	Impacted	Blakely's Red Gum	Secondary	15	Very good	26	3.12	236614.178	6569714.560
81	No	Blakely's Red Gum	Secondary	9	Good	18	2.16	236674.332	6569878.067
82	No	Blakely's Red Gum	Secondary	15	Very good	30	3.60	236659.536	6569861.275
83	Establish TPZ	Blakely's Red Gum	Secondary	15	Good	34	4.08	236658.434	6569856.717
84	Establish TPZ	Blakely's Red Gum	Secondary	14	Good	39	4.68	236647.586	6569849.666
85	No	Blakely's Red Gum	Secondary	20	Very good	34	4.08	236646.532	6569859.309

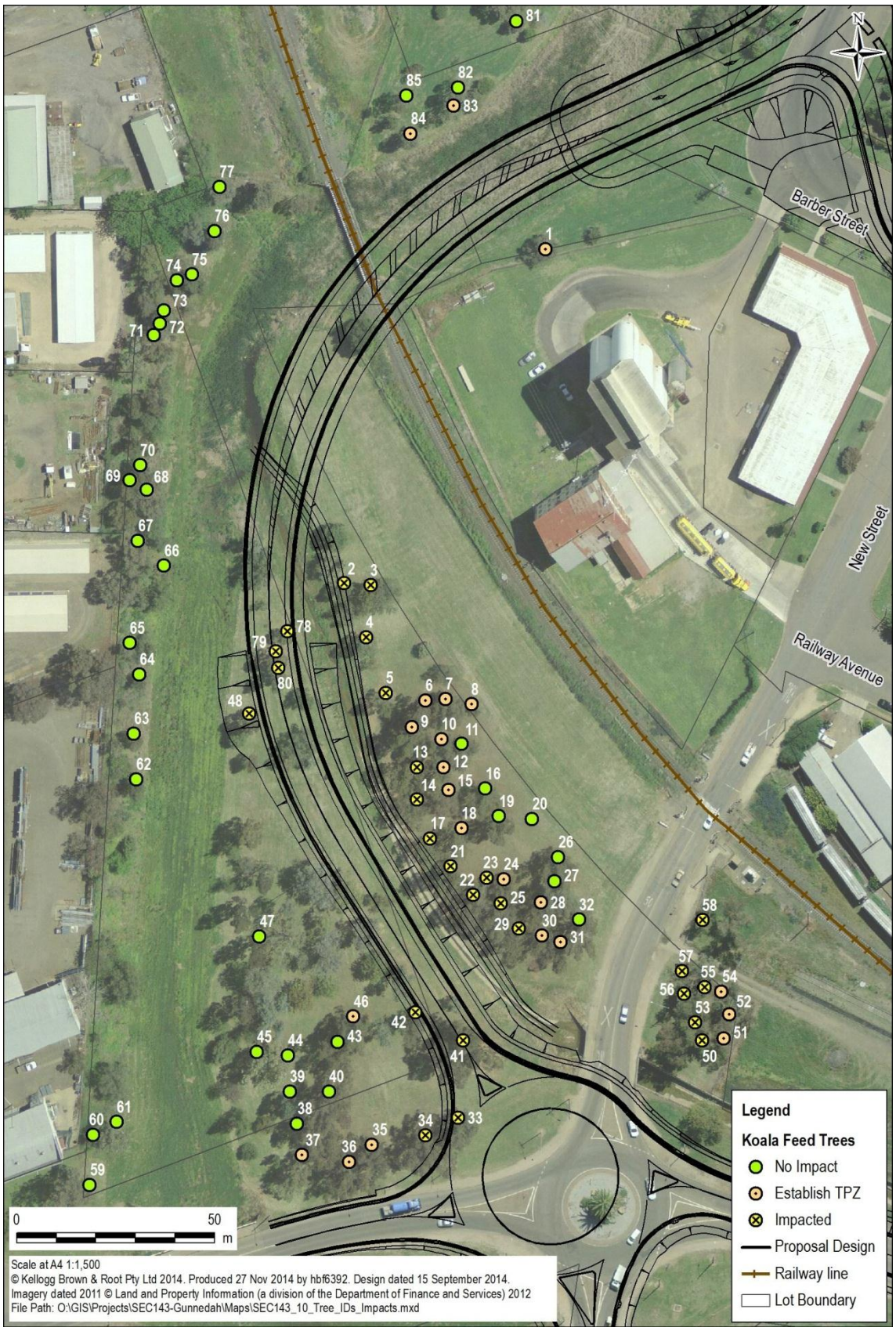

Figure D1
KOALA FEED TREE IDENTIFICATION