Travers

bushfire & ecology

Biodiversity Constraints Report

Wallamore Road
Taminda

December 2018
(REF: 18EC03BCA)

Biodiversity Constraints Report

72 and 21 Wallamore Rd,
55 Dampier Street
Taminda

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Survey effort has been reduced to provide an indication of the insitu vegetation and fauna habitat present. Consequently, further target threatened species survey may be required by the determining authority. The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy. Consequently, the location of all mapped features is to be confirmed by a registered surveyor.

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List of abbreviations

APZ	asset protection zone
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act (2016)*
BCR	*Biodiversity Conservation Regulation (2017)*
BDAR	Biodiversity Development Assessment Report
BPA	bushfire protection assessment
CLUMP	conservation land use management plan
DCP	Development Control Plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)
DOEE	Commonwealth Department of Environment and Energy
EEC	endangered ecological community
EPA	Environmental Protection Agency
EP&A Act	*Environmental Planning and Assessment Act (1979)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act (1999)*
ESMP	ecological site management plan
FF	flora and fauna assessment
FM Act	*Fisheries Management Act*
FMP	fuel management plan
HTA	habitat tree assessment
IPA	inner protection area
LEP	Local Environment Plan
LGA	local government area
NES	national environmental significance
NPWS	NSW National Parks and Wildlife Service
NSW DPI	NSW Department of Primary Industries
OEH	Office of Environment and Heritage (Part of the NSW Department of Premier and Cabinet)
OPA	outer protection area
PBP	*Planning for bushfire protection 2006*
POM	plan of management
RF Act	*Rural Fires Act (1997)*
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SEPP 44	*State Environmental Protection Policy No 44 – Koala Habitat Protection*
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement
SULE	safe useful life expectancy
TPO	tree preservation order
TPZ	tree preservation zone
TRRP	tree retention and removal plan
TSC Act	*Threatened Species Conservation Act 1995*
VMP	vegetation management plan

Biodiversity Assessment

1.0 Background

Travers bushfire & ecology has been engaged to undertake a biodiversity constraints assessment within the following properties:

Lot 1 DP 1234850 – 72 Wallamore Road, Taminda
Lot 2 DP 1234850 – 21 Wallamore Road, Taminda
Lot 3 DP 1234850 – 55 Dampier Street, Taminda
Lot 60 DP 1227482 – 72 Wallamore Road, Taminda

These lots are located within the Tamworth local government area (LGA). The extent of these lots to the south of the Wallamore anabranch of the Peel River has been subject to detailed survey and is referred to as the 'study area' (Figure 1).

Figure 1 – Aerial appraisal of the study area (red).

1.1 Proposed rezoning

The proposal involves the rezoning of the two southern lots of the study area.

The future development consists of employment lands created by either filling or a levee system at the two lots. A solar farm, a high flow channel and a low flow channel is depicted in Figure 2.

Access to the site may be provided via Wallamore Road, Dampier Street and a future extension of Jewry Street along the existing (unformed) road reserve.

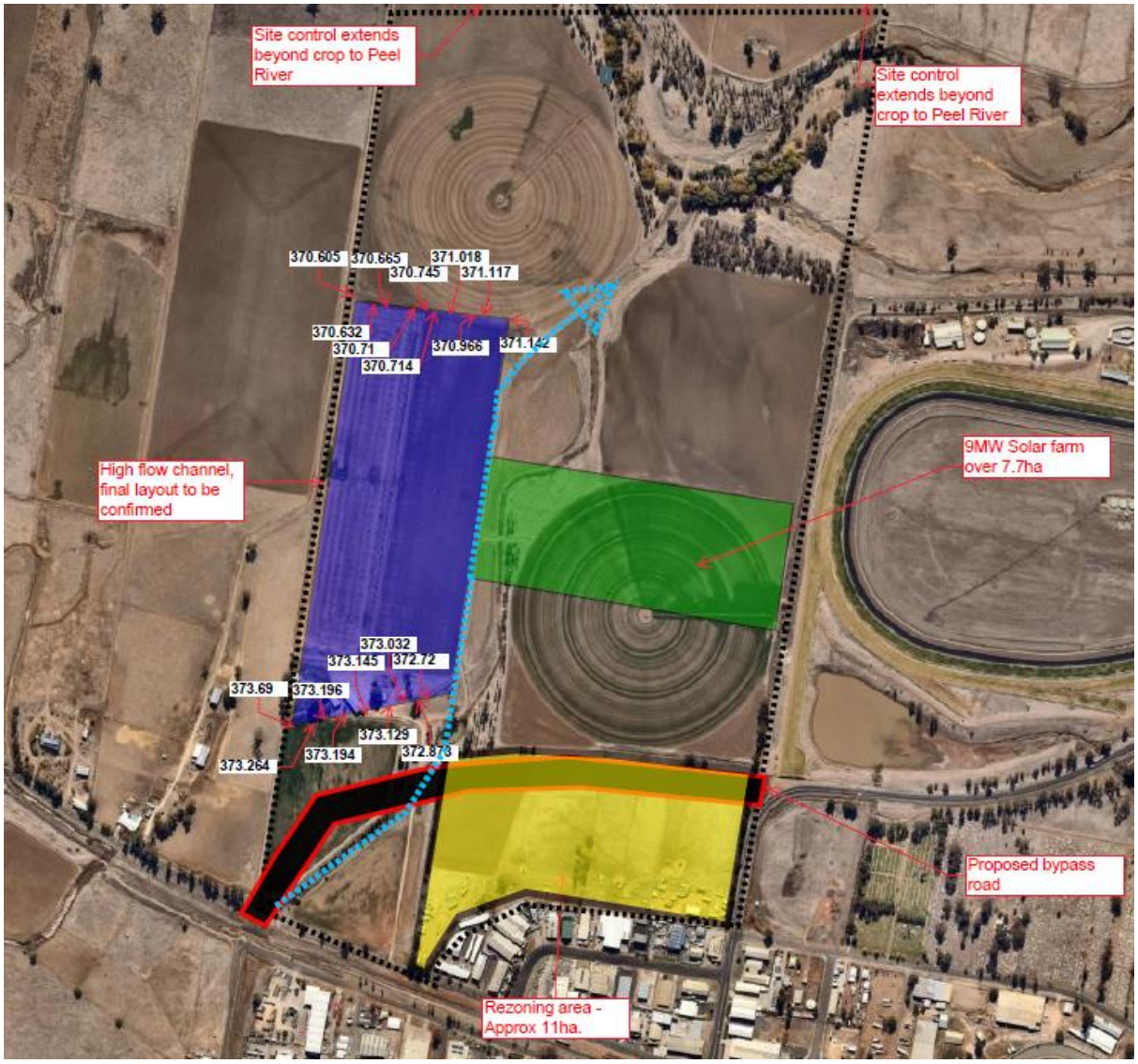

Figure 2 – Proposed rezoning
(Source: Elton Consulting - February 2019)

1.2 Site description

Table 1 provides a summary of the planning, cadastral, topographical, and disturbance details of the study area.

Table 1 – Site features

Location	Lot 1 DP 1234850 – 72 Wallamore Road, Taminda Lot 2 DP 1234850 – 21 Wallamore Road, Taminda Lot 3 DP 1234850 – 55 Dampier Street, Taminda Lot 60 DP 1227482 – 72 Wallamore Road, Taminda
Location description	The site is located approximately 3 km to the west of Tamworth Town Centre. Wallamore Road and existing industrial development along Kingsford Smith Street forms the boundary to the south, with part of the eastern boundary formed by Dampier Street. Adjoining rural lots are located on the entire length of the western boundary. The study area extends northwards and stops short of the top of bank of the Wallamore Anabranch channel associated with the Peel River. The allotments extend further north and are not included in this study north from the southern bank of the anabranch.
Area	Approx. 92ha
Local government area	Tamworth
Zoning	RU4 – Primary production small lots
Grid reference MGA-56	299215E 6558940N
Elevation	Approx. 371 - 377m AHD
Topography	Situated on very gently sloping floodplain, slopes of less than 0.4% with a northerly aspect.
Catchment and drainage	Catchment – Peel River Overland flow into a drainage swale which flows in a NNE direction into the Wallamore anabranch of Peel River.
Existing land use	The property currently contains a rural residence, the remainder of the study area is used for agricultural purposes.

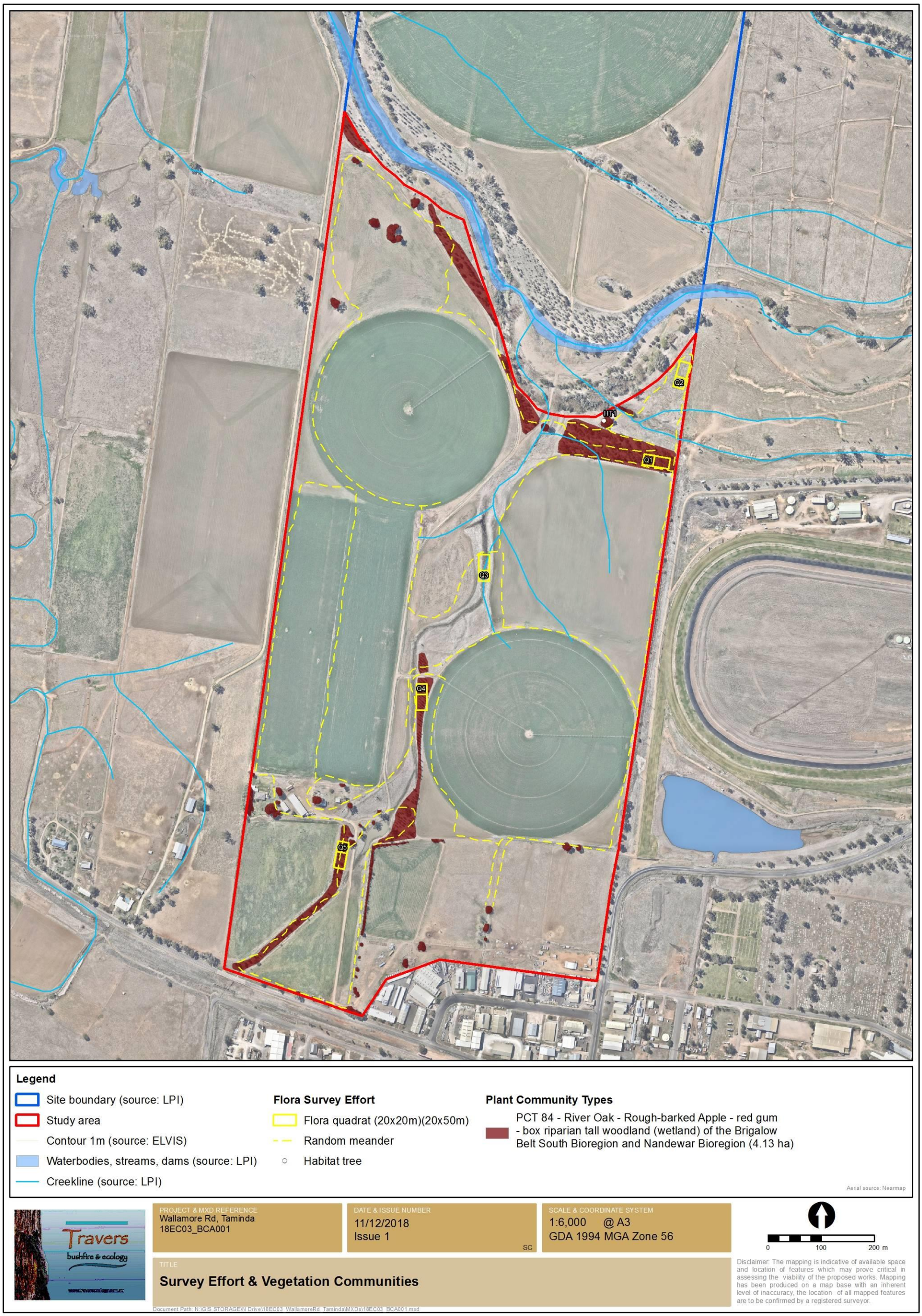

Figure 3 – Field survey effort and vegetation communities

2.0 Biodiversity Offsets Scheme (BOS)

The *BC Act* repeals the *Threatened Species Conservation Act (TSA Act) 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*.

Together with the *Biodiversity Conservation Regulation 2017*, the *BC Act* establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

2.1 Threshold assessment

The BOS includes two (2) elements to the threshold test – an area trigger and a Sensitive Biodiversity Values Land Map trigger. If clearing exceeds either trigger, the Biodiversity Offset Scheme applies to the proposed clearing.

2.1.1 Sensitive Biodiversity Land Map

Sensitive Biodiversity Values Land has not been mapped within the study area – an offset is not required under this trigger. Figure 4 shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.

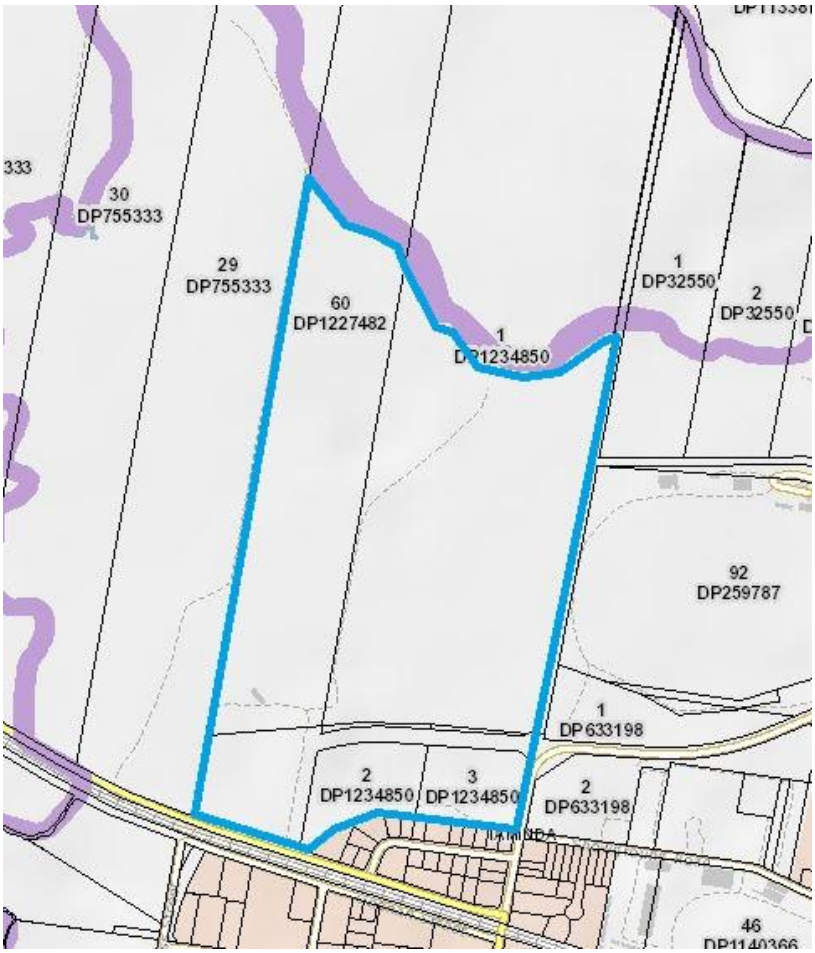

Figure 4 – Biodiversity value land (mauve shading) in the local area
(Source: OEH – Biodiversity Values Map – November 2018)

The area proposed for rezoning is not located on lands mapped as Sensitive Biodiversity Values Land – an offsetting is not required

2.1.2 Area clearing threshold

The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

Table 2 – BOS entry threshold report

Date of Calculation	01/03/2019 10:20 AM	**BDAR Required***
Total Digitised Area	55.85 ha	
Minimum Lot Size Method	Lot size	
Minimum Lot Size	4.4 ha	
Area Clearing Threshold	0.5 ha	
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

Table 2 identifies that BOS entry threshold report has determined the area threshold based on the smallest lot size within the study area (given as 4.4ha). However, the Current LEP states that the minimum lot size for the study area is 40ha. Based on either of these methods, the area clearing threshold for which the BOS applies is 0.5ha. Clearing of 'native vegetation' that exceeds 0.5ha will require a biodiversity offset to be obtained. Note that 'native vegetation' includes planted native species.

The proposed rezoning area is not located within any area mapped as Sensitive Biodiversity Land. However, based upon the preliminary design, the impacts will be above 0.5ha and will trigger the BOS. The total impacts upon paddock trees which are included in the Area Clearing Threshold of native vegetation will need to be established at the development application stage to finalise the overall impact areas.

2.2 Serious and irreversible impacts on biodiversity values

Reference is made to the '*Guidance to assist a decision-maker to determine a serious and irreversible impact Office of Environment & Heritage 2017'.* Development consent cannot be granted for non-State significant development under Part 4 of the *Environmental Planning and Assessment Act, 1979* (NSW) if the consent authority is of the opinion it is likely to have serious and irreversible impacts (SAII) on biodiversity values. The determination of SAII is to be made in accordance with principles prescribed section 6.7 of the BC Regulation (2017). The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales.

The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales. These are impacts that:

- will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

- will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- impact on the habitat of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

The first three principles broadly align with the IUCN (2017) (see also Bland *et al*. (2016)) criteria used to identify entities at the greatest risk of extinction (i.e. critically endangered entities) and the fourth principle captures impacts on entities that cannot be offset.

Impacts upon the remnant paddock trees or small areas of replanted canopy commensurate with the vegetation type known as PCT 84 – River Oak / Rough-barked Apple red gum box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion & Nandewar Bioregion is not considered to be a potential SAII as this vegetation type is not listed as a threatened ecological community, and therefore by default, does not meet any of the four (4) principles for nomination as a potential SAII.

Reference to the *threatened biodiversity data collection* for the most up-to-date information on ecological communities that are potential SAII and for entity-specific thresholds is recommended if an application is intended to be submitted or is likely to be delayed.

2.3 BOS Conclusion

For council to assess any development proposal a Biodiversity Development Assessment Report (BDAR) will be required. This may involve additional targeted flora and fauna searches and surveys to determine the presence or absence of threatened species or their habitats and to assess the likely impacts of the proposed works upon threatened species, populations or ecological communities or their habitats in accordance with the Significance of Impact Test as specified in the *BC Act.*

The Significance of Impact Test within the BDAR will determine if the proposal is likely to trigger biodiversity offsets or is likely to cause a serious or irreversible impact (SAII) upon threatened species, endangered populations or endangered ecological communities.

3.0 Flora

3.1 Survey

A field inspection was undertaken by Botanist, Mr Robert Sansom B. Sc. (Hons.) on 6-7 November, 2018 over the time frame of approximately 11hrs. This field inspection was restricted to the study area as shown in red within Figure 2 and was undertaken primarily to confirm the plant community type (PCT) or to determine the ecological and habitat value of the site.

Five (5) flora quadrats of 20m x 50m in accordance with the Biodiversity Assessment Method (BAM) were undertaken within the existing replanted native vegetation of the lot to assist in the identification of any PCT present.

Botanical survey included a random meander in accordance with *Cropper* (1993) to gain a full species list of the plants within the site. A review of the *Atlas of NSW Wildlife* (OEH 2019) was undertaken prior to the site visit to determine threatened species previously recorded within 10km of the study area, and relevant target searches were undertaken as suited, generally as meandering transects as shown in Figure 3.

All naturally occurring species were identified to species level where possible, and tabulated in Appendix 1.

3.2 Vegetation communities

Within the study area native vegetation occurs as widely scattered remnant trees within large areas of agricultural land. There are also small areas of replanted native trees which do not contain any native shrubs and the ground layer is dominated by exotics grasses, herbs and forbs. These tree planting areas occupy a total of approximately 0.57ha. The vast majority of the study area contains agricultural land currently used for growing Lucerne, oats and a small-grained wheat which are all used for making Hay and stock feed. There is a small area of household gardens located around the dwelling and ancillary farm structures. A variety of small trees consisting of exotic and planted native species occur along the centrally located drainage swale.

The vegetation in the locality has been mapped within *extant and potential natural vegetation of Tamworth, Manilla and Cobbadah VIS_3796* (Rolhauser, Thonell and Peackock 2009) as River Red Gum – River Oak riparian open forest of Brigalow Belt South and Nandewar Bioregions. This corresponds to *River Oak – Rough-barked Apple – Red Gum box riparian tall Woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar South Bioregion* (PCT 84). Our quadrat and ecological survey results support this classification.

The vegetation within the study site (PCT 84) is not commensurate with any Threatened Ecological Community (TEC) listed under the *Biodiversity Conservation Act 2016 (BC Act)* or *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

The remaining vegetation in the study area occurs as planted trees, garden beds and managed cropping and pastoral areas.

Field verification of the study area found the following vegetation communities for the purposes of biodiversity constraints assessment include:

- managed agricultural lands, and
- PCT 84 – *River Oak, Rough-barked Apple, Red Gum, box riparian tall Woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar South Bioregion* (remnant trees or planted canopy only)

Managed Agricultural Lands

<u>Canopy</u>
Widely scattered *Eucalyptus camaldulensis, Eucalyptus sideroxylon, Eucalyptus albens* occur within the agricultural areas of the study area. Canopy projected foliage cover is estimated at less than 1% with a height of 15-24m.

Mid-storey

The mid-storey is generally absent but consists of very sparse occurrences of individual or small clumps of exotic species and contributes less than 1% PFC within the whole study area. Species present include *Lycium ferocissimum, Melaleuca armillaris, Callistemon viminalis* and *Indigofera adesmiifolia*. These species are either exotic weeds or were planted within the household gardens or escaped.

Ground layer

Cropping areas consisted of large areas (95%) of the study area were under cultivation of oats, lucerne or small-seeded wheat. These crops are grown to produce bales of hay or stock feed.

There are introduced or exotic species mixed with these crops and located along farm tracks and within the drainage swale which runs north through the centre of the study area. Typical exotic species observed were *Brassica tournefortii, Capsella bursa-pastoris, Carthamus lanatus, Chenopodium album, Lolium perrenne, Malva parviflora, Rorippa palustris*, and *Rapistrum rugosum.*

Photo 1 – Agricultural land in the north-east corner of the study area (quadrat 2) looking north.

Photo 2 – Agricultural land in use, looking west from the centre of the study area. Note crops of Lucerne (right) and Wheat (left) and isolated scattered individual trees in the middle distance

PCT 84 – *River Oak, Rough-barked Apple, Red Gum, box riparian tall Woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar South Bioregion* (remnant trees or planted canopy only)

Canopy

There are areas of tree replanting within areas shown in Figure 3. These areas have been replanted with species that are likely to occur naturally on the Peel River floodplain. These patches of replanted trees all contain the same mixture of species such as *Eucalyptus camaldulensis, Eucalyptus sideroxylon, Eucalyptus albens* and presently have a canopy projected foliage cover of 25 to 35% with a height of 8 to 12m.

Travers bushfire & ecology notes that 'native vegetation' either naturally occurring or planted, if impacted by any future proposed works, is assessed under the Biodiversity Assessment Methodology as impacted native vegetation for determination of biodiversity offsetting.

Mid-storey

The mid-storey is absent (see photos 3 and 4).

Ground layer

This layer was generally disturbed through previous removal and impacts from cattle such as grazing and sheltering under the canopy resulting in soil disturbance (see photos 3 and 4). No planting within the ground layer appears to have been undertaken.

There are some exotic species present within the patches of planted trees. Typical exotic species observed were *Rapistrum rugosum, Brassica tournefortii, Capsella bursa-pastoris, Lolium perrenne, Alternanthera pungens, Asphodelus fistulosus*, *Chenopodium album* and *Rorippa palustris.*

This Planted trees vegetation is commensurate with Plant Community Type (PCT) 84 – *River oak, Rough-barked Apple, Red Gum, Box riparian Tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion*. PCT 84 is not commensurate with any Threatened Ecological Community (TEC) listed within the *Biodiversity Conservation Act 2016* (*BC Act*) or *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*).

Photo 3 – Planted Trees within Quadrat 1 looking west. Note lack of Mid-storey

Photo 4 – Planted trees within Quadrat 4, looking south.
Note lack of mid storey and ground disturbance from cattle

Photo 5 – Remnant trees located approximately 60 metres NE of Quadrat 5, looking N.E.

3.3 Threatened flora species

BC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2019) indicated a list of species that have been recorded within a 10 km radius of the study area. These species are listed in Appendix 2 Table A2.1 and are considered for potential habitat within the study area.

EPBC Act – A review of the schedules of the *EPBC Act* indicated the potential for a list of threatened flora species to occur within a 10km radius of the study area. These species have also been listed in Appendix 2 Table A2.1 for consideration of potential to occur.

Based on the habitat assessment within Table A2.1 it is considered that the study area provides potential habitat for the following threatened flora species. These species should be considered in any Significance of Impact Test included within a BDAR for any future development application.

Table 2 – Threatened flora species with suitable habitat present

Scientific name	*BC Act*	*EPBC Act*	Potential to occur
Dichanthium setosum	V	V	Very low

All threatened flora species in both the Bionet (NSW) and *EPBC Act* coordinate search (National) were considered to have very low potential suitable habitat within the study area possibly due to factors such as previous clearing and landscaping works, past and ongoing land management practices, unsuitable soils / geology, unsuitable previous vegetation type or large distance to known specimens.

3.4 Endangered flora populations

No endangered flora populations occur within Tamworth Council LGA.

No specimens of any endangered flora population were observed within the study area during the flora survey. Therefore, it is considered that no endangered populations occur within the study area.

3.5 Endangered ecological communities

No endangered ecological community occurs within Tamworth Council LGA. PCT 84 is not commensurate with any Threatened Ecological Community (TEC) listed within the *Biodiversity Conservation Act 2016* (*BC Act*) or *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*).

Therefore, no endangered ecological communities were observed within the study area during the flora survey.

3.6 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) was one of a suite of Land Management and Biodiversity Conservation (LMBC) reforms that commenced in New South Wales on 25 August 2017. The Vegetation SEPP (the SEPP) works together with the *BC Act* and the *Local Land Services Amendment Act 2016* to create a framework for the regulation of clearing of native vegetation in NSW.

The SEPP will ensure the biodiversity offset scheme (established under the Land Management and Biodiversity reforms) will apply to all clearing of native vegetation that

exceeds the offset thresholds in urban areas and environmental conservation zones that does not require development consent.

Vegetation SEPP applies to the following local government areas:

Bayside, City of Blacktown, Burwood, Camden, City of Campbelltown, Canterbury-Bankstown, Canada Bay, Cumberland, City of Fairfield, Georges River, City of Hawkesbury, Hornsby, Hunter's Hill, Georges River, Inner West, Ku-ring-gai, Lane Cove, City of Liverpool, Mosman, Newcastle, North Sydney, Northern Beaches, City of Parramatta, City of Penrith, City of Randwick, City of Ryde, Strathfield, Sutherland Shire, City of Sydney, The Hills Shire, Waverley, City of Willoughby, Woollahra.

The Vegetation SEPP also applies to land within a variety of zones as set out in the legislation 'Land to which the policy applies'. The zonings that the SEPP applies to include

Zone RU5 Village, Zone R1 General Residential, Zone R2 Low Density Residential, Zone R3 Medium Density Residential, Zone R4 High Density Residential, Zone R5 Large Lot Residential, Zone B1 Neighbourhood Centre, Zone B2 Local Centre, Zone B3 Commercial Core, Zone B4 Mixed Use, Zone B5 Business Development, Zone B6 Enterprise Corridor, Zone B7 Business Park, Zone B8 Metropolitan Centre, Zone IN1 General Industrial, Zone IN2 Light Industrial, Zone IN3 Heavy Industrial, Zone IN4 Working Waterfront, Zone SP1 Special Activities, Zone SP2 Infrastructure, Zone SP3 Tourist, Zone RE1 Public Recreation, Zone RE2 Private Recreation, Zone E2 Environmental Conservation, Zone E3 Environmental Management, Zone E4 Environmental Living or Zone W3 Working Waterways.

3.6.1 Is an Authority to clear vegetation required

As 'development consent' is required for the proposed works the Vegetation SEPP does not apply.

3.7 Local Land Services Act 2013

The *Local Land Services Act 2013* became fully operational in January 2014. The amended *Local Land Services Act* 2013, provides a new regulatory framework for native vegetation and land management activities in NSW. The amended Act:

- categorises regulated and exempt land to provide certainty and clarity for landholders
- creates Allowable Activities which simplify and expand the former routine agricultural management activities (RAMAs)
- creates the Land Management (Native Vegetation) Code
- establishes a Native Vegetation Panel
- enables landholders to use the Biodiversity Offsets Scheme for agricultural development.

The *Local Land Services Act 2013* repeals the *Rural Lands Protection Act 1998,* the *Rural Lands Protection Amendment Act 2008,* and the *Catchment Management Authorities Act 2003*.

The new Land Management Framework provides landholders with more options to manage native vegetation on their property. Land in NSW is categorised into three main categories including, Category 1 (exempt land), Category 2 (regulated land) and excluded land. Categorisation of land provides certainty to landholders and defines options available for each category for native vegetation management.

The NVR Map generally covers rural land in NSW. It categorises land where management of native vegetation can occur without approval or where management of native vegetation may

be carried out in accordance with Part 5A of the LLS Act. A summary of categories used in the NVR Map is shown below (Figure 5) as it applies to the study area.

Reference to the Native Vegetation Regulation Map identifies that the subject land is not mapped as sensitive or vulnerable regulated land and therefore the Local Land Services Act does not apply. The proposal does not impact vulnerable regulated land.

For the purposes of this assessment we have assumed the land is exempt Land and determination of the proposal is subject to development assessment under the Biodiversity Conservation Act.

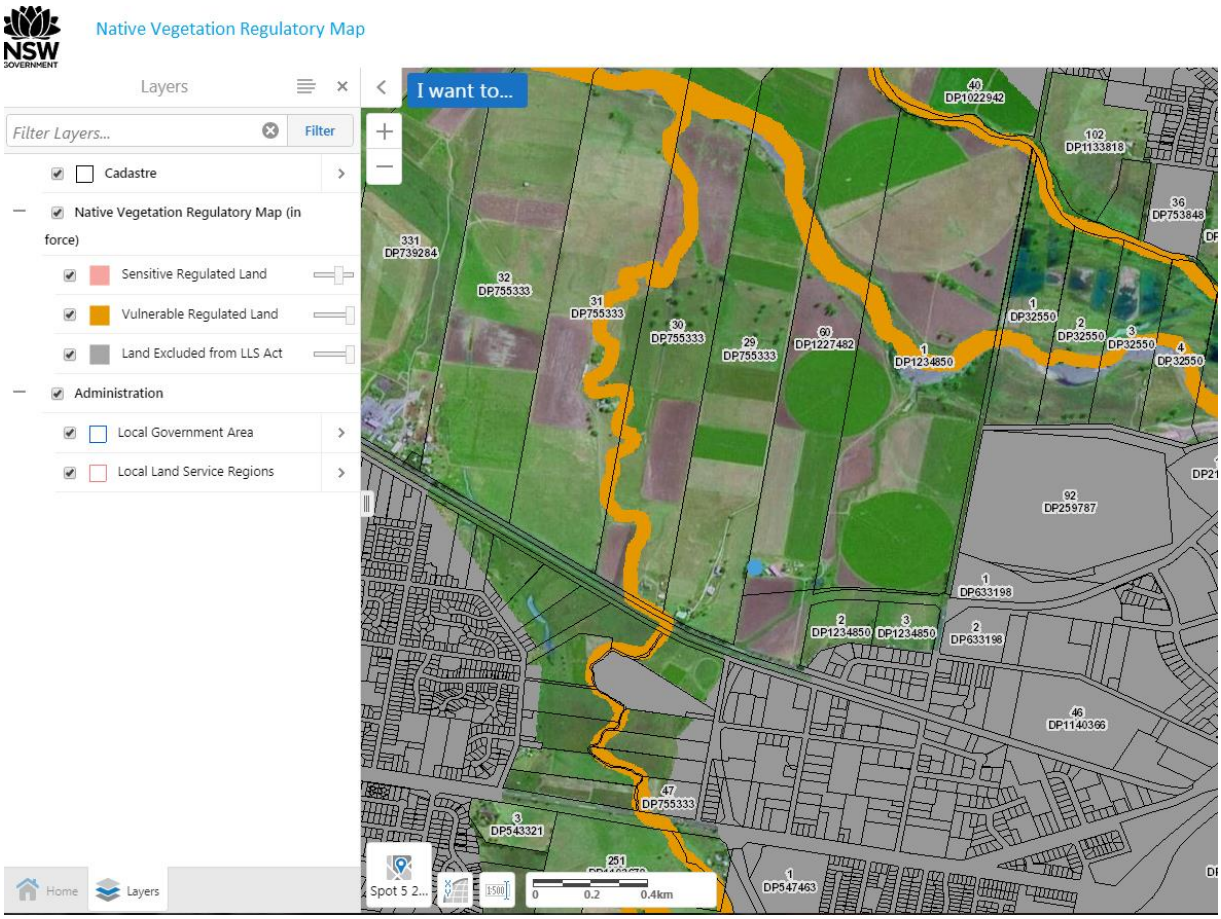

Figure 5 – Native Vegetation Regulation Map
(Source: OEH – Native Vegetation Regulation Map – November 2018)

4.0 Fauna

4.1 Survey / Habitat assessment

A fauna habitat assessment was undertaken during the botanical survey to identify the habitat types available and its quality and to identify any specific or important features.

The fauna habitat assessment is based on a site inspection with notes and photographs taken where required, desktop analysis, threatened species records (OEH 2019) and habitat attributes identified during the flora survey. Particular note was taken to search for the following potential threatened fauna species habitat:

- A count of tree species present to determine 'Potential Koala Habitat' according to the definitions of SEPP 44.
- Hollow-bearing trees present.
- Presence of any raptor nests.

- Terrestrial shelters, burrows and/or hollows.
- Connectivity potential to and from the site.
- Presence of drainages for frog species habitat.

Significant habitat trees are defined as trees containing large hollows suitable for owls/cockatoos and/or two or more good quality medium hollows and/or several small hollows and/or a tree showing notable use by a threatened species (eg. sap feed tree, raptor nest tree or microbat roost).

A review of the *Atlas of NSW Wildlife* (OEH 2019) was undertaken prior to the site visit to determine threatened fauna species previously recorded within 10km of the study area.

The following notable habitat features were observed present:

- At least three (3) habitat trees containing good quality medium or small hollows.
- Year-round nectar producing tree species, principally *Eucalyptus* or *Angophora* species
- Seed producing C*asuarina* trees
- Ephemeral constructed drainage lines
- Commercial buildings
- Large areas undergoing agricultural use for stock feed

4.2 Hollow-bearing trees

Hollow-bearing trees were not generally surveyed during the flora survey. However, one tree HT01 was assessed as an unidentified raptor was seen leaving the tree on approach by the botanist. Hollow-bearing tree data for HT01 is provided in Table 3. The location of HT001 is in the north-eastern parts of the study area as shown in Figure 3. This Habitat tree will not be impacted by the proposed works.

Table 3 – Hollow-bearing tree data

No	Common name	DBH (cm)	Height (m)	Spread (m)	Vigour (%)	Hollows recorded
HT001	River Red Gum	180	23	16	75	1x 5-10cm branch hollow 1x 15-20cm branch hollow 2x 20-30cm branch hollows

The recorded hollows may be suitable for hollow-dependent threatened species with considered potential to occur.

The proposed development layout enables retention of this recorded hollow-bearing tree.

4.3 Threatened fauna species

BC Act – A search of the *Atlas of NSW Wildlife* (OEH, 2018) provided a list of threatened fauna species previously recorded within a 10km radius of the study area. These species are listed in Appendix Table A2.2 and are considered for potential habitat within the study area.

Fisheries Management Act (*FM Act*) – No habitats suitable for threatened aquatic species were observed within the study area and as such the provisions of this act do not require any further consideration.

EPBC Act – A review of the schedules of the *EPBC Act* identified a list of threatened fauna species or species habitat likely to occur within a 10km radius of the study area. These species have also been listed in Appendix Table A2.2.

In accordance with Table A2.2 the following state and nationally listed threatened fauna species are considered to have suitable habitat with varying potential to occur within the study area. The state listed species will be considered in the seven-part test (Appendix 3):

Table 4 – Threatened fauna species with suitable habitat present

Common name	*BC Act*	*EPBC Act*	Potential to occur
Grey-headed Flying-fox	V	V	Low
Eastern Bentwing-bat	V	-	Low
Swift Parrot	E	E	Low
Square-tailed Kite	V	-	unlikely
Little Lorikeet	V	-	unlikely
Dusky Woodswallow	V	-	unlikely
Turquoise Parrot	V	-	unlikely
Speckled Warbler	V	-	unlikely
Diamond Firetail	V	-	unlikely
Koala	V	V	unlikely
Black Falcon	V	-	unlikely

Additional protected migratory species listed under the *EPBC Act* are considered for habitat potential in Table A2.3.

It is concluded that there will be no likely serious or irreversible impact any state or nationally listed threatened fauna species with considered potential to occur.

4.4 Protected migratory species (National)

The EPBC Act Protected Matters Report provides additionally listed terrestrial, wetland and marine migratory species of national significance likely to occur, or with habitat for these species likely to occur, within a 10km radius of the study area. The habitat potential of migratory species is considered in Table A2.3 (Appendix 2).

No nationally protected migratory bird species were recorded present within the study area during the preliminary survey. The study area does not contain any breeding habitat or habitat of other unique importance for foraging or breeding for nationally listed migratory species. Therefore these species will not likely offer constraint to the proposal.

4.5 Endangered fauna populations

There are no endangered fauna populations known to occur within the Tamworth local government area.

4.6 Connectivity

The vegetation within the study area is already highly fragmented and disconnected from other areas of contiguous bushland. The nearest natural vegetation occurs immediately to the north of the study area along the banks of the Wallamore Anabranch. The planted canopy vegetation within the study area (shown as reddish-brown patches in Figure 6) are discontinuous and lack any native ground or shrub layers. Other isolated remnant trees are located within the site but do not provide any more than small widely separated single or small groups of trees. Therefore the study area provides no local or regionally important connective values to warrant protection within a conservation corridor. However, the banks of the Wallamore Anabranch located immediately to the north of the study area do support narrow bands of mixed native and exotic (Willows) vegetation.

Figure 6 – Local connectivity

5.0 Wetlands, Groundwater dependent Ecosystems and Watercourses

5.1 Endangered wetland communities

A number of wetland communities have been listed as an 'endangered ecological community' under the NSW *BC Act*. We note that ‘wetlands’ are included in the definition of ‘waterfront lands’ in accordance with the *Water Management Act* (*WM Act*) 2000 due to their inclusion in the definition of a ‘lake’ under the same act.

Impacts on wetland communities must be assessed under the *BC Act* and if present the management of wetland communities must be given due consideration in accordance with the objectives and principles of management as contained within the NSW Wetlands Policy (2010), and appropriate management as determined by NSW DPI - Office of Water in their general terms of approval (GTA’s). This may include but not limited to the provision of buffers, management of stormwater runoff and maintenance of natural inflows or runoff into those wetland communities.

- Artesian springs ecological community - endangered ecological community listing
- Castlereagh swamp woodland community - endangered ecological community listing
- Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Kurri sand swamp woodland in the Sydney Basin Bioregion - endangered ecological community listing
- Lagunaria swamp forest on Lord Howe Island - endangered ecological community listing
- Maroota Sands swamp forest - endangered ecological community listing
- Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion - endangered ecological community listing
- Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing
- Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological listing
- Sydney Freshwater Wetlands in the Sydney Basin Bioregion - endangered ecological community listing
- The shorebird community occurring on the relict tidal delta sands at Taren Point - endangered ecological community listing
- Upland wetlands of the drainage divide of the New England Tableland Bioregion - endangered ecological community listing
- Wingecarribee Swamp - endangered ecological community listing

In accordance with the *WM Act*, endangered wetland communities are through the definition of ‘lakes’ potentially classed as waterfront land. Referral to DPI WaterNSW may be required for determination under the *WM Act* as a controlled activity. As well as protection, a buffer may be applied to these communities as specified by DPI WaterNSW.

No endangered wetland communities were present within the study area and therefore a referral to WaterNSW is not required.

5.2 Groundwater dependent ecosystems (GDEs)

Groundwater dependent ecosystems are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Some examples of ecosystems which depend on groundwater are:

- wetlands;
- red gum forests, vegetation on coastal sand dunes and other terrestrial vegetation;
- ecosystems in streams fed by groundwater;
- limestone cave systems;
- springs; and
- hanging valleys and swamps.

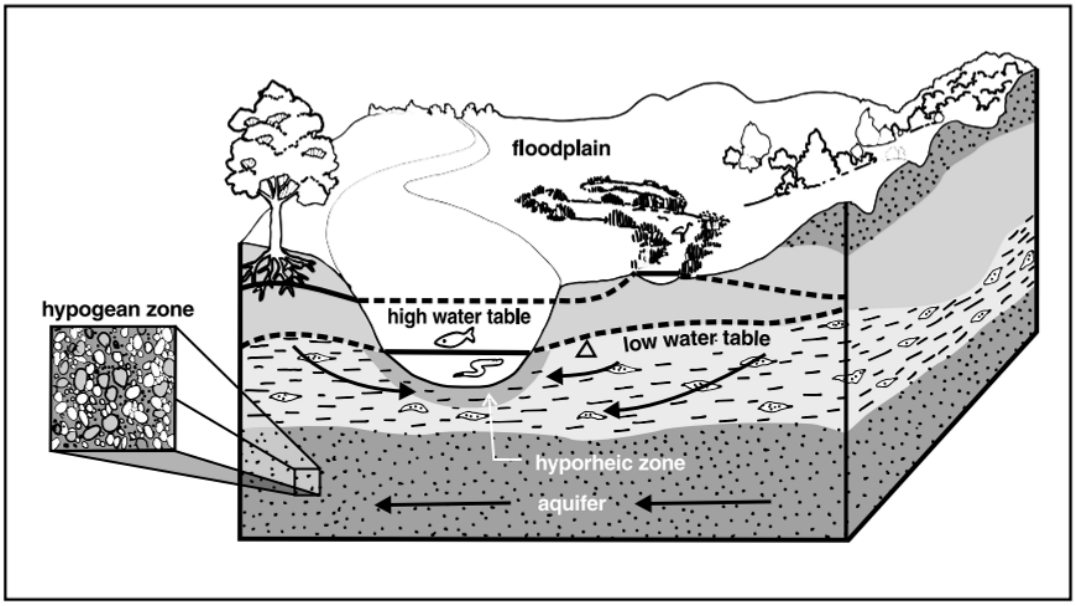

Figure 7 – Alluvial groundwater system discharging into a river

Groundwater dependent ecosystems are therefore ecosystems which have their species composition and their natural ecological processes determined by groundwater (NSW State Groundwater Dependent Ecosystems Policy April 2002).

Remnants of Groundwater Dependent Ecosystems (GDEs) in the form of remnant trees and planted patches of tree species commensurate with PCT 84 - *River Oak – Rough-barked Apple – Red Gum box riparian tall Woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar South Bioregion* were observed within the study area This community corresponds to a Red Gum Forest as shown in point two above.

This vegetation community has in the past been reliant on flooding events along the river to create and maintain the floodplain vegetation and its habitat. Impacts on groundwater dependent ecosystems is to be determined and considered in any future biodiversity or impact assessment.

5.3 Watercourses

Topographic maps indicate presence of watercourses within the northern portion of the site (Figure 8).

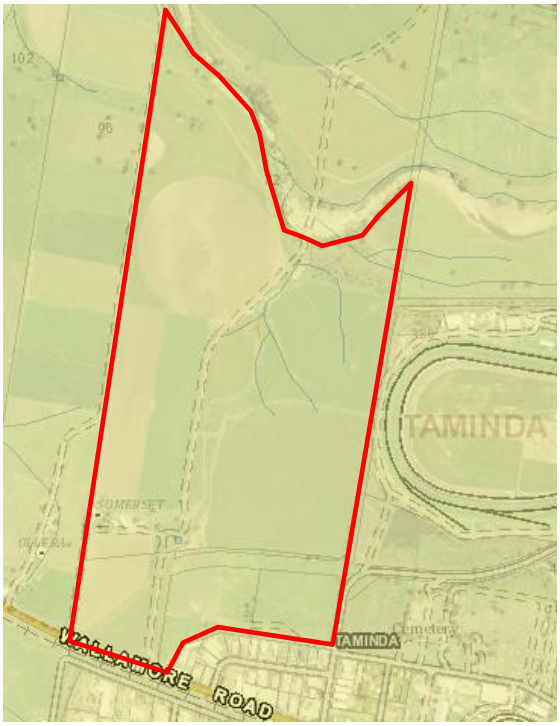

Figure 8 – Mapped Watercourses

A constructed drainage channel also passes through site and discharges into the mapped streams and hence into Wallamore Anabranch as shown as a solid blue line within Figure 9. This constructed drainage channel is also fed by several small depressions which constitute overland flow within large, almost flat cropping areas as shown by blue dashed lines. The drainage channel and ephemeral overland flows are ephemeral in nature.

The parts of the main constructed drainage channel located south of the small dam as shown in Figure 9 are characterised by a series of remnant or planted endemic native trees and also planted exotics and non-endemic trees as shown in Photo 6.

Figure 9 – Ephemeral watercourses within the site

Photo 6 – Looking south along the constructed drainage swale within Quadrat 5

Photo 7 – Looking south along the constructed drainage swale within Quadrat 3

Another ephemeral drainage line exists outside the study area which is located approximately ten (10) metres outside and parallel to the eastern boundary of the study area. This drainage channel primarily drains the verges of Dampier and Jewry Streets and the horse racing property to the east.

The constructed drainage channel forms as an extension to the existing mapped streams as shown on SixMaps therefore a referral for general terms of approval and controlled activity approval may be required under the *Water Management Act 2000* (*WM Act*).

6.0 Conclusions

Ecological survey and has been undertaken within Lot 1 DP 1234850 – 72 Wallamore Road, Lot 2 DP 1234850 – 21 Wallamore Road, Lot 3 DP 1234850 – 55 Dampier Street and Lot 60 DP 1227482 – 72 Wallamore Road, Taminda.

No threatened flora species, populations or ecological communities have been observed or considered likely to occur in a natural state within the study area.

Whilst fauna survey has not been undertaken, it is considered that the habitat attributes within the study area do not provide any significant or unique habitat of breeding importance for any threatened fauna species. Remnant and planted vegetation may provide low key foraging value. The single recorded hollow-bearing tree will be retained and will not be further fragmented from other local adjacent natural habitats.

The native vegetation present within the study area is attributable to highly modified remnants or planted trees (canopy only) commensurate with Plant Community Type (PCT) 84 - *River Oak, Rough-barked Apple, Red Gum, box riparian tall Woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar South Bioregion* which is not listed within the NSW *BC Act* (2016) or within the Commonwealth *EPBC Act* (1999) as a Threatened Ecological Community (TEC).

The area clearing threshold for this site is 0.5ha, that is, impacts of more than 0.5ha need to be adequately offset through the BOS. Based upon the preliminary design, the impacts will be above 0.5ha and will trigger the entry into the BOS.

6.1 Recommendations

To minimise adverse ecological impacts, the following mitigation measures are proposed:

1. Assessment of the project in accordance with the Biodiversity Offsetting Scheme (BOS) is recommended.

2. Biodiversity offsetting of impacts is likely to be required. Consideration to the establishment of a Biodiversity Stewardship Site either within the site or within the riparian zone associated with the Wallamore Anabranch is recommended.

3. Alternatively, assess the Biodiversity Credit value of the vegetation to be removed and purchase biodiversity offset credits from the NSW BioBanking Trust.

4. Revegetation such as along the existing or redirected drainage line, is to utilise locally-occurring native species commensurate with PCT 84 – *River Oak, Rough-barked Apple, Red Gum, box riparian tall Woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar South Bioregion* including trees, shrubs and ground covers to encourage local fauna use, to consolidate remnant vegetation linkages and to provide 'island' refuges for native flora and fauna species within the locality.

5. Sediment and erosion control measures in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) to minimise impact of possible sedimentation to local drainage lines.

6. Control and eradication of invasive ecological weeds should be undertaken to prevent further invasion by these species. High threat weed species listed within the NSW *BC Act* (2016) such as Canary Island Date Palm, White Poplar, Weeping Willow, Khaki Weed, Mediterranean Turnip, Saffron Thistle and Coolatai Grass were observed within the study area.

7. It is recommended that a Vegetation Management Plan (VMP) be produced to ensure that any proposed revegetation areas within the site address the potential to expand the extent of PCT 84 along drainage lines or within the riparian corridor associated with the Wallamore Anabranch and to control or eradicate high threat and environmental weeds which are required to be controlled in accordance with the NSW *Biosecurity Act* (2015).

8. The future development of the site is to consider drainage and native vegetation restoration actions within the site.

Appendix 1
Flora Species List

Table A1.1 – Flora species recorded

Family	Scientific name	Common name
TREES		
Sterculiaceae	*Brachychiton populneus* subsp. *populneus*	Kurrajong
Cupressaceae	*Callitris spp.*	
Casuarinaceae	*Casuarina cunninghamiana* subsp. *cunninghamiana*	River Oak
Myrtaceae	*Eucalyptus albens*	White Box
Myrtaceae	*Eucalyptus camaldulensis*	River Red Gum
Myrtaceae	*Eucalyptus melanophloia*	Silver-leaved Ironbark
Myrtaceae	*Eucalyptus melliodora*	Yellow Box
Myrtaceae	*Eucalyptus sideroxylon*	Red Ironbark
Arecaceae	*Livistona australis*	Cabbage Tree Palm
Meliaceae	*Melia azedarach*	White Cedar
Oleaceae	*Notelaea microcarpa* var. *microcarpa*	Velvet Mock Olive
Arecaceae	*Phoenix canariensis**	Canary Island Date Palm
Salicaceae	*Populus alba**	White Poplar
Salicaceae	*Salix babylonica**	Weeping Willow
Anacardiaceae	*Schinus areira**	Pepper Tree
SHRUBS		
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush
Faboideae	*Indigofera adesmiifolia*	Tick Indigo
Solanaceae	*Lycium ferocissimum**	African Boxthorn
Myrtaceae	*Melaleuca armillaris* subsp. *armillaris*	Bracelet Honey Myrtle
Chenopodiaceae	*Sclerolaena tetracuspis*	Brigalow Burr
GROUNDCOVERS		
Amaranthaceae	*Alternanthera pungens**	Khaki Weed
Asphodelaceae	*Asphodelus fistulosus**	Onion Weed
Poaceae	*Austrostipa pubescens*	Tall Speargrass
Poaceae	*Austrostipa ramosissima*	Stout Bamboo Grass
Poaceae	*Avena sativa**	Oats
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Brassicaceae	*Brassica rapa**	Wild Turnip
Brassicaceae	*Brassica tournefortii**	Mediterranean Turnip
Poaceae	*Bromus cartharticus**	Prairie Grass
Brassicaceae	*Capsella bursa-pastoris**	Shepherds purse
Cyperaceae	*Carex incomitata*	-
Asteraceae	*Carthamus lanatus**	Saffron Thistle
Asteraceae	*Centaurea calcitrapa**	Star Thistle
Chenopodiaceae	*Chenopodium album**	Fat Hen
Asteraceae	*Cirsium vulgare**	Spear Thistle
Asteraceae	*Conyza sumatrensis**	Tall Fleabane

Family	Scientific name	Common name
Apiaceae	*Cyclospermum leptophyllum**	Slender Celery
Poaceae	*Cynodon dactylon*	Common Couch
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Poaceae	*Echinochloa crus-galli**	Barnyard Grass
Boraginaceae	*Echium plantagineum**	Paterson's Curse
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Chenopodiaceae	*Einadia polygonoides*	-
Apiaceae	*Foeniculum vulgare**	Fennel
Poaceae	*Hyparrhenia hirta**	Coolatai Grass
Juncaceae	*Juncus usitatus*	Common Rush
Poaceae	*Lachnagrostis filiformis*	Blown Grass
Asteraceae	*Lactuca serriola**	Prickly Lettuce
Brassicaceae	*Lepidium africanum*	Common Peppercress
Poaceae	*Lolium perrenne**	Perennial Ryegrass
Malvaceae	*Malva parviflora**	Small-flowered Mallow
Malvaceae	*Malvastrum americanum**	Spiked Malvastrum
Faboideae	*Medicago sativa**	Lucerne
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Rice Grass
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Alliaceae	*Nothoscordum borbonicum**	Onion Weed
Poaceae	*Notodanthonia spp.*	-
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Phalaris aquatica**	Phalaris
Plantaginaceae	*Plantago lanceolata**	Ribwort
Polygonaceae	*Polygonum aviculare**	Wire Weed
Lobeliaceae	*Pratia concolor*	Poison Pratia
Brassicaceae	*Rapistrum rugosum**	Turnip Weed
Brassicaceae	*Rorippa palustris**	Yellow Cress
Polygonaceae	*Rumex crispus**	Curled Dock
Malvaceae	*Sida corrugata*	Corrugated Sida
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Asteraceae	*Silybum marianum**	Variegated Thistle
Brassicaceae	*Sisymbrium irio**	London Rocket
Asteraceae	*Sonchus asper* subsp. *asper**	Prickly Sowthistle
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Asteraceae	*Tragopogon porrifolius* subsp. *porrifolius**	Salsify
Faboideae	*Trifolium repens**	White Clover
Poaceae	*Triticum aestivum**	Wheat
Verbenaceae	*Verbena bonariensis**	Purpletop
Verbenaceae	*Verbena x brasiliensis**	Gin Case
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell
Waterplants		
Juncaceae	*Juncus effusus**	-

Family	Scientific name	Common name
Cyperaceae	*Bolboschoenus medianus*	a Clubrush
Typhaceae	*Typha orientalis*	Cumbungi
VINES		
Fabaceae	*Vicia sativa subsp. sativa**	Common Vetch
* denotes exotic species		

It should be noted that not all garden, cultivar or landscape species have been identified as part of this assessment.

Appendix 2
Threatened Flora and Fauna Species Habitat Assessment

Table A2.1 – Threatened flora species habitat assessment

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Cadellia pentastylis EPBC	V	V	Occurs along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield. Occurrs within vine thickets and dry rainforest. There appears to be a strong correlation between the presence of Ooline and low- to medium-nutrient soils of sandy clay or clayey consistencies, with a typical soil profile having a sandy loam surface layer, grading from a light clay to a medium clay with depth.	x	x	-	-	x	x
Callistemon pungens EPBC	-	V	Habitats range from riparian areas dominated by *Casuarina cunninghamiana* subsp. *cunninghamiana* to woodland and rocky shrubland. Often in rocky watercourses, usually with sandy granite (occasionally basalt) creek beds. Flowers over spring and summer, mostly in November.	x	Sub-optimal	x	x	x	x
Dichanthium setosum OEH EPBC	V	V	An erect perennial grass to <1m high. Flowers in summer. Grows in woodland and is associated with heavy basaltic black soils and stony red-brown hard-setting loam with clay subsoil. *Known chiefly on the northern tablelands in the Saumarez area, west of Armidale, and 18-30 km east of Guyra. It is more rarely found on the north-western slopes, central western slopes and north-western plains of NSW*	x	Sub-optimal	3 km E. (4 records within 10km)	2003	Very Low	✓

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Eucalyptus nicholii OEH	V	-	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. *It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property.*	x	x	-	-	x	x
Euphrasia arguta EPBC	CE	CE	An annual herb to 35cm tall, flowers October to January. Grows in grassy areas near rivers. *Recorded from Bathurst to Walcha area.* Considered extinct until recent rediscovery in 2008 near Nundle.	x	x	-	-	x	x
Picris evae EPBC	V	V	Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora, E. crebra, E. populnea, E. albens, Angophora subvelutina, Allocasuarina torulosa*, and/or *Casuarina cunninghamiana* with a *Dichanthium* grassy understory. Soils are black, dark grey or red-brown (specified as shallow, stony soil over basalt for one collection) and reddish clay-loam or medium clay soils. The flowering and fruiting period is mainly October to January, with a few plants collected in flower or fruit until May. Known in NSW north from the Inverell area, in the north-western slopes and plains regions. It has been collected from Elsmore and Myall Creek (both near Inverell) as well as in Inverell, Oxley Park (Tamworth) and also from Dangar Falls	x	x	-	-	x	x

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Prasophyllum sp. Wybong EPBC	-	CE	Known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga areas. A perennial orchid, appearing as a single leaf over winter and spring. Flowers in spring and dies back to a dormant tuber over summer and autumn. Known to occur in open eucalypt woodland and grassland	x	x	-	-	x	x
Syzygium paniculatum OEH EPBC	V	V	Small tree. Subtropical and littoral rainforest on sandy soil. *Distribution limits N-Forster S-Jervis Bay.*	x	x	-	-	x	x
Thesium australe EPBC	V	V	Erect herb to 0.4m high. Root parasite. Themeda grassland or woodland often damp. *Distribution limits N-Tweed Heads S-south of Eden.*	x	x	-	-	x	x
Tylophora linearis EPBC	V	E	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum* species and *Casuarina* species. Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later.	x	x	-	-	x	x

OEH	- Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	- Denotes species listed within 10km of the subject site in the *EPBC Act* habitat search
V	- Denotes vulnerable listed species under the relevant Act

Scientific name DATABASE SOURCE1	***BC Act***	***EPBC Act***	**Growth form and habitat requirements** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and / or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
E or E1	- Denotes endangered listed species under the relevant Act								
E4a or CE	- Denotes critically endangered listed species under the relevant Act								
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 2. 'records' refer to those provided by the *Atlas of NSW Wildlife* 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle								

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Table A2.2 – Threatened fauna species habitat assessment

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Booroolong Frog *Litoria booroolongensis* EPBC	E	E	Found near rocky mountain streams on the slopes and tablelands of the Great Dividing Range. *Distribution limit: QLD border to VIC border restricted to highlands.*	x	x	-	-	x	x
Bell's Turtle *Wollumbinia belli* EPBC	E	V	Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country. Occupied pools are most commonly less than 3 m deep with rocky or sandy bottoms and patches of vegetation. Most typically uses narrow stretches of rivers 30 - 40 m wide. Most surrounding habitat has been converted to grazing land. *Distribution limit: four disjunct populations in the upper reaches of the Namoi, Gwydir and Border Rivers systems, on the escarpment of the North West Slopes.*	x	x	-	-	x	x
Pink-tailed Legless Lizard *Aprasia parapulchella* EPBC	V	V	Inhabits open areas of native grasses and rocky outcrops and scattered rocks. *Distribution from Central tablelands, Southern tablelands, Central Western Slopes, and South West Slopes.*	x	x	-	-	x	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Border Thick-tailed Gecko *Uvidicolus sphyrurus* OEH EPBC	V	V	Occurs on steep rocky or scree slopes, especially granite. Recent records from basalt and metasediment slopes and flats indicate its habitat selection may have extended into areas that were cleared for agriculture. Favours forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter. Occupied sites often have a dense tree canopy that helps create a sparse understorey. Active at night and shelter by day under rock slabs, in or under logs, and under the bark of standing trees. *Distribution limit: West of the ranges from New England Tableland to Liverpool Range and west to Moree.*	x	x	-	-	x	x
Australasian Bittern *Botaurus poiciloptilus* EPBC	E	E	Found in or over water of shallow freshwater or brackish wetlands with tall reed beds, sedges, rushes, Cumbungi, lignum and also in rice fields, drains in tussocky paddocks, occasionally saltmarsh, brackish wetlands. *Distribution limit: N-North of Lismore. S- Eden.*	x	x	-	-	x	x
Little Eagle *Hieraaetus morphnoides* OEH	V	-	Utilises plains, foothills, open forests, woodlands and scrublands; river red gums on watercourses and lakes. *Distribution limit - N-Tweed Heads. S-South of Eden.*	x	✓	5.5km NE (1 record within 10km)	1999	Not Likely	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Square-tailed Kite *Lophoictinia isura* OEH	V	-	Utilises mostly coastal and sub-coastal open forest, woodland or lightly timbered habitats and inland habitats along watercourses and mallee that are rich in passerine birds. *Distribution limit: N-Goondiwindi. S-South of Eden.*	x	Sub-optimal	4.5 km SE (1 record within 10km)	2013	Unlikely	✓
Red Goshawk *Erythrotriorchis radiatus* EPBC	E	V	Inhabits tall open forests and woodlands. Breeds in tall trees adjacent to watercourses of wetlands. *Distribution limit: N-Border Ranges National Park. S-Foster.*	x	x	-	-	x	x
Black Falcon *Falco subniger* OEH	V	-	Inhabits plains, grasslands, foothills, timbered watercourses, wetland environs, crops; occasionally over towns and cities. *N-Tweed Heads. S-South of Eden*	x	✓	4 km ESE (4 records within 10km)	3013	Unlikely	✓
Australian Painted Snipe *Rostratula australis* EPBC	E	E	Most numerous within the Murray-Darling basin and inland Australia within marshes and freshwater wetlands with swampy vegetation. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x
Curlew Sandpiper *Callidris ferruginea* EPBC	E	CE	Mainly coastal, but many inland feeding along tidal mudflats, salt marsh, salt fields, fresh, brackish or saline wetlands and sewerage ponds. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	x	-	-	x	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Little Lorikeet *Glossopsitta pusilla* OEH	V	-	Inhabits forests, woodlands; large trees in open country; timbered watercourses, shelterbeds, and street trees. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	✓	3 km N (1 record within 10km)	2004	Unlikely	✓
Swift Parrot *Lathamus discolor* OEH EPBC	E	E	Inhabits eucalypt forests and woodlands with winter flowering eucalypts. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	x	✓	6 km E (2 records within 10km)	2002	Low	✓
Turquoise Parrot *Neophema pulchella* OEH	V	-	Inhabits coastal scrubland, open forest and timbered grassland, especially ecotones between dry hardwood forests and grasslands. *Distribution limit: N-Near Tenterfield. S-South of Eden.*	x	Sub-optimal	4 km NE (6 records within 10km)	1999	Unlikely	✓
Brown Treecreeper *Climacteris picumnus victoriae* OEH	V	-	Occupies eucalypt woodlands, open woodland lacking a dense understorey with fallen dead timber. *Distribution limit: (Sub species victoriae) Central NSW west of Great Div. Cumberland Plains, Hunter Valley, Richmond, Clarence, and Snowy River Valleys.*	x	x	-	-	x	x
Speckled Warbler *Chthonicola sagittata* OEH	V	-	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution limit: N-Urbanville. S-Eden.*	x	Sub-optimal	11 km NE (2 records within 10km)	2005	Unlikely	✓

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Regent Honeyeater *Xanthomyza Phrygia* EPBC	E4A	CE	Found in temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts. *Distribution limit: N-Urbanville. S-Eden.*	x	x	-	-	x	x
Painted Honeyeater *Grantiella picta* EPBC	V	V	A nomadic bird occurring in low densities within open forest, woodland and scrubland feeding on mistletoe fruits. Inhabits primarily Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. *Distribution limit: N-Boggabilla. S-Albury with greatest occurrences on the inland slopes of the Great Dividing Range.*	x	x	-	-	x	x
Dusky Woodswallow *Artamus cyanopterus cyanopterus* OEH	V	-	Found in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Prefers habitat with an open understorey. Often observed in farmland tree patches or roadside remnants. *Widespread in eastern, southern and south-western Australia.*	x	✓	3 km N (1 record within 10km)	2004	Unlikely	✓
Diamond Firetail *Stagonopleura guttata* OEH	V	-	Found in eucalypt woodlands, forests and mallee where there is grassy understorey west of the Great Div. also drier coastal woodlands of the Cumberland Plain and Hunter Richmond and Clarence River Valleys. *Distribution limit: N-Rockhampton Q. S-Eyre Pen Kangaroo Is. SA.*	x	✓	3 km N (4 records within 10km)	2004	Unlikely	✓

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Spotted-tailed Quoll *Dasyurus maculatus* OEH EPBC	V	E	Dry and moist open forests containing rock caves, hollow logs or trees. *Distribution limit: N-Mt Warning National Park. S-South of Eden.*	x	x	-	-	x	x
Koala *Phascolarctos cinereus* OEH EPBC	V	V	Inhabits both wet and dry eucalypt forest on high nutrient soils containing preferred feed trees. *Distribution limit: N-Tweed Heads. S-South of Eden.*	x	Sub-optimal	2km E (2 records within 10km)	2006	Unlikely	✓
Squirrel Glider *Petaurus norfolcensis* OEH	V	-	Mixed aged stands of eucalypt forest & woodlands including gum barked & high nectar producing species & hollow bearing trees. *Distribution limit: N-Tweed Heads. S-Albury.*	x	x	-	-	x	x
Greater Glider *Petauroides volans* EPBC	-	V	Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Population density is optimal at elevation levels at 845 m above sea level. Prefer overstorey basal areas in old-growth tree stands. Highest abundance typically in taller, montane, moist eucalypt forests, with relatively old trees and abundant hollows *Distribution limit: N-Border Ranges National Park. S- South of Eden.*	x	x	-	-	x	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Brush-tailed Rock-wallaby *Petrogale penicillata* EPBC	E	V	Found in rocky gorges with a vegetation of rainforest or open forests to isolated rocky outcrops in semi-arid woodland country. *Distribution limit: N-North of Tenterfield. S-Bombala.*	x	x	-	-	x	x
Grey-headed Flying-fox *Pteropus poliocephalus* OEH EPBC	V	V	Found in a variety of habitats including rainforest, mangroves, paperbark swamp, wet and dry open forest and cultivated areas. Forms camps commonly found in gullies and in vegetation with a dense canopy. *Distribution limit: N-Tweed Heads. S-Eden.*	x	Foraging only	6 km ESE (1 record within 10km)	2015	Low	✓
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* OEH	V	-	Rainforests, sclerophyll forests and woodlands. *Distribution limit: N-North of Walgett. S-Sydney.*	x	x	-	-	x	x
East-coast Freetail Bat *Micronomus norfolkensis* OEH	V	-	Inhabits open forests and woodlands foraging above the canopy and along the edge of forests. Roosts in tree hollows, under bark and buildings. *Distribution limit: N-Woodenbong. S-Pambula.*	x	✓	5.5 km NE (1 record within 10km)	1999	Not likely	x

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Large-eared Pied Bat *Chalinolobus dwyeri* OEH EPBC	V	V	Warm-temperate to subtropical dry sclerophyll forest and woodland. Roosts in caves, tunnels and tree hollows in colonies of up to 30 animals. *Distribution limit: N-Border Ranges National Park. S-Wollongong.*	x	✓	4.5 km NE (1 record within 10km)	1999	Not likely	x
Eastern Falsistrelle *Falsistrellus tasmaniensis* OEH	V	-	Recorded roosting in caves, old buildings and tree hollows. *Distribution limit: N-Border Ranges National Park. S-Pambula.*	x	✓	7 km WNW (1 record within 10km)	1995	Not likely	x
Eastern Bentwing-bat *Miniopterus orianae oceanensis* OEH	V	-	Prefers areas where there are caves, old mines, old buildings, stormwater drains and well-timbered areas. *Distribution limit: N-Border Ranges National Park. S-South of Eden.*	x	✓	3 km N (3 records within 10km)	2004	Low	✓

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
Corbens Long-eared Bat *Nyctophilus corbeni* EPBC	V	V	Inhabits a variety of vegetation types, including mallee, bulloke *Allocasuarina luehmannii* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground. *Distribution limit: Central NSW west of the ranges.*	x	x	-	-	x	x
Murray Cod *Maccullochella peelii* EPBC	-	V	Utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures. *Distribution limit:* throughout the Murray-Darling Basin	x	x	-	-	x	x

OEH	Denotes species listed within 10km of the subject site on the *Atlas of NSW Wildlife*
EPBC	Denotes species listed within 10km of the subject site in the *EPBC Act* habitat search
V	Denotes vulnerable listed species under the relevant Act
E or E1	Denotes endangered listed species under the relevant Act
E4a or CE	Denotes critically endangered listed species under the relevant Act

Common name ***Scientific name*** Database source	***BC Act***	***EPBC Act***	**Preferred habitat** ***Distribution limit***	**Recorded on site (✓)**	**If not recorded on site**				**Required assessment of significance test (✓) (at DA stage)**
					Suitable habitat present (✓)	**Nearby and/or high number of record(s) (✓)** *Notes 1,2 & 3*	**Record(s) from recent years (✓)** *Notes 1,2 & 3*	**Potential to occur**	
NOTE:	1. This field is not considered if no suitable habitat is present within the subject site 2. 'records' refer to those provided by the *Atlas of NSW Wildlife* 3. 'nearby' or 'recent' records are species specific accounting for home range, dispersal ability and life cycle								
Unlikely	Represents such a low margin but not enough to 100% rule it one. A significance of impact test is required.								
Not likely	Means 0% change of occurring, despite there being potential habitat. A significance of impact test is not applied to these species.								

Table A2.3 provides an assessment of potential habitat within the study area for nationally *protected* migratory fauna species recorded within 10km on the *EPBC Act* Protected Matters Tool. Nationally *threatened* migratory species are considered in Table A2.3.

Table A2.3 – Migratory fauna habitat assessment

Common name ***Scientific name***	**Preferred habitat** ***Migratory breeding***	**Suitable habitat present (✓)**	**Comments on potential impacts**
Osprey *Pandion cristatus*	Utilises waterbodies including coastal waters, inlets, lakes, estuaries and offshore islands with a dead tree for perching and feeding. *Distribution Limit: N-Tweed Heads. S-South of Eden.*	×	-
White-throated Needletail (*Hirundapus caudacutus*)	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns; companies forage often along favoured hilltops and timbered ranges. *Breeds Siberia, Himalayas, east to Japan. Summer migrant to eastern Australia.*	✓	No likely significant impact
Yellow Wagtail (*Motacilla flava*)	The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops.	✓	No likely significant impact
Satin Flycatcher (*Myiagra cyanoleuca*)	Heavily vegetated gullies in forests, taller woodlands, usually above shrub-layer; during migration, coastal forests, woodlands, mangroves, trees in open country, gardens. *Breeds mostly south east Australia and Tasmania over warmer months, winters in north east Qld.*	×	-
Rufous Fantail (*Rhipidura rufifrons*)	Undergrowth of rainforests / wetter eucalypt forests / gullies; monsoon forests, paperbarks, sub-inland and coastal scrubs; mangroves, watercourses; parks, gardens. On migration, farms, streets buildings. *Breeding migrant to south east Australia over warmer months. Altitudinal migrant in north east NSW in mountain forests during warmer months.*	✓	No likely significant impact
Fork-tailed Swift (*Apus pacificus*)	Aerial: over open country, from semi-arid deserts to coasts, islands; sometimes over forests, cities. *Breeds Siberia, Himalayas, east to Japan south east Asia. Summer migrant to east Australia. Mass movements associated with late summer low pressure systems into east Australia. Otherwise uncommon.*	✓	No likely significant impact