OAKLANDS ESTATE STAGE 3

PLANNING PROPOSAL

For the proposed

AMENDMENT TO MINIMUM LOT SIZE

Lot 18 in DP 1199163
Oaklands Estate, Oaklands Drive,
Nemingha NSW 2340

Prepared for: Nunworth Pty Ltd

Our reference: 14111

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1.0 Introduction

Mitchel Hanlon Consulting Pty Ltd has been engaged to prepare a planning proposal to amend the Tamworth Regional Local Environmental Plan 2010 (TRLEP 2010).

The proposed amendment will amend the TRLEP 2010 Lot Size Map. The subject land is currently zoned *R5 Large Lot Residential* and *E3 Environmental Management*.

The site is owned by Nunworth Pty Ltd and forms part of the 'Oaklands' rural-residential estate development. Existing infrastructure is present in the front portion of the estate with frontage to Nundle Road. This area forms Stage 1 and 2 of the development. Housing has been constructed and residents living within the estate.

This planning proposal has been prepared in accordance with the Department of Planning and Infrastructure's '*Guide to Preparing Planning Proposals'* (DP&E, 2016) and *'List of local planning directions issued by the Minister on or after 1 July 2009 (updated 5 August 2017)'*.

The reason for the proposed change to the planning instrument is as follows:

- Compliance with the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999;*
- Compliance with the Matters of National Environmental Significance (MNES) for the Critically Endangered Ecological Community (CEEC) White Box - Yellow Box – Blakely's Red Gum Grassy Woodland;
- Supply of sufficient lot yield to offset the costs associated with the ongoing maintenance and management of the CEEC conservation area; and
- To increase the efficient use of infrastructure (in particular water supply infrastructure) to the site.

2.0 Proposal Objective

The objective of the planning proposal is to amend the Tamworth Regional Local Environmental Plan 2010 (TRLEP 2010) Lot Size Map.

The site in relation to the immediate locality is presented in Figure 1. A site plan is shown in Figure 2 and the proposed lot layout is illustrated in Figure 3.

The subject site is zoned as *R5 Large Lot Residential, RU1 Primary Production* and *E3 Environmental Management* per the TRLEP 2010. It is proposed to reduce the minimum lot size on the *R5 Large Lot Residential* zone from 2 hectares (*Z*) to 1 hectare (*Y*).

Reducing the minimum lot size will result in an increased lot yield from the site. This will increase properties that are able to utilise the present infrastructure.

The aim of the amendment is to allow a future subdivision of the site to create potentially 28 allotments with a lot size of 1ha and one lot with a lot area of approximately 345ha [Refer to Figure 3].

Stage 3 of Oaklands Estate was previously approved (DA0193/2010) for 17 rural residential lots (ranging from approximately 4.3ha to 77ha) [Refer to Appendix A]. This DA lapsed in 2015 and is now void.

It is also noted that six (6) lots contained within the approved Stage 1 (ranging in size from approximately 4.5ha to 15ha) were not constructed [Refer to Figure 2]. The location of these lots is now contained within the area subject to this planning proposal, therefore the proposal will only create potentially five (5) additional lots rather than eleven (11).

Table 1: Site Identification

ASPECT	DESCRIPTION
Site Address	Oaklands Drive, Nemingha
Lot / Section / DP	Lot 18 in DP 1199163
Town / City	Tamworth
Parish	Nemingha
County	Parry
LGA	Tamworth Regional
Site Owner/s	Nunworth Pty Ltd
Approximate Lot Area	383 ha
Current Use	Rural
Current Zoning #	*R5 – Large Lot Residential;* *RU1 – Primary Production; and* *E3 – Environmental Management.*
Current Minimum Lot Size#	*AD (100ha);* *Z (2ha); and* *AH (800ha)*

Zoning under Tamworth Regional LEP 2010

3.0 Planning Context

3.1 Tamworth Regional Local Environmental Plan 2010

The subject site is zoned as *R5 Large Lot Residential, RU1 Primary Production* and *E3 Environmental Management* [Refer to Figure 4] per the TRLEP 2010. The site is also identified as having a minimum lot size of *Z* (2ha) for *R5* land, *AD* (100ha) for *E3* land and *AH* (800ha) for *RU1* land

The planning proposal seeks to amend the minimum lot size associated with the R5 zoning. The objectives of the R5 zone have been reproduced below to demonstrate the proposal's compliance to the zone.

Tamworth Regional Local Environmental Plan 2010 defines *R5* Large Lot Residential as follows:

Zone R5 Large Lot Residential

1 Objectives of zone

- To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality.
- To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future.
- To ensure that development in the area does not unreasonably increase the demand for public services or public facilities.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To provide a mix of housing that supports and encourages neighbouring equine-related facilities and is compatible with surrounding land uses and activities.

2 Permitted without consent

Home-based child care; Home occupations; Moorings; Roads

3 Permitted with consent

Backpackers' accommodation; Bed and breakfast accommodation; Cellar door premises; Dwelling houses; Home industries; Markets; Neighbourhood shops; Any other development not specified in item 2 or 4

4 Prohibited

Advertising structures; Air transport facilities; Amusement centres; Boat building and repair facilities; Boat sheds; Cemeteries; Charter and tourism boating facilities; Commercial premises; Correctional centres; Crematoria; Dairies (pasture-based); Depots; Eco-tourist facilities; Forestry; Freight transport facilities; Heavy industrial storage establishments; Highway service centres; Home occupations (sex services); Industrial retail outlets; Industrial training facilities; Industries; Intensive livestock agriculture; Marinas; Mooring pens; Mortuaries; Passenger transport facilities; Recreation facilities (indoor); Recreation facilities (major); Registered clubs; Research stations; Residential accommodation; Restricted premises; Rural industries; Service stations; Sex services premises; Storage premises; Tourist and visitor accommodation; Transport depots; Turf farming; Vehicle body repair workshops; Vehicle repair stations; Water recreation structures; Wharf or boating facilities; Wholesale supplies

4.0 Explanation of Provisions

This planning proposal seeks to amend the minimum lot size associated with the portion of the site zoned R5. The proposed amendment will affect TRLEP 2010 Lot Size Map – Sheet LSZ_004G.

It is proposed to increase the yield of lots on the remaining land by reducing the minimum lot size. Presently, the TRLEP 2010 Lot Size Map indicates the minimum lot size permissible on the site is two (2) hectares. It is proposed to reduce this to one (1) hectare. This reduction in lot area and increase in yield will ensure the endangered CEEC is protected and the cost of the ongoing maintenance of the CEEC is offset by the additional land sales.

The Critically Endangered Ecological Community (CEEC) White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-gum woodland) found to the rear of the site will remain undeveloped and will be placed under a yet to be determine Conservation mechanism ensuring its conservation and management.

The biodiversity constraints assessment undertaken by Niche Environment and Heritage and the flora and fauna assessment prepared by Eco Logical Australia have been included in this submission as Appendix B and Appendix C respectively.

5.0 Justification

5.1 Need for Planning Proposal

Is the planning proposal a result of any strategic study or report?

Tamworth Regional Development Strategy

The Tamworth Regional Development Strategy (TRDS 2008) prepared by GHD for Tamworth Regional Council provides a direction for the settlement land within the Tamworth region.

The TRDS 2008 states that the Tamworth region is expected to continue to grow in the future. It also identifies that the predominant form of housing is detached dwellings on lots ranging from 700 – 1000m^2.

By increasing the available lots of the predominant housing type, coupled with an anticipated increase in population, people in the area will be supplied with preferred housing options. Further, the TRDS 2008 identifies that significant areas of native vegetation should be protected through zoning and development controls as well as reinforcing distinctive natural elements such as hills and vegetation. By placing the CEEC under a conservation agreement (a restrictive covenant or similar) administered by the NSW government, this goal can be achieved.

Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The planning proposal is the most appropriate method for amending the TRLEP 2010.

5.2 Relationship to Strategic Planning Framework

Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub regional Strategy?

Strategic Regional Land Use Policy

The Department of Planning and Infrastructure released the Strategic Regional Land Use Policy for the New England and North West in September 2012 (NSW DPI, 2012).

The Strategy identified that there is a requirement for new housing to provide for population growth in the area. Further, it identified that Tamworth may need to rezone additional residential land by 2016.

The planning proposal is consistent with the regional strategy, as it will allow for the development of housing and will result in effective use of infrastructure.

The proposal is also consistent with the recently released Regional Plan for the New England North West. This strategy was prepared by NSW Planning and Environment.

Is the planning proposal consistent with the local Council's Community Strategic Plan or other local strategic plan?

The planning proposal is considered consistent with the strategic planning direction outlined in the TRDS as well as the Strategic Regional Land Use Policy.

Is the planning proposal consistent with applicable State Environmental Planning Policies?

The following State Environmental Planning Policy (SEPP) is considered to be relevant to the subject land:

- SEPP No. 44 – Koala Habitat Protection;
- SEPP No. 55 – Remediation of Land; and
- SEPP – Rural Lands 2008.

An assessment has been undertaken to determine the level of consistency within the planning proposal has with the relevant State Environmental Planning Policy (SEPP). The results of the assessment are provided in Table 2.

Table 2: Compliance with State Environmental Planning Policy

SEPP	RELEVANCE	IMPLICATIONS
SEPP 44 – Koala Habitat Protection	This Policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.	Ecological assessments undertaken onsite concluded that based on the definitions under SEPP 44, the areas supporting White Box Woodland and Yellow Box/River Red Gum on the site are 'potential Koala habitat'. However, no Koalas have been sighted in the study area during the numerous studies undertaken. The assessments undertaken determined that the proposed action will not adversely affect habitat critical to the survival of the Koala. The site is not deemed to be 'core koala habitat. It is noted that the area considered to be potential Koala habitat are predominately located within the future conservation area (and existing E3 zoned land).
SEPP 55 – Remediation of Land	The object of this Policy is to provide for a Statewide planning approach to the remediation of contaminated land.	The planning proposal does not have any implications in terms of the application of the provisions of SEPP 55. A SEPP 55 assessment for the entire development site (stages 1 – 3) was undertaken in the development application associated with Stages 1 & 2. The subject site is not known to be contaminated. The site is not listed on the NSW EPA Register of Contaminated Sites, or the Contaminated Land – Record of Notices.
State Environmental Planning Policy (Rural Lands) 2008	The object of this Policy is to provide for a Statewide planning approach to the subdivision of rural land to ensure the orderly and economic use and development of rural lands and to minimise land use conflict.	Given the current zoning the proposal is deemed to generally comply with the objectives of the SEPP and will have a positive environmental outcome.

No other relevant State Environmental Planning Policies (SEPP) were identified.

Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

Table 3: Planning Proposal Compliance with Ministerial Directions

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
1. Employment and Resources		
1.1 Business & Industrial Zones	Not applicable to this planning proposal.	The subject site is not within an existing or proposed business or industrial boundary.
1.2 Rural Zones	The objective of this direction is to protect the agricultural production value of rural land.	A small portion of the site (the north eastern corner) is zoned RU1. However, the proposal does not intend to rezone this portion of the site i.e. the RU1 zoned land will be retained. As such the proposal is deemed to satisfy the objectives of this direction.
1.3 Mining, Petroleum Production & Extractive Industries	Not applicable to this planning proposal.	The planning proposal does not relate to the rezoning of land with a known future associated with the Mining, Petroleum Production and Extractive Industries.
1.4 Oyster Aquaculture	Not applicable to this planning proposal.	The planning proposal does not relate to a Priority Oyster Aquaculture Area.
1.5 Rural Lands	The objectives of this direction are to: o protect the agricultural production value of rural land, o facilitate the orderly and economic development of rural lands for rural and related purposes.	The subject site contains land identified within existing rural and environment protection zones (RU1 and E3 under the TRLEP 2010). The proposal does not intend to rezone the RU1 zoned land within the site. The proposal will result in better management of the CEEC and E3 zoned land.

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
2. Environment and Heritage		
2.1 Environment Protection Zones	The objective of this direction is to protect and conserve environmentally sensitive areas.	The subject site is within an existing environment protection zone (E3 under the TRLEP 2010), the proposal will result in better management of the E3 zoned land and provide for its ongoing maintenance.
2.2 Coastal Protection	Not applicable to this planning proposal.	The subject site is not within the coastal zone.
2.3 Heritage Conservation	Not applicable to this planning proposal.	The planning proposal will not affect land in a known heritage conservation area.
2.4 Recreation Vehicle Areas	Not applicable to this planning proposal.	The planning proposal does not relate to a Recreational Vehicle Area.
2.5 Application of E2 and E3 Zones and Environmental Overlays in Far North Coast LEPs	Not applicable to this planning proposal.	The planning proposal does not relate to land in a Far North Coast LEP

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
3. Housing, Infrastructure and Urban Development		
3.1 Residential Zones	The objectives of this direction are: o to encourage a variety and choice of housing types to provide for existing and future housing needs, o to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and o to minimise the impact of residential development on the environment and resource lands.	The planning proposal provides consistency with this direction. The subject site is within an existing residential zone (R5) under the TRLEP 2010. The proposal aims to make efficient use of the existing infrastructure and services of the site. Electricity, telecommunications and adequate water supply services are existing for the site. There is no proposal to subdivide or rezone environmentally sensitive or resource lands.
3.2 Caravan Parks and Manufactured Home Estates	Not applicable to this planning proposal.	The planning proposal does not restrict land available for caravan parks or manufactured home estates.
3.3 Home Occupations	Not applicable to this planning proposal.	The planning proposal does not relate to home occupations.
3.4 Integrating Land Use and Transport	Not applicable to this planning proposal.	The planning proposal does not relate to transport access.
3.5 Development Near Licensed Aerodromes	Not applicable to this planning proposal.	The proposal is not in the vicinity of a licensed aerodrome.
3.6 Shooting Ranges	Not applicable to this planning proposal.	The planning proposal does not relate to or impact on a shooting range.

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
4. Hazard and Risk		
4.1 **Acid Sulfate Soils**	Not applicable to this planning proposal.	There are no known occurrences of acid sulfate soils in the region.
4.2 **Mine Subsidence and Unstable Land**	Not applicable to this planning proposal.	The land is not identified to be an area affected by mine subsidence or unstable land.
4.3 **Flood Prone Land**	Not applicable to this planning proposal	The land is not identified to be a flood prone.
4.4 **Planning for Bushfire Protection**	Bush fire mapping indicates parts of the site are affected [Refer to Figure 6]. The objectives of this direction are: o (a) to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and o (b) to encourage sound management of bush fire prone areas.	The requirement of Planning for Bushfire Protection will be implemented during the development application and subsequent construction certificate phases of the development. As the conservation area will be limited to the area shown in Figure 3, the proposed future lots will not be burdened by the agreement. As such, the future lots are deemed to be capable of complying with the requirements of PBP.

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
5. Regional Planning		
5.1 Implementation of Regional Strategies	Not applicable to this planning proposal.	The site is not located within the South Coast Regional or the Sydney-Canberra Corridor Regional Strategies.
5.2 Sydney Drinking Water Catchments	Not applicable to this planning proposal.	The site is not within the Sydney drinking water catchment.
5.3 Farmland of State and Regional Significance on the NSW Far North Coast	Not applicable to this planning proposal.	The planning proposal does not relate to state or regionally significant farmland on the NSW Far North Coast.
5.4 Commercial and Retail Development along the Pacific Highway, North Coast	Not applicable to this planning proposal.	The planning proposal does not relate to commercial and retail development along the Pacific Highway, North Coast.
5.5 Development in the vicinity of Ellalong, Paxton and Millfield (Cessnock LGA)	Revoked & Not Applicable	
5.6 Sydney to Canberra Corridor	Revoked & Not Applicable	
5.7 Central Coast	Revoked & Not Applicable	
5.8 Second Sydney Airport: Badgerys Creek	Not applicable to this planning proposal.	The planning proposal is not in proximity to a second airport site at Badgerys Creek.

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
5.9 **North West Rail Link Corridor Strategy**	Not applicable to this planning proposal.	The planning proposal is not in proximity to the North West Rail Link Corridor
5.10 **Implementation of Regional Plans**	The objective of this direction is to give legal effect to the vision, land use strategy, goals, directions and actions contained in Regional Plans.	The Regional Plan for the New England North West was recently released by NSW Planning and Environment. The project is consistent with the following goals: Goal 3 – Communities resilient to change with housing choice and services that meet shifting needs and lifestyles. Tamworth and Armidale are expected to have more than half the region's population by 2036. Directions 3.3 and 3.4 address housing choice and sustainable settlement. This development addresses these two concerns Goal 5 – Protected water, environment and heritage. The implementation of the proposed environmental protection in accordance with the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999 is consistent with this goal. Action 5.2.2 is for the identification of areas of potential high environmental value in new release areas.

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
6. Local Plan Making		
6.1 **Approval and Referral Requirements**	Not applicable to this planning proposal.	Not deemed applicable.
6.2 **Reserving Land for Public Purposes**	Not applicable to this planning proposal.	The planning proposal does not relate to land that is reserved for public purpose.

MINISTERIAL DIRECTIONS	PROVISIONS	IMPLICATIONS
6.3 Site Specific Provisions	Not applicable to this planning proposal.	The planning proposal does not seek to impose restrictive site specific provisions.
7. Metropolitan Planning		
7.1 Implementation of a Plan for Growing Sydney	Not applicable to this planning proposal.	The site is not subject to the Plan for Growing Sydney.
7.2 Implementation of Greater Macarthur Land Release Investigation	Not applicable to this planning proposal.	The site is not subject to the Greater Macarthur Land Release Investigation.
7.3 Parramatta Road Corridor Urban Transformation Strategy	Not applicable to this planning proposal.	The site is not subject to the Parramatta Road Corridor Urban Transformation Strategy.
7.4 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	Not applicable to this planning proposal.	The site is not subject to this plan.
7.5 Implementation of Greater Parramatta Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	Not applicable to this planning proposal.	The site is not subject to this plan.
7.6 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	Not applicable to this planning proposal.	The site is not subject to this plan.

5.3 Environmental, Social & Economic Impacts

Is there any likelihood that critical habitat or threatened species, populations or ecological communities or their habitats will be adversely affected as a result of the proposal?

The proposal occurs on land which comprises the Critically Endangered Ecological Community (CEEC) White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-gum woodland). This box-gum woodland is predominantly located in a current E3 *Environmental Management zoned area*. The proposed development will not impact this zoning or the box-gum woodland. All development will be limited to a 39ha portion of the zoned R5 area. As a result, no negative impacts on the CEEC have been identified. Further, a conservation area will be created containing the box-gum woodland, this area will be placed under a conservation agreement (a restrictive covenant or similar) administered by the NSW government ensuring its conservation [Refer to the proposed conservation area identified in Figure 3].

Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

Bushfire mapping indicates parts of the site are affected [Refer to Figure 6].

The requirement of Planning for Bushfire Protection will be implemented during the development application and subsequent construction certificate phases of the development.

As the conservation area will be limited to the area shown in Figure 3, the proposed future lots will not be burdened by the agreement. As such, the future lots are deemed to be capable of complying with the requirements of PBP.

No other environmental effects have been identified.

How has the planning proposal adequately addressed any social and economic impacts?

The social and economic impact of the planning proposal is predicted to be positive as it will allow for additional residential areas thus providing for a broader range of buyer's tastes and economic circumstances.

As the Tamworth Regional Development Strategy (GHD, 2008) identifies, Tamworth is a growing area, resulting in a demand for housing options.

The development will allow for the continued expansion of an identified future growth zone for the Tamworth Local Government Area. This will help ensure that future services are provided and maintained within the Nemingha locality.

The proposal is also considered to have a positive impact on the surrounding locality as the proposed development will generally be marketed to 'second' and 'third' home buyers whom generally have young children. As such, it is anticipated the increased in lot yield will potentially result in an increase in children attending Nemingha Public School.

It is also noted that the proposal is not expected to a have a negative impact to property values within the surrounding area.

5.4 State and Commonwealth Interests

Is there adequate public infrastructure for the planning proposal?

Investigations show that there will be adequate existing infrastructure to service the site. The subject site is serviced by electricity, stormwater, telecommunications and has access via a sealed road.

There is adequate area for on-site sewerage systems for each lot.

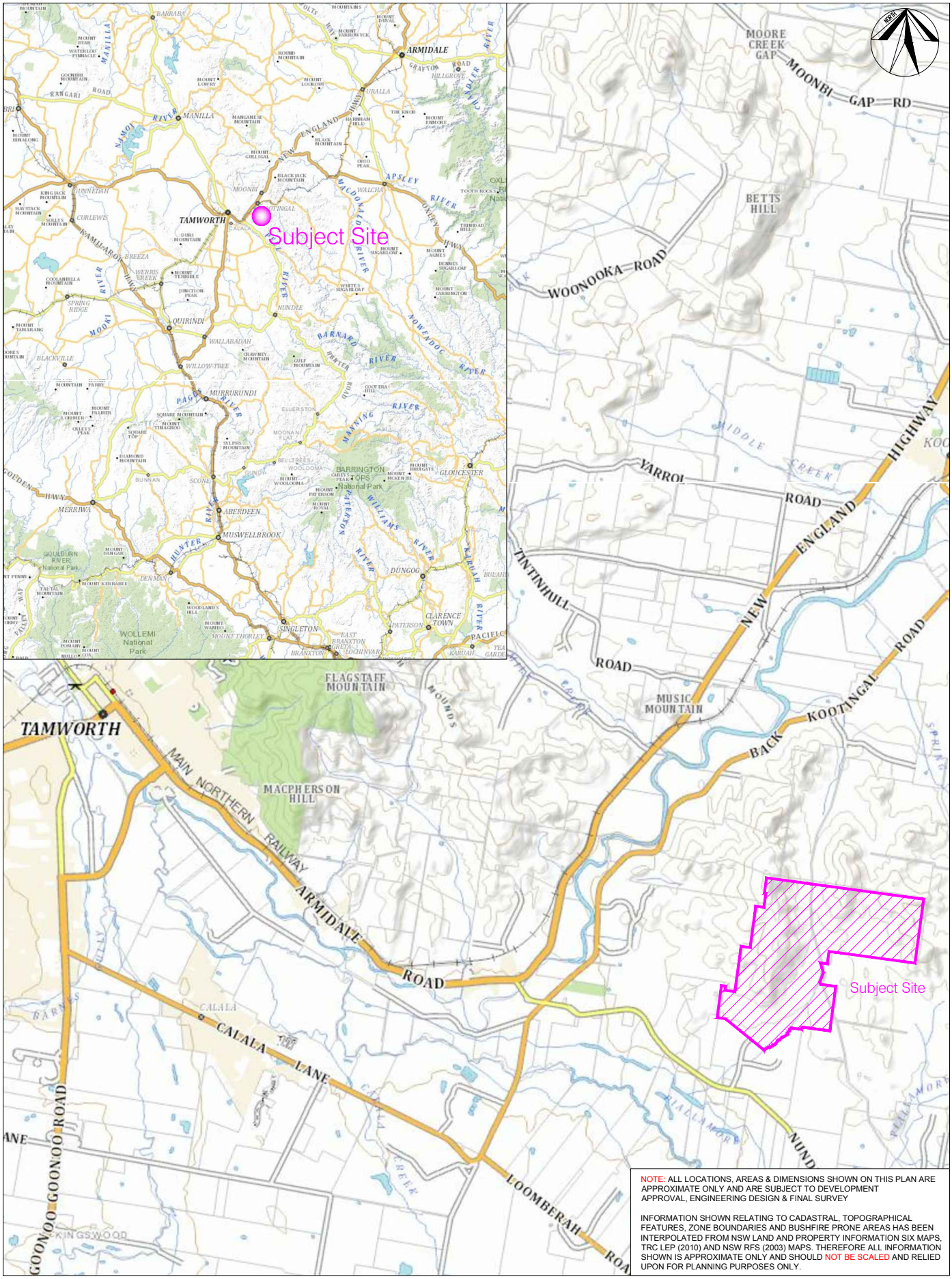
What are the views of State and Commonwealth public authorities consulted with the gateway determination?

It is proposed that the issues raised by State and Commonwealth public authorities will be addressed during the Planning Proposal public exhibition phase.

6.0 Mapping

To assist with the assessment of the proposal, the following mapping has been prepared:

- Figure 1: Site Locality Plan;
- Figure 2: Site Aerial Plan with Current Boundaries;
- Figure 3: Site Aerial Plan with Proposed Layout;
- Figure 4: Current Zoning and Lot Size Plan;
- Figure 5: Proposed Zoning and Lot Size Plan;
- Figure 6: NSW RFS Bushfire Mapping;
- Figure 7: Extent of White Box Grassy Woodland; and
- Figure 8: Extent of Vegetated Riparian Zone.



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PLANNING PROPOSAL, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 1

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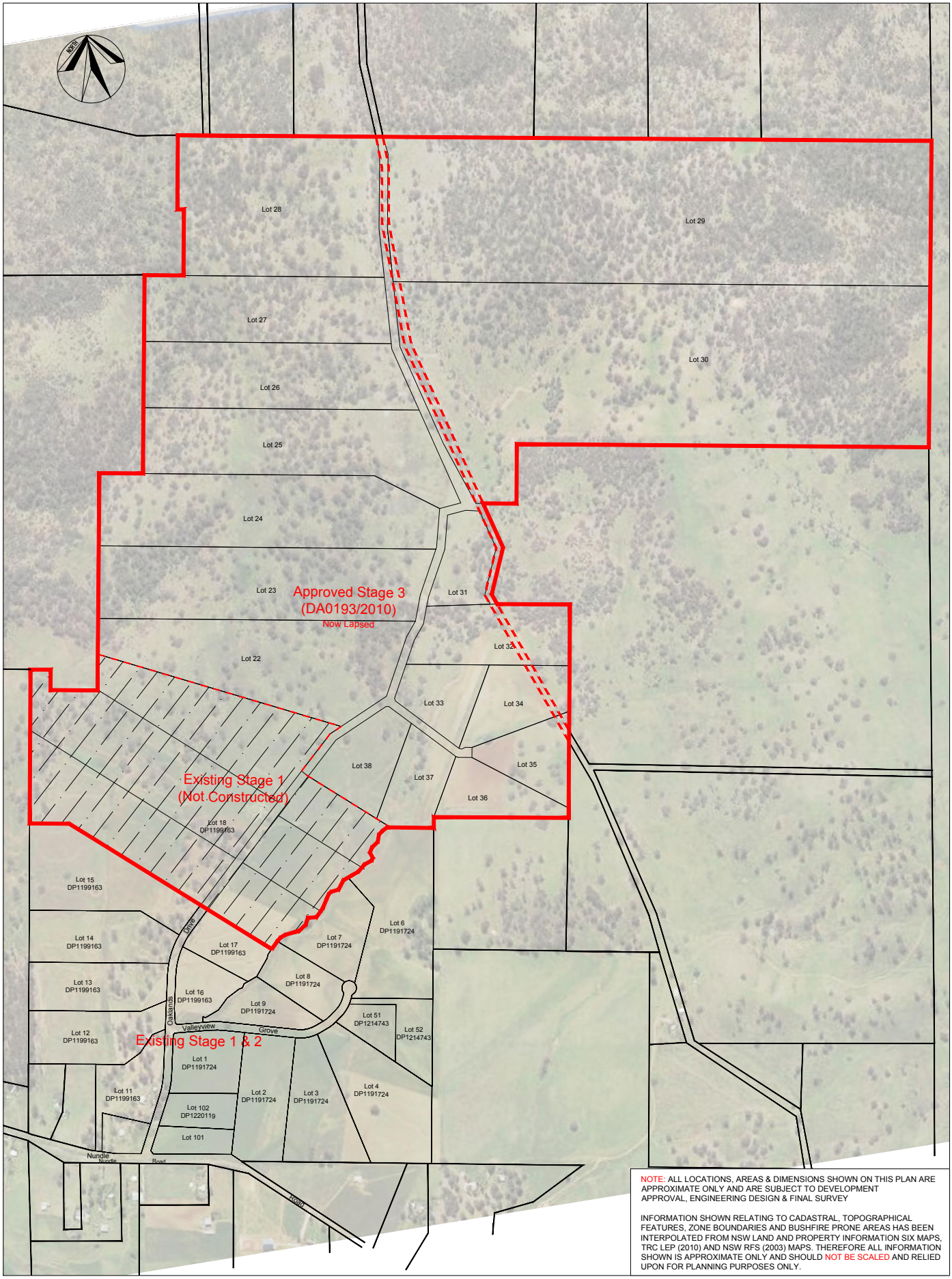

NOTE: ALL LOCATIONS, AREAS & DIMENSIONS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND ARE SUBJECT TO DEVELOPMENT APPROVAL, ENGINEERING DESIGN & FINAL SURVEY

INFORMATION SHOWN RELATING TO CADASTRAL, TOPOGRAPHICAL FEATURES, ZONE BOUNDARIES AND BUSHFIRE PRONE AREAS HAS BEEN INTERPOLATED FROM NSW LAND AND PROPERTY INFORMATION SIX MAPS, TRC LEP (2010) AND NSW RFS (2003) MAPS. THEREFORE ALL INFORMATION SHOWN IS APPROXIMATE ONLY AND SHOULD NOT BE SCALED AND RELIED UPON FOR PLANNING PURPOSES ONLY.

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PLANNING PROPOSAL, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 2

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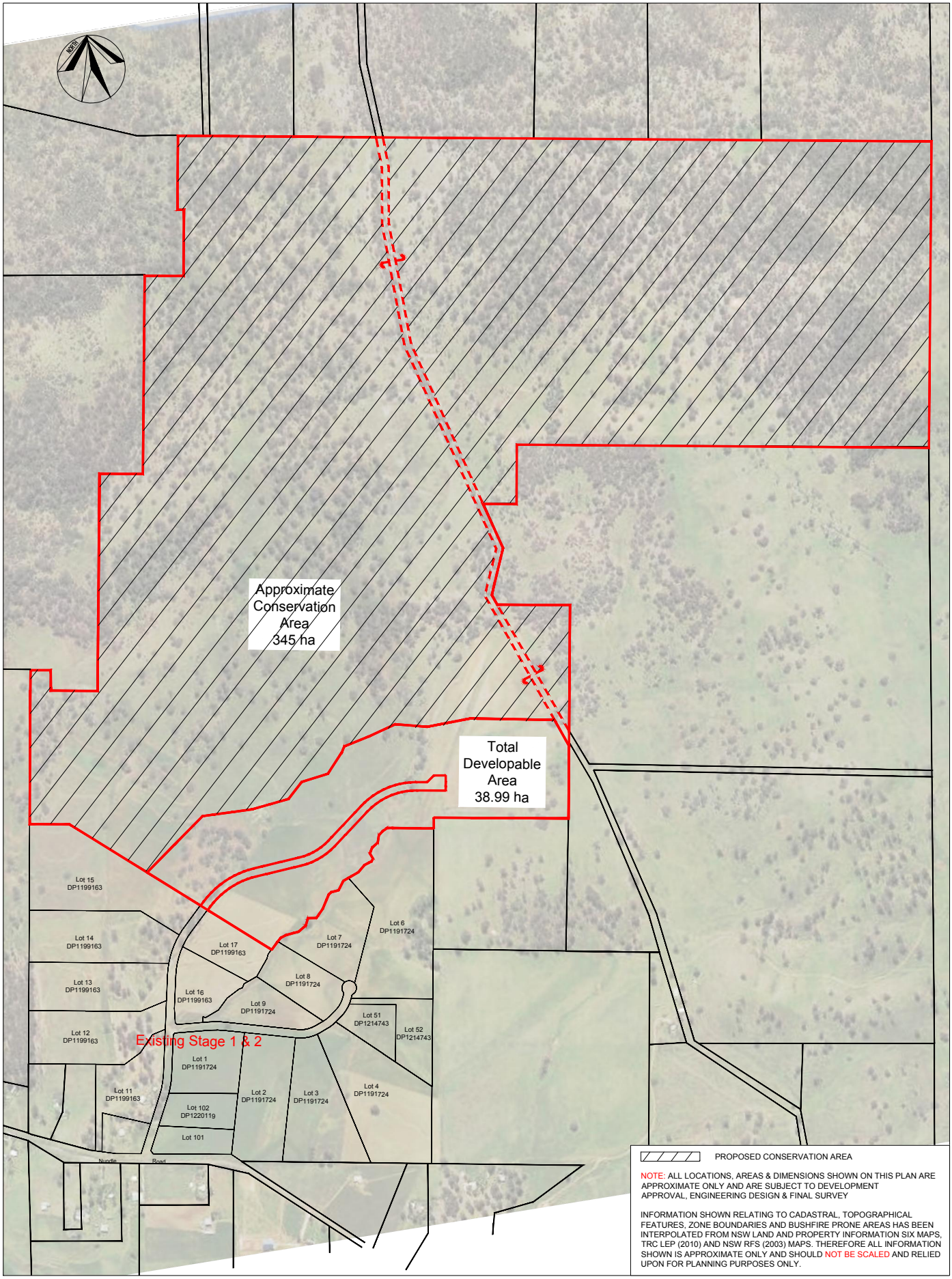

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FIGURE 3

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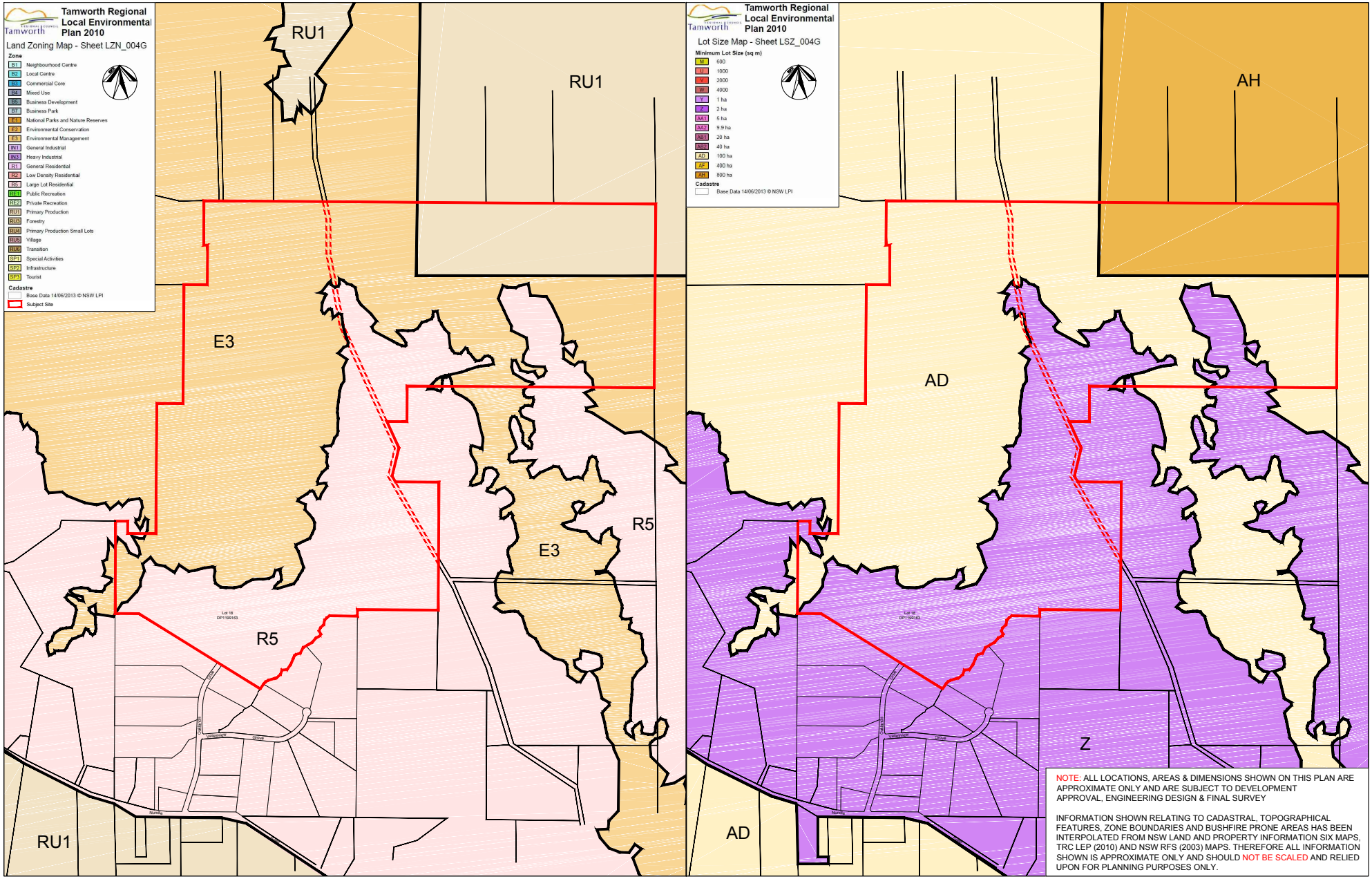

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FIGURE 4

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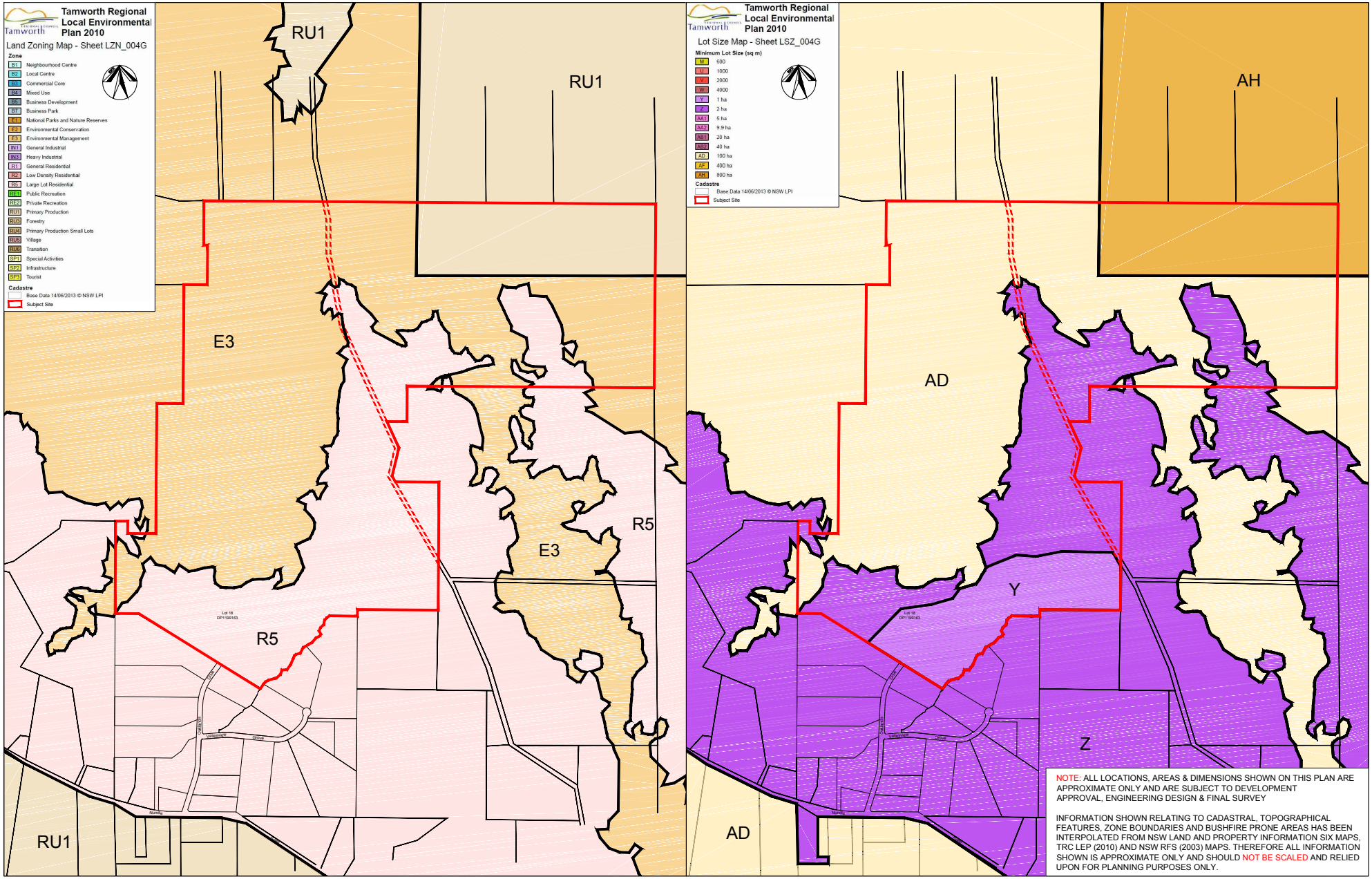

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FIGURE 5

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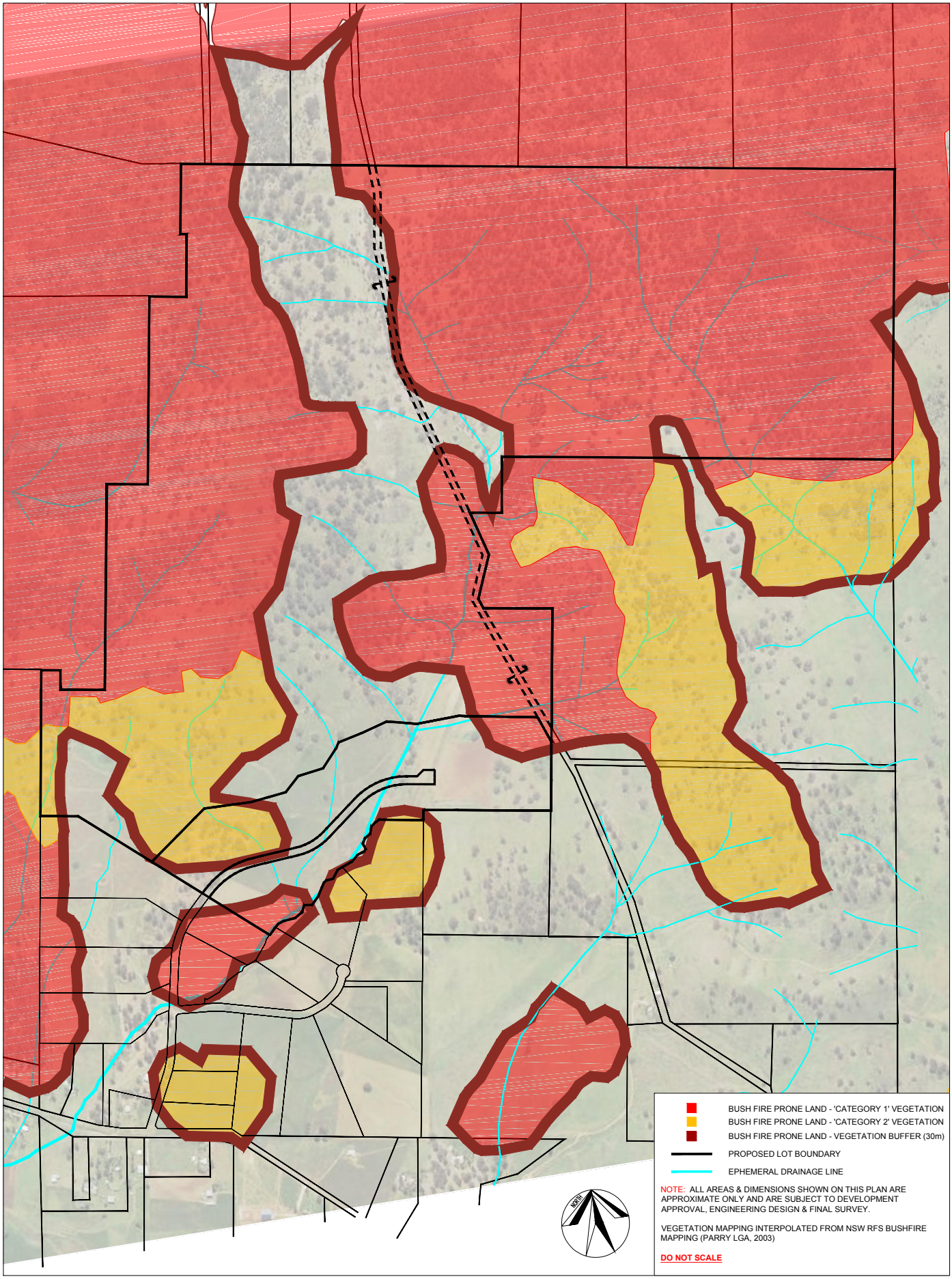

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FIGURE 6

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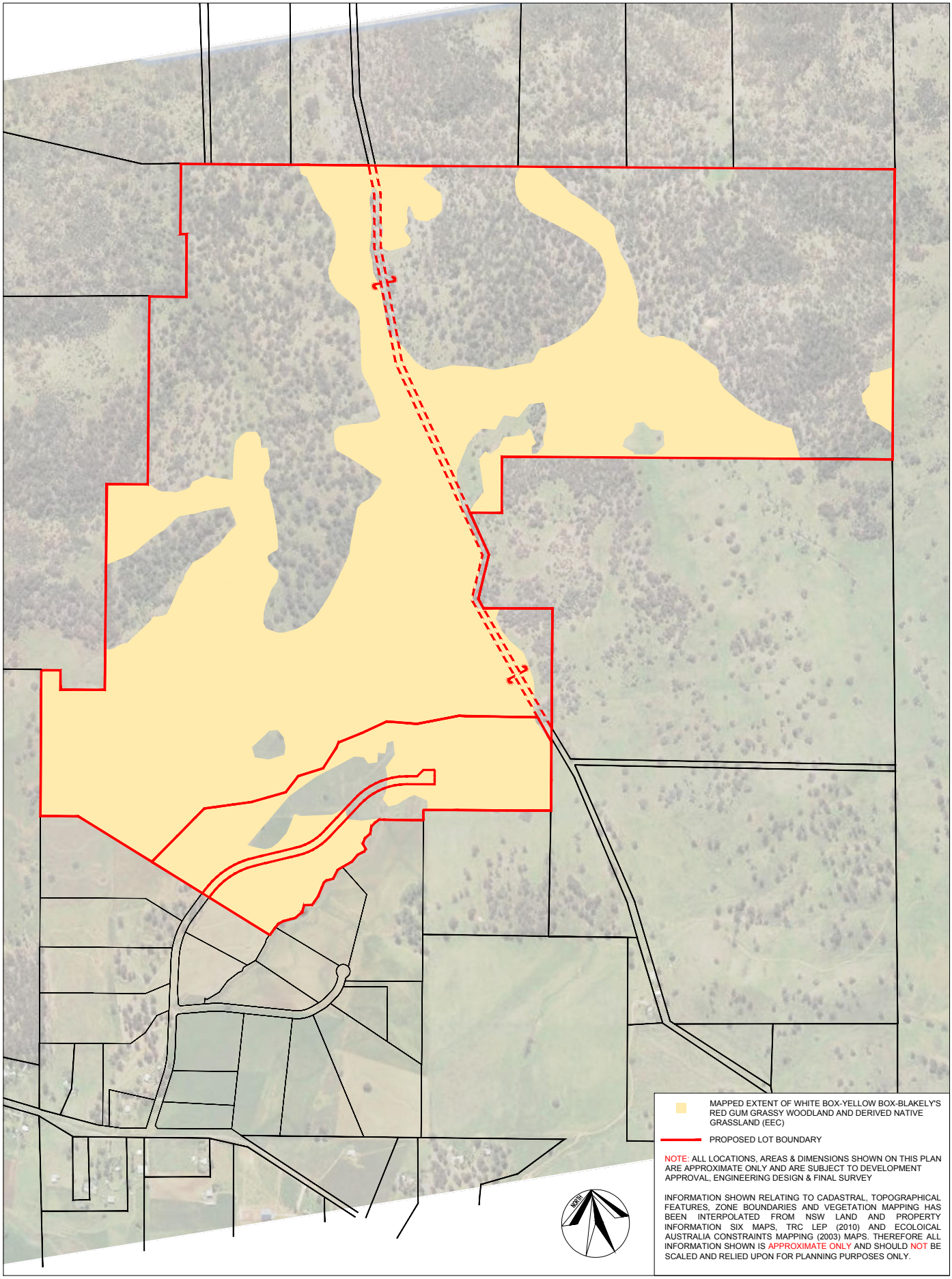

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FIGURE 7

Plot Date: 4 May 2018
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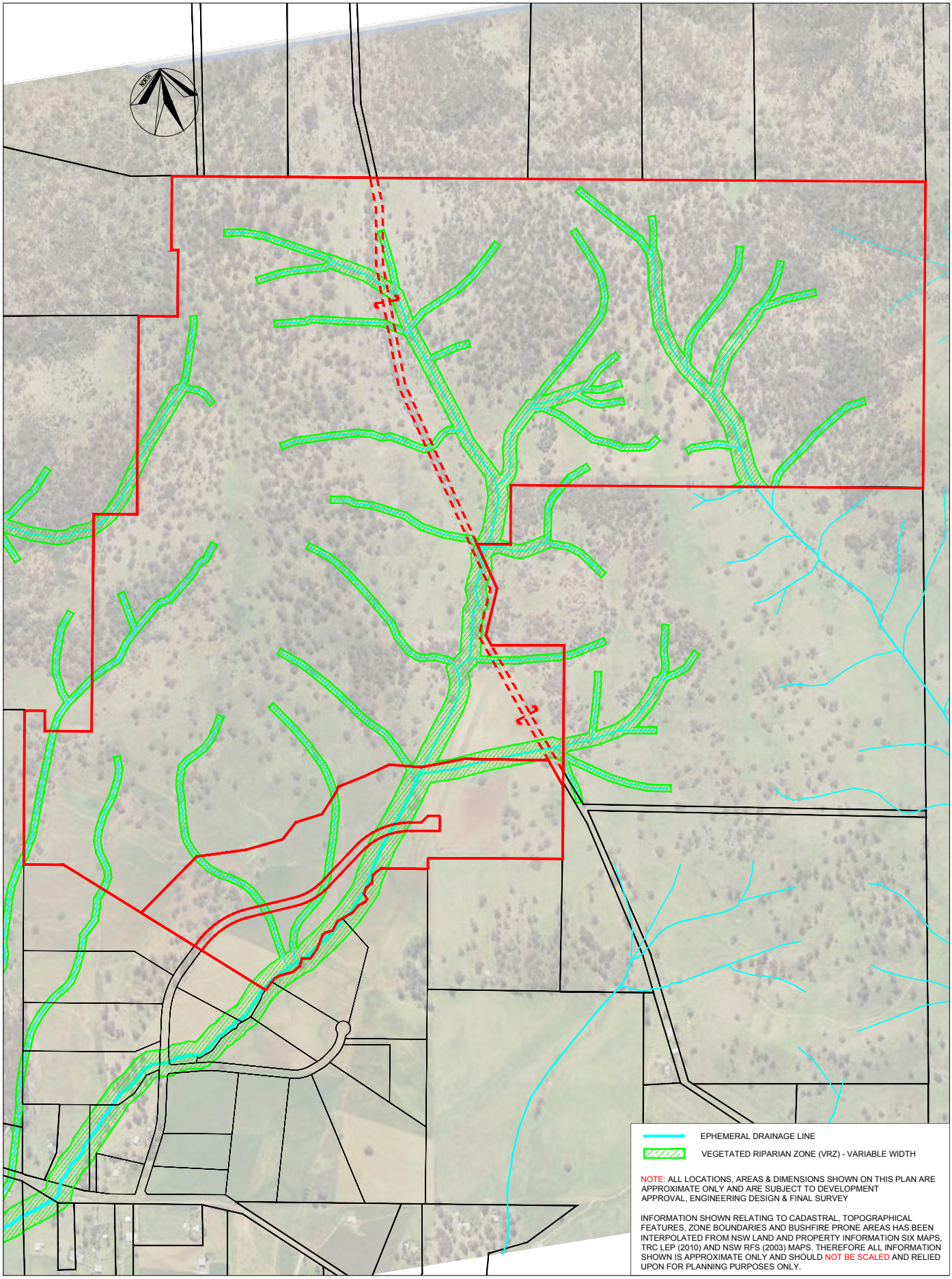

Mitchel Hanlon Consulting Pty Ltd

Nunworth Pty Limited

PLANNING PROPOSAL, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 8

Plot Date: 4 May 2018
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7.0 Stakeholder Consultation

7.1 Community & Adjoining Landholders

In accordance with the NSW Department of Planning's *Guidelines to Preparing LEPs*, upon Gateway Determination adjoining landholders and any affected community organisation will be formally notified of the proposal and invited to provide comment.

Council notified MHC that engaging the community early in the Planning Proposal process was advisable. This was to ensure that any concerns raised are suitably assessed and mitigated or eliminated where possible.

A letter drop of residents and adjoining landholders provided notification of a meeting to on the 18th November 2016 [Refer to Appendix G]. The following summarises the concerns raised at the meeting together with a response.

Lot sizes are not appropriate and it was understood that lot sizes were to remain constant.

Initially, expectations from all parties (including the developer) were that lot sizes were to be larger than 2 ha throughout the estate.

Changes to listed matters under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) saw the available land for development reduce from 80 ha to 39 ha.

Properties will lose value as a result of higher density development.

Taylor Byrne Valuation and Property Consultants were engaged to prepare an independent Market Value Impact Study [Refer to Appendix D]. This was undertaken to identify any impacts to land value that a higher density may have.

It was found that:

> Little, if any, impacts are created on existing property values which can be directly attributed to the existence of higher density development as proposed within the subject development.

The conclusion reached was that a reduction in minimum lot sizes is unlikely to negatively impact property values. In fact, it may increase the value of the existing lots in Stages 1 and 2 due to the shortage of larger rural-residential lots.

Will current landowners be compensated from the developer for loss of value?

No compensation is proposed.

As indicated in the report prepared by Taylor Byrne Valuation and Property Consultants, it is unlikely that property values will be affected. No compensation will occur as there will be no loss of value.

Increased traffic issues

The previously approved subdivision layout for Stage 3 (DA0193/2010) comprised 17 lots. The planning proposal seeks to allow potentially 28 lot.

It should be noted that, six (6) lots contained within approved Stage 1 (ranging in size from approximately 4.5ha to 15ha) were not constructed. The location of these lots is now contained within the area subject to this planning proposal, therefore the proposal will only potentially create five (5) additional lots rather than eleven (11).

Given the proposed increase in lot yield, TRC requested that an addendum be prepared to the initial traffic impact assessment associated with DA0193/2010.

Seca Solutions were engaged to undertake the necessary site works (including traffic counts) and prepare an addendum detailing any potential impacts to the local traffic environment associated with the planning proposal [Refer to Appendix F]..

The traffic assessment undertaken determined that there will be no traffic impact as a result of the additional lots associated with the proposal.

The road network within Stages 1 and 2 and the intersection at Nundle Road has been designed to cater for the expected number of traffic movements. This includes road geometry and pavement thickness.

Pavement thickness issues

All roads have been designed to meet the Australian Standards.

Too many neighbours

The total number of lots has only marginally changed. The number of potential residents will only increase by a maximum of five (5) residences.

Inadequate services

Stormwater is directed to the creek on the eastern side of the estate. All table drains and culverts have been adequately designed and sized to meet Tamworth Regional Council's guidelines and Australian Standards.

Water supply will remain trickle feed per TRC guidelines for rural residential subdivisions.

Loss of amenity

Definition

The online edition of the Merriam-Webster dictionary defines amenity as the quality of being pleasant or agreeable.

The Planning Academy (2017) defines the term as

> The pleasant or normally satisfactory aspects of a location which contribute to its overall character and the enjoyment of residents or visitors.

The August 2008 newsletter from the Victorian Government Solicitor's Office provides the following definition of amenity:

> Amenity is an elusive concept. It has its usual meaning of pleasantness, but also has a wider ambit. It has a physical (or tangible) component, which could include character and appearance of building and works, proximity to shopping facilities, quality infrastructure and absence of noise, unsightliness or offensive odours. It has been said to embrace all the features, benefits and advantages inherent in the environment in question. It also has a psychological or social component.

Amenity is a subjective quality and, in this regard, can be considered to be the agreeableness of the site and surrounds with respect to its rural character. This includes the sights, sounds, odours, scale and climate of the Oaklands estate. This implies the agreeableness of the site may be compromised if the agricultural use of the adjoining lands were to change from say lucerne cropping to intensive poultry farming.

Concerns are typically expressed in terms such as:

- invasion of privacy through densification;
- too much extra demand on community services (health, education, social services)
- too much extra demand on public infrastructure (roads, water supply, sewerage, drainage, electricity, gas, etc)
- excessive environmental impacts (i.e. odour, dust, noise, chemicals, electromagnetic, etc);
- diminishment of land and property values;
- increased competition for businesses;
- detriment to physical and mental health;
- loss of neighbouring land for exclusive private use;
- sense of betrayal by the developer, the real estate agent, Council and the development consultants.

No doubt there are others.

Land holders sometimes have an idealised perception of a rural landscape. The use of machinery and pumps by existing primary producers may affect the perceived amenity of new residents not accustomed to the working noises and odours of a neighbouring farm.

Similarly the use of machinery and pumps at night may affect the perceived amenity of the site resulting in complaints to authorities.

For Oaklands, the following have been identified as the key concerns of the existing residents that could affect their amenity.

Visual impact

The proposed Stage 3 will have a visual impact.

The impact is perhaps greatest for the existing Lots 6 and 7 in Stage 1. These lots have the creek as their rear boundary. Should Stage 3 proceed, smaller one (1) ha lots will extend to the creek with the result being Lots 6 and 7 having up to three (3) neighbours rather than the expected single neighbour.

The consequences are three (3) homes built and three (3) family units in residence.

The loss of privacy concern for Lots 6 and 7 comes from the elevated nature and line-of-sight thereby allowing residents and visitors to peer into and out of each existing and proposed lot. Lot 6 and 7 will have this issue whether there is one lot or three (3) future neighbours.

Given the presence of a 4th order stream along the rear boundaries of the southern lots within Stage 3, it is anticipated that a vegetated riparian buffer along the northern bank (within proposed lots 1 to 7) of the 'stream' will be required. This buffer is considered to be sufficient to screen the future lots within Stage 3 and subsequently reduce any visual impact potentially experienced by adjoining landowners

Lot Density

The lot areas in Stages 1 and 2 range from 2.915 ha to 10.51 ha.

It is acknowledged the average lot size will reduce and lot density will increase compared to Stages 1 and 2.

The terrain of the initial section of Stage 3 site does not lend itself to large rural-sized lots. Whilst large-sized lots were considered, the ability to manage large lots on sidling country is not as conducive as for lots on the flatter Stages 1 and 2.

Traffic

The increase in traffic movements is not expected to impact the surrounding locality [Refer to Appendix F].

Water Supply and Utilities

The proposed layout has been developed to ensure adequate servicing provisions are available to each lot. The existing services present within the development site are deemed to be adequate to facilitate the proposal.

Misleading marketing

A statement was made that the marketing of the subdivision was misleading. It was the purchasers' belief that future stages were to be larger than average rural-residential lots.

In a sense, this thinking is understandable. This "social contract" is the view that a person's moral and/or political obligations are dependent upon a *contract* or agreement among them in order to form the society in which they live. In this case, that the remaining stages of Oakland would be large rural-residential lots.

It can be stated that the developer did comply with his moral contract as evidenced by the large lots within Stage 2. Thus the owners of the lots in Stage 1 saw the developer deliver on its obligation.

The change occurred as a result of an externality i.e. through no fault of the developer. The circumstances affecting the developer's ability to deliver the desired outcomes had changed. All contracts can be renegotiated if circumstances change.

The refusal to understand the needs of the developer and the wider community reflects human nature and is often at its most shrill when information is lacking.

The importance of the community engagement session to communicate the changes to Stage 3 due to the ecological study cannot be understated.

Unethical behaviour

A statement was made that subdivisions within Stage 1 were undertaken by the developer. No subsequent subdivision has been made by the developer.

It is noted that while two (2) lots were further subdivided by the developer in Stage 2, subsequent purchasers of lots within stage 1 have conducted their own subdivisions. Since plan registration of Stage 1, the following lots have been subdivided by their owners (i.e. not the developer):

- Lot 5 in Stage 1 into two (2) lots of 2 ha each.
- Lot 10 in Stage 1 into two (2) lots of 2 ha each

Continued access and use to land within Stage 3

Many residents expressed disappointment in not being able to access the land comprising to Stage 3. They currently walk or ride their horses through the site. This will be restricted if the development is granted approval. It is noted that the site is in the private ownership of the development company and is not a public reserve. Therefore, the adjoining residents do not currently have a right to access the site.

The plan of management will, most likely, restrict usage of the residue land so as to comply with the 'protect and enhance' requirements of the environmental approval. The unsupervised access of the protected lands may prevent achievement of the performance targets with the plan of management.

Future land owners of the lot containing the vegetation offset may be able to undertake selective grazing for weed control and land management.

Opportunity to use protected land for horse trails

This may not be possible due to the requirements of the future land management plan.

7.2 Tamworth Regional Council

In addition to consultation with the adjoining landholders within Oaklands Estate, Mitchel Hanlon Consulting has undertaken consultation with Tamworth Regional Council (TRC). This consultation comprised various discussions and meetings with TRC's planning and engineering staff as well as the preparation of lodgement of a draft planning proposal for review and comment by Council staff.

The correspondence received from Council staff following the review indicated that further information regarding riparian corridor requirements, servicing and traffic impacts was to be provided within the planning proposal.

The following has been undertaken in an attempt to comply with Councils request:

Riparian Corridor Requirements

The correspondence received from Council recommended that given the presence of a 'fourth (4^{th}) order stream' within the development area, consultation with the NSW Department be undertaken to determine appropriate vegetation implantation and management of a riparian zone along the southern boundary of the subject site.

Initial discussions were held with NSW DPI (Water) staff to determine appropriate management of the required riparian and is outlined within Section 7.3.

Servicing

The correspondence received requested a preliminary servicing strategy be prepared to outline the proposed servicing provisions for the development with particular attention given to water and wastewater disposal. A preliminary strategy has subsequently been prepared and accompanies this planning proposal [Refer to Appendix E].

The strategy details that adequate servicing provisions can be provided to the proposed site. Final servicing details will be provided during the development application / construction certificate process.

Traffic

Given that the previously approved subdivision layout for Stage 3 (DA0193/2010) comprised 17 lots and the planning proposal seeks to allow potentially 28 lots, TRC requested that an addendum be prepared to the initial traffic impact assessment associated with DA0193/2010. It is also noted that six (6) lots contained within approved Stage 1 (ranging in size from approximately 4.5ha to 15ha) were not constructed. The location of these lots is now contained within the area subject to this planning proposal. Therefore the proposal will only potentially create five (5) additional lots rather than eleven (11).

Seca Solutions were engaged to undertake the necessary site works (including traffic counts) and prepare an addendum detailing any potential impacts to the local traffic environment associated with the planning proposal.

The assessment concluded:

> The additional traffic associated with the implementation of the proposed 28 residential lots will be easily accommodated by the existing road network. The site connection with the New England Highway operates well, a review of the accident data found no accidents have occurred since 2015, with only 3 recorded in the period between October 2011 and September 2016. Given the volume of traffic utilising this intersection it is considered to provide a good level of safety for road users, with the low flows generated by the proposed development not considered to have a significant impact on its current operation.
>
> Nundle Road currently operates well with low traffic flow passing the subject site and will remain well within its capacity as a rural road with the additional traffic flow associated with the proposed development. The auxiliary turn treatment that currently exists at the intersection of Nundle Road and Oakland Drive has been upgraded as part of the earlier stages of this development and whilst no longer considered ideal by the RMS given the low traffic flow through this area and the very low utilisation of this turn treatment, it is considered the intersection operates safely under its current configuration and will continue do so with the additional lots associated with Stage 3 of the development proposal.

The overall conclusion from the assessment is that access arrangements for the proposed development are sufficient and there are no traffic impediments to the development.

7.3 NSW Department of Primary Industries – Water

As recommended by TRC, Mitchel Hanlon Consulting has undertaken initial discussions with the NSW department of Primary Industries – Water (NSW DPI – Water).

The initial discussions related to the most effective management of the necessary riparian zone associated with the existing fourth (4th) order ephemeral stream which traverse the site. As the stream is identified as a fourth (4th) watercourse (as classified under the Strahler System), the NSW DPI – Water requires a total Vegetated Riparian Zone (VRZ) width of 95m (comprising of 40m each side of the watercourse plus the approximate channel width of 15m).

Plate 1 illustrates the layout of a typical VRZ while Figure 8 details the extent of the proposed VRC within proposed Stage 3.

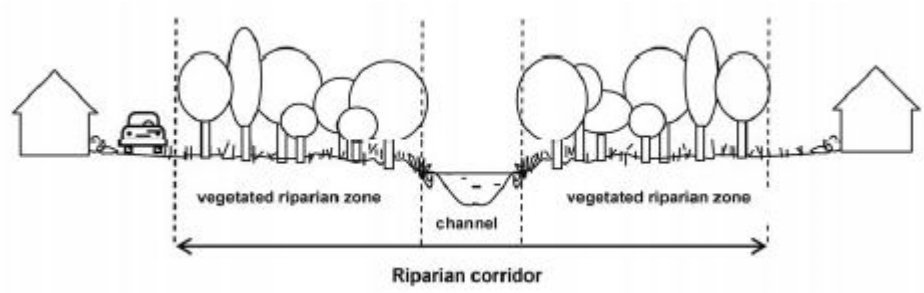

Plate 1: Typical VRZ Configuration

Following discussions with NSW DPI – Water staff it is intended that the necessary VRZ be included within each lot and be implement, managed and protected via suitable covenants prepared and registered on each lot pursuant to section 88B of the Conveyancing Act 1919.

It is considered that this is the most appropriate management method as it places the ongoing maintenance of the zone on future landholders opposed to Tamworth Regional Council.

It is proposed that a vegetation management plan prepared by a suitable qualified person will be prepared and submitted for approval as part of any future development application.

8.0 Project Timelines

In accordance with the NSW Planning & Infrastructure '*A Guide to Preparing Planning Proposals*' a Part 6 Project timeline has been developed. The proposed project timeline is detailed in the table below:

Table 4: Proposed Project Timeline

PLANNING PROPOSAL COMPONENT	PROPOSED TIME PERIOD
Submission to Council	November 2017 / December 2017
Gateway Determination	February 2018*
Public exhibition period and agency consultation	June 2018
Consideration of submissions post exhibition	July 2018
Consideration and determination of Planning Proposal	August 2018
Anticipated date of making the plan (under delegation)	September 2018

It should be noted that the above timeframes are estimates only and are subject to change in accordance with any unforeseen developments.

9.0 Conclusion

This submission has been prepared to request amendment to the Tamworth Regional LEP for a reduction of the minimum lot sizes on Stage 3 to be reduced from the current 2 ha minimum to 1 ha.

The reasons for the proposed change to the planning instrument are:

- Compliance with the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999;*
- Compliance with the Matters of National Environmental Significance (MNES) for the Critically Endangered Ecological Community (CEEC) White Box - Yellow Box – Blakely's Red Gum Grassy Woodland;
- Supply of sufficient lot yield to offset the costs associated with the ongoing maintenance and management of the CEEC conservation area; and
- To increase the efficient use of infrastructure (in particular water supply infrastructure) to the site.

Overall the development is considered to have positive environmental and social outcomes. The proposal will result in the ongoing protection, management and improvement of a critically endangered ecological community.

The development will allow for the continued expansion of an identified future growth zone for the Tamworth Local Government Area. This will help ensure that future services are provided and maintained within the Nemingha locality through enhanced use of public commercial infrastructure and services.

The proposal is also considered to have a positive impact on the surrounding locality as the proposed development will generally be marketed to 'second' and 'third' home buyers whom generally have young children. As such, it is anticipated the increased in lot yield will potentially result in an increase in children attending Nemingha Public School.

It is also noted that the proposal is not expected to a have a negative impact to property values within the surrounding area.

10.0 Limitations

This report has been prepared for use by the client (Nunworth Pty Ltd) who has commissioned the works in accordance with the project brief only.

The report only relates to the identified site referred to in the scope of works being the proposed development area within Lot 18 in DP 11991663, Oaklands Estate, Oaklands Drive, Nemingha NSW 2340 ('the site').

This report may not be relied upon by any third party not named in this report for any purpose, except with the prior written consent of Mitchel Hanlon Consulting Pty Ltd or Nunworth Pty Ltd (which consent may or may not be given at the discretion of Mitchel Hanlon Consulting Pty Ltd or Nunworth Pty Ltd).

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This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason.

11.0 References

Bath, Stewart Associates Pty Ltd 2006, *Statement of Environmental Effects (and associated documentation) – Anvil Hills Rural Residential Subdivision Development, 'Oatlands', 355 Nundle Road Piallamore NSW*.

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NSW Department of Planning and Environment 2017 *Draft Regional Plan for the New England North West*.

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NSW Rural Fire Service (RFS) & Department of Planning NSW (2006). *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners.* ISBN 0 9751033 2 6.

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Tamworth Regional Council, *Tamworth Regional Development Control Plan 2010 (Amendment 10).*

Tamworth Regional Council, *Tamworth Regional Local Environmental Plan 2010.*

Victorian Government Solicitor's Office 2008. Client Newsletter, *What is "amenity"?*

Appendix A Previous Conditions of Consent

Oaklands Stage 3 (DA0193/2010)

175621/2010

FILE COPY

Group Development Services Pty Limited
PO Box 498
PENNANT HILLS NSW 1715

Dear Sir/Madam

Environmental Planning and Assessment Act 1979
NOTICE TO APPLICANT OF DETERMINATION OF A DEVELOPMENT APPLICATION

Pursuant to Section 81(1)(a) of the Act, notice is hereby given of the determination by Council of the following development application.

Development Application No.	DA0193/2010
Subject Land:	Proposed Lot 22 (in the subdivision of Lot 5 DP 114596, Lots 134, 213 and 214, DP 755334, Lots 4 and 5, DP 826712 and the Unformed Public Road traversing these lots), 355 Nundle Road, NEMINGHA
Description:	Subdivision (17 lots)

In the determination of this application Council considered all matters listed under Section 79C of the Act. The development application has been determined by the **granting of consent subject to the conditions** listed below.

Section 80(3) of the Act makes provision for the issue of a "deferred commencement" consent. This involves granting approval on condition that specified matters be resolved before the consent can operate. Those matters which remain to be addressed to the satisfaction of Council are identified below as "Deferred Commencement Matters".

Deferred Commencement Matters

To confirm and clarify the terms of approval as provided for by Section 80(3) of the Environmental Planning & Assessment Act, 1979 the consent shall not operate until evidence has been submitted to Council's Director, Environment, Planning and Economic Development to confirm:

(i) the section of unformed public road traversing Lot 5 DP 114596, Lots 4 and 5 DP 826712, Lots 134, 213, 214 DP 755334 has been closed and ownership transferred to Nunworth Pty Ltd;

(ii) the public road and water supply infrastructure to be constructed as a component of Development Application No. DA0397/2009 and which provides public road access and water supply to this subdivision, has been constructed and dedicated to Council; and

(iii) the landowner has entered into a conservation agreement with the Minister for the environment to protect the undisturbed White Box/Yellow Box/Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands located on proposed Lots 28, 29 and 30.

General Terms of Approval

1) The development shall be carried out in accordance with the General Terms of Approval issued by the Rural Fire Service, attached in Annexure A and the General Terms of Approval issued by the Office of Water, attached in Annexure B to this consent.

Prior to Work Commencing

2) A Construction Certificate is to be obtained prior to commencement of any subdivision works and can be obtained by applying to either Council, or a private certifier. Please note that under Council's current planning instrument, Parry Local Environmental Plan 1987, the Principal Certifying Authority must be the Council.

3) In the week prior to work commencing, a report shall be prepared by an ecologist or zoologist and submitted to Council to confirm that the trees to be removed do not contain bird nests with offspring of one of the threatened woodland birds identified in the addendum to the Flora and Fauna Assessment prepared by EA Systems Pty Ltd (dated 9 October 2010).

Prior to Issue of a Construction Certificate

4) A compliance certificate under the Water Management Act 2000 must be obtained from the Council (as the local water supply authority). Council requires the following works to be completed prior to issuing a compliance certificate:

   (i) A concept Water Servicing Strategy for the development shall be submitted and approved by Council prior to the submission of the detailed engineering drawings required by condition 4(ii) of this consent. Prior to preparation of the Water Servicing Strategy, consultation shall be undertaken with Council's Water Enterprises Directorate to determine the applicable requirements.

   (ii) Engineering drawings and construction specifications for the extension to the water main shall be prepared in accordance with Council's Engineering Guidelines for Subdivision and Development and submitted and approved by Council prior to the issue of a Construction Certificate for subdivision.

5) Engineering drawings and construction specifications prepared in accordance with Council's Engineering Guidelines for Subdivision and Development are required for stormwater drainage and roads to ensure all works are designed and constructed in accordance with recognised and accepted guidelines.

6) A pavement report shall be prepared that demonstrates compliance with Australian Road Research Board "Special Report No. 41" and shall be submitted for approval prior to the issue of a Construction Certificate for subdivision to ensure that the minimum requirements for the public road have been met.

7) An Inspection and Test Plan (ITP) shall be prepared that satisfies the requirements of AUS-SPEC Document Numbers 7200.C0102-2006 and 7200.C0103-2006 to ensure that construction meets the relevant design criteria. The ITP shall be submitted prior to the issue of a Construction Certificate for subdivision. Copies of the referenced documents are available from Council upon request.

8) Prior to the issue of a Construction Certificate, a Construction Management Plan shall be prepared by a suitably qualified person and submitted to Council to address protection of existing flora and fauna, water management, sediment and erosion control, drainage and noxious weed control during construction. These measures are to be approved, installed and/or implemented for the duration of the works.

9) A Conservation Management Plan shall be prepared by a suitably qualified person to address issues including, but not limited to, the recommendations of the addendum to the Flora and Fauna Impact Assessment Report prepared by EA Systems (dated 7 October 2009), existing vegetation, biodiversity and water management, drainage, grazing and noxious weed control and submitted for the approval of Council prior to issue of a Construction Certificate.

10) A plan shall be prepared and submitted to Council for approval, nominating the location and area of a building envelope on each of the allotments in the subdivision. The building envelopes shall be appropriately located having regard to the White Box/Yellow Box/Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands, bushfire risk, topography and natural water courses.

General

11) The development must be carried out in accordance with the Development Application and accompanying plans, drawings and other documents as amended by conditions of this consent. Any amendment to the development or to these conditions will require the consent of the Council.

12) Conservation measures to mitigate the potential impacts of the proposed subdivision on existing vegetation and habitats present on the site and in the locality shall be undertaken in accordance with the recommendations of the addendum to the Flora and Fauna Impact Assessment Report prepared by EA Systems Pty Ltd (dated 9 October 2009).

13) A Restriction as to User under Section 88b of the Conveyancing Act 1919 is to be registered to designate that the owners:

    (i) of each rural residential allotment in the subdivision are not permitted to construct a commercial or stock/domestic bore;

    (i) are required to comply with the provisions of the Conservation Management Plan required by condition 9 of this consent, with the exception of Lots 28, 29 and 30 which are subject to the Conversation Agreement required by deferred commencement matter (iii); and

    (ii) may only construct a dwelling and associated outbuildings or infrastructure within the envelopes nominated on each allotment in the subdivision.

14) To confirm and clarify Council's terms of approval, the roads illustrated on the submitted plan (ref Oak S2 and dated September 2009) on the adjoining property "Springhill" do not comprise part of this consent.

During Construction

General

15) The contractors engaged on the construction the subdivision must maintain public liability insurance cover to the value of $20 million. The policy shall specifically indemnify Council from all claims arising from the execution of the works. Documentary evidence of the currency of the policy shall be provided to the Council upon request.

16) In the event that material suspected of being an Aboriginal relic is discovered during the activity, work must cease immediately and the National Parks and Wildlife Service and the Local Aboriginal Land Council be contacted to arrange inspection. Subject to discussion on the relic, any approval to proceed with the works would then require a licence under the National Parks and Wildlife Act 1974.

17) Work on the project shall be limited to the following hours to prevent unreasonable disturbance to the amenity of the area:-

Monday to Friday:	7.00am to 5.00pm;
Saturday:	8.00am to 1.00pm if audible on other residential premises, otherwise 7.00am to 5.00pm;

No work to be carried out on Sunday or Public Holidays if it is audible on other residential premises.

The developer shall be responsible to instruct and control his sub-contractors regarding the hours of work.

Road Construction

18) Full width rural standard bitumen sealed roads shall be constructed for the full frontage of the lots to ensure that public road facilities are established to an appropriate standard having regard to the traffic generated by the proposed development. The work shall be completed in accordance with the Council's Engineering Guidelines for Subdivisions and Development.

Access

19) All driveways shall be bitumen sealed with a two coat application from the edge of the new seal to the lot boundary and appropriate sealing of the shoulders at the driveways shall occur in a splayed format.

20) Depending on the location of the driveways either of the following shall apply:

(i) A rural type dish-drain crossing shall be provided in the driveway for each lot to facilitate access to the site and provide for road drainage in accordance with Council's Guidelines; or

(ii) A concrete driveway culvert with reinforced concrete headwalls shall be provided to allow access to each lot and also to facilitate drainage in accordance with Council's Guidelines.

Electricity

21) Underground electrical reticulation shall be provided to each lot in accordance with the requirements of the electricity supply authority to ensure a high standard of visual amenity.

Prior to Issue of a Subdivision Certificate

22) Notification being provided that satisfactory arrangements have been made with Country Energy to ensure that electricity supply infrastructure is available for each lot in accordance with community expectations.

23) Notification being provided that satisfactory arrangements have been made with Telstra to ensure that telecommunication infrastructure is available for each lot in accordance with community expectations.

24) Council is satisfied that the proposed development is likely to increase the demand for the following public amenities and public services within the area:

- Rural Fire Brigade Services; and
- Rural Roads.

Pursuant to Section 94 of the Environmental Planning and Assessment Act 1979, Council requires the payment of a monetary contribution of:

- $3262 per additional lot toward the provision of rural roads; and
- $234 per additional lot toward the provision of rural fire brigade services.

The contributions shall be paid prior to issue of the Subdivision Certificate.

The contributions required by this condition are allowed by and determined in accordance with the Parry Section 94 Contribution Plan No. 1- Rural Roads and Parry Section 94 Contributions Plan No. 2 Bushfire Brigade Services, copies of which may be inspected at the office of the Council.

NOTE: The above contributions have been adopted under the 2010/20011 Council Management Plan. Revised rates adopted in subsequent Management Plans will apply to lots released in later financial years.

25) A compliance certificate under the Water Management Act 2000 must be obtained from the Council (as the local water supply authority). Council requires the following works and payments to be completed prior to issuing a Subdivision Certificate:

(i) A single water supply service shall be provided to each lot through an internal trickle feed system.

(ii) Water headworks contributions will apply at the rate identified in Council's Management Plan at the time of issue of a Subdivision Certificate or by a Development Servicing Plan applicable to the land. Revised rates adopted in subsequent Management Plans will apply to lots released in later financial years.

26) One set of approved construction drawings shall be amended to show the "work-as executed". These drawings shall be provided prior to issue of the subdivision certificate. The drawings are required to ensure that adequate records are maintained of community infrastructure. The drawings shall be certified by a registered surveyor or a Chartered Professional Civil Engineer.

27) All test results, material certificates, non-conformance reports and signed off Hold/Witness Points as required by the Inspection and Test Plan (ITP) shall be submitted for the review of the Development Engineer to verify the Quality of the completed product.

The conditions have been imposed in accordance with the Environmental Planning and Assessment Act and Council's adopted policies.

In accordance with Clause 95(3) of the Regulation, a period of two (2) years from the date of this notice is allowed for the satisfaction of the "deferred commencement" matters. Under the provisions of Section 97(3) of the Act you may [within twelve (12) months from this notice] appeal to the Land and Environment Court against the necessity to satisfy the deferred commencement matters prior to the consent operating.

Where an applicant provides evidence/information to satisfy the deferred commencement condition, the Council shall respond within twenty-eight (28) days [cl.95(6)] from its submission. Failure to do so may be taken to indicate dissatisfaction and confers on an applicant the right of appeal to the Land and Environment Court.

Under the provisions of Section 97 of the Act you may (within twelve [12] months of receipt of this notice) appeal to the Land and Environment Court against conditions imposed should you feel they are unreasonable.

All conditions imposed by Council shall be observed as non-compliance is an offence under the Act.

Yours faithfully

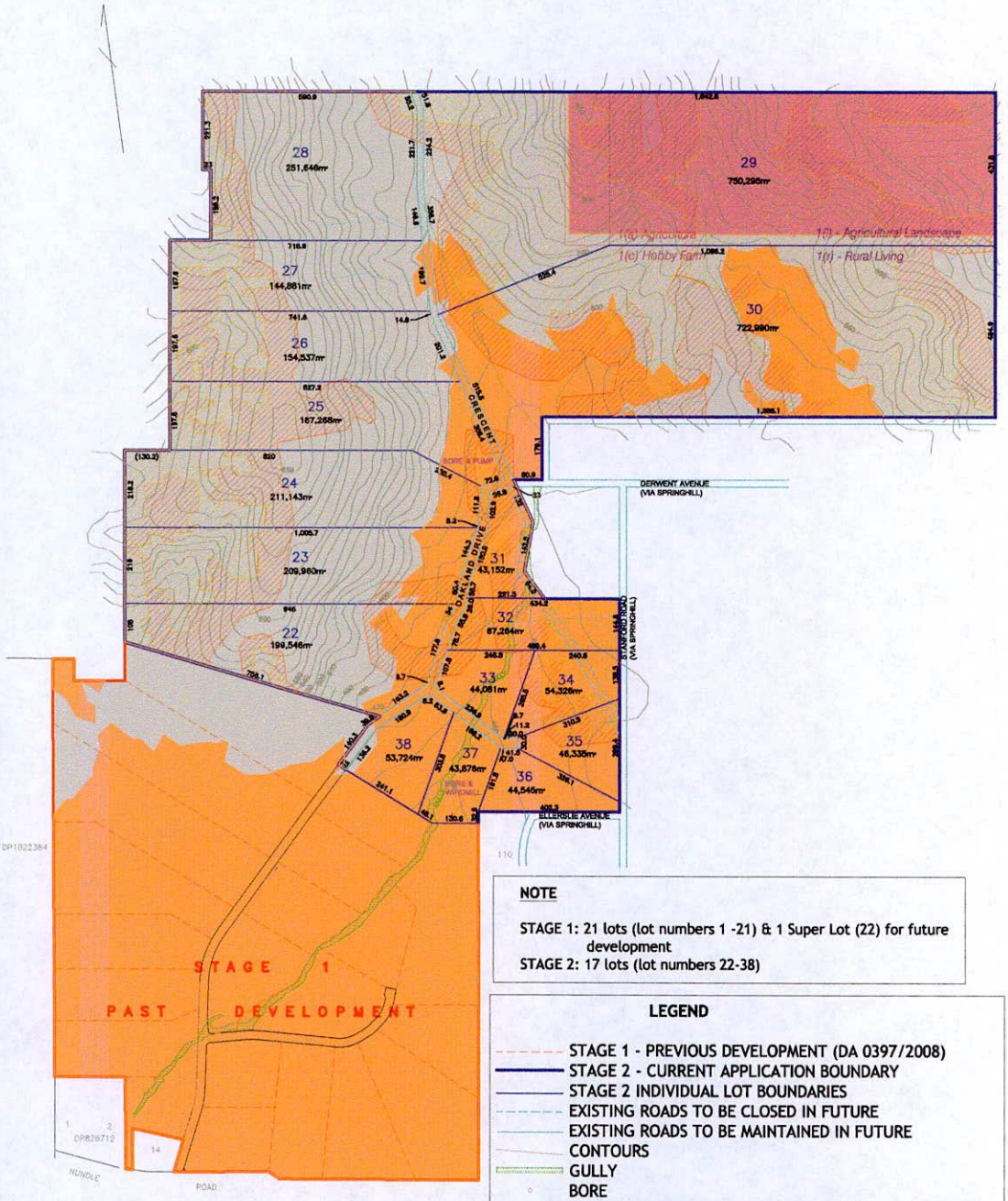
Alison McGaffin
Director Environment Planning & Economic Development

Contact: Lucy Walker (02) 6767 5530

Reference: CP/DA0193/2010

17 November 2010
Annexures ✓

Correspondence issued in accordance with a resolution of Council made on: 9 November 2010



NOTE

STAGE 1: 21 lots (lot numbers 1 -21) & 1 Super Lot (22) for future development
STAGE 2: 17 lots (lot numbers 22-38)

LEGEND

- STAGE 1 - PREVIOUS DEVELOPMENT (DA 0397/2008)
- STAGE 2 - CURRENT APPLICATION BOUNDARY
- STAGE 2 INDIVIDUAL LOT BOUNDARIES
- EXISTING ROADS TO BE CLOSED IN FUTURE
- EXISTING ROADS TO BE MAINTAINED IN FUTURE
- CONTOURS
- GULLY
- BORE
- ZONING BOUNDARY (AS PER PARRY SHIRE DRAFT LEP 2004)
- ZONING BOUNDARY (AS PER PARRY SHIRE LEP 1987)
- DEPRESSIONS (NATURAL DRAINAGE MAPPING)
- BUSHFIRE MAPPING
- R5- LARGE LOT RESIDENTIAL/Z-2ha (LEP2009)
- E3- ENVIRONMENTAL MANAGEMENT/AD-100ha (LEP2009)
- RU1-PRIMARY PRODUCTION/AH-800 ha(LEP)

TAMWORTH REGIONAL COUNCIL
This is the Plan referred to in relation to Development Application No. 0193 / 2010
17 / 11 / 2010
DEVELOPMENT OFFICER

SHEET No. 1 | No. OF SHEETS 2
COUNCIL REFERENCE

OAKLANDS ESTATE NUNDLE ROAD PIALLAMORE CREEK

SHEET DESCRIPTION CONCEPT PLAN (STAGE 2)
PROPOSED SUBDIVISION OF LOTS 134, 213, 214 IN DP826712 & LOT 22 IN A PROPOSED SUBDVIISION OF LOTS 4 & 5 IN DP826712

REFERENCE OAK S2 | DATE SEP 2009
SCALE Hor. Ver. 1:10000 AT A2 AND AS SHOWN

GROUP DEVELOPMENT SERVICES PTY LTD
SURVEYORS PROJECT MANAGERS ENGINEERS
PO Box 406 PENNANT HILLS NSW 1715
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REVISIONS	by	on
REVISED	SB	10/10
FIRST ISSUE	LH	10/09

Appendix B Biodiversity Constraints Assessment

Niche Environment and Heritage, 2015

niche
Environment and Heritage

Oaklands Rural Subdivision

Biodiversity constraints analysis

Prepared for Mitchell Hanlon Consulting

14 April 2015

Document control

Project no.:	2371
Project client:	Mitchell Hanlon Consulting
Project office:	Tamworth
Document description:	Biodiversity Constraints Analysis
Project Director:	Frank Lemckert
Project Manager:	Mark Aitkens
Authors:	Mark Aitkens
Internal review:	Frank Lemckert
Document status:	Rev1
Document address:	
Local Government Area:	Tamworth Regional Council

Document revision status

Author	Revision number	Internal review	Date issued
M Aitkens	Rev0	F Lemckert	23/03/2015
M Aitkens	Rev1	F Lemckert	

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Cover photograph: Grasslands of the Oaklands property

Executive summary

Context

Niche Environment and Heritage Pty Ltd was commissioned by Mitchel Hanlon Consulting Pty Ltd to prepare a biodiversity constraint analysis for the proposed Oaklands rural subdivision (the Project). The analysis was to focus on threatened biodiversity and include a notional BioBanking assessment to assist subdivision design.

Aims

This report aims to provide detailed information suitable for the further consideration of development/ land use options within the Oaklands property.

Methods

Threatened biodiversity listed under the State *Threatened Species Conservation Act* 1995 (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) were identified through desktop investigations and subject to a preliminary 'likelihood of occurrence' analysis. A preliminary vegetation cover and condition map was prepared to guide field investigations (i.e. sampling units). Field surveys involving floristic and fauna surveys were performed within sampling units from 13-15 January 2015. Vegetation typing and boundary definition was validated during these surveys. A revised likelihood of occurrence analysis was prepared following completion of field surveys.

Key Results – Plant Community Types (PCTs)

Two Plant Community Types (PCTs) in various condition states (native grasslands to forest) were confirmed with the subject site cover (i.e. NA225 and NA226). NA226 vegetation is represented by grassy White Box (*Eucalyptus albens*) and occurs in the more arable parts of the site and has been variously developed and used for an agricultural purpose. The second PCT is represented by a shrubbier White Box variant generally in an undisturbed forest to woodland structure. Occurrence is linked to the remote parts of the subject site where it is associated with lands of low arability (i.e. steep upper slopes and hilltops with shallower, less fertile, and stonier soils).

Key Results – flora

No TSC Act or EPBC Act listed threatened flora species have been detected within the site. Patchy areas of low value habitat suitable for at least two threatened species were identified; Bluegrass (*Dichanthium setosum*) and Austral Toadflax (*Thesium australe*). Neither species was observed despite the completion of appropriately timed targeted surveys.

Key Results - fauna

Three species listed on the TSC Act were observed during the field survey including the Brown Treecreeper (*Climacteris picumnus*), Little Lorikeet (*Glossopsitta pusilla*) and Speckled Warbler (*Chthonicola sagittata*). No EPBC Act listed threatened fauna species have been detected within the site, although suitable habitat is present for the Koala (*Phascolarctos cinereus*), Greater Long-eared Bat (*Nyctophilus corbeni*), Large-eared Pied Bat (*Chalinolobus dwyeri*), Spotted-tailed Quoll (*Dasyurus maculata*), Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*). A moderate to high likelihood of occurrence is attributed to these species where 'moderate to good' condition vegetation occurs (i.e. excludes patches in low condition).

Constraints

This study identified 282.9 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (Box Gum Woodland) within the site, which is a listed threatened ecological community (TEC) on the TSC Act (i.e. endangered) and EPBC Act (i.e. critically endangered). The development of these areas would require assessment under both State and Commonwealth legislation. In this respect, the southern parts of the subject site represent the least constrained lands, particularly lands adjacent the 'exotic grasslands'. Development within the least constrained parts of the subject site would require the consideration of buffers to protect the biodiversity values found in adjacent moderate to good condition Box Gum Woodland.

Recommendations

Subdivision potential is limited to the southern parts of the subject site, although the moderate biodiversity constraint identified in this area would require assessment in accordance with relevant State and Commonwealth environmental legislation. This said, land use opportunities also exist in the high constraint areas, notably the potential for establishing environmental offsets. With these considerations in mind, the following recommendations are provided:

- Design a low impact subdivision pattern sensitive to the biodiversity constraints identified within the subject site.
- Conduct a feasibility analysis for a BioBanking outcome within the residual part of the subject site (i.e. areas of high biodiversity constraint).
- Conduct a pre-Referral meeting with the Commonwealth Department of the Environment (DotE) to discuss the biodiversity values of the subject site, the low impact subdivision design and project specific thresholds for a significant impact. This would involve the submission of this report and concept subdivision design to allow the DotE to have an informed position for the meeting.
- Re-evaluate the development options and design following a review of the BioBanking feasibility analysis and consultation with the DotE.
- Prepare documentation suitable for the assessment of development options proposed for the subject site.

Glossary and abbreviations

CEEC	Critically Endangered Ecological Community
EEC	Endangered Ecological Community
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
Flora and fauna of conservation significance	Threatened species or populations listed on the schedules of the TSC Act and/or listed as matters of National Environmental Significance (NES) under the EPBC Act
Local population	The population of a particular threatened species that occurs in the locality
Locality	The area within 10 km of the study area
Local occurrence	Refers to the distribution of an ecological community within the study area and continuous with it
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage
TEC	Threatened ecological community as listed on the TSC Act and or EPBC Act. Collective term to describe vulnerable, endangered and critically endangered ecological communities
Threatened biodiversity	Threatened species, populations and ecological communities as listed on the TSC and or EPBC Acts
TSC Act	NSW *Threatened Species Conservation Act 1995*
OCVT	Over Cleared Vegetation Type
RBVT	Revised Biometric Vegetation Type
SEPP	State Environment Planning Policy

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1. Introduction

1.1 Background

Niche Environment and Heritage Pty Ltd was commissioned by Mitchel Hanlon Consulting Pty Ltd to prepare a biodiversity constraint analysis for the Oaklands rural subdivision (the Project).

1.2 The subject site and study area

The subject site is located approximately 10 km south southeast of Tamworth, NSW (Figure 1). Context for analysing the biodiversity values of the subject site was drawn from the study area. Both these terms are defined as follows:

- Subject site – Property described as Lot 18 in DP 1199163 (approximately 384.0 ha).
- Study area – the subject site and lands within 10 km radius.

1.3 Project context

The analysis of biodiversity constraints was conducted within the context outlined in the following sections.

1.3.1 Land use potential

The primary land use proposed within the subject site aligns with the rural land zoning. As the subject site exceeds the permitted minimum lot size, potential exists for its land area to be variously subdivided in accordance with permissibility defined by the Tamworth Regional Local Environment Plan. In addition, consideration has been given to the use of lands as a biodiversity offset under the NSW Biodiversity Offsets Scheme (BioBanking).

1.3.2 Site history

The following information is a summary of a site history review supplied by Mitchel Hanlon Consulting (email from Ms Jocelyn Ullman dated 25February 2015).

A Flora and Fauna Assessment prepared in 2006 by Ecotone Ecological Consultants assessed a proposed subdivision for part of the subject site (DA 0288/2007). Mitchel Hanlon Consulting note the following from a review of this document:

- Relatively intact native vegetation remains on the hills in the northern half of the property with scattered small woodland remnants elsewhere.
- Approximately 100 hectares of gentler topography on the southern section of the property is currently, or has been, under cultivation.
- Majority of high quality woodland that remains are located on steeper country so will not be disturbed or developed.
- Ground cover in the disturbed White Box Woodland does not constitute native vegetation as it makes up less than 50% of the vegetation.
- The proposed rehabilitation of the drainage line that runs through the property will provide significant offsets.
- Presence of the *Threatened Species Conservation Act* 1995 listed White Box, Yellow Box, Blakely's Red Gum Woodland Endangered Ecological Communities.
- Presence of the *Environment Protection and Biodiversity Conservation Act* 1999 listed Grassy White Box Woodlands Endangered Ecological Community (now known as White Box, Yellow Box, Blakely's Red Gum Grassy Woodland and Derived Native Grasslands Critically Endangered Ecological Community).

"In summary, it is not anticipated that the proposed development will have a significant effect on any of the threatened species, populations or communities assessed. This is due to the limiting the disturbance of woodland habitat to 16 trees at the location of a proposed dam and the avoidance of the vast majority of the treed habitat within the property" (Ecotone Environmental Consultants 2006).

and

"The proposal to rehabilitate the White Box/*Angophora floribunda* riparian community along the drainage line that traverses the middle of the property would offset the proposed disturbance of the community caused by road construction. These rehabilitation works are also likely to offset any disturbances of treeless areas of the community that may result from construction of dwellings or rural buildings on the subdivided lots. Successful rehabilitation of this vegetated riparian corridor would likely result in a net gain of Box Gum Woodland on the property" (Ecotone Environmental Consultants 2006).

Summary of recommendations from Ecotone Environmental Consultants (2006) were:

- "Building envelopes are to be adopted for any lots containing Box Gum Woodland Endangered Ecological Community, Grassy White Box Woodland Endangered Ecological Community".
- "Building envelope should avoid White Box Woodland and Yellow Box Woodland, but could appropriately be positioned to avoid canopy trees in Disturbed White Box Woodland".
- "The proposed riparian rehabilitation works along the drainage line should reinstate White Box woodland riparian vegetation at least between the proposed dam site and the northern extent of the cultivation area".

DA 0288/2007 was approved on 27th February 2007. A subsequent DA was lodged (DA 0397/2008) comprising a different lot structure, and different lot numbers. This DA was approved on 27th May 2008 thus resulting in the relinquishment of DA 0288/2007.

DA 0193/2010 was lodged on 19th October 2009 to subdivide the rear of land into 17 lots, with a deferred commencement approval granted on 17th November 2010. Applicable deferred commencement matters were:

- "The landowner has entered into a conservation agreement with the Minister for the Environment to protect the undisturbed White Box Yellow Box Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands located on proposed Lots 28, 29 and 30."

Prior to the issue for a Construction Certificate:

- "A conservation management plan shall be prepared by a suitably qualified person to address issues including, but not limited to, the recommendations of the addendum to the Flora and Fauna Impact Assessment Report prepared by EA systems (dated 7 October 2009), existing vegetation, biodiversity and water management, drainage, grazing and noxious weed control".
- "A plan shall be prepared and submitted to council for approval, nominating the location and area of a building envelope on each of the allotments in the subdivision. The building envelopes shall be appropriately located having regard to the White Box/Yellow Box/Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands, bushfire risk, topography and natural water courses".

In all these DAs there has not been any referral to the Commonwealth Department of the Environment (DotE) to assess impacts on MNES as identified by Ecotone Environmental Consultants (2006).

1.3.3 Regulatory framework

The following legislation, policies and guidelines are likely to apply in an assessment of future developments and land use changes within the subject site.

Commonwealth EPBC Act

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on 'matters of national environmental significance' undergo an assessment and approval process. Under the EPBC Act, an action includes a project, undertaking, development or activity. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Commonwealth Minister for the Environment. The EPBC Act identifies MNES as:

- world heritage properties
- national heritage places
- wetlands of international importance (RAMSAR wetlands)
- threatened species and ecological communities
- migratory species
- Great Barrier Reef Marine Park
- commonwealth marine areas
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

Listings under the EPBC Act are relevant to the impact assessment for the proposed action. An impact assessment has been prepared in accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DotE 2013).

Commonwealth EPBC Act Environmental Offsets Policy 2012

Environmental offsets are required for Projects assessed as having a significant residual impact on MNES (i.e. projects where a controlled action is declared). Such offsets are determined through the EPBC Act Environmental Offsets Policy (October 2012) (the Policy) and associated guideline. Avoidance and mitigation measures can reduce and, in some cases, remove the need for offsets if the residual impact is no longer considered significant. Offsets will not be considered until all reasonable avoidance and mitigation measures are considered, or acceptable reasons are provided as to why avoidance or mitigation of impacts is not reasonably achievable.

Commonwealth EPBC Act Policy Statement: White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands

This policy statement provides background on:

- What is Box Gum Woodland including the features that distinguish between what is and what is not part of the listed community.
- Identification flowchart including species list.
- Guidance on what makes a patch of Box Gum Woodland CEEC important for the long term future of the ecological community.
- Guidance on what can be rehabilitated.

The Policy states the following about Box Gum Woodland CEEC:

"Large patches, those that link remnants in the landscape, those that occur in highly cleared areas, those that contain rare, declining or threatened species, and those that represent the entire range of the ecological community, are important for the long term future of the ecological community."

NSW TSC Act

The TSC Act provides legal status for biota of conservation significance in NSW. The Act aims to, inter alia, 'conserve biological diversity and promote ecologically sustainable development'. It provides for:

- The listing of 'threatened species, EPs and EECs' under Schedule 1.
- 'Critically endangered' species and CEECs listed under Schedule 1A.
- Vulnerable species and communities listed under Schedule 2.
- 'Key Threatening Processes' listed under Schedule 3.
- The preparation and implementation of Recovery Plans and Threat Abatement Plans.
- Requirements, or otherwise, for the preparation of a Species Impact Statement (SIS).

Threatened species, populations and ecological communities listings gazetted under the TSC Act are relevant to this assessment. The impact assessment is limited to threatened biodiversity identified as likely to occur within the subject site and impacted by the proposed action.

NSW Biodiversity Banking and Offsets Scheme

The NSW Biodiversity Banking and Offsets Scheme (BioBanking), established under Part 7A of the NSW Threatened Species Conservation Act 1995 (TSC Act), enables a streamlined method for biodiversity assessment (i.e. the BioBanking Assessment Methodology or BBAM) and a rigorous, credible regulatory framework for biodiversity offsetting. It provides mechanisms for the consideration of impacts on listed threatened species and communities and specifies the criteria needing to be met for the offsetting of these impacts.

The BBAM incorporates a 'maintain and improve' test to determine whether or not there will be a net impact on threatened species or native vegetation. The rules used in the assessment are designed to meet the objectives of the TSC Act. The results of a BioBanking assessment are expressed as the number of biodiversity credits required to be retired by a development site and the number of credits generated and available for retirement at a BioBank site (offset site).

Offset sites, otherwise known and BioBank sites, are established following the execution of signed agreements specifying the management actions required for the site and the funding arrangements necessary to maintain the management regime in perpetuity. These agreements are legally binding and are tied to the property deeds. Relinquishment or revocation of such agreements is only possible through a Ministerial direction, making such agreements the strongest regulatory covenant for biodiversity conservation within NSW outside of national park/ reserve declarations.

NSW State Environmental Planning Policy 44 Koala Habitat Protection (SEPP 44)

SEPP 44 aims to encourage the 'proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline'. This policy allows for the differentiation between potential and core koala habitat on the basis of preferred feed tree species and koala activity.

There is a requirement under this policy for the preparation of a site specific Koala Plan of Management (KPoM) where the development site is deemed to contain core koala habitat. Council and the Director General of NSW Planning is responsible for approving a site specific KPoM.

1.4 Purpose and objectives

The scope defining the biodiversity constraints analysis prepared for the subject site is as follows:

- Undertake desktop review of existing records and reports.
- Undertake field survey to ascertain the nature of any prevailing biodiversity constraints.
- Prepare a report which provides an opportunities and constraints assessment, including maps, and notional BioBanking credit calculations.
- An outline of the assessment pathways required and the risks of the proposal.

1.5 Report structure

The structure of this report is as follows:

Section 2: Methods including approach used to consolidate investigation findings into a conservation assessment (i.e. biodiversity constraints mapping).

Section 3: Results (findings from literature, database and site investigations).

Section 4: Constraints Analysis (interpretation of results and compilation of biodiversity constraint maps that provide an evaluation of conservation significance across the study area).

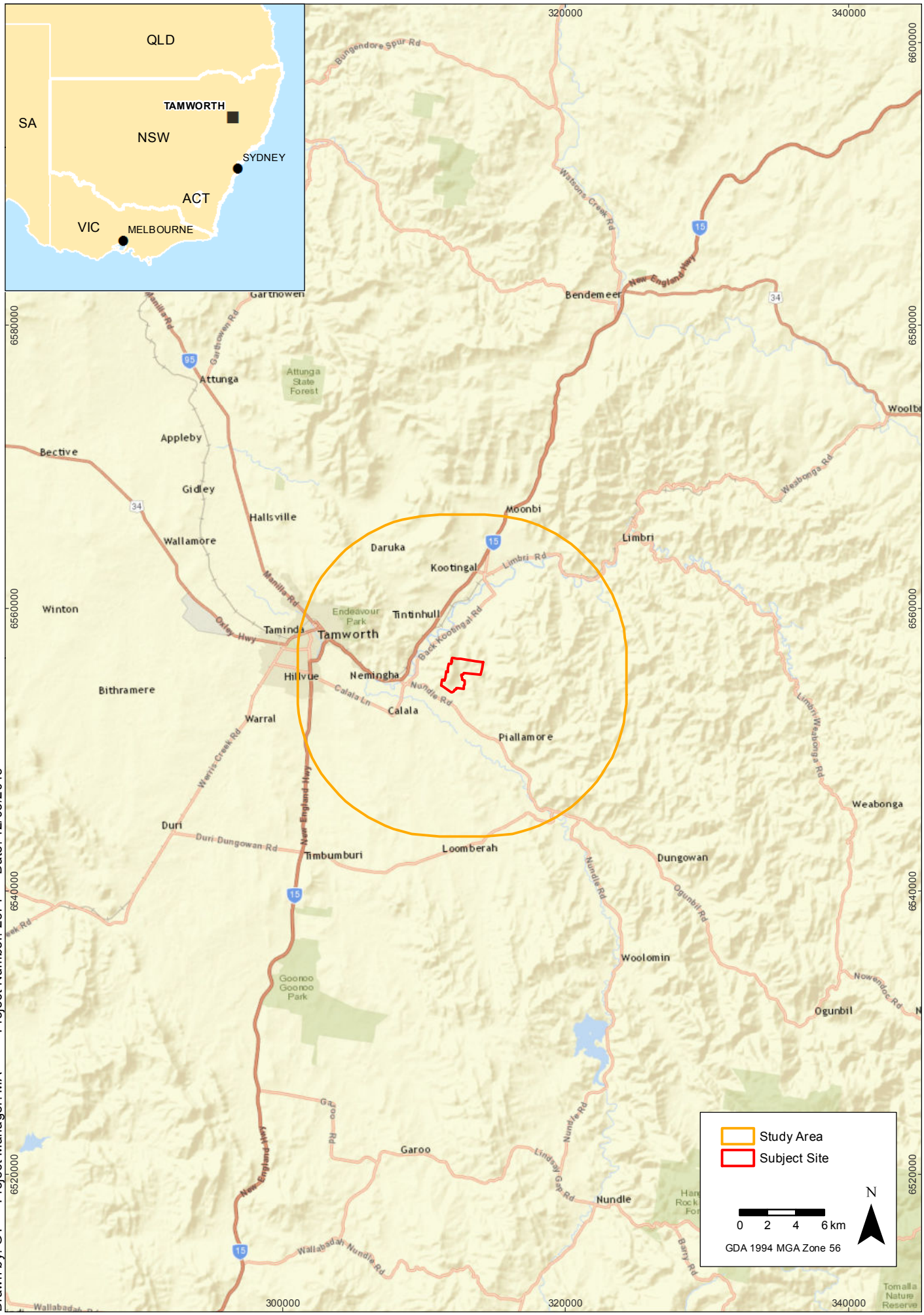
Section 5: Recommendations (how the constraints mapping can be used to maximise commercial opportunities within the subject site).

1.6 Response to project brief

This report responds addresses brief in the manner specified in Table 1.

Table 1: Project brief

Brief	Addressed
Undertake desktop review of existing records and reports	Section 2 (methods) Section 3 (results)
Undertake field survey to ascertain the nature of any prevailing biodiversity constraints	Section 2 (methods) Section 3 (results)
Prepare a report which provides an opportunities and constraints assessment, including maps, and notional BioBanking credit calculations	Section 4
An outline of the assessment pathways required and the risks of the proposal	Section 5



Drawn by: GT Project Manager: MA Project Number: 2371 Date: 12/03/2015

Location of the subject site and study area

Oaklands Biodiversity Constraints Analysis

FIGURE 1

niche Environment and Heritage

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2. Methodology

The following sections outline the method used to obtain and consolidate information on the biodiversity values present within the study area. This includes desktop based reviews (i.e. literature and database sources), site inspections and data analysis culminating in biodiversity constraints mapping. Site investigations were performed during 13-15 January 2015.

2.1 Database and literature sources

2.1.1 Databases

A MNES search of lands within a 10 kilometre radius of the subject site was performed using the online EPBC Act Protected Matters Search Tool. This was performed to identify MNES of potential relevance (DotE 2015). The analysis of MNES was restricted to threatened species, ecological communities and migratory species (i.e. excludes other MNES identified by the search tool). A search of the Wildlife Atlas Database (OEH 2015a) was also performed and reviewed in parallel with the results of the EPBC Act Protected Matters Search.

2.1.2 Spatial datasets

The following spatial datasets were interrogated as part of the evaluation of landscape values:

- Mitchell Landscapes (NPWS 2003)
- IBRA Region and subregion mapping (IBRA7)
- Catchment management areas.

2.1.3 Literature

Scant literature exists within the locality. Information of potential relevance to the subject site was procured from the following reports:

- EPBC Referral (2013/6812): Hills Plain Subdivision, Tamworth (RPS Australia Asia Pacific 2013).
- EPBC Referral (2013/7060): Rosewood Estate, Moore Creek (Niche 2014, 2015).
- EPBC Referral (2012/6523): Chaffey Dam upgrade, Peel River Nundle (nghEnvironmental 2012).
- EPBC Referral (2005/2201): Subdivision of Lot 13 DP 261244, Warramunga Ave, Tamworth (E.A. Systems 2005).
- EPBC Referral (2003/1142): One Tree Hill Estate, Tamworth (E.A. Systems 2003).

2.2 Vegetation mapping

A stepwise approach to vegetation mapping started with the preparation of a preliminary vegetation map followed by field validation. A survey stratification map was generated from the field validated preliminary vegetation map, which details areas of homogenous vegetation useful for rationalising survey methods and effort.

2.2.1 Aerial photography interpretation

Remote sensing techniques were used to generate a preliminary vegetation map with vegetation being classified to a vegetation class or formation level. This was facilitated by aerial photography interpretation (API) using the recent imagery available for the subject site. API is a cognitive method used to objectively classify land areas of relatively homogenous land cover characteristics. Factors considered in classifying vegetation cover were:

- Structure (e.g. woodland, open woodland, shrubland and grassland).
- Colour (e.g. differences in overstorey canopy colouration).
- Texture (e.g. presence of a shrubby or grassy understorey).

Other datasets such as topography and soils were simultaneously considered. Condition states were notionally ascribed where land use appears to have had an influence on the vegetation cover.

2.2.2 Validation

The validation of API classified vegetation cover involved a ground truthed investigation of notional vegetation types and condition. Vegetation extent (i.e. boundaries) was also examined where uncertainty exists.

Rapid data points (RDPs) were used for this purpose. RDPs provide information on plant species dominance and structure; a recognised survey method used to validate vegetation mapping (Bell 2009). RDPs principally focused on areas where data gaps in the vegetation mapping were identified, although their wider use also facilitated a rapid point based evaluation of condition.

RDPs are summaries of dominant floristic information recorded at specific points in the field. Data was recorded on field sheets together with a GPS waypoint for transfer to GIS. Information recorded included:

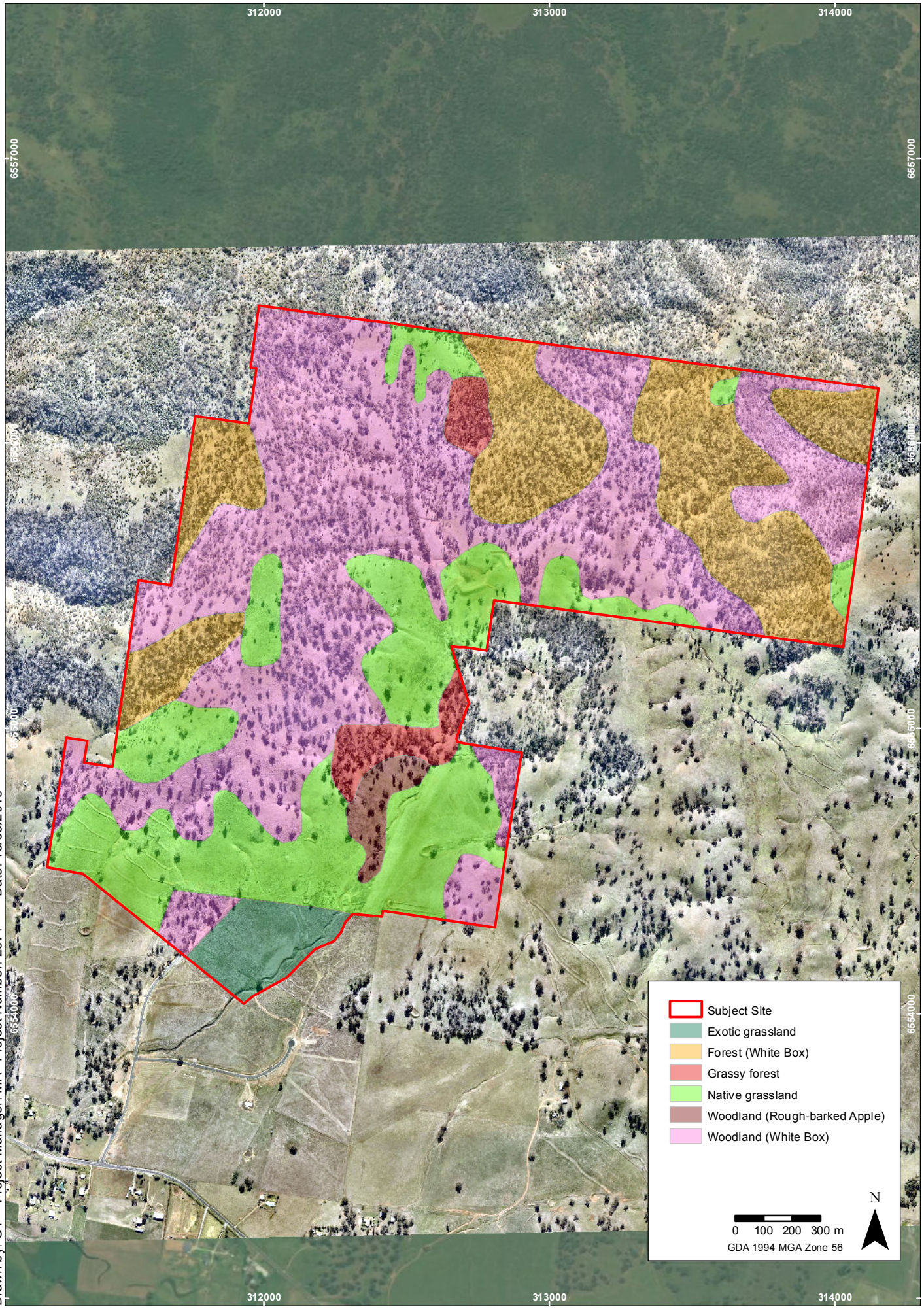
- Canopy layer dominant species.
- Shrub layer dominant species.
- Ground layer dominant species.
- Suspected vegetation unit.
- Vegetation condition (Niche use a measure of 'ecosystem resilience' as a function of disturbance), BioBanking condition (moderate-good, low and cleared) and other notes regarding habitat and other important features.
- Physical attributes of the site (vegetation structure, soil type, elevation, slope, aspect, geomorphic position) are also recorded and photographs taken for later reference.

2.2.3 Stratification units

Biological data was systematically collected through site surveys performed in accordance with a stratified sampling regime (DECC 2004), which is described by the NSW Office of Environment and Heritage (OEH) as:

> *"a logical, objective and efficient method of undertaking surveys and ensures that the full range of potential habitats and vegetation types will be systematically sampled" (OEH 2014).*

Sampling units were determined from the field validated vegetation type map. This map, as shown in Figure 2, was the basis for determining the location of formal flora and fauna survey points. Survey replication was guided by the area of each sampling unit and reference guideline used in developing the field survey methodology. A sub-guideline replication regime has been adopted in this constraint analysis as the subdivision design and assessment framework is yet to be determined.



Drawn by: GT Project Manager: MA Project Number: 2371 Date: 16/03/2015

Survey Stratification Units

Oaklands Biodiversity Constraints Analysis

FIGURE 2

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Imagery: (c) Nearmap

2.3 Field survey methods

The survey methods used during site investigations are outlined in Table 2. Survey dates are also tabulated.

Table 2: Field survey methods and effort

Survey method	13 January 2015	14 January 2015	15 January 2015
Rapid data plots	✓	✓	
BioMetric plots (including flora plots)		✓	✓
Targeted flora searches		✓	✓
Random meanders		✓	✓
Bird plots	✓	✓	✓
Spotlighting	✓	✓	
Habitat searches	✓	✓	✓

A description of the field survey methods is provided in the following sections.

2.4 Vegetation typing, floristics and habitat condition

Detailed field survey methods were used to refine notional vegetation typing, as presented in the stratification units map, into Plant Community Types (PCT) consistent with the NSW Vegetation Types Database. Surveys methods involved BioMetric plots (Gibbons *et al* 2009), with floristics plots nested within these plots. As shown in Figure 3, 11 BioMetric/ flora plots were sampled in accordance with the stratified sampling design outlined in Section 2.2.

Survey replication within stratification units was possible in a number of instances, although regarded as unnecessary in this analysis when following guidance provided on page 5 of the Box Gum Woodland CEEC Policy (DEH 2006a). Opportunistic observations from unmapped targeted searches conducted between plot locations and areas of habitat potentially suitable for threatened species were also noted. Site investigation methods are described below.

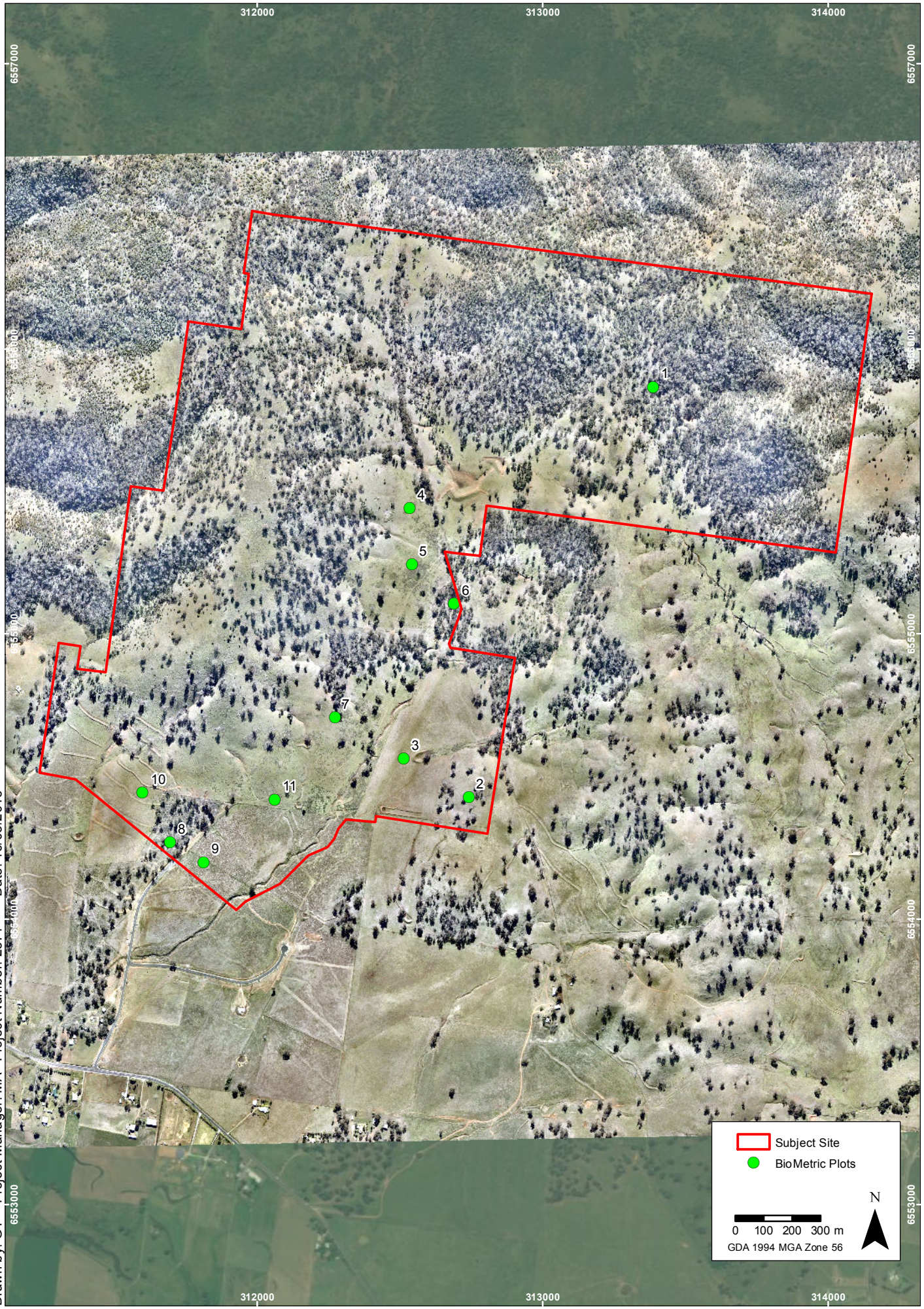
2.4.1 Flora plots

The floristics of each stratification unit was measured using 400 m^2 (i.e. 20 x 20 metre quadrats) flora plots, nested within each biometric plot, for the purposes of determining PCT and, where possible, condition. The modified Braun-Blanquet cover abundance scale was used to record species dominance (Table 3).

Table 3: Braun-Blanquet Scores

Braun-Blanquet Score	Cover Abundance Category
1	1-5% cover - rare
2	1-5% cover - common
3	6-25% cover
4	26-50% cover
5	51-75% cover
6	76-100% cover

Modified Braun-Blanquet scores were estimated for each observed plant species within the flora plot.



Location of Flora and BioMetric Plots

Oaklands Biodiversity Constraints Analysis

FIGURE 3

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2.4.2 BioMetric plots

Data procured from a BioMetric plot provides an objective standardised approach to the characterisation of bio-condition for a given PCT listed on the NSW Vegetation Types Database. Condition assessment via this method uses a comparison of measured site attribute scores against published 'vegetation benchmarks' for a comparable PCT. The site attribute data was collected from BioMetric plots measuring 1,000 m^2 (i.e. 20 x 50 metres) using methods consistent with those species by the BBAM (OEH 2014) and Gibbons *et al* (2009). Site attributes measured in a BioMetric plot are listed below:

- native plant species richness (NPS)
- native overstorey cover (NOC)
- native mid-storey cover (NMS)
- native groundcover stratum grasses (NGSG)
- native groundcover stratum shrubs (NGSS)
- native groundcover other (NGSO)
- exotic plant cover (EPC)
- number of trees with hollows (NTH)
- overstorey regeneration (OR)
- total length of fallen logs (FL).

A 'Site Value Score' was calculated for each PCT/ condition class combination (i.e. vegetation zone) mapped within the subject site. This score was determined by entering the landscape details (Section 2.1), mapped vegetation zone and BioMetric plot data into the NSW BioBanking Credit Calculator, resulting in a value between 0-100. A qualitative description for the range of possible site value scores is outlined below:

- Low (site value score of 0-34). Woody vegetation that is likely to have no overstorey or midstorey. Weed cover is likely to be high. Native plant species richness is low. Requires substantial and sustained management for regeneration/ recovery. Scores below 20 are likely to represent vegetation and habitat that is no longer characteristic of a native plant community type.
- Moderate/ good-derived grassland (site value score of >34-45). Woody vegetation and habitat demonstrating impaired condition with clear evidence of past or present impacts/ threats. Woody overstorey or midstorey is absent. Native plant species richness is likely to be moderate to high with variable exotic plant cover. Requires routine, landscape wide management to assist regeneration/ recovery (e.g. management of weeds and feral fauna).
- Moderate/ good-poor (site value score of >34-45). Vegetation and habitat demonstrating impaired condition with clear evidence of effects from past or present impacts/ threats. Requires routine, landscape wide management to assist regeneration/ recovery (e.g. management of weeds and feral fauna).
- Moderate/ good-medium (site value score of >45-69). Vegetation and habitat demonstrating resilient condition capable for recovering without assistance other than for the removal of threats. Generally requires targeted management to facilitate improved condition (e.g. targeted weed removal).
- Moderate/ good-high (site value score of >70-100). Vegetation and habitat close to benchmark condition. Limited ecological benefit would be gained through management.

2.4.3 Targeted surveys

A targeted survey following methods described in DEC (2004) (i.e. random meander, plots and transects) was conducted within habitat areas deemed potentially suitable for threatened plant species. These methods were used to determine species incidence and, if found, an estimate of their abundance. Among other species, targeted surveys were focused on Bluegrass (*Dicanthium setosum*) and Austral Toadflax (*Thesium australe*), as these species are the most likely to occur within the subject site.

2.4.4 Opportunistic surveys

Random meanders were used as a method allowing optimal coverage of the study area. Observed threatened plants were marked by GPS and a population count conducted using plots and/or transects. Survey tracks were not logged.

2.5 Fauna

Fauna and habitat survey methods performed in this constraints analysis include:

- BioBanking plots to sample for habitat condition (previously outlined in Section 2.4.2).
- Timed point and area surveys for birds.
- Timed diurnal habitat search surveys for reptiles.
- Spotlighting surveys for nocturnal mammals, amphibians, birds and reptiles.

The location of survey sites is shown in Figure 4.

2.5.1 Bird Survey

Point/ area bird census sites were surveyed on each investigation day. Each survey comprised a point-based, 10-minute count of 0.785 ha (50 m radius) circular plots was employed. During the 10 minute period, the observer stayed at the point, watching and listening for bird activity in the surrounding 50 metres. This allowed the observer to safely keep track of individual birds within the reduced area, recording the numbers of each species and the closest distance that they approach the point during the 10 minute period. The data were recorded in four distance categories around each point: 0-10 m, 10-20 m, 20-30 m and 30-50 m. Birds within the larger 2 ha area and beyond are also recorded during this time and indicated as within the 2 ha category or the “outside” category.

Once the 10 minute quantitative count period was over the observer undertook a 10 minute survey of the entire 2 ha area searching for any cryptic bird species they may have missed during the point count period. Birds flying through the 2 ha area were not recorded unless they were regarded as making some use of that vegetation type, for example, foraging in the airspace above.

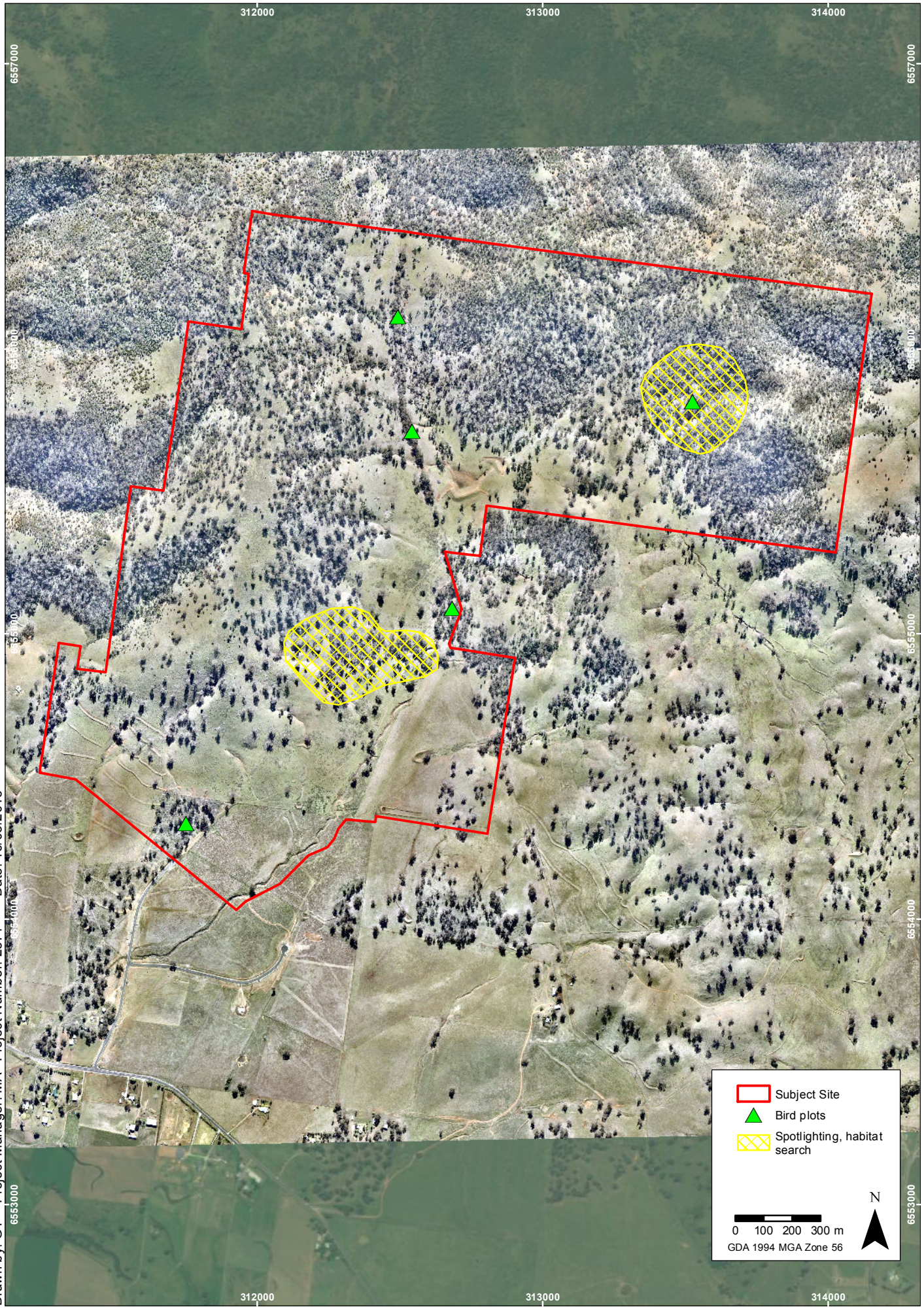
2.5.2 Diurnal habitat searches

Approximately 2 person hours was expended targeting areas of woodland vegetation. During this time fauna habitats such as logs and rocks were inspected during daylight hours. This survey was restricted to wooded areas outside of the agricultural landscape as lands impacted by agriculture no longer containing habitat features suitable for inspection (i.e. fallen logs, rock). These surveys were conducted early in the morning to locate inactive diurnal species and through the evening for nocturnal species (e.g. geckos).

2.5.3 Spotlighting surveys

Six person hours of spotlighting was performed targeting areas of woodland and open woodland vegetation. Spotlighting complimented the habitat searches and targeted more cryptic species such as nocturnal reptiles and small mammals. Spotlighting transects were largely restricted to woodland areas where habitat such as an intact groundcover habitat (i.e. rocks and fallen logs) and presence of hollow-bearing trees where present.

Spotlighting was conducted by 2-4 persons at any one time and involved the repeated scanning of overstorey, midstorey and groundcover habitat zones for purposes of detecting active fauna (e.g. eye shine). Head torches with high powered LED cells were preferentially used due to their light weight, hands free use and suitability for detecting fauna movement.



Location of fauna survey methods

Oaklands Biodiversity Constraints Analysis

FIGURE 4

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2.6 Nomenclature

2.6.1 Plant taxonomy

Plant taxonomy used was consistent with the nomenclature of the Flora of NSW (Harden 1990-1993; 2002), except where more recent revisions have been published in recognised scientific journals and accepted by the National Herbarium of New South Wales (as per their PlantNet web site http://plantnet.rbgsyd.nsw.gov.au/).

2.6.2 Fauna taxonomy

Taxonomy and common names of fauna in this report were from the following sources.

- **Mammals**: Menkhorst and Knight (2010), Churchill (2008), Pennay et al. (2004).
- **Birds**: Christidis and Boles (2008).
- **Reptiles**: Wilson and Swan (2010).
- **Frogs**: Tyler and Knight (2009).

2.6.3 Native Plant Community Types (PCTs)

The assigning of PCTs to describe mapped vegetation cover was in accordance with the NSW Vegetation Types Database (OEH, 2012). Published scientific literature, where available, was used to aid in the interpretation of this database (e.g. referenced source documents).

2.7 Likelihood of occurrence analysis

The list of threatened species, populations and ecological communities (threatened biodiversity) identified as potentially occurring within the study area (i.e. database and literature review) was assessed to determine their likelihood of occurrence within the study area. A preliminary likelihood of occurrence analysis was performed prior to field surveys to guide methods and effort. This was subsequently refined following the completion of subject site investigations using field survey results.

Five categories for 'likelihood of occurrence' were attributed to threatened biodiversity after considering the number and proximity of known records, presence or absence of preferred habitat types (e.g. native vegetation types), the mobility of the species, field survey results and professional judgement. Habitat descriptions were generally taken from the online Threatened Species Profile Database (TSPD) (OEH 2015b). The categories are outlined in Table 4.

Table 4: Likelihood of occurrence criteria

Likelihood rating	Threatened flora criteria	Threatened and migratory fauna criteria
Known	The species was observed within the subject site.	The species was observed within the subject site.
High	It is likely that a species inhabits or utilises habitat within the subject site.	It is likely that a species inhabits or utilises habitat within the subject site.
Moderate	Potential habitat for a species occurs on the site. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the subject site.	Potential habitat for a species occurs on the site and the species may occasionally utilise that habitat. Species unlikely to be wholly dependent on the habitat present within the subject site.
Low	It is unlikely that the species inhabits the subject site.	It is unlikely that the species inhabits the study area. If present at the site the species would likely be a transient visitor. The site contains only very common habitat for this species which the species would not rely on for its on-going local existence.
None	The habitat is unsuitable for the species.	The habitat is unsuitable for the species.

2.8 Constraints mapping

2.8.1 Assessment of conservation significance

Mappable areas of biodiversity (e.g. PCTs), having conservation significance, were initially determined by examining alignment with listed threatened ecological communities (TECs). The following documents were used to assess for the presence of listed TECs within the subject site:

- Commonwealth listing advice and conservation advice on White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (TSSC 2006).
- EPBC Act policy statement 3.5 - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (DEH 2006a).
- Species list for the EPBC Act policy statement 3.5 - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (DEH 2006b).
- National Recovery Plan for Box Gum Woodland (DECCW 2011).
- Commonwealth and State listing advice on Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions.
- National Recovery Plan for the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community.
- Natural Grasslands on Basalt and Fine Textured Alluvial Plains of Northern NSW and Queensland, and Natural Grasslands of Queensland Central Highlands and the Northern Fitzroy Basin: A guide to the Identification, assessment and management of nationally threatened ecological communities (DSEWPaC 2012).

Preliminary listed TECs (i.e. TECs nominated for listing, but as yet are not listed on the TSC Act or EPBC Act) have not been considered in this analysis as they have no listed status at the time of writing. However, the potential for constraints arising from these preliminary listings would be identified and noted for future consideration.

The habitat extent for threatened species that does not match the extent of a mapped PCT were also considered when determining the conservation significance of biodiversity values within the subject site (i.e. when PCTs do not reliably represent habitat surrogates for a threatened species).

2.8.2 Landscape features

Constraint classes used to calculate the 'relative constraint index' are listed below:

- Overcleared vegetation types (OCVTs)
- Koala habitat (SEPP 44)
- Wildlife corridors.

The approach taken to quantify these constraint classes is outlined below.

OCVTs

The per cent cleared estimates for native vegetation types identified within the subject site for the relevant Mitchell Landscape (NPWS 2002) were determined from the literature (OEH 2012) and classified as follows:

- Highly overcleared (>90% cleared within the corresponding Mitchell Landscape).
- Overcleared (>70-90% cleared within the corresponding Mitchell Landscape).
- Not overcleared (<70% cleared within the corresponding Mitchell Landscape).

These categories have been used to map OCVTs within the subject site.

Koala habitat

Vegetation identified as forming 'potential Koala habitat' (i.e. 15% or more preferred feed tree species) is mapped as such. Where results permit, areas of 'core Koala habitat' (i.e. evidence of Koala breeding activity) are also delineated and mapped.

Corridors

Native vegetation in moderate-good condition contributes to wildlife movement pathways. The following connectivity link criteria (width and condition) have been used to evaluate the value of each mapped vegetation unit within the subject site. Table 5 and Table 6 define the criteria used to evaluate connectivity within the subject site (OEH 2014).

Table 5: Connectivity width classes

Linkage width (metres)	0 – 5	>5 – 30	>30 – 100	>100 – 500	>500
Linkage width class	Very narrow	Narrow	Moderate	Wide	Very wide

Table 6: Connectivity condition classes

Linkage condition	<25% of lower benchmark for overstorey and understorey	25-50% benchmark for overstorey and understorey	>50% of lower benchmark for overstorey or understorey –alternate in 25-50% range	>50% of lower benchmark for overstorey and understorey	Benchmark condition
Linkage condition class	1	1.5	2	2.5	3

3. Results

3.1 Landscape context

Landscape scale information relevant to the subject site is discussed in the following sections.

3.1.1 IBRA Bioregion and Subregion

The subject site is located within the Peel subregion of the Nandewar IBRA Bioregion and Namoi catchment management area (CMA).

3.1.2 Mitchell landscapes

NSW Landscapes mapping also known as Mitchell landscapes (DECC 2003) is the spatial basis for the NSW Ecosystems Database; a consistent State wide map using the best available data useful in developing and tracking conservation priorities and progress across NSW. Mitchell landscape mapping is primarily based on geomorphic characteristics and as such provides a useful adjunct to more detailed vegetation mapping.

The subject site is mapped as occurring within the Tamworth – Keepit Slopes and Plains Mitchell Landscape, which is not currently classed as an overcleared landscape (i.e. 65% cleared), although is nearing this threshold (i.e. >70% cleared). Vegetation, topography and geology occurring within this landscape is generally characterised as follows:

> "Extensive area of undulating to rolling slopes and plains with low hills and low ranges forming the western fall of the New England plateau. Complex geology of folded and faulted sedimentary and metamorphic rocks with minor interbedded volcanics. Rock types include; Silurian-Devonian chert, slate, phyllite, tuff, schist and Carboniferous conglomerate, sandstone, mudstone, andesite and small areas of limestone. General elevation 500 to 800m, local relief 250m, with some peaks reaching 1100m. Shallow stony soils on ridges. Texture contrast soils on almost all slopes shifting in colour from red-brown on upper slopes to yellow with harsh subsoils prone to gully development on lower slopes. White Box (*Eucalyptus albens*) grassy woodlands, with Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyii*), Cooba (*Acacia salicina*) and Lightwood (*Acacia implexa*) on lower slopes. Rough-barked Apple (*Angophora floribunda*) and Yellow Box (*Eucalyptus melliodora*) on flats. River Oak (*Casuarina cunninghamiana*) along major streams with River Red Gum (*Eucalyptus camaldulensis*) increasing to the west. Patches of Red Stringybark (*Eucalyptus macrorhyncha*) and Red Ironbark (*Eucalyptus sideroxylon*) on steeper slopes in the east." (NPWS 2003).

Both volcanic (i.e. basalt) and sedimentary rocks (i.e. metasediments) have been observed, with the latter largely restricted to the northern elevated parts of the subject site.

3.1.3 Native vegetation cover

Per cent native vegetation cover in moderate to good condition can be used as a rapid indicator of ecological integrity at the landscape scale. The subject site is largely defined as containing native vegetation cover in two forms, these being woodlands and forests (moderate to good condition) and native grasslands (low condition). The woodland and forest cover is approximately 60-65%, which is nearly double the average vegetation cover of the Tamworth – Keepit Slopes and Plains Mitchell landscape. Without consideration of effects of past land uses, it is considered that the subject site is likely to exhibit moderate to high ecological integrity.

3.1.4 Corridors

Habitat fragmentation is one of the most detrimental threats to the conservation of ecological values. The combined assessment of corridor width and condition indicates that the majority of biodiversity movement through the landscape would be through the northern half of the subject site. This is an important part of the site for maintaining wildlife connectivity, although it should be noted that there is a low risk of connectivity loss in this area.

Current wildlife connectivity at greatest risk of deterioration is referred to as the primary link and is shown in yellow in Figure 5. The width of the corridor at this location is 150 m with vegetation in benchmark condition. The higher arability in this part of the subject site substantially increases the risk connectivity loss or deterioration through reductions in vegetation condition and width. As such a substantial loss in wildlife connectivity would eventuate across the subject site should the primary link experience any change. Conversely, a substantial increase in wildlife connectivity is possible by rejuvenating the adjoining grasslands to a high condition state (i.e. increasing width and condition).

3.1.5 Summary: Landscape score

The landscape score is calculated using algorithms defined by Gibbons *et al* (2009), which takes into account the landscape features described in the above sections.

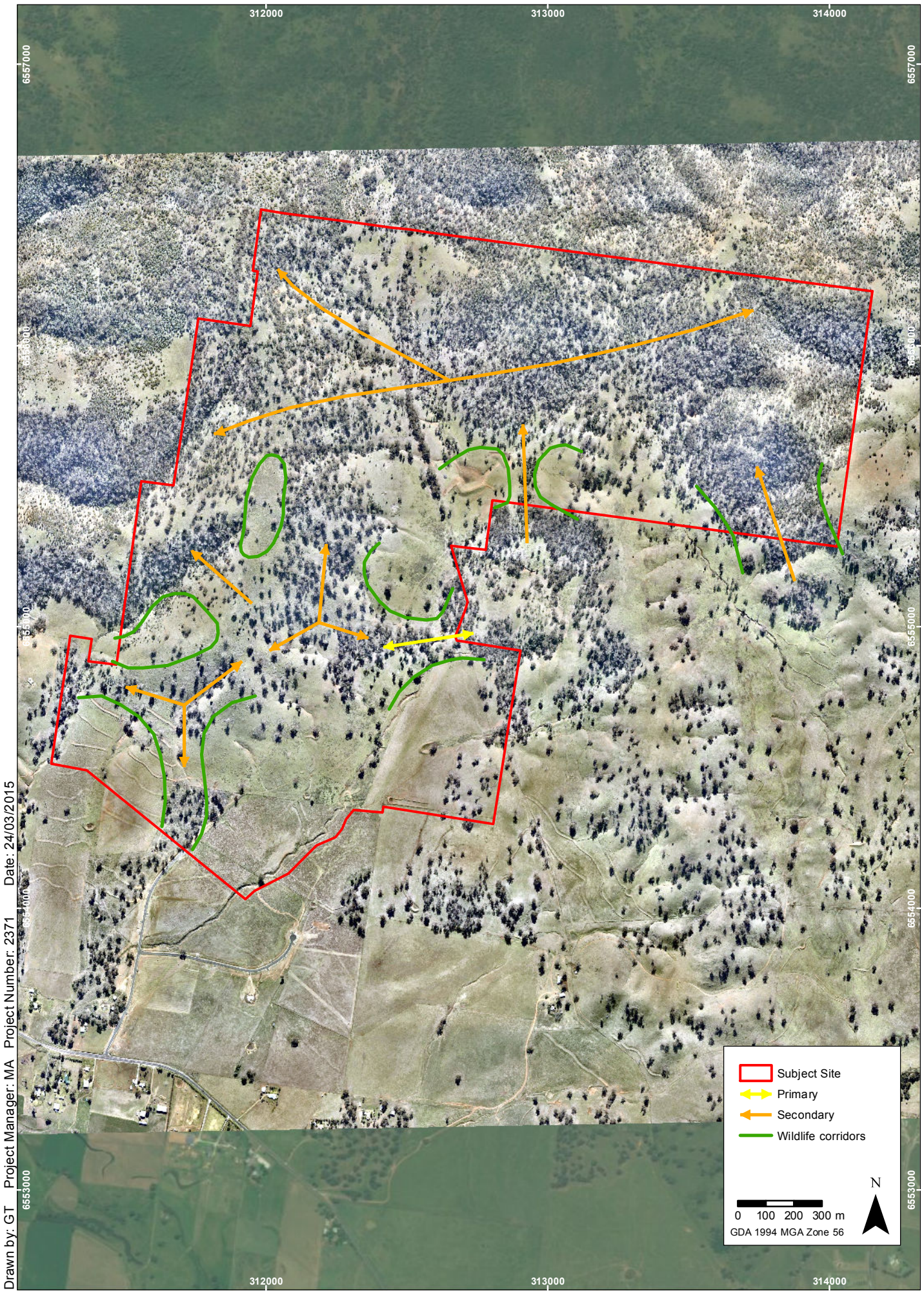
Table 7: Landscape context of the subject site

Landscape feature	Dominant
IBRA Bioregion	Nandewar
IBRA Sub-region	Peel
CMA	Namoi
Mitchell Landscape	Tamworth – Keepit Slopes and Plains
Patch size	>500 ha (maximum classification in BioMetric)
Adjacent remnant area	>500 ha (maximum classification in BioMetric)
Primary links (width and condition)	Primary link - 150 m (wide) in benchmark condition (3) Other links - >500 m in <50% benchmark condition

3.2 Database and literature

3.2.1 Database

The BioNet database search performed for the study area identified 17 threatened flora and fauna species as occurring within the locality. A Likelihood of Occurrence analysis was performed (see Annex 1) and identified the threatened biodiversity relevant to the subject site. Table 8 summarises this analysis to those considered as having potential to occur within the subject site.



Wildlife connectivity

Oaklands Biodiversity Constraints Analysis

FIGURE 5

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Table 8: Summary of Likelihood of Occurrence analysis

Scientific name	Common name	TSC Act	EPBC Act	Likelihood of occurrence
Plants				
Dichanthium setosum		V	V	Medium
Thesium australe	Austral Toadflax	V	V	Medium
Birds				
Anthochaera phrygia	Regent Honeyeater	CE	E,M	High
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Known
Daphoenositta chrysoptera	Varied Sittella	V	-	High
Glossopsitta pusilla	Little Lorikeet	V	-	Known
Lathamus discolor	Swift Parrot	E	E	High
Lophoictinia isura	Square-tailed Kite	V	-	High
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	High
Neophema pulchella	Turquoise Parrot	V	-	High
Stagonopleura guttata	Diamond Firetail	V	-	High
Mammals				
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	High
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	High
Petaurus norfolcensis	Squirrel Glider	V	-	High
Phascolarctos cinereus	Koala	V	V	High

3.2.2 Literature

Box Gum Woodland, including representations of the listed ecological community, is commonly found within the Tamworth area (E.A Systems 2005, RPS Australia Asia Pacific 2013, Niche 2014). Condition classes observed in the area range from derived grasslands to undisturbed woodlands. The majority of current and historical occurrences are mostly limited to the fertile landscapes, such as the Peel floodplain and basalt derived soils of the adjacent hills.

Development related impacts on Box Gum Woodland CEEC within the Tamworth area has resulted in numerous controlled action declarations under the EPBC Act (EPBC 2003/1142, EPBC 2012/6523). While there is no clear indication on what the significance threshold is for a controlled action, projects having impacts greater than 2.5 ha are likely to be considered by the DotE as candidates for a controlled action.

3.3 Vegetation cover

3.3.1 Flora species observations

Flora species observed within the subject site are listed in Annex 2. A total of 119 species were observed with 33 being exotic. The most commonly observed native species included grazing tolerant grasses (i.e. Stout Bamboo Grass, Wire Grass, Queensland Bluegrass, Redleg Grass) and 'weedy' herbs (i.e. *Trebulus microccus* and *Chenopodium pumilio*). The weedy herbs are commonly found in high abundance where intense agricultural activity has occurred.

3.3.2 Native vegetation

Native vegetation cover within the subject site varies largely with respect to soil conditions (i.e. PCT) and historical land use (i.e. condition). Two native PCTs are recognised, these being:

- NA225 White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion.
- NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion.

In an undisturbed state, NA225 typically exhibits a shrubby forest structure, with a grassy herbaceous groundcover stratum often present. Shrubbiness is generally greater then 20-30 per cent foliage cover, although it may locally exceed or fall below this range due to various environmental factors (e.g. soil depth, fertility, slope, mean rainfall or transition zones with adjacent PCTs).

Natural occurrences of NA226 typically exhibit a woodland structure with the midstorey being absent. The groundcover strata is generally grassy herbaceous. The presence of a shrubby understorey is often related to land use practices (e.g. use of fire and grazing), although shrubbiness may also be linked to proximal 'shrubby' PCTs (e.g. transition zones). Locally, transitions between NA225 and NA226 were observed on the upper slopes of the subject site where basalt derived soils are either absent or are heavily weathered.

A general description of these PCTs is provided below.

White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA225)

Forests almost solely dominated by White Box with a moderately shrubby understorey occur throughout the elevated parts in association with soils derived from sedimentary rocks and/ or shallow, heavily weathered basalts. A shrubbier understorey was generally found on the steeper slopes where White Cypress Pine (*Callitris glaucophylla*) was more common. The shrubby understoery was a composite of Sticky Olearia (*Olearia elliptica*), Blackthorn (*Bursaria spinosa*) and Mock Olive (*Notelaea microcarpa*). Sparse grassy tussocks characterise the groundcover stratum and comprised a highly variable array of species including Snow Grass (*Poa sieberiana*), Barbed Wire Grass (*Cymbopogon refractus*), Kangaroo Grass (*Themeda australis*), Wire Grass (*Aristida ramosa*), Umbrella Grass (*Chloris ventricosa*) and Wallaby Grass (*Rytidoperma* spp.).

The shrubbier forests transition into grassy woodlands on the mid and lower gentler slopes where basalt derived soils emerge (i.e. increased soil depth and fertility). This transition coincides with a change in land arability and thus generally marks the extent of agricultural suitability, which may have, in part, enhanced the observed change in vegetation structure. Plot data and opportunistic observations indicate a very low weed cover within this area of vegetation cover.

White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)

Vegetation structure including forest (transition), woodland, open woodland and derived grasslands almost solely dominated by White Box with a moderately shrubby understorey occur throughout the elevated parts in association with soils derived from sedimentary rocks and no weathered basalts . A shrubbier understorey was generally found on the steeper slopes where White Cypress Pine (*Callitris glaucophylla*) was more common. The shrub understorey was largely absent although occasional occurrences of Wattle (*Acacia* sp.), Sticky Olearia (*Olearia elliptica*), Blackthorn (*Bursaria spinosa*) and Mock Olive (*Notelaea microcarpa*) were noted.

The groundcover stratum was grassy herbaceous and comprised a highly variable array of species including Wire Grass (*Aristida ramosa*), Umbrella Grass (*Chloris ventricosa*) and Wallaby Grass (*Rytidoperma* spp.). Grasses dominated, particularly in the open woodlands and derived grasslands where agricultural activity has substantially modified vegetation structure and floristic composition.

Transitions toward upslope shrubbier forests vary in species composition and structure due to the effect of past agricultural activity (including land clearing). Intact woodlands merge with more even aged stands in a forest like structure at the periphery of the more fertile arable lands. Patches of overstorey regeneration also exists and, in some cases, is solely dominated by the fire sensitive White Cypress Pine, thus potentially indicating a variable and potential infrequent fire regime.

Plot data and opportunistic observations indicate variable weed cover from low (i.e. 5%) to moderate (i.e. 20-30%). In addition, weedy natives were also observed in the more arable parts, this potentially indicative of overstocking. Overabundant native plant species regularly observed included Caltrop (*Trebulus microccus*) and *Chenopodium pumilio*; these being species known to respond to overgrazed landscapes.

3.3.3 Condition

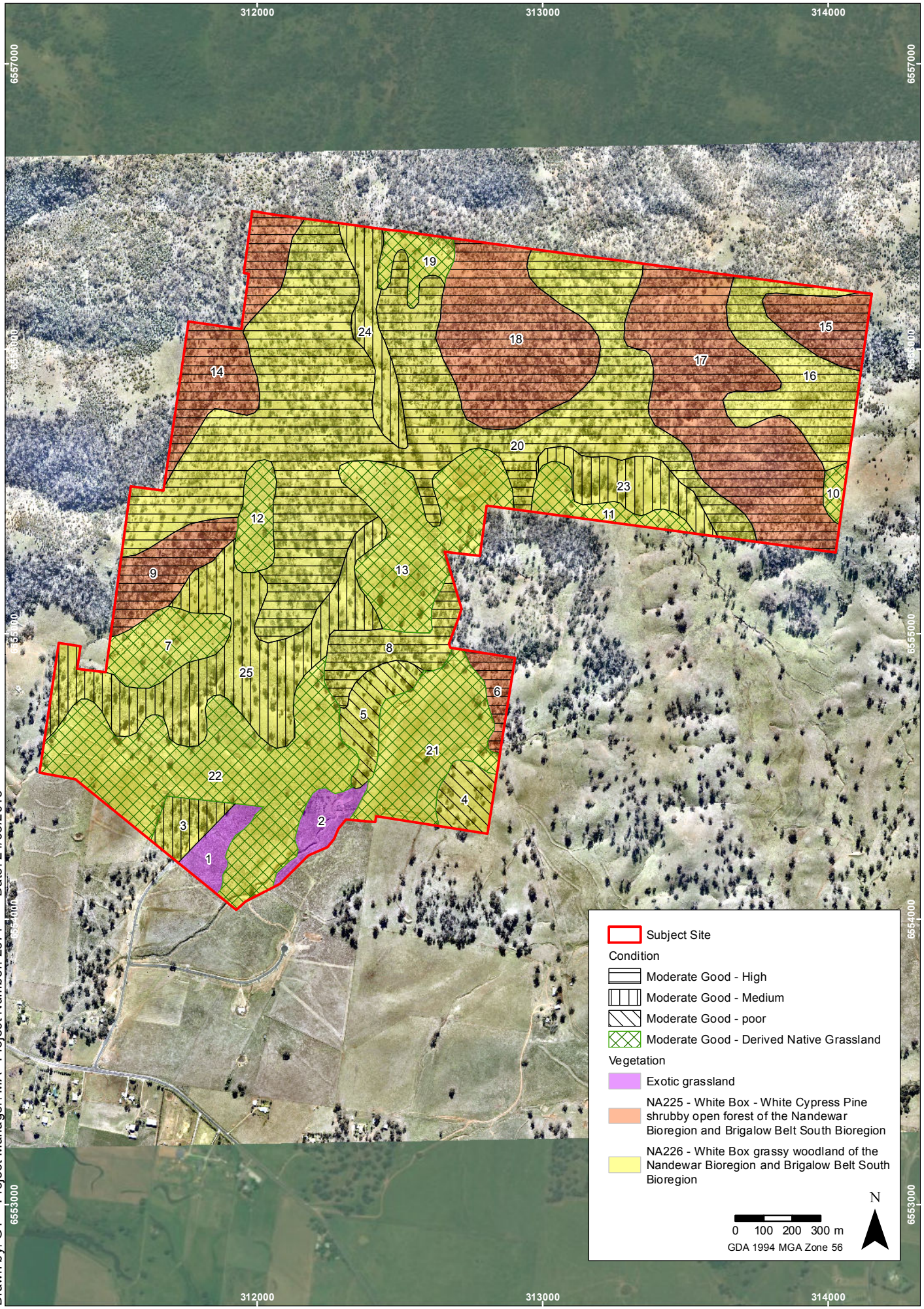
Varying condition states are recognised for native vegetation mapped within the subject site, as shown in **Error! Reference source not found.**. NA225 is found primarily in a open forest structure, although isolated patches may exhibit a woodland features, especially where transitions with NA226 occur. NA226 occurs in variable structural forms ranging from derived grasslands (i.e. loss of overstorey canopy cover through historical clearing) to open forest (i.e. transitions with NA225). Woodland (i.e. natural character) and open woodland forms also exist, with the latter a function of agricultural activity. Native PCTs and condition states are summarised in Table 9. The range in BioMetric scores observed in each PCT/ condition state combination is provided in Table 10, with BioMetric raw data provided in Annex 3.

Table 9: Native PCTs and condition class within the subject site

Plant Community Type (PCT code)	Structure	Site Value Score (0-100)	Condition	Area (ha)
White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA225)	Forest	81	Moderate/Good-High	93.8
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	Woodland/Forest	90	Moderate/Good-High	123.9
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	Woodland	57	Moderate/Good-medium	50.4
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	Open Woodland	41	Moderate/Good-poor	9.8
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion(NA226)	Grassland	33	Moderate/Good-derived native grasslands	98.8
Total mapped in study area				**376.7**

Table 10: Native PCTs and condition – BioMetric scores

PCT	Structure	NPR (#)	OS (%)	MS (%)	NGCG (%)	NGCS (%)	NGCO (%)	EC (%)	NTH (#)	OR	Logs (m)
NA225	Forest	37	10.2	0	76	14	24	4	3	present	48
NA226	Forest	44	9.5	1.6	40	4	28	2	2	present	25
NA226	Woodland	30 ±7	3 ±3	0	50 ±2	0	67 ±11	5 ±3	3 ±3	absent	2 ±2
NA226	Open Woodland	31	0	0	32	0	80	2	0	absent	0
NA226	Derived Grassland	29 ±4	0	0	65 ±18	0	46 ±17	8 ±8	0	absent	<1
N/A	Exotic Grassland	25	0	0	2	0	26	74	0	absent	0



Vegetation cover and condition

Oaklands Biodiversity Constraints Analysis

FIGURE 6

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A general description of the varying conditions states observed is provided below.

White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA225): FOREST

The crests and upper slopes in the north of the subject site comprise vegetation formed on metasediment derived soils of relatively low fertility, which generally leads to increased understorey woodiness (i.e. shrubbiness). The overstorey is dominated by White Box (*Eucalyptus albens*) with Cypress Pine (*Callitris glaucophylla*) forming a minor associate.

Historically this vegetation has avoided clearing for agricultural purposes due to the limitations such as terrain and soil fertility. The site value score indicated the vegetation and habitat is within a benchmark condition (i.e. site value score of 81).

White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226): FOREST

The dominance of White Box as an overstorey species is visually evident throughout the mid slopes of the central and northern parts of the subject site; an area coincident with limited agricultural suitability. The forest structure is likely to be a function of natural (i.e. transition with upslope vegetation and marginal increase in soil fertility) and anthropogenic influences (i.e. limited grazing pressure, but may have been historically cleared many decades ago). A forest like structure was also observed within drainage lines as shown in Plate 1.

Plate 1 White Box grassy forest (Plot 6)

Despite the forest structure, it was noted that the vegetation understorey was relatively less shrubby than upslope vegetation and comprised increased grassiness. Increased grass and herb plant species richness was also observed. Fallen log length and tree hollow incidence was largely consistent with benchmark conditions indicating this vegetation to be in moderate-good high condition. The site value score indicated the vegetation and habitat is generally within a benchmark condition (i.e. site value score of 90).

White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226): WOODLAND

A classical woodland pattern dominated by White Box exists through the majority of the central and western parts of the site. However, tree age appears to be relatively consistent indicating that the current overstorey cover may be a maturing regenerating state from a historical land clearing event. The shrub stratum is almost entirely absent from areas mapped as White Box woodland. Further, there was no evidence of native overstorey or midstorey regeneration in the central more arable parts of the site (i.e. trees with a diameter at breast height of 100mm or less), which is indicative of agricultural activity.

The grassy groundcover stratum, as exhibited by the dense cover of grazing tolerant native grasses such as Wire Grass (*Aristida ramosa*), Stout Bamboo Grass (*Austrostipa verticillata*), Redleg Grass (*Bothriochloa macra*) and Queensland Bluegrass (*Dichanthium sericeum*), represents a high proportion of the biomass contained within these woodlands. The presence of Caltrop and *Chenopidium pumilio* further support the view that these woodlands have been subject to substantial grazing pressure for a sustained period.

The site value score of 57 indicates vegetation and habitat of moderate/ good - medium benchmark condition. The sub benchmark site value score was attributed to native grass cover (50% ±2) and mean groundcover herbs and forbs cover (67% ±11%) being significantly above benchmark conditions. The latter exceedence is primarily related to the high incidence of weedy natives such as Caltrop and *Chenopidium pumilio*. The above benchmark mean native species richness (30 ±7) and relatively low weed cover (approximately 5%) were important factors in maintaining a relatively high site value score.

White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226): OPEN WOODLAND

The White Box open woodland exists through the majority of the central parts of the site. As for woodlands, it is considered that the tree age indicates a historical clearing event where all trees were previously removed. The shrub stratum is absent as was there was no evidence of native overstorey or midstorey regeneration (i.e. trees with a diameter at breast height of 100mm or less), which is considered indicative of sustained agricultural activity (see Plate 2). The grassy groundcover stratum is very similar and generally indistinguishable to that observed within the woodland patches.

The site value score of 41 indicates vegetation and habitat to be in a moderate/ good - poor condition.

White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226): DERIVED GRASSLAND

Interspersed throughout the lower slopes of the site in areas with no native overstorey are patches of native grasslands dominated by Wire Grass, Queensland Bluegrass and Redleg Grass (see Plate 5). Native herb species richness and cover in these areas is above benchmark conditions, although species incidence is restricted to cosmopolitan resilient native species such as Kidney Weed (*Dichondra repens*) and Rumex (*Rumex brownii*). No characteristic dominant species (i.e. White Box, Yellow Box, Blakely's Red Gum or juveniles thereof) are present within this vegetation unit, as seen in plate 3.

Plate 2 White Box grassy open woodland (Plot 7)

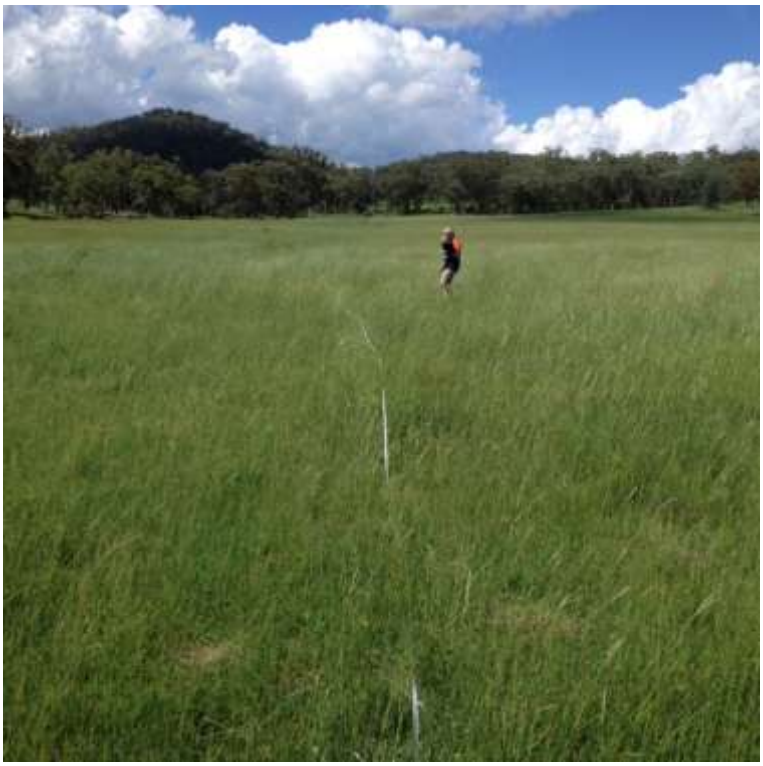


Plate 3: Derived native grassland (Plot 3)

Whilst classified as native vegetation on the basis of the grass cover alone, it is clear from plot data that these grasslands exhibit poor floristic assemblages and vegetation structure, which is indicative of impaired species diversity. Relative to the natural state, these simplified patches of NA226 are characterised by low to medium native plant species richness (12.1 ±4.0 species/ 1,000m^2 BioMetric plot), an overabundant cover of native grasses (55.1% ±19.7% cover) and highly variable herbs and forbs cover (8.6% ±13.4).

3.3.4 Exotic vegetation

Exotic grasslands

Woodlands and grasslands with a predominantly exotic groundcover occur within the site. Plot data clearly indicates that such woodlands and grasslands have poor native floristic assemblages and vegetation structure and no longer align with any naturally occurring native vegetation type of the locality.

These vegetation patches have experienced severe and persistent disturbance from intense farming activity including high livestock stocking rates. A substantial number of exotic groundcover species characterise this part of the site in combination with some native grass species resilient to high intensity grazing and soil compaction (e.g. Stout Bamboo Grass and Common Couch). Much of the native vegetation cover within this part of the site can be attributed to these two native grass species.

Other native species that also occur within this part of the site include Wire Grass, Queensland Bluegrass (both subspecies) and Redleg Grass, although in lower abundances. Native herb species richness and cover is almost absent. These grasslands are highly simplified and are characterised by very low native plant species diversity with the dominant feature being exotic grasses and herbs.

3.3.5 Threatened species

No threatened flora species were detected within the subject site during the field survey period.

3.4 Fauna

3.4.1 Observations

Fauna species observed within the subject site are listed in Annex 4. A total of 67 species were observed including three amphibians, 53 birds, six mammals and five reptiles. Exotic fauna observations were rare and limited to a few species (e.g. European Rabbit, Feral Pig, Starling). The most commonly observed native species by group and number were birds included Grey and Pied Butcherbirds, Magpie and Crested Pigeon, which is consistent with the 'increaser species' found in modified habitats of the Wheat-Sheep belt (Reid 1999). Notwithstanding, decliner species were also observed regularly, particularly throughout the northern parts of the subject site including the Restless Flycatcher, Eastern Yellow Robin and Rufous Whistler (Reid 1999).

3.4.2 Threatened species

Three State listed threatened species were observed within the subject site, as listed below:

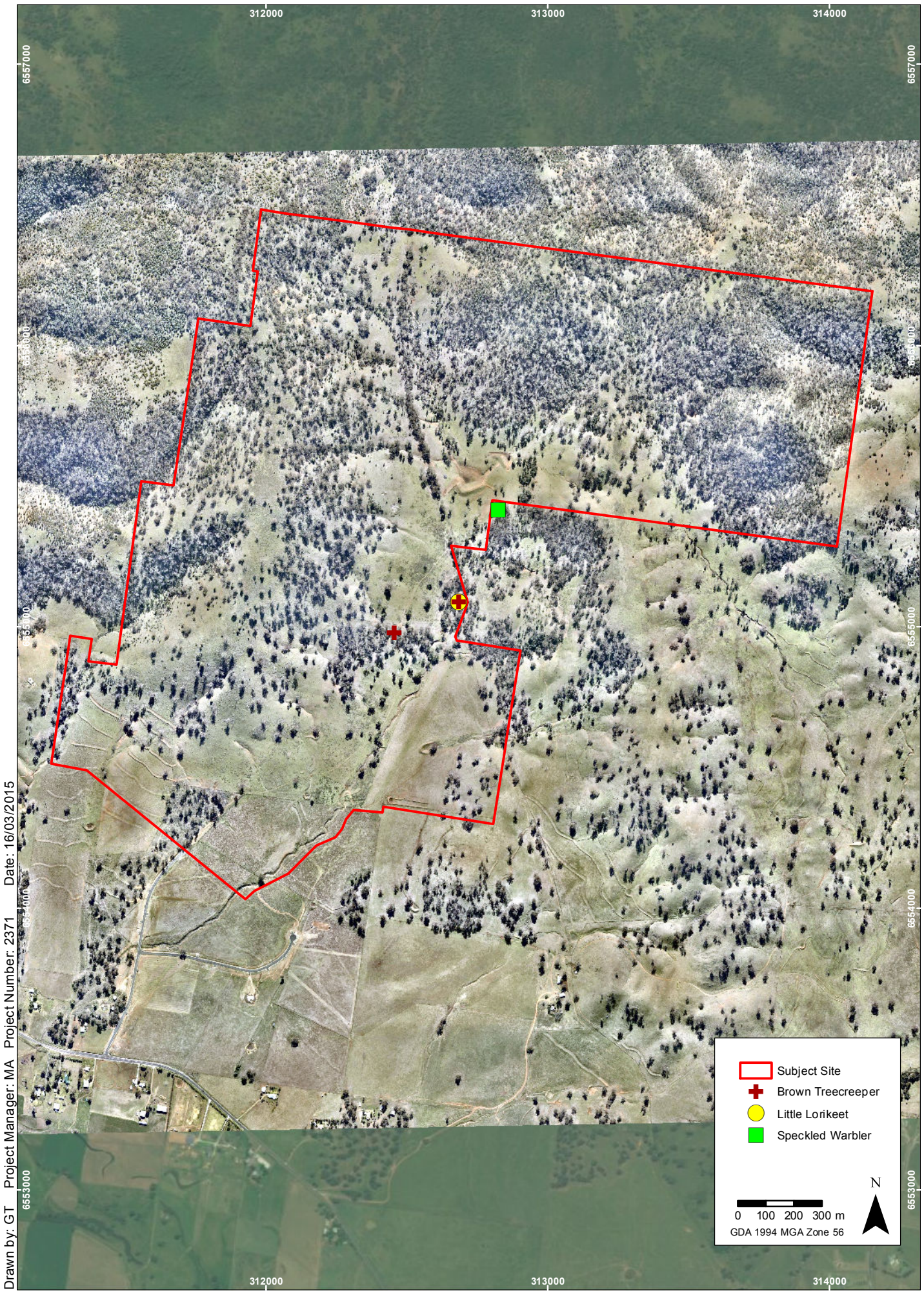
- Brown Treecreeper (*Climacteris picumnus*)
- Little Lorikeet (*Glossopsitta pusilla*)
- Speckled Warbler (*Chthonicola sagittata*).

The location of these observations is provided in Figure 7. The habitat context for these observations is consistent with the literature as outlined in Annex 1.

3.4.3 Habitat types

Habitat such as fallen logs and hollow bearing trees is largely restricted to the White Box forests of the subject site. The benchmark conditions found in these parts of the subject site would provide sufficient habitat values for fauna species predicted to occur within the attributed PCTs. Remnant size and edge to area ratios also favour the widespread presence of high value habitat throughout the woodland areas.

Conversely, the woodlands and open woodlands have limited fallen log and hollow log resources, this potentially due to the even age of White Box trees (i.e. effect of past clearing events). The above benchmark groundcover grassiness potentially enhances the habitat values of the subject site for granivore birds, although this would be at the expense of many passerine bird species that exhibit insect based diets and preference for complex vegetation structure.



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Threatened fauna observations

Oaklands Biodiversity Constraints Analysis

FIGURE 7

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4. Biodiversity constraints analysis

4.1 Vegetation cover

4.1.1 OCVTs

NA226 is currently assessed as being 85% cleared and is thus, by definition, classed as an OCVT.

4.1.2 Threatened ecological communities

Areas mapped in **Error! Reference source not found.** as NA226 represent the extent of Box Gum Woodland CEEC within the subject site, which is shown in Figure 8. The following analysis provides the rationale for determining the extent of Box Gum Woodland CEEC within the subject site.

Overview

A patch of the Box Gum Woodland ecological community, including parts belonging to the listed ecological community, could occur if:

- The site occurs within the natural range for Box – Gum Woodland (TSSC 2006).
- A characteristic canopy dominant is or was present (i.e. White Box).
- There are parts of the site where the understorey is predominantly native.
- Vegetation patches are greater than 0.1 (i.e. with sufficient diagnostic plant species) or two hectares (i.e. where there is sufficient tree density).
- A woodland structure is present (i.e. either now or historically).
- There is a native grassy understory in woodland and open woodland areas.

For the above reasons native vegetation cover of the subject site has potential to form part of the listed Box Gum Woodland ecological community.

The Box Gum Woodland listing advice (TSSC 2006) and Policy Statement (DEH 2006a) describes what is included in the listed ecological community under the EPBC Act (i.e. CEEC). Vegetation included in the listed ecological community and important to its long-term future has one of more of the following conservation values:

- They are large patches
- Link remnant vegetation and habitat in the landscape
- Occur in highly cleared areas
- Contain rare, declining or threatened species
- Represent the entire range of the ecological community.

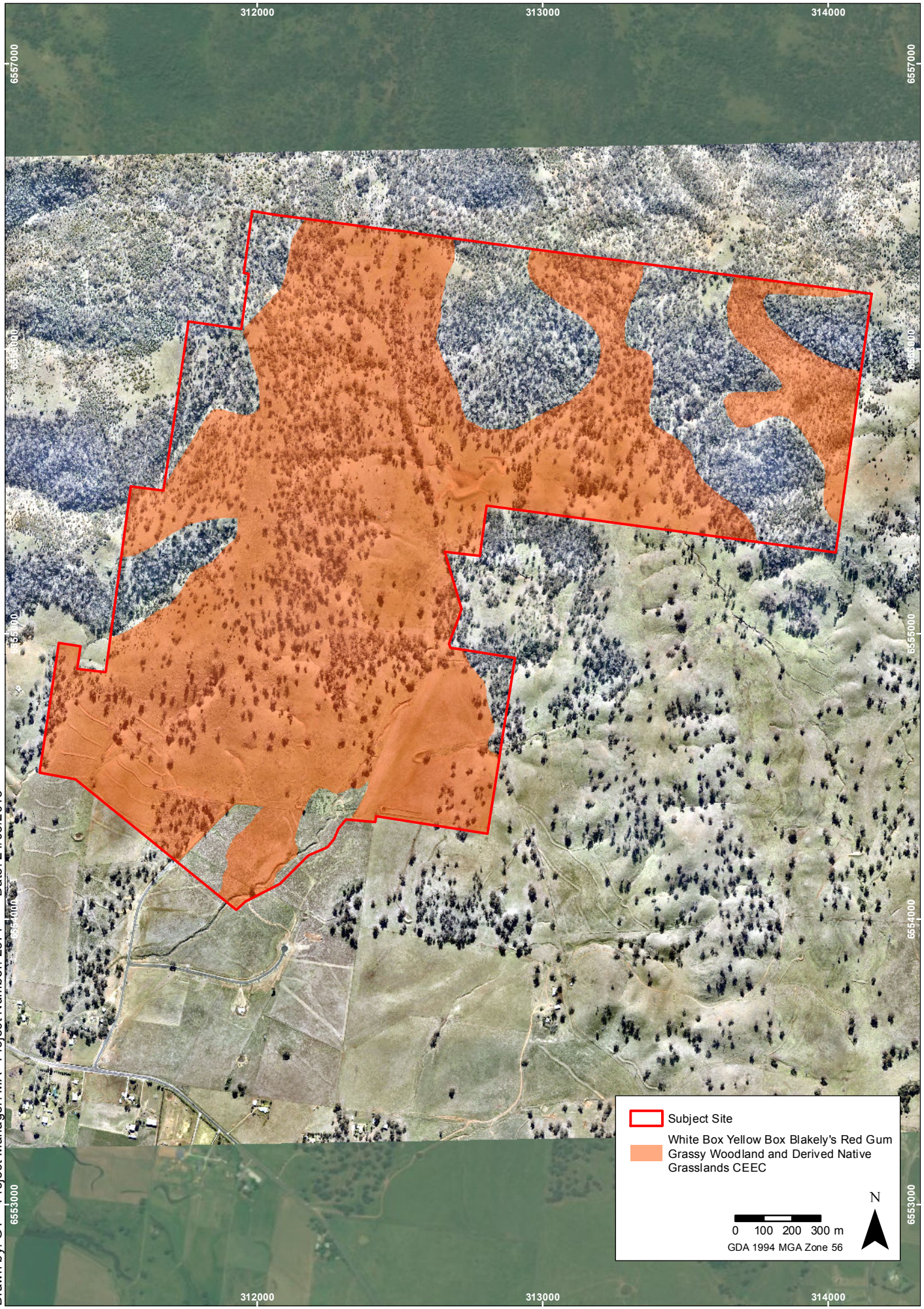
Occurrence of the listed CEEC within the subject site

Vegetation units codified as belonging to NA226 (i.e. PCT and condition states), which is notionally regarded as a patch of the ecological community, were individually tested for high species diversity to determine if the vegetation formed part of the listed ecological community. This investigation approach is described by OEH (2014) as a reliable, logical and scientifically repeatable examination of species diversity for an ecological community. The results of this analysis are provided in Table 11, which shows all patches of NA226 to form part of the listed ecological community. The extent of Box Gum Woodland CEEC (and the State listed EEC) is provided in Figure 8.

Table 11: EPBC Act listed Box Gum Woodland CEEC: plot data analysis for NA226 against identification criteria

NA226 Condition State1	Is, or was previously, dominated by grassy White Box, Yellow Box or Blakely's Redgum?	Is a characteristic dominant tree species currently present?	Is the understorey predominantly native?	Is the sampling unit 0.1 ha or greater?	Are there 12 or more understorey species including 1 important species	Does the patch have 20 or more trees/ ha or is there eucalypt regeneration evident	Is it the listed ecological community?
Moderate/Good - High	Yes	Yes	Yes	Yes	Yes	n/a	**Yes**
Moderate/Good – Medium	Yes	Yes	Yes	Yes	Yes	n/a	**Yes**
Moderate/Good - Poor	Yes	Yes	Yes	Yes	Yes	n/a	**Yes**
Moderate/Good - Derived Native Grasslands	Yes	No	Yes	Yes	Yes	n/a	**Yes**

[1] See Figure 6 for mapped condition states



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Extent of Threatened Ecological Communities

Oaklands Biodiversity Constraints Analysis

FIGURE 8

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4.2 SEPP 44 – Koala habitat protection

SEPP 44 assessments initially involve a determination of habitat suitability (i.e. potential Koala habitat or not). Vegetation constituting 'potential Koala habitat' must exhibit at least 15% cover of preferred feed tree species, as listed in Schedule 1 of SEPP 44. Habitat classifications such as 'Primary, Secondary or Tertiary Koala Habitat' are applied to lands identified as 'Potential Koala habitat' and represent the conventional classification nomenclature used in a Koala Plan of Management.

White Box is a listed preferred Koala feed tree species, which is commonly found in the subject site and local area. One other important preferred Koala feed tree species observed locally is Blakely's Redgum (*Eucalyptus blakelyii*), although occurrences of this tree species within the subject site were very rare. Other considerations applied in distinguishing between areas of potential primary, secondary and tertiary Koala habitat are listed below:

- Soil fertility (i.e. basalt soils superior to sedimentary soils)
- Riparian zones (i.e. availability of water).

The woodland and open forest areas of the subject site contain prescribed feed tree species with 15% or more cover and are thus classified as 'potential Koala habitat' under SEPP 44 (i.e. White Box). On site Koala activity, or absence thereof, has not been fully evaluated although indications are that the Koala, if present, is unlikely to be common (i.e. no observations during spotlighting). Should the Koala be detected on site then it is likely that the White Box dominated vegetation would, at the very least, be considered Secondary Koala Habitat.

If present, primary Koala habitat would be indicated by the presence of breeding individuals, although such classification would require targeted surveys during the breeding season. Potential primary Koala habitat is likely to be associated with the grassy White Box woodlands where present on basalt derived soils (i.e. areas identified as forming part of the Box Gum Woodland CEEC as shown in Figure 8). Vegetation mapped as NA225 is considered to be less prospective for the Koala and has been mapped as potential secondary habitat. The extent of potential Primary and Secondary Koala Habitat is shown in Figure 9.

4.3 BioBanking calculations

Notional BioBanking calculations were performed to estimate the likely ecosystem credit yield per hectare for two options (i.e. development or offset site). The results are provided in Table 12 and Table 13.

Table 12: Notional BioBanking assessment: Development site

Plant Community Type (PCT code)	Site Value Score (0-100)	Condition	Area (ha)	Credits per hectare
White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA225)	81	Moderate/Good-High	93.8	66
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	90	Moderate/Good-High	123.9	73
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	57	Moderate/Good-medium	50.4	48
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	41	Moderate/Good-poor	9.8	37
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion(NA226)	33	Moderate/Good-derived native grasslands	98.8	31
Total	-	-	376.7	-

Table 13: Notional BioBanking assessment: BioBank site

Plant Community Type (PCT code)	Site Value Score (0-100)	Condition	Area (ha)	Credits per hectare
White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA225)	81	Moderate/Good-High	93.8	10
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	90	Moderate/Good-High	123.9	10
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	57	Moderate/Good-medium	50.4	8
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)	41	Moderate/Good-poor	9.8	8
NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion(NA226)	33	Moderate/Good-derived native grasslands	98.8	8
Total			376.7	

These notional ecosystem credit rates per hectare could be used to estimate the potential cost of development in constrained areas. Current ecosystem credit pricing ranges between $1,500 and $10,000, with the likely credit pricing for this site anticipated to be in the lower part of that range (i.e. limited demand locally and limited management cost).

It should also be noted that costs for additional field investigations and assessment would need to be factored into the development costs. This would involve specific assessments to address the loss of endangered ecological communities (i.e. red flag assessment) and preparation of a Referral under the EPBC Act. An application fee of approximately $11,000 is also payable to the OEH when applying for a BioBanking Statement.

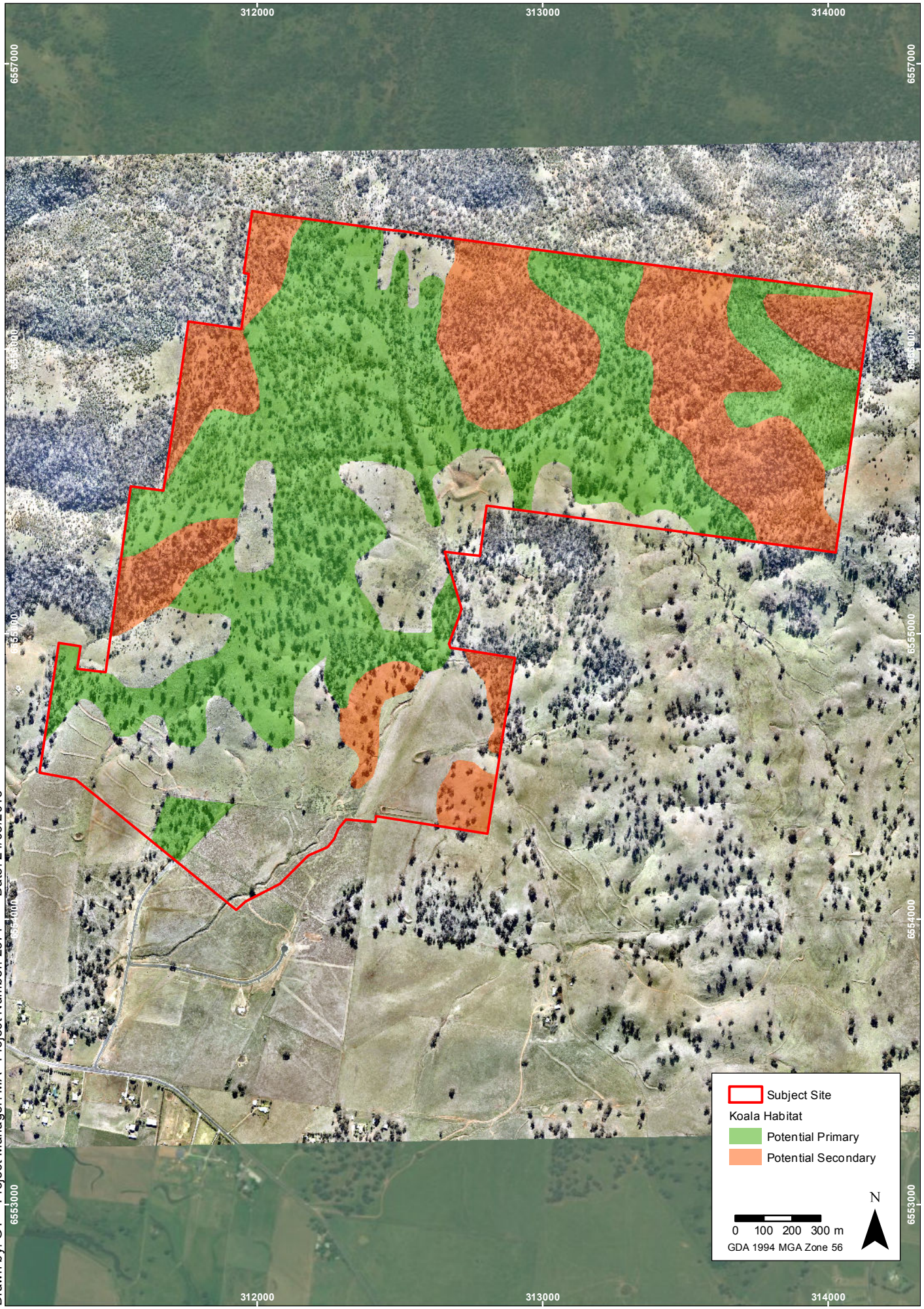
4.4 Summary

The subject site comprises native vegetation in various conditions states. Parts of the subject site are classified as belonging to the State and Commonwealth listed Box Gum Woodland EEC/ CEEC, with much of the patch considered to be of moderate to high value (i.e. presence of threatened species, large patch size and connectivity evident). This vegetation cover, as shown in Figure 8, is also classed as an overcleared vegetation type. Additionally, all vegetation comprising White Box as the overstorey species is classed as potential Koala habitat under SEPP 44.

While areas of derived native grasslands are considered to form part of the Box Gum Woodland CEEC, it is considered that the extent of this vegetation cover in the southern parts of the subject site is of lower conversation importance. The patches of derived native grasslands in the southern parts of the subject site are assessed in this manner for the following reasons:

- Vegetation is in a low condition (i.e. site value score < 34) and exhibits poor species diversity (i.e. overabundance of native grasses and 'weedy' native herbs).
- Does not comprise the elements of the listed ecological community considered important to its long-term future, as listed in Section 4.1.2.

For these reasons, it is considered that patches of derived native grasslands identified in the southern parts of the subject site are distinct from patches of higher value native vegetation cover, thus warranting separate consideration when assessed (e.g. are of lower relative constraint).



Potential Koala Habitat

Oaklands Biodiversity Constraints Analysis

FIGURE 9

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5. Recommendations

5.1 Managing future land issues

Conceptually, the best approach to managing the impacts of development on biodiversity starts by examining the potential for impact avoidance matched with conservation outcomes. Once exhausted, impact minimisation (i.e. mitigation) represents the next level of consideration. The last and least preferable option is the use of biodiversity offsets. The following sections provide a broad narrative for the consideration of this conceptual framework in the planning of future land uses within the subject site.

5.1.1 Impact avoidance

Figure 10 consolidates the various constraints identified in Figure 5, Figure 7, Figure 8 and Figure 9. Two zones of constraint are identified these being:

- High: Areas of Box Gum Woodland in moderate to good condition and areas of low condition where imbedded wholly within a moderate to good patch. Potential Koala habitat and wildlife connectively has also been considered. High value threatened species habitat associated with riparian vegetation is also recognised within parts of the high biodiversity constraint area.
- Medium: While largely treeless the derived native grasslands found within areas of medium biodiversity constraint area are considered to form part of the State and Commonwealth Box Gum Woodland listing (i.e. endangered/ critically endangered ecological community). Constraints such as potential Koala habitat, wildlife connectivity and threatened species habitat are generally absent from this area.

In terms of development potential it is considered that the most suitable part of the subject site is areas mapped as 'medium' biodiversity constraint although it should be noted that a significant impact may still occur if developed. Unpublished significant impact thresholds considered relevant to the subject site are as follows:

- High constraint areas: Development exceeding 2 ha is highly likely to result in a significant impact hence represent a controlled action.
- Medium constraint areas: Development exceeding 5-7 ha is likely to result in a significant impact hence represent a controlled action. The 'quality' of the derived grasslands and its context would need to be carefully considered when evaluating whether or not a significant impact is considered likely.

The use of Section 88b instruments or the like, which are considered lower order 'user restriction' mechanisms, are not considered sufficient to demonstrate an impact avoidance outcome. In this respect it is known that the DotE would consider the entire area of a lot as impacted irrespective of any applied 'user restriction', as it is their view that considerable uncertainty exists in maintaining the intended impact avoidance outcome.

5.1.2 Conservation

Biodiversity conservation outcomes are highly suited to areas mapped as high biodiversity constraint within the subject site. Commercially, it is considered that this part of the subject site is highly compatible with the objects of the NSW BioBanking Scheme especially in light of the conservation significance of vegetation within this part of the subject site. The creation of a BioBank over this portion of the subject site would provide income generating potential (i.e. sale of ecosystem and species credits to the development industry) with minimal management cost (i.e. few weeds and feral animals to control). Demand for PCTs present with in the subject site is likely to be high as the majority of lands zoned for development within the Namoi CMA interact with Box Gum Woodland EEC/ CEEC.

5.1.3 Impact minimisation

Two factors require consideration when considering development within the subject site viz:

- The notional impact threshold for determining impact significance (see Section 5.1.1).
- The importance of protecting areas of high biodiversity constraint from indirect impacts (i.e. buffers).

As previously discussed, it is recommended that no development should be considered within areas of high biodiversity constraint (i.e. impact avoidance). However, if development is considered within this area then impact thresholds should be considered within the context of each constraint (i.e. Figure 5, Figure 7, Figure 8, Figure 9), in particularly the importance of maintaining the width and condition of wildlife corridor. In this respect, it is recommended that the primary corridor identified in Figure 5 be maintained or enhanced, thus limiting development options largely to lands south of this part of the subject site.

The use of buffers to protect areas of high constraint is also recommended. Buffer specifications would vary and depend primarily on topographic relief (i.e. development downslope of a high constraint area would command a narrower buffer to the contrary scenario). With respect to the subject site and relative proximity of high and medium constraint areas, it is considered that a 30 m wide buffer would be sufficient to separate development from high constraint lands. The buffer would have to form part of a 'no development area' and may, in itself, be subject to enhancement works to improve the effectiveness of a buffer as a means of controlling indirect impacts.

5.1.4 Offsetting

Development within the subject site is likely to trigger a significant impact on State listed threatened biodiversity and MNES unless the impact footprint is largely restricted to areas of medium biodiversity constraint. The triggering of a significant impact on listed threatened biodiversity would likely result in a requirement for offsetting. Ideally, offsetting would be performed locally (i.e. areas of high constraint within the subject site), although other offsite options may be explored.

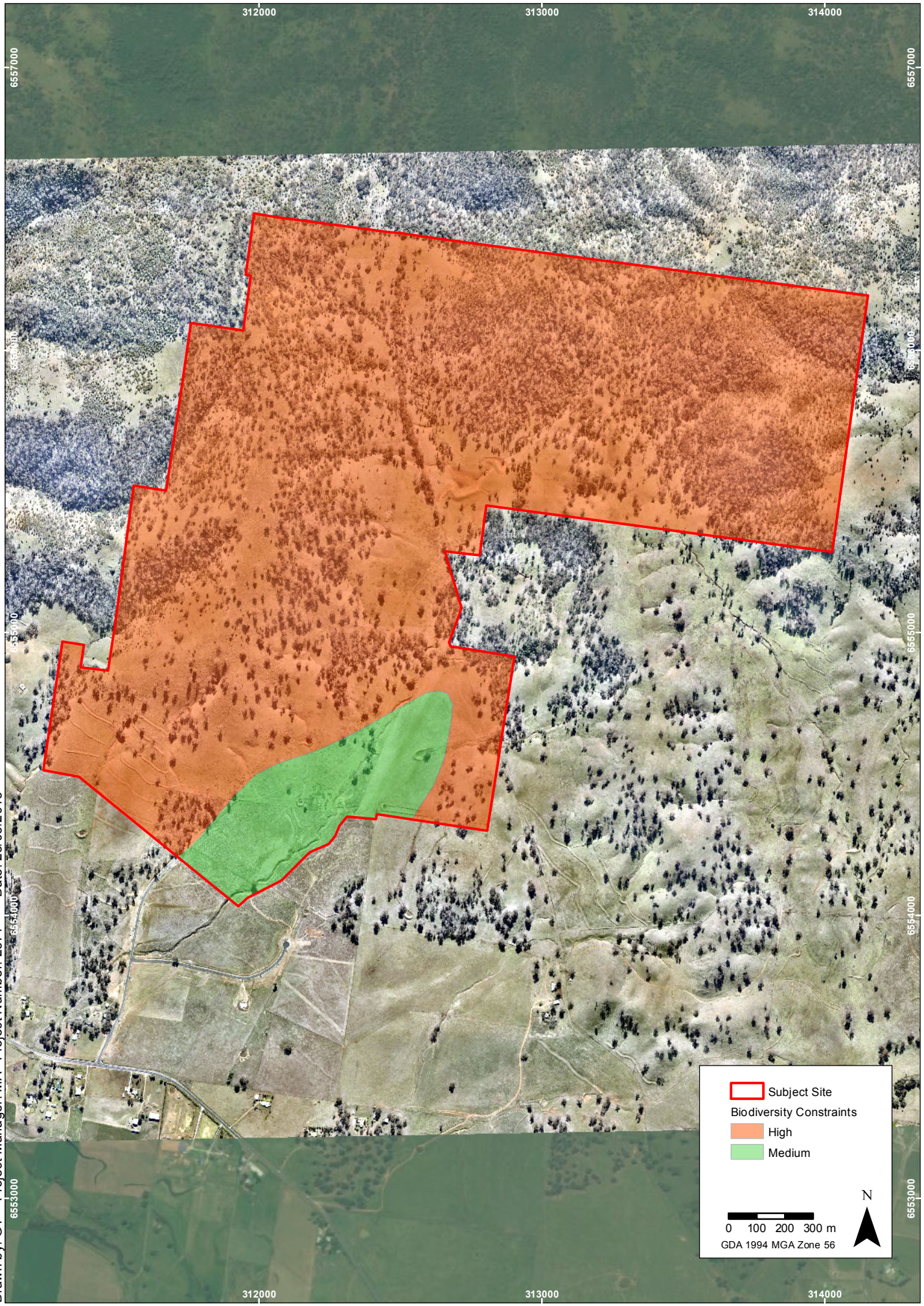
With respect to a seamless interaction between the development assessment process and offset acquisition it is considered that the NSW BioBanking Assessment Methodology represents the most appropriate assessment framework suited to the subject site. This method provides a clear transparent framework for determining the offset requirement and establishing a commensurate offset site. This State based regulatory assessment pathway is recognised by the DotE and, in the main, is compatible with the assessment criteria specified under the Commonwealth Environmental Offsets Policy (2011). When considering the Commonwealth offsetting policy, it should be noted that a local offsetting solution is generally preferred and may play a role in how an offset would be procured under BioBanking Methodology.

5.2 Further investigations

Subdivision potential is limited to the southern parts of the subject site, although the moderate biodiversity constraint identified in this area would require assessment in accordance with relevant State and Commonwealth environmental legislation. This said, land use opportunities also exist in the high constraint areas, notably the potential for establishing environmental offsets. With these considerations in mind, the following recommendations are provided:

- Design a low impact subdivision pattern sensitive to the biodiversity constraints identified within the subject site.
- Conduct a feasibility analysis for a BioBanking within the residual part of the subject site (i.e. areas of high biodiversity constrain).

- Conduct a pre-Referral meeting with the Commonwealth Department of the Environment (DotE) to discuss the biodiversity values of the subject site, the low impact subdivision design and project specific thresholds for a significant impact. This would involve the submission of this report and concept subdivision design to allow the DotE to have an informed position for the meeting.
- Re-evaluate the development options and design following a review of the BioBanking feasibility analysis and consultation with the DotE.
- Prepare documentation suitable for the assessment of development options proposed for the subject site.



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Biodiversity Constraints

Oaklands Biodiversity Constraints Analysis

FIGURE 10

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Annex 1, Likelihood of Occurrence

Scientific name	Common name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Ecosystem credit species (Y/N)
Plants						
Dichanthium setosum		V	V	Occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, as well as in Queensland and Western Australia. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	Medium	N
Euphrasia ruptura		Extinct	Extinct	Was known only from a single collection in Tamworth, NSW in 1904. The species is now presumed to be extinct. Nothing is known of the species' ecology, although it may have shared the cliff face or cliff edge habitat of its closest relatives *E. bowdeniae* and *E. bella*.	None	N
Amphibians						
Litoria booroolongensis	Booroolong Frog	E	E	The Booroolong Frog is found along permanent western flowing streams of the Great Dividing Range through most of NSW and down into northern Victorua. Streams range from small slow-flowing creeks to large rivers and the adults are found on or near cobble banks and other rock structures within stream margins and shelter under rocks or amongst vegetation near the ground on the stream edge. The species occurs along streams in both forested areas and open pasture, but has been affected by the presence of the introduced willow tree. Booroolong Frogs have been recorded basking in the sun on exposed rocks near or within flowing water.	None	N
Birds						
Anthochaera phrygia	Regent Honeyeater	CE	E,M	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly	High	N

Scientific name	Common name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Ecosystem credit species (Y/N)
				confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.		
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Known	Y
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbarks, but also in paperbarks or mature Eucalypts with hollows.	High	Y
Glossopsitta pusilla	Little Lorikeet	V	-	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	Known	Y
Lathamus discolor	Swift Parrot	E	E	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	High	Y
Lophoictinia isura	Square-tailed Kite	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by *Eucalyptus longifolia*, *Corymbia maculata*, *E. elata* or *E. smithii*. Individuals appear to occupy large hunting ranges of more than 100km^2. They require large living trees for breeding, particularly near water with surrounding woodland -	High	N

Scientific name	Common name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Ecosystem credit species (Y/N)
				forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.		
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Occupy a wide range of eucalypt woodlands, Acacia shrublands and open forests.	High	Y
Neophema pulchella	Turquoise Parrot	V	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December. It lays four or five white, rounded eggs on a nest of decayed wood dust.	High	Y
Stagonopleura guttata	Diamond Firetail	V	-	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including box-gum woodlands and snow gum woodlands. Also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities.	High	Y
Mammals						
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	High	Y
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	High	Y
Petaurus norfolcensis	Squirrel Glider	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a	High	N

Scientific name	Common name	TSC Act	EPBC Act	Habitat	Likelihood of occurrence	Ecosystem credit species (Y/N)
				suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked.		
Phascolarctos cinereus	Koala	V	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall.	High	N
Reptiles						
Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	V	V	Occurs in dry sclerophyll open forest and woodland associated with outcrops of granite, basalt, sandstone and metamorphic rocks. The majority of sites are associated with granite outcrops. Surveys conducted in north-eastern NSW indicate that geckos may show a preference for easterly aspects and the base of rock scarps. The composition of vegetation appears to have little influence on the occurrence of geckos. Shelter sites include rocks, decaying logs, bark, and litter in rocky rubble. Shelter sites are usually laying on a litter substrate and shaded by nearby vegetation. Litter depth at shelters located during CRA surveys varied between one and 10 cm.	None	N

Key: CE = Critically Endangered; E, E1 = Endangered; EP = Endangered Population; V = Vulnerable; M = Migratory.

Note: Fauna that are exclusively dependant on marine environments, including near shore environments, were not included in the assessment due to lack of suitable habitat.

Habitat descriptions taken from the relevant profiles on the OEH Threatened Species website unless otherwise stated.

Annex 2, BioMetric Site attributes

Plot	PCT code	PCT	NPS	NOS	NMS	NGCG	NGCO	NGCS	EC	OR	HBT	FL
1	NA225	White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion	44	10.2	0	76	14	24	4	3	1	48
2	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	21	0	0	32	0	80	2	0	0	0
3	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	31	0	0	80	0	24	14	0	0	0
4	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	24	0	0	58	0	61	0	0	0	1
5	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	13	0	0	54	0	66	6	0	0	0
6	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	9	9.5	1.6	40	4	28	2	2	1	25
7	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	13	0	0	48	0	78	2	0	0	0
8	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	8	6	0	52	0	56	8	5	0	3
9	-	'Exotic grassland'	10	0	0	2	0	26	74	0	0	0
10	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	9	0	0	90	0	28	2	0	0	0
11	NA226	White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion	11	0	0	42	0	52	20	0	0	0

Annex 3, Flora species list

Species	Exotic	1	2	3	4	5	6	7	8	9	10	11
Pseuderanthemum variabile							2					
Rostellularia adscendens		2	1			1	1		2			
Cheilanthes sieberi		2	1		1	1	2		2			
Amaranthus mitchellii			1	1	1	1	1	1	1		1	1
Schinus areira	*						1					
Dichopogon fimbriatus									1			
Tricoryne elatior		2										
Calotis lappulacea		2	2	1	1	2	1	2	3		1	1
Cassinia quinquefaria		1										
Centaurea solstitialis	*		1						1	4		
Chondrilla juncea	*			1						2		
Chrysocephalum apiculatum							2					
Cirsium vulgare	*									2	1	
Conyza bonariensis	*								1		1	1
Cymbonotus lawsonianus					1			2	1		2	2
Glossocardia bidens		2										
Lactuca serriola	*								1			
Olearia elliptica		2										
Sonchus oleraceus	*								1			
Vittadinia cuneata			1			1					1	1
Vittadinia muelleri							2	2	1			
Vittadinia sulcata			1									
Xanthium spinosum	*		1	1	1	2	1			2	2	2
Heliotropium amplexicaule	*			1	1			1			1	1
Brassica rapa	*											1
Lepidium africanum	*		1	1	1	3	2	2	2	2		1
Lepidium bonariense	*								2			
Opuntia aurantiaca	*	1	1		1	1	2		1			1
Opuntia stricta	*		1		1		1				1	
Wahlenbergia communis						1						1
Wahlenbergia luteola		2	2	1	1		2	2	2	2	1	2
Paronychia brasiliana	*		1	1		1				2	1	
Chenopodium pumilio			4	2	4	3	3	2	1	2	2	3
Einadia hastata			1	1	1	1	2		3	1		
Einadia polygonoides			3	1	1	2	2	2	3	2		3
Hypericum gramineum		2										
Hypericum perforatum	*	1										

Species	Exotic	1	2	3	4	5	6	7	8	9	10	11
Commelina cyanea				1		1	3			1		1
Convolvulus erubescens					1			2				1
Dichondra repens		2	1	1		2	3	2	2		1	1
Citrullus colocynthis	*		1	1		1				2		2
Carex inversa		1		1	1	2	2		2	2		2
Cyperus gracilis			2	1	1		2		3	2	2	2
Cyperus lucidus				1								
Hibbertia obtusifolia		1										
Chamaesyce drummondii		2	3				1	2	2			2
Desmodium brachypodum		1			1		1					
Desmodium varians		2	1									
Glycine clandestina		2										
Glycine tabacina		2	2		2	1	2	2		2	1	1
Medicago sativa	*								1	2	1	
Swainsona behriana		2										
Swainsona oroboides		2										
Acacia paradoxa		1										
Centaurium tenuiflorum	*										1	
Erodium crinitum			1			1						
Geranium homeanum					1	1						
Geranium solanderi										2		
Juncus usitatus										1		
Marrubium vulgare	*								1			
Mentha satureioides			1		1	1		2	1		2	
Oncinocalyx betchei		2	1		1	1	3					
Stachys arvensis	*							2				
Lomandra glauca							2					
Amyema spp.									1			
Hibiscus trionum												1
Modiola caroliniana	*			1	1	2	1	1	1	1	1	1
Sida corrugata			1	1	2	2	2	2	2	1	2	2
Sida rhombifolia	*									2	1	1
Angophora floribunda		1										
Eucalyptus albens		3	1				3		3			
Boerhavia dominii			2	1	1				1		2	
Jasminum suavissimum									1			
Notelaea microcarpa		1					1					
Oxalis perennans		1		1	1	3	2		1	2	2	3
Phyllanthus virgatus		2					1					
Bursaria spinosa							1					

Species	Exotic	1	2	3	4	5	6	7	8	9	10	11
Plantago debilis			1		1				1		1	1
Aristida ramosa		2						2			1	4
Austrodanthonia pilosa			1				2	2	2		2	2
Austrostipa scabra			2			4	2	2	3	2		2
Austrostipa verticillata			1	1	4		3	3	3			3
Bothriochloa macra		2	2	4		2				1		
Chloris truncata			1		2							2
Chloris ventricosa			1				2	2		1	2	2
Cymbopogon refractus		2					1					
Cynodon dactylon				1						1		1
Dichanthium sericeum		2			3	2	2	3	3	2	4	3
Digitaria brownii								2				
Echinopogon ovatus							1					
Ehrharta erecta	*						1					
Eleusine indica	*											1
Eleusine tristachya	*			1							1	1
Enneapogon nigricans							2					
Enteropogon acicularis			1	1	3	2	2	2	2	2	3	2
Eragrostis cilianensis	*			1	1	2		2			2	1
Microlaena stipoides							2			1	1	3
Panicum effusum					1	2	1	2	2	2	2	2
Panicum queenslandicum				1								
Panicum simile					2	1		2				
Poa sieberiana		2										
Sarga leiocladum		1										
Setaria sphacelata	*									3		
Sporobolus creber					1		1		2	3	2	1
Themeda australis		2										
Fallopia convolvulus	*									1		
Fallopia convolvulus						1						
Rumex brownii		1	1	1	1	1	2	2	2	2		2
Portulaca oleracea			1	1	3	3	1	2	2	2	3	3
Rosa rubiginosa	*						1			1		
Asperula conferta					1		1	2	1	1		
Galium migrans		1										
Datura spp.	*				1	2						1
Solanum cinereum				1	1			1	1			1
Solanum nigrum	*								1			
Brachychiton populneus							2					
Pimelea curviflora var. sericea		2					1					

Species	Exotic	1	2	3	4	5	6	7	8	9	10	11
Urtica incisa					1	1	1		1			
Tribulus micrococcus		1										
Total native species richness		37	31	22	32	29	44	27	35	24	23	34
Total Native (non-grass understorey species)		8	12	7	12	13	12	10	15	7	9	13
Total Important (non-grass understorey species)		9	4	2	5	3	6	4	4	3	3	3
Total non-grass understorey species		17	16	9	17	16	18	14	19	10	12	16

Annex 4, Fauna species list

Scientific name	Common name	TSC Act	EPBC Act
Amphibians			
Litoria caerulea	Green Tree Frog		
Litoria rubella	Desert Tree Frog		
Litoria peronii	Perons Tree Frog		
Birds			
Aegotheles cristatus	Australian Owlet-nightjar		
Podargus strigoides	Tawny Frogmouth		
Todiramphus sanctus	Sacred Kingfisher		
Egretta novaehollandiae	White-faced Heron		
Climacteris picumnus	Brown Treecreeper	V	
Myiagra inquieta	Restless Flycatcher		
Ocyphaps lophotes	Crested Pigeon		
Gymnorhina tibicen	Australian Magpie		
Rhipidura leucophrys	Willie Wagtail		
Pachycephala rufiventris	Rufous Whistler		
Platycerus eximius	Eastern Rosella		
Cacatua roseicapilla	Galah		
Grallina cyanoleuca	Magpie Lark		
Eudynamys scolopacea	Common Koel		
Rhipidura albiscapa	Grey Fantail		
Colluricincla harmonica	Grey Shrike-thrush		
Falco cenchroides	Nankeen Kestrel		
Cacatua tenuirostris	Little Corella		
Philemon corniculatus	Noisy Friarbird		
Manorina melanocephala	Noisy Miner		
Malurus cyaneus	Superb Fairywren		
Corvus coronoides	Australian Raven		
Dicaeum hirundinaceum	Mistletoe Bird		
Strepera graculina	Pied Currawong		
Smicrornis brevirostris	Weebill		
Falco berigora	Brown Falcon		
Acanthiza pusilla	Brown Thornbill		
Scythrops novaehollandiae	Channel-billed Cuckoo		
Cracicus torquatus	Grey Butcherbird		
Cracticus nigrogularis	Pied Butcherbird		

Scientific name	Common name	TSC Act	EPBC Act
Chthonicola sagittata	Speckled Warbler	V	
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Pachycephala pectoralis	Golden Whistler		
Glossopsitta pusilla	Little Lorikeet	V	
Glossopsitta concinna	Musk Lorikeet		
Cuculus pallidus	Pallid Cuckoo		
Zosterops lateralis	Silvereye		
Plectorhyncha lanceolata	Striped Honeyeater		
Acanthiza nana	Yellow Thornbill		
Lichenostomus chrysops	Yellow-faced Honeyeater		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Chrysococcyx basalis	Horsefield's Cuckoo		
Phaps chalcoptera	Common Bronzewing		
Platycercus elegans	Crimson Rosella		
Taeniopygia bichenovii	Double-barred Finch		
Eopsaltria australis	Eastern Yellow Robin		
Microeca fascinans	Jacky Winter		
Anthochaerra caruncula	Red Wattlebird		
Dacelo novaeguineae	Kookaburra		
Pardalotus striatus	Striated Pardalote		
Acanthiza lineata	Striated Thornbill		
Cirus approximans	Swamp Harrier		
Aquila audax	Wedge-tail Eagle		
Lichenostomus pencillatus	White-plumed Honeyeater		
Mammals			
Macropus giganteus	Eastern Grey Kangaroo		
Macropus robustus	Wallaroo		
Lepus curpaeums	European Rabbit		
Sus scrofa	Feral Pig		
Tachyglossus aculeatus	Short-beaked Echidna		
Trichosurus vulpecula	Brush-tailed Possum		
Reptiles			
Geyhra variegata	Varied Dtella		
Crytpoblephrus virgatus	Wall Skink		
Anomolopus leuckartii	Two-clawed Worm-skink		
Underwoodisaurus millii	Wood Gecko		

Scientific name	Common name	TSC Act	EPBC Act
Oedura robusta	Robust Velvet Gecko		

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Appendix C Flora and Fauna Assessment

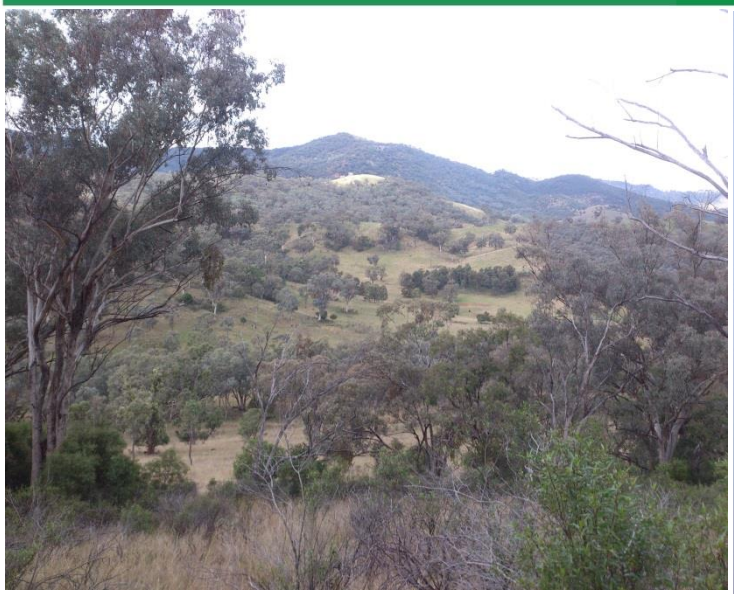
Eco Logical Australia, 2016

Oaklands Rural Subdivision

Flora and Fauna Assessment

Prepared for
Mitchel Hanlon Pty Ltd

May 2016



DOCUMENT TRACKING

Item	Detail
Project Name	Oaklands Subdivision – Flora and Fauna Assessment
Project Number	15ARM 2341
Project Manager	Robert Cawley Ph: +61 2 8081 2685 92 Taylor St, Armidale NSW 2350
Prepared by	Emily Mowat
Reviewed by	Bruce Mullins
Approved by	Paul Frazier
Status	Final
Version Number	1b
Last saved on	27 November 2017
Cover photo	Clockwise from top left: White Box shrubby open forest in proposed offset area; gate near entrance to proposed development; derived native grassland in subject site. Photos by ELA.

This report should be cited as 'Eco Logical Australia 2016. *Oaklands Subdivision – Flora and Fauna Assessment*. Prepared for Mitchel Hanlon Consulting.'

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Abbreviations

Abbreviation	Description
APZ	Asset Protection Zone
DA	Development Application
DoE	Commonwealth Department of the Environment
DNG	Derived Native Grassland
EEC	Endangered Ecological Community
CEEC	Critically Endangered Ecological Community
EES	Ecotone Environmental Services
ELA	Eco Logical Australia
EMP	Environmental Management Plan
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GPS	Global Positioning System
LGA	Local Government Area
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
SEPP 44	State Environmental Planning Policy 44 (Koala Habitat)
TSC Act	NSW *Threatened Species Conservation Act 1995*

Executive summary

Eco Logical Australia (ELA) was commissioned by Mitchel Hanlon Pty Ltd on behalf of Nunworth Pty Ltd to prepare a Flora and Fauna Assessment for Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) relevant to the proposed Oaklands subdivision near Tamworth, NSW. This report was completed to determine the extent of ecological values and any impacts to MNES, and supports the current Referral for the project. Ecological surveys at the subject site were conducted by Niche Environment and Heritage and supplemented by ELA.

Field investigations revealed that the study area:

- Supports one species listed as threatened under the EPBC Act – *Lathamus discolor* (Swift Parrot), listed as Critically Endangered.
- Provides potential habitat for seven other threatened fauna species and four migratory species listed under the EPBC Act.
- Is not known to contain any threatened flora species listed under the EPBC Act but provides potential habitat for several species.
- Contains two native plant community types (*White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion* and *White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion*).
- Contains 193.2 ha of White Box grassy woodland that corresponds to *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*, a Critically Endangered Ecological Community (CEEC) under the EPBC Act.

The design of the proposal has been modified to minimise impact to areas of intact vegetation in moderate to good condition, which are mainly located in the north of the subject site. These areas provide the highest quality fauna habitat and the greatest level of connectivity to vegetation in the surrounding landscape.

Areas that are currently the most disturbed have been targeted in the design, including an area of exotic pasture and adjoining patch of low condition DNG in the south of the site. 0.03% of moderate to good condition White Box - White Cypress Pine shrubby open forest and 16.5% of moderate to good condition White Box grassy woodland in the study area would be impacted.

A likelihood of occurrence table has been prepared that provides an indication of the threatened flora and fauna and Endangered Ecological Communities (EECs) that may be present in the study area. From this, and in conjunction with the information gathered during the field investigations, the significant impact criteria were applied to threatened flora and fauna species, migratory species and EECs.

The significant impact criteria determined that the proposal is likely to have a significant impact on the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* ecological community in the study area, and thus a referral is required.

The proposal would not have a significant impact on any of the threatened species or migratory species that were addressed in this assessment, provided the avoidance and mitigation measures are used during the planning, construction and operational phases.

Recommendations have been provided to manage environmental impacts should the proposal be approved.

1 Introduction

Eco Logical Australia (ELA) was commissioned by Mitchel Hanlon Pty Ltd on behalf of the developer, Nunworth Pty Ltd, to prepare a Flora and Fauna Assessment for Matters of National Environmental Significance (MNES) relevant to the proposed Oaklands subdivision near Tamworth, NSW. This report was completed to determine the extent of ecological values and any impacts to MNES, and supports the current Referral prepared for the project.

1.1 Proposed action

The proposal (herein referred to as Oaklands subdivision) seeks to subdivide the Oaklands site into 17 rural residential lots (**Figure 1**), complete site establishment works including roads and stormwater drainage, develop the land and protect key areas of ecologically sensitive vegetation as an offset area as part of the action.

The study area comprises 383.5 ha, of which 39 ha will be impacted.

1.2 Subject site and study area

The Oaklands subdivision is located in the Tamworth Regional local government area (LGA), approximately 10 kilometres (km) south southeast of the Tamworth town centre. The site is located approximately 3 km to the east of the township of Nemingha (**Figure 2**). Access to the site is currently the new Oaklands Drive which connects to Nundle Road. The current subdivision development (Stage 3) is located on Lot 18 DP1199163.

The entire site (hereafter referred to as the study area, (**Figure 1**) has been predominantly used for agricultural purposes and thus contains historically cleared paddocks with improved pastures. Pockets of residual vegetation are located scattered throughout the site. The land has previously been stocked with sheep, and is currently used for cattle grazing and other agricultural activities. The surrounding locality includes highly modified, irrigated agricultural land parcels to the south and west, cattle grazing to the east, and rural land into sparse woodland to the north.

The land is generally undulating along a southerly slope in the south of the site, with a steeply-flanked ridge line extending from the north along the western boundary. The north-east of the site is more steeply undulating. Several drainage lines (dry creeks) traverse the site draining towards the south into the Peel River.

The area to be directly developed is hereafter referred to as the subject site (approx. 39 ha, **Figure 1**). The subject site is located in the south of the study area, adjoining the northern boundary of the previously approved stages of the Oaklands subdivision.

There is a crown road reserve running approximately north-south through the study area. This is a paper road only and has no implications for impact assessment. Nunworth Pty Ltd does not intend to close the road by purchasing the land within, but instead holds an enclosure permit covering the road reserve which allows it to be enclosed by fencing and used for grazing or access purposes. The crown road reserve has been excluded from the study area for purposes of this assessment.

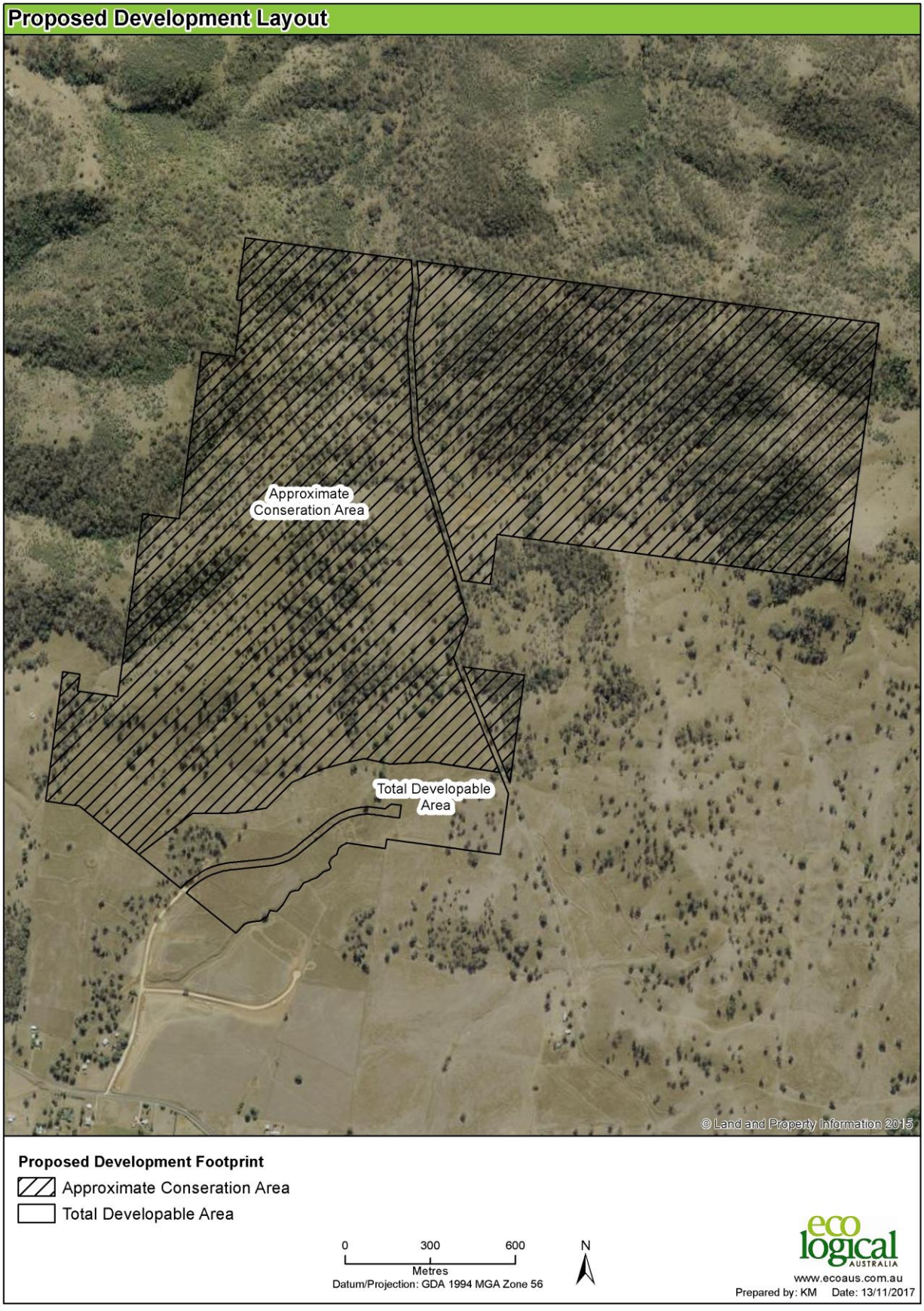

Figure 1: Proposed Oaklands Subdivision layout

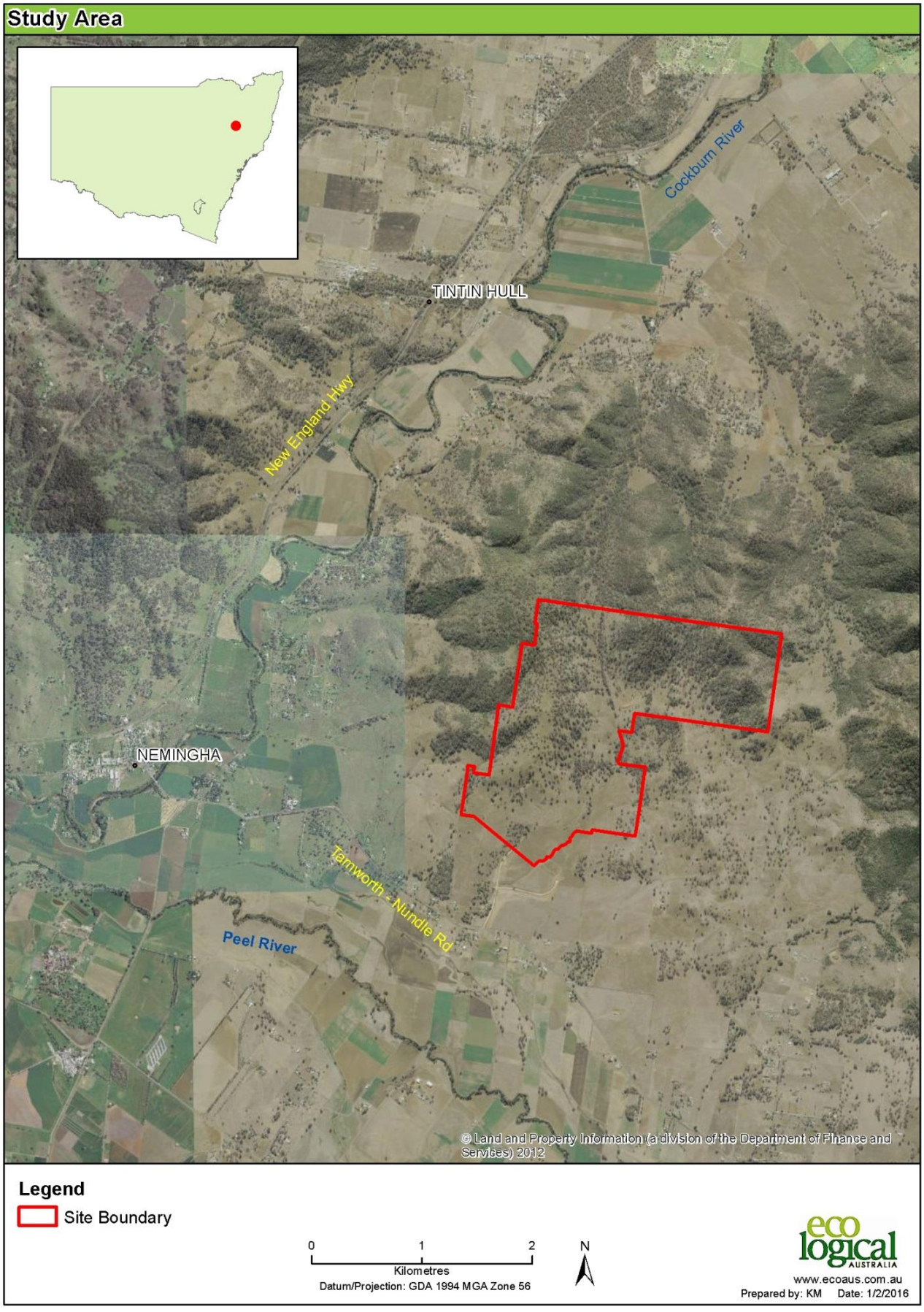

Figure 2: Location of study area

1.3 Context of this report

A Flora and Fauna Assessment prepared in 2006 by Ecotone Environmental Services (EES) assessed a proposed subdivision, the layout of which covered part of the current subject site. The assessment covered the entire study area (then comprising an area of 473.7 ha). The development application (DA 0288/2007) was approved on 27th February 2007. A subsequent DA (DA 0397/2008) was then lodged comprising a different lot structure. The proposal included 22 lots, including 21 rural-residential lots (known as Stage 1) and one 'super lot' intended for future development. This DA was approved on 27 May 2008, thus resulting in the relinquishment of DA 0288/2007.

DA 0193/2010 was lodged on 19 October 2009 to subdivide the remainder of the Oaklands site (the 'super lot' designated in Stage 1) into 17 rural residential lots, a development referred to as Stage 2. A deferred commencement approval was granted on 17 November 2010. Applicable deferred commencement matters were:

- "The consent shall not operate until evidence has been submitted to Council's Director, Environment, Planning and Economic Development to confirm the landowner has entered into a conservation agreement with the Minister for the Environment to protect the undisturbed White Box Yellow Box Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands located on proposed Lots 28, 29 and 30."

All of the abovementioned lots are located within the proposed offset area of the current proposal.

Tamworth Regional Council also stated that prior to the issue of a Construction Certificate:

- "A conservation management plan shall be prepared by a suitably qualified person to address issues including, but not limited to, the recommendations of the addendum to the Flora and Fauna Impact Assessment Report prepared by EA systems (dated 7 October 2009), existing vegetation, biodiversity and water management, drainage, grazing and noxious weed control."

And:

- "A plan shall be prepared and submitted to council for approval, nominating the location and area of a building envelope on each of the allotments in the subdivision. The building envelopes shall be appropriately located having regard to the White Box/Yellow Box/Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands, bushfire risk, topography and natural water courses."

There has not been any referral to the Commonwealth Department of the Environment (DoE) to assess impacts on Matters of National Environmental Significance (MNES) as identified by Ecotone Environmental Services (2006) in any of the above DAs. This report addresses potential impacts to MNES as a result of the proposed development, and supports the current Referral prepared for the project.

2 Literature review and database search

2.1 Database searches

2.1.1 BioNet Atlas of NSW Wildlife

A search for Commonwealth listed threatened species using the BioNet Atlas of NSW Wildlife (OEH 2016a) was conducted for a 10 km x 10 km (100 km^2) area, centred on the subject site. The database search returned three records of threatened species within the search area, all of which were fauna species (**Appendix D**).

2.1.2 EPBC Protected Matters Search Tool

Previous records of Commonwealth listed threatened and migratory species in a 10 km radius of the proposed Oaklands Subdivision were sourced and collated using the EPBC Protected Matters Search Tool (DoE 2016b). The data base search returned 24 listed threatened species and nine listed migratory species. Four EPBC Act listed ecological communities were also recorded (**Appendix D**).

2.2 Previous ecological reports

EES prepared the initial Flora and Fauna Assessment for a subdivision of the Oaklands site in 2006. An addendum to this report was prepared by EA Systems Pty Ltd to address changes to legislation. The original subdivision layout encompassed 22 lots covering the entire study area (21 rural residential lots at the southern end of the site and one 'super lot' covering the remainder of the site); thus the ecological assessment covered the entire study area. The proposed development included the removal of 15 trees for the construction of a dam, but no other tree removal, with building envelopes to be designated outside of woodland areas. Two water storage reservoirs were proposed to be situated within open areas on the ridge on the north-west periphery of the site, with access roads built through existing open areas. Other access roads to the lots were to follow existing tracks and incorporate previously cleared areas.

The survey conducted by EES comprised a two day site inspection, which involved a systematic traverse of the entire study area. The survey methods included:

- Searches for threatened flora potentially present on site (however, ELA notes the survey was undertaken during July, outside the flowering time of these threatened species)
- One morning bird survey
- One session of vehicle-based spotlighting
- Searches for Koala scratches on trees and scats beneath individuals of known feed trees
- Assessment of habitat suitability for threatened flora and fauna with potential to occur on site
- Description of the vegetation present on site
- Identification of weeds present on site
- Compilation of a list of the dominant flora species present

2.2.1 Flora

47 flora species (including 18 exotic species) were identified by EES within the survey area. No threatened flora species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) or EPBC Act were located during the site inspection or considered likely to occur onsite.

Vegetation onsite was determined to qualify as *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* which is listed as a critically endangered ecological community under the EPBC Act.

2.2.2 Fauna

38 bird species (including one exotic species) and eight mammal species (including three exotic species) were recorded by EES within the study area. No reptile or amphibian species were detected but this is unsurprising considering the survey timing (during winter).

There were four TSC-listed threatened bird species (*Climacteris picumnus* – Brown Treecreeper, *Glossopsitta pusilla* – Little Lorikeet, *Melanodryas cucullata* – Hooded Robin, and *Melithreptus gularis* – Black-chinned Honeyeater) detected on the site and a further 10 TSC-listed threatened fauna species identified as likely or possible inhabitants of the site.

No EPBC-listed fauna were detected during the field survey; however, four threatened species were considered to have the potential to occur on site (*Anthochaera phrygia* – Regent Honeyeater, *Lathamus discolor* – Swift Parrot, *Chalinolobus dwyeri* – Large-eared Pied Bat, and *Nyctophilus corbeni* – Corben's Long-eared Bat). In addition, four EPBC-listed migratory species were considered to have the potential to occur on site (*Merops ornatus* – Rainbow Bee-eater, *Hirundapus caudacutus* – White-throated Needletail, *Ardea ibis* – Cattle Egret and *Apus pacificus* – Fork-tailed Swift).

EES concluded that based on the definitions under SEPP 44, the areas supporting White Box Woodland and Yellow Box/River Red Gum on the site are "potential Koala habitat". However, there were no signs indicating the presence of Koala.

3 Flora and fauna survey methodology

3.1 Fauna surveys

Fauna surveys at the subject site were conducted by Niche Environment and Heritage (2015) and supplemented by ELA. Total survey effort is outlined in **Table 1** and more detail is provided below.

Table 1: Fauna survey methods, timing and effort

Target fauna groups	Method	Sample Period	Total Effort
Diurnal birds	20 min diurnal bird surveys at 5 sites	13 – 15 January 2015	1.67 person hours
Nocturnal mammals, amphibians, birds and reptiles	Spotlighting at 2 locations	13 – 14 January 2015	6 person hours
Reptiles	Habitat searches at 2 locations	13 – 15 January 2015	2 person hours
Swift Parrot, Regent Honeyeater	Winter bird surveys in areas of flowering eucalypts	26 – 28 August 2015	6 person hours

3.1.1 Diurnal bird surveys

Five point-count and area search bird surveys were conducted across the subject site (Niche 2015). Each survey involved a 10 minute stationary count of all birds seen or heard within a 50 m radius of the observer. Following the initial 10 minute point-count, a wider 2 hectare (ha) area-search was undertaken for any cryptic bird species that may have been missed. Birds flying through the search area were only recorded if they were making some use of the site, for example, foraging above the vegetation.

3.1.2 Spotlighting

Six person hours of spotlighting was performed targeting areas of woodland and open woodland vegetation where habitat such as an intact groundcover habitat (i.e. rocks and fallen logs) and hollow-bearing trees were present (Niche 2015).

3.1.3 Reptile surveys

Diurnal reptile searches targeted two areas of woodland vegetation, and involved inspection of habitat features such as fallen logs and rocks (Niche 2015). Surveys were conducted early in the morning to locate inactive diurnal species and during the evening for nocturnal species (e.g. geckos), and comprised a total of two person hours.

3.1.4 Winter bird surveys

ELA conducted targeted surveys for the Swift Parrot and Regent Honeyeater where winter-flowering eucalypts were observed in the study area. Patches of potential habitat were targeted by two observers in the morning, with opportunistic surveys continuing throughout the day whilst traversing the study area during flora surveys.

3.1.5 Habitat assessment

Niche (2015) noted the location and suitability of habitat in the study area for a number of threatened fauna species considered to have the potential to occur in the study area.

3.1.6 Wildlife corridors

Niche used connectivity link criteria (linkage width and vegetation condition) to evaluate the connectivity value of each mapped vegetation unit within the study area, which allowed mapping of likely wildlife corridors (see Niche 2015).

3.2 Flora surveys

3.2.1 Vegetation mapping (Niche)

Preliminary vegetation mapping was facilitated by aerial photography interpretation (API) and examination of topography and soil mapping. Vegetation validation was then undertaken in the field using Rapid Data Points to ground-truth the vegetation communities present. Information collected included the dominant plant species in each structural layer, vegetation condition in accordance with BioBanking methodology (moderate-good, low and cleared), physical attributes of the site (vegetation structure, soil type, elevation, slope, aspect, geomorphic position) and any other attributes.

Stratification units were determined from the field validated vegetation type map. BioMetric and floristic plots within these stratification units were used to refine the vegetation mapping into Plant Community Types (PCTs) consistent with the NSW Vegetation Types Database, and assign BioMetric condition classes. 11 plots were initially sampled, in accordance with the areas of the stratification units (Niche 2015).

Full floristic surveys involved recording all plant species within a 20 m x 20 m quadrat (0.04 ha). The abundance of each species in the plot was estimated, using a modified Braun-Blanquet scale as follows:

1 = 1-5% cover - rare
2 = 1-5% cover - common
3 = 6-25% cover
4 = 26-50% cover
5 = 51-75% cover
6 = 76-100% cover

Within the broader 20 x 50 m (0.1 ha) BioMetric plot, biometric attributes were recorded using the Biobanking Assessment Methodology (OEH 2014). These were:

- Native plant species richness (NPS)
- Native overstorey cover (NOC)
- Native mid-storey cover (NMS)
- Native groundcover stratum grasses (NGSG)
- Native groundcover stratum shrubs (NGSS)
- Native groundcover other (NGSO)
- Exotic plant cover (EPC)
- Number of trees with hollows (NTH)
- Overstorey regeneration (OR)
- Total length of fallen logs (FL).

A ‘Site Value Score’ was calculated for each PCT/ condition class combination (i.e. vegetation zone) mapped within the subject site. This score was determined by entering the landscape details, mapped vegetation zone and BioMetric plot data into the NSW BioBanking Credit Calculator, resulting in a value between 0–100. A qualitative description for the range of possible site value scores is outlined below:

- Low (site value score of 0-34). Woody vegetation that is likely to have no overstorey or midstorey Weed cover is likely to be high. Native plant species richness is low. Requires substantial and sustained management for regeneration/ recovery. Scores below 20 are likely to represent vegetation and habitat that is no longer characteristic of a native plant community type.
- Moderate/ good-derived grassland (site value score of >34-45). Woody vegetation and habitat demonstrating impaired condition with clear evidence of past or present impacts/ threats. Woody overstorey or midstorey is absent. Native plant species richness is likely to be moderate to high with variable exotic plant cover. Requires routine, landscape wide management to assist regeneration/recovery (e.g. management of weeds and feral fauna).
- Moderate/ good-poor (site value score of >34-45). Vegetation and habitat demonstrating impaired condition with clear evidence of effects from past or present impacts/ threats. Requires routine, landscape wide management to assist regeneration/ recovery (e.g. management of weeds and feral fauna).
- Moderate/ good-medium (site value score of >45-69). Vegetation and habitat demonstrating resilient condition capable for recovering without assistance other than for the removal of threats. Generally requires targeted management to facilitate improved condition (e.g. targeted weed removal).
- Moderate/ good-high (site value score of >70-100). Vegetation and habitat close to benchmark condition. Limited ecological benefit would be gained through management

3.2.2 Vegetation mapping (ELA)

ELA further refined the vegetation community mapping produced by Niche, surveying an additional seven BioMetric vegetation plots and recording additional rapid assessment points across the study area to refine community boundaries (in particular the extent of exotic grassland and the extent and quality of the derived native grassland impacted by the proposal) and assess in greater detail the condition of the potential offset area.

In collecting floristic survey data in BioMetric plots, ELA followed the Biobanking Assessment Methodology (OEH 2014), whereby data was collected for both cover (estimated % cover for each recorded species) and abundance (estimated number of individuals or shoots of a species within the plot).

3.2.3 Targeted flora surveys

Niche (2015) conducted a targeted survey using random meanders, plots and transects within habitat areas deemed potentially suitable for threatened plant species. Targeted surveys were focused on *Dichanthium setosum* (Bluegrass) and *Thesium australe* (Austral Toadflax).

3.3 Survey limitations

Ecological surveys aiming to provide an inventory of fauna and flora species are always constrained by survey effort and variables that may influence the detectability, distribution and abundance of fauna and flora, such as survey season and longer term climatic fluctuations (periods of high rainfall and drought).

The current survey provides insight into the flora and fauna communities utilising the study area but does not claim to provide a full inventory of the species occurring on site throughout the year or over longer periods of time. The scope of services provided by Eco Logical Australia has been defined in consultation with Mitchel Hanlon Consulting, by time and budgetary constraints, and the availability of reports and other data on the subject area.

Where survey has not detected a threatened species, every effort has been made to try and predict the likelihood of occurrence of threatened species and the importance of the study area to species based on suitability and quality of habitat and other ecological characteristics.

4 Impact assessment methodology

The magnitude of the potential impacts of the proposal has been calculated and a description of these calculations is provided below. These impact calculations have been used in the impact assessments provided in **Appendix E**.

4.1 Direct impact calculations

Direct impacts are those impacts that directly affect habitat and individuals (DECC 2007). Direct impacts considered for this assessment are vegetation removal within the development footprint. It is considered that all impacts of the proposal will be contained within the development footprint, with no additional indirect impacts likely to occur outside of this area.

For the purposes of assessment, ELA has assumed total vegetation clearance, including clearing for asset protection zones (APZ), within the development footprint. Whilst it is unlikely that all vegetation within the subdivided lots will need to be removed, there may be impacts (e.g. mowing) to vegetation outside the building footprints, to be determined at the individual DA approval stage.

The maximum amount of vegetation to be removed was calculated using ArcGIS software. The disturbance footprint (all development lots and the proposed access road) was overlayed with the vegetation mapping and the area of each vegetation type within the disturbance footprint was calculated. This allowed calculation of the potential amount of habitat loss for each threatened species or ecological community.

4.2 SEPP 44

State Environmental Planning Policy 44 (Koala Habitat) (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for *Phascolarctos cinereus* (Koala) to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. An assessment under SEPP 44 is required for proposals that are over 1 ha in size and are located within a local government area listed in Schedule 1 of SEPP 44. The current proposal is located within Tamworth Regional LGA, which is not listed under Schedule 1. Thus SEPP 44 does not apply to the development.

However, as the Koala is listed as a threatened species under the EPBC Act and is considered to have the potential to utilise the subject site, impacts to Koala and their habitat have been assessed in this report (**Appendix E**).

5 Results

5.1 Fauna

5.1.1 Fauna species

72 species of vertebrate fauna were detected by Niche and ELA within the subject site (listed in **Appendix A**). This included 57 bird species, three amphibians, seven mammals and five reptiles. Exotic species observed were *Oryctolagus cuniculus* (European Rabbit), *Sus scrofa* (Feral Pig), *Sturnus vulgaris* (Common Starling) and *Capra hirta* (Feral Goat).

One fauna species listed as threatened under the EPBC Act was recorded in the study area – *Lathamus discolor* (Swift Parrot), listed as Critically Endangered. During winter bird surveys in 2015, ELA observed 10 individuals feeding in *Eucalyptus albens* (White Box) open forest at the top of a hill in the proposed offset area (**Figure 3**).

No other EPBC Act listed threatened fauna species have been detected within the site, although suitable habitat is present for *Phascolarctos cinereus* (Koala), *Pteropus poliocephalus* (Grey-headed Flying-fox), *Nyctophilus corbeni* (Greater Long-eared Bat), *Chalinolobus dwyeri* (Large-eared Pied Bat), *Dasyurus maculatus* (Spotted-tailed Quoll), *Anthochaera phrygia* (Regent Honeyeater) and *Grantiella picta* (Painted Honeyeater).

A number of EPBC Act listed migratory bird species are also considered to have the potential to utilise the site for foraging (*Apus pacificus* – Fork-tailed Swift, *Ardea ibis* – Cattle Egret, *Hirundapus caudacutus* – White-throated Needletail and *Merops ornatus* – Rainbow Bee-eater).

5.1.2 Habitat assessment

Niche (2015) noted that fauna habitat features such as fallen logs and hollow bearing trees were largely restricted to the areas of White Box Forest (mainly located outside of the development footprint). ELA observed that there were also a number of hollow-bearing trees and fallen logs located within the White Box grassy woodlands and areas of derived native grassland (DNG) within the subject site, though the locations or numbers of these were not recorded (other than those which fell within the BioMetric plots).

5.1.3 Wildlife corridors

The combined assessment of corridor width and condition conducted by Niche (2015) during the biodiversity constraints analysis indicates that the majority of biodiversity movement through the landscape would be through the northern half of the subject site. This is an important part of the site for maintaining wildlife connectivity.

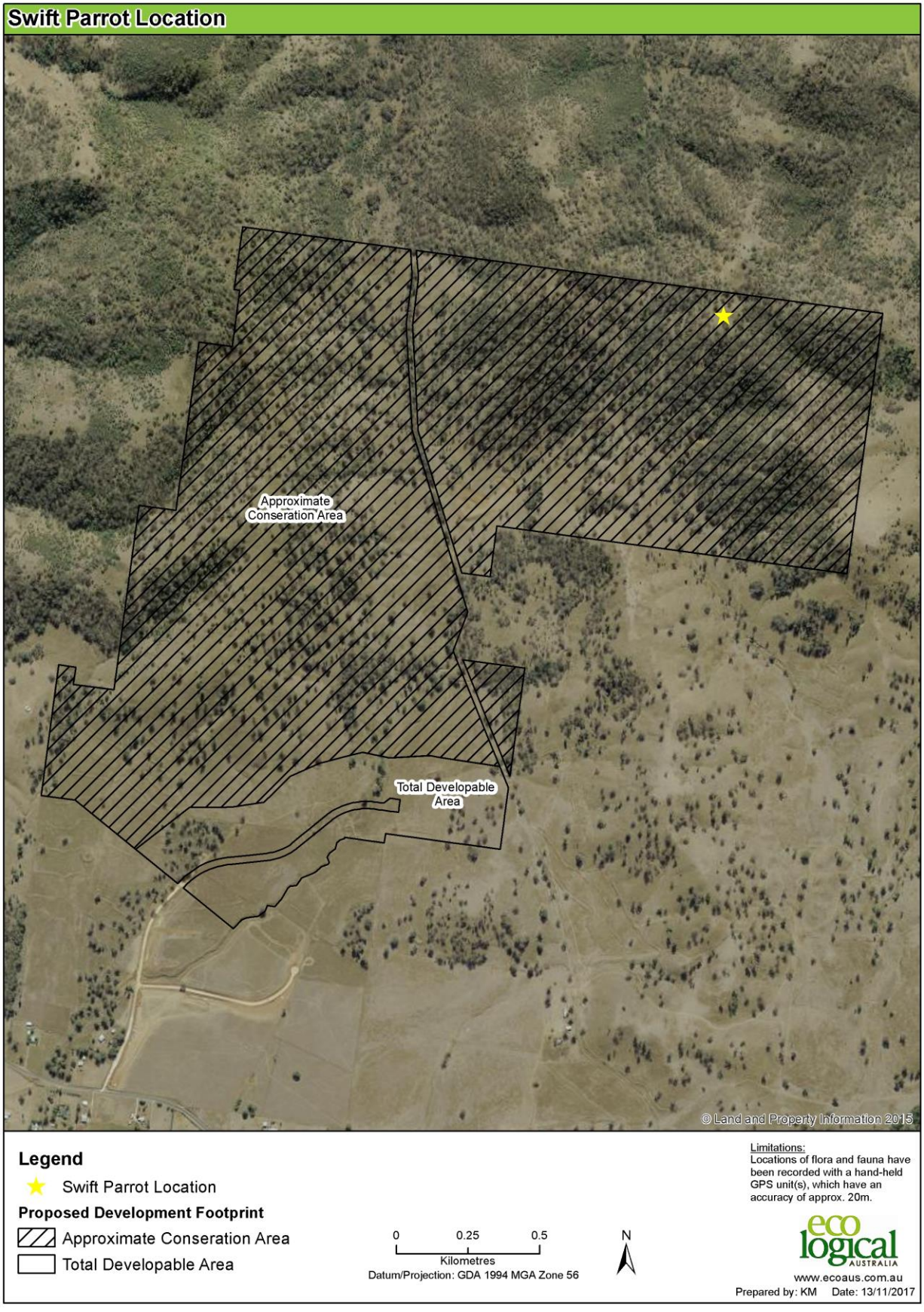

Figure 3: Location of *Lathamus discolor* (Swift Parrot) recorded during winter bird surveys

5.2 Flora

5.2.1 Flora species

A total of 176 flora species were observed, including 54 exotic species. Recorded flora species are listed in **Appendix B**. No threatened flora species were recorded during surveys; however, suitable habitat is present for a number of threatened species (*Dichanthium setosum, Picris evae, Thesium australe* and *Tylophora linearis*). Of these species, *D. setosum* and *T. australe* have been targeted in surveys (Niche 2015) and are thus considered unlikely to occur on site. *Picris evae* and *T. linearis* a have the potential to occur on site as surveys have not been conducted during the flowering period for these species.

5.2.2 Vegetation mapping

Two native PCTs were identified, these being:

- NA225 White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion.
- NA226 White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion.

All the NA225 recorded on site was classed as being Intact (moderate to good condition). Three forms of NA226 were classified: DNG in low condition, DNG in moderate to good condition and Intact (moderate to good condition). Biometric data is provided in **Appendix C**. The extent of each of the condition classes of the PCTs on site is shown in **Table 2** and **Figure 4**.

The remainder of the site was classed as Exotic Pasture, comprising areas of predominantly exotic groundcover that do not align with any naturally-occurring vegetation types of the locality. These areas have been subject to ongoing disturbance from intense agricultural use, such as intense grazing and soil compaction.

Table 2: Condition classes of each PCT recorded in study area

Vegetation	Condition	Impact area (ha)	Retained area (ha)	Total (ha)
White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion – Intact	Moderate to Good	0.1	178.6	**178.7**
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion – Intact	Moderate to Good	8.8	78.7	**87.5**
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion – DNG medium	Moderate to Good	23.1	82.6	**105.7**
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion – DNG low	Low	3.4	4.6	**8.0**
Exotic Pasture	Cleared	3.7	-	**3.7**
				383.5

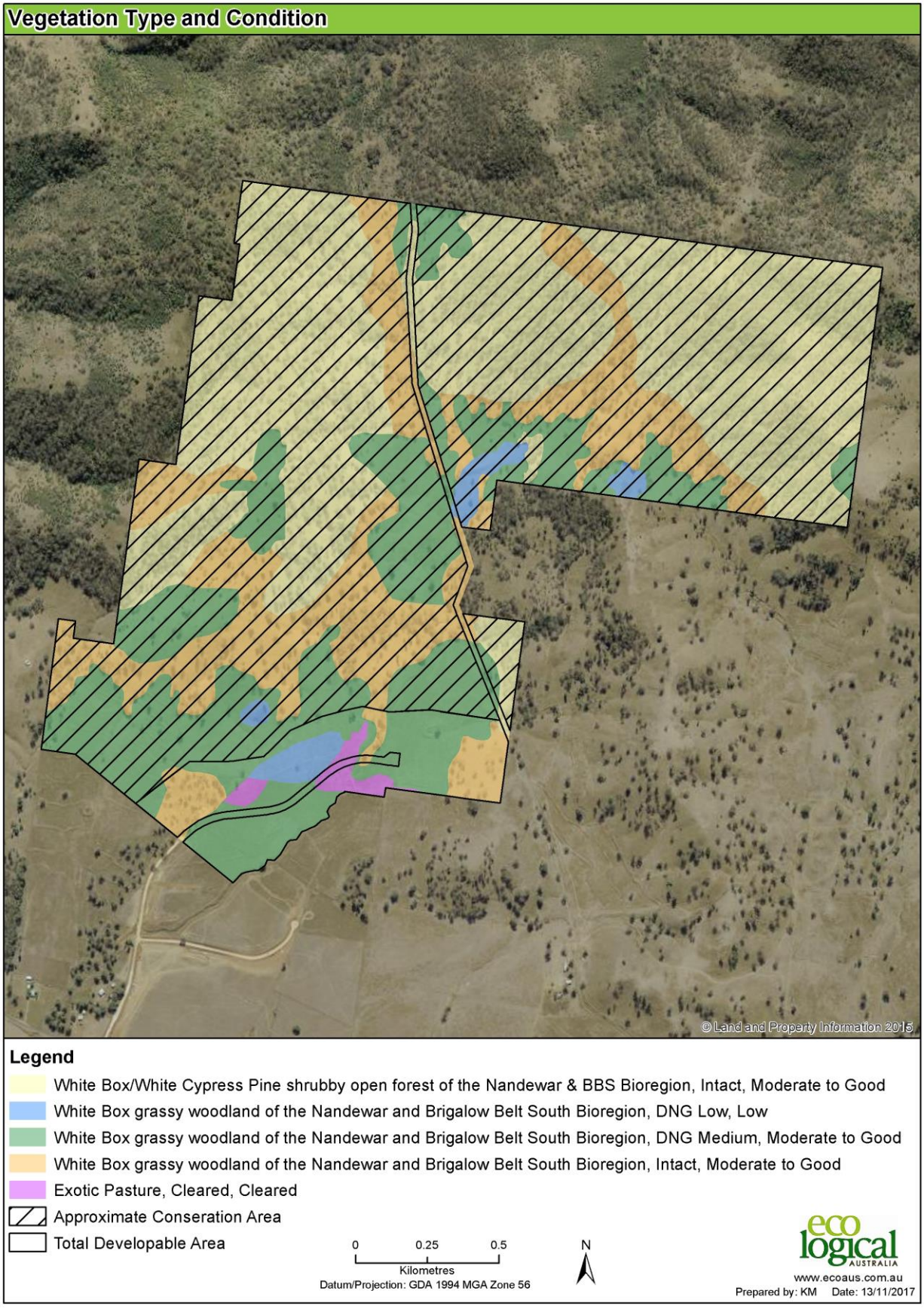

Figure 4: Vegetation types and condition classes within study area

A general description of the two native PCTs is provided below:

White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA225)

Forests almost solely dominated by White Box with a moderately shrubby understorey occur throughout the elevated parts in association with soils derived from sedimentary rocks and/ or shallow, heavily weathered basalts. A shrubbier understorey was generally found on the steeper slopes where *Callitris glaucophylla* (White Cypress Pine) was more common. The shrubby understorey was a composite of *Olearia elliptica* (Sticky Olearia), *Bursaria spinosa* (Blackthorn) and *Notelaea microcarpa* (Mock Olive). Sparse grassy tussocks characterise the groundcover stratum and comprised a highly variable array of species including *Poa sieberiana* (Snow Grass), *Cymbopogon refractus* (Barbed Wire Grass), *Themeda triandra* (Kangaroo Grass), *Aristida ramosa* (Wire Grass), *Chloris ventricosa* (Umbrella Grass) and *Rytidosperma* spp. (Wallaby Grass).

The shrubbier forests transition into grassy woodlands on the mid and lower gentler slopes where basalt derived soils emerge (i.e. increased soil depth and fertility). This transition coincides with a change in land arability and thus generally marks the extent of agricultural suitability, which may have, in part, enhanced the observed change in vegetation structure. Plot data and opportunistic observations indicate a very low weed cover within this area of vegetation cover.

White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion (NA226)

Vegetation structure including forest (transition), woodland, open woodland and derived grasslands almost solely dominated by White Box. The shrub understorey was largely absent although occasional occurrences of *Acacia* spp., *Olearia elliptica* (Sticky Olearia), *Bursaria spinosa* (Blackthorn) and *Notelaea microcarpa* (Mock Olive) were noted.

The groundcover stratum was grassy herbaceous and comprised a highly variable array of species including *Aristida ramosa* (Wire Grass), *Chloris ventricosa* (Umbrella Grass) and *Rytidosperma* spp. (Wallaby Grass). Grasses dominated, particularly in the open woodlands and derived grasslands where agricultural activity has substantially modified vegetation structure and floristic composition.

Transitions toward upslope shrubbier forests vary in species composition and structure due to the effect of past agricultural activity (including land clearing). Intact woodlands merge with more even aged stands in a forest like structure at the periphery of the more fertile arable lands.

Plot data and opportunistic observations indicate variable weed cover from low (i.e. 5%) to moderate (i.e. 20-30%). In addition, weedy natives were also observed in the more arable parts, this potentially indicative of overstocking. Overabundant native plant species regularly observed included *Trebulus microccus* (Caltrop) and *Chenopodium pumilio*, these being species known to respond to overgrazed landscapes.

5.2.3 Endangered Ecological Communities

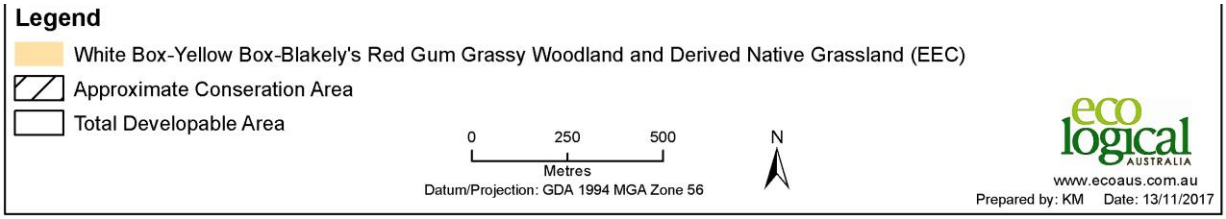

Figure 5).

The patches that met the criteria for the CEEC were determined by referring to the Box Gum Grassy Woodland listing advice (TSSC 2006) and Policy Statement (DEH 2006a), which describe what vegetation is included in the listed ecological community under the EPBC Act. The patches within the study area determined to be the CEEC met the following criteria:

- The site occurs within the natural range for Box – Gum Woodland (TSSC 2006).
- A characteristic canopy dominant is or was present (White Box).
- Understorey is predominantly native (more than 50% of the perennial ground layer comprises native species).
- Vegetation patches are greater than 0.1 and have 12 or more diagnostic native understorey species, or are two hectares or greater and have either a mature tree density of ≥20 per ha or natural regeneration of overstorey eucalypts.
- The shrub layer comprises less than 30% cover

Figure 5: Extent of White Box Grassy Woodland EEC in the study area

6 Impact assessment

6.1 Avoidance and minimisation

The design of the proposal has been modified to minimise impact to areas of intact vegetation in moderate to good condition, which are mainly located in the north of the subject site. These areas were mapped by Niche (2015) as having high biodiversity constraints, as they provide the highest quality fauna habitat and the greatest level of connectivity to vegetation in the surrounding landscape.

Areas that are currently the most disturbed have been targeted in the design, including the area of exotic pasture and adjoining patch of low condition DNG in the south of the site. 100% of the exotic pasture area and 42% of the low condition White Box grassy woodland will be directly impacted. The development footprint is located largely outside of the area mapped as having high biodiversity constraints, and avoids the areas identified as being most important for fauna movement on the site. 0.03% of the moderate to good condition White Box - White Cypress Pine shrubby open forest would be directly impacted by the proposal. Approximately 16.5% of moderate to good condition White Box grassy woodland in the study area would be directly impacted by the proposal.

ELA recommends the following additional avoidance measures for the proposal:

- Tree removal should be kept to the minimum number necessary for construction to occur.
- Where possible, hollow-bearing trees that provide significant habitat for threatened fauna should be avoided.
- Building envelopes should preferentially be sited in cleared areas to minimise tree removal.

6.2 Impact calculations

The direct impact boundary for this proposal is the footprint of the development (the subject site). It is considered that all impacts of the development will be contained within this footprint, with no additional indirect impacts outside of this area, provided that the recommended mitigation measures are implemented (see **Section 7**).

The calculations for vegetation directly impacted in the subject site are presented in **Table 3**. The percentage of the direct impact with relation to the amount of total vegetation present in the study area is also presented.

Table 3: Vegetation directly impacted compared with total amount present in study area

Plant community type	Study area (ha)	Impact area (ha)	% directly impacted
Exotic Pasture - Cleared	3.7	3.7	100%
White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion - Moderate to Good	178.6	0.06	0.03%
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion - Moderate to Good	193.2	31.9	16.5%
White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion - Low	8.0	3.4	42%
Total vegetation	**383.5**	**39.0**	**10.2%**

6.3 Significance of impact

A likelihood table has been constructed using information from the literature review and field investigations to categorise those species that were potential, likely or known to occur in the study area (**Appendix D**).

Significant Impact Criteria under the EPBC Act have been carried out for those species considered 'potential', 'likely' or 'known' to occur in the study area and that have potential for impact by the proposal (**Table 4, Table** 5 and **Table** 6) (refer to **Appendix E**).

Table 4: Threatened flora species assessed

Scientific Name	Common Name	Status		Occurrence in study area	Conclusion of assessment (EPBC Act)
		TSC Act	EPBC Act		
Picris evae	Hawkweed	V	V	Potential	No significant impact
Tylophora linearis		V	E	Potential	No significant impact

Table 5: Threatened fauna species assessed

Scientific Name	Common Name	Status		Occurrence in study area	Conclusion of assessment (EPBC Act)
		TSC Act	EPBC Act		
Birds					
Anthochaera phrygia	Regent Honeyeater	CE	CE	Potential	No significant impact
Apus pacificus	Fork-tailed Swift		M, Mar	Potential	No significant impact
Ardea ibis	Cattle Egret		M, Mar	Potential	No significant impact
Grantiella picta	Painted Honeyeater	V	V	Potential	No significant impact
Hirundapus caudacutus	White-throated Needletail		M, Mar	Potential	No significant impact
Lathamus discolor	Swift Parrot	E	E, Mar	Likely	No significant impact
Merops ornatus	Rainbow Bee-eater		M, Mar	Potential	No significant impact
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Potential	No significant impact
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Potential	No significant impact
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Potential	No significant impact

Scientific Name	Common Name	Status		Occurrence in study area	Conclusion of assessment (EPBC Act)
		TSC Act	EPBC Act		
Phascolarctos cinereus	Koala	V	V	Potential	No significant impact
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Potential	No significant impact

Table 6: Endangered ecological communities assessed

Community name	**Status**		**Occurrence in study area**	**Conclusion of assessment (EPBC Act)**
	TSC Act	**EPBC Act**		
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	E	CE	Known	Significant impact likely

7 Mitigation measures

The following section provides general mitigation measures recommended by ELA for the proposal which have been developed to protect the existing environmental and ecological values associated with the project site through the preconstruction, construction and operational phases of the project. These measures are recommended following the avoidance and minimisation measures discussed in **Section 6.1**. It is recommended that all measures and management procedures are detailed in an Environmental Management Plan (EMP) prior to any construction works commencing.

Adoption of these measures will protect existing values in the short-term and in the longer-term lead to an improvement in ecological conditions relative to those currently associated with the site. Furthermore, specific environmental protection and enhancement strategies shall be developed during the preparation of Environmental Management Plans for both construction and operation, following project approval.

Operational management plans will be developed to enhance the existing environmental values of this site and shall include requirements for active management activities including revegetation and weed control works and pest species management.

The successful application of the proposed mitigation measures requires all personnel working in the study area to be aware of the mitigation measures and the reasons why they are required. To ensure this education is obtained by all personnel, an ecological induction should be prepared and undertaken prior to commencement of work. The ecological induction should be up to date with biodiversity issues and site environmental procedures specific to the proposal. The induction should include stop work procedures and details on key contacts for an environmental emergency of environmental notification.

7.1 General mitigation measures

General mitigation measures have been provided for each identified risk and presented in **Table 7**.

Table 7: Mitigation measures by impact

Impact	No.	Mitigation measure	Timing
General ecology management			
Ecological induction	G1.	An ecological induction will be prepared to educate all personnel working in the study area. It will contain: • Description of all mitigation measures and reasoning why they are required • Areas of the study area that are to be avoided to minimise impact outside of the subject site • Pre-clearing and clearing requirements • Stop work procedures • Key contacts for environmental emergency and environmental notification	Pre-construction
Direct impacts			

Impact	No.	Mitigation measure	Timing
Vegetation removal and habitat removal	D1.	The final disturbance footprint (subject site) should minimise removal of key habitat features (especially hollow-bearing trees). The footprint boundary should be marked prior to any vegetation removal using measures such as fencing and high visibility flagging. No vehicle access, clearing or disturbance is to occur outside of the boundary.	Pre-construction
	D2.	Large hollows (with an entrance greater than 30 cm) would be preferentially avoided during the marking of the final disturbance footprint.	Pre-construction
	D3.	The removal of hollows should be compensated for by a 1:1 replacement (one nest box for every hollow removed). Special attention to nest box design is necessary to avoid attracting Common Starling occupation. The following nest boxes are recommended: • Bat boxes • Front-entry bird boxes with a cover over the front entrance to deter Common Starlings.	Pre-construction and construction
	D4.	Nest boxes should be monitored to ensure the target species are occupying the boxes and to check for maintenance and repairs. Monitoring must occur annually for four years from installation. Any repairs to nest boxes must be identified and undertaken to ensure the lifespan of the nest boxes is maintained.	Operation
	D5.	Vegetation clearing would be managed to minimise clearing during sensitive breeding periods for fauna. Clearing should be focused between March to June. As a secondary option, clearing could occur in February and in July/August. All clearing is to be avoided during September to January.	Construction
	D6.	All hollow-bearing trees are to be removed following the clearing supervision provisions provided below.	Construction
	D7.	Medium and large hollows removed in the subject site should be relocated to the retained vegetation in the study area to provide fallen log habitat.	Construction

Impact	No.	Mitigation measure	Timing
	D8.	Exclusion fencing will be placed around the subject site during construction to restrict access to vegetation that would be retained in the study area. The type of fencing may be a temporary structure but must be robust enough to withstand damage during construction and inhibit passage. The fencing must be fauna friendly (i.e. no barbed wire). Wire mesh fencing is not recommended due to the potential for Swift Parrot collision, unless covered with shade cloth or other material during February to October (when the species is present on the mainland).	Construction
Indirect site impacts			
Noise	I - s 1.	Noise mitigation design and engineering measures must be considered to decrease noise impacts during construction. Noise should be restricted at dawn and dusk. Noise should be directed away from the retained vegetation where possible.	Design and construction
Light	I - s 2.	Lighting would be focused on work sites during construction to minimise light spill into adjoining areas.	Construction
Weed invasion	I - s 3.	Prior to earthworks, declared noxious weeds that are present in the study area should be controlled according to their control category.	Construction
	I - s 4.	Weeds should be controlled in accordance with a Pest and Weed Management Plan developed for the proposal.	Construction and operation
	I - s 5.	Weed transportation would be minimised by ensuring all equipment (machinery, tools, and vehicles) are washed down and cleaned inside prior to entering the study area. Inspections are required for all equipment entering the study area to ensure they are free of soils, seeds etc. as practicable.	Construction
Predation by domestic dogs	I - s 6.	The presence of domestic dogs within the development could result in increased predation pressure on threatened fauna. It is recommended that all lots within the subdivision are securely fenced to prevent dogs from roaming.	Construction and operation

Impact	No.	Mitigation measure	Timing
Swift Parrot collision	I - s 7.	Collision with buildings is known to be a threat to Swift Parrots. As the species is known to utilise the study area, consideration should be given to building design so as to minimise the potential for collisions. This may include: • Avoiding designs with corner windows or sightlines through buildings from window to window • Use of low-reflectance glass in large glassed areas of houses • Installation of glass at an angle to reflect the ground and not habitat or sky	Construction and operation
Indirect downstream or downwind impacts			
Sedimentation, erosion and dust	I - d 1.	Appropriate sediment and erosion control measures should be installed and maintained. This should include the following: a. Specifics about activities that intersect with any of the drainage lines	Construction and operation
	I - d 2.	b. Any stockpiled subsoils should be covered to avoid compaction and water erosion.	Construction and operation
	I - d 3.	c. Stockpiles will be managed according to best management practices such as the measures outlined in Managing Urban Stormwater: Soils and Construction (Landcom 2004) ('the Blue Book').	Construction and operation
	I - d 4.	d. Erosion and sediment controls will be implemented where necessary during construction activities, in accordance with best management practices (such as the Blue Book or International Erosion Control Association (IECA) Guidelines). These controls will be maintained until disturbed areas of the study area are stabilised.	Construction and operation
Accidental spills and leaks	I - d 5.	All liquids (fuel, oil etc.) will be stored appropriately and disposed of at suitably licensed facilities.	Construction and operation
	I - d 6.	Spill management procedures will be implemented as required.	Construction and operation
	I - d 7.	A chemical management procedure will be developed to control and manage chemical use on site. This would ensure that no chemicals would enter aquatic environments through runoff or direct	Construction and operation

Impact	No.	Mitigation measure	Timing
		application.	
Indirect facilitated impacts			
Access to retained vegetation	I - h 1.	Any observations of access in the retained vegetation (motor bike riding, 4WDs etc.) or collecting of flora or fauna materials should be recorded and appropriate personnel should be notified.	Construction and operation

7.2 Pre-clearing and clearing procedure

A pre-clearing and clearing procedure has been developed to minimise potential impacts or risk to fauna during vegetation removal (**Appendix F**). The purpose of the procedure is to identify fauna and flora occurrence in the subject site, encourage fauna to relocate outside of the subject site prior to habitat clearing and move fauna during clearing.

7.2.1 Pre-clearing surveys

Pre-clearing surveys undertaken by appropriately qualified ecologists involve the following steps:

1. Mark the location of all hollow-bearing trees or other significant fauna habitat features (nests, hollow-bearing logs, stags) within a buffered area of the proposed subject site. Use obvious marking such as yellow and black striped flagging tape and spray paint an 'H' on the trunk.
2. Align trees marked with records already obtained from the hollow-bearing tree survey.
3. If any signs of owl occupation is identified (white wash, pellets etc.), further survey should be completed to identify if the hollow is a nest tree.

7.2.2 Clearing supervision

Clearing operations are supervised by an appropriately qualified ecologist following the steps below. The clearing procedure is detailed in **Appendix F** and contains the following key steps.

1. Planning and walk-through
2. Slash shrub and ground layer (under scrubbing)
3. Tap hollow-bearing trees
4. Remove hollow-bearing trees
5. Relocate suitable hollows

During clearing, the number of hollow-bearing trees removed will be recorded.

8 Conclusion

Field investigations of the Oaklands Subdivision site revealed that the study area:

- Contains two native plant community types and area of exotic grassland
- Contains one listed Critically Endangered Ecological Community (CEEC) – *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*
- Supports a diversity of fauna and flora species
- Supports one threatened species listed under the EPBC Act – *Lathamus discolor* (Swift Parrot)
- Contains suitable habitat (foraging / roosting / breeding) for a suite of other threatened fauna species under the EPBC Act
- Contains potential habitat for several listed threatened flora species under the EPBC Act
- Provides connectivity with surrounding areas of vegetation, with the northern half of the study area providing most of the corridors for biodiversity movement through the landscape.

The significant impact criteria conducted for this assessment determined that it is unlikely that the proposal would have a significant impact on Commonwealth listed threatened species or migratory species, provided the avoidance and mitigation measures are used during the planning, construction and operational phases. However, it was determined that the proposal has the potential to significantly impact the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* ecological community in the study area, and thus a referral is required.

Avoidance and minimisation measures are addressed in the design of the proposal. Development has been focused on the most disturbed part of the study area and thus avoids the areas of highest fauna and flora habitat value and the most important wildlife corridors. Additionally, the quality of the vegetation community has been categorised such that vegetation removal can be minimised in the high quality areas.

A tailored list of mitigation measures presented in this assessment address the potential impacts of the proposal. Application of these mitigation measures would ensure that the study area would continue to support foraging, roosting, nesting and/or breeding for threatened and protected fauna species. Additionally, the retained vegetation community would be maintained or improved through cessation of livestock grazing, weed control and access restriction.

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Appendix A Fauna species list

Scientific name	Common name	Introduced (*)	TSC Act Status	EPBC Act Status
Amphibians				
Litoria caerulea	Green Tree Frog			
Litoria peronii	Perons Tree Frog			
Litoria rubella	Desert Tree Frog			
Birds				
Acanthagenys rufogularis	Spiny-cheeked Honeyeater			
Acanthiza lineata	Striated Thornbill			
Acanthiza nana	Yellow Thornbill			
Acanthiza pusilla	Brown Thornbill			
Aegotheles cristatus	Australian Owlet-nightjar			
Anthochaera carunculata	Red Wattlebird			
Aquila audax	Wedge-tail Eagle			
Cacatua roseicapilla	Galah			
Cacatua tenuirostris	Little Corella			
Cacomantis flabelliformis	Fan-tailed Cuckoo			
Chrysococcyx basalis	Horsefield's Cuckoo			
Chthonicola sagittata	Speckled Warbler		V	
Circus approximans	Swamp Harrier			
Climacteris picumnus	Brown Treecreeper		V	
Colluricincla harmonica	Grey Shrike-thrush			
Coracina novaehollandiae	Black-faced Cuckoo-shrike			
Corvus coronoides	Australian Raven			
Cracticus torquatus	Grey Butcherbird			
Cracticus nigrogularis	Pied Butcherbird			

Scientific name	Common name	Introduced (*)	TSC Act Status	EPBC Act Status
Cuculus pallidus	Pallid Cuckoo			
Dacelo novaeguineae	Kookaburra			
Dicaeum hirundinaceum	Mistletoe Bird			
Egretta novaehollandiae	White-faced Heron			
Eopsaltria australis	Eastern Yellow Robin			
Eudynamys scolopaceus	Common Koel			
Falco berigora	Brown Falcon			
Falco cenchroides	Nankeen Kestrel			
Glossopsitta concinna	Musk Lorikeet			
Glossopsitta pusilla	Little Lorikeet		V	
Grallina cyanoleuca	Magpie Lark			
Gymnorhina tibicen	Australian Magpie			
Lathamus discolor	Swift Parrot		E	E, Mar
Lichenostomus chrysops	Yellow-faced Honeyeater			
Lichenostomus penicillatus	White-plumed Honeyeater			
Malurus cyaneus	Superb Fairywren			
Manorina melanocephala	Noisy Miner			
Microeca fascinans	Jacky Winter			
Myiagra inquieta	Restless Flycatcher			
Ocyphaps lophotes	Crested Pigeon			
Pachycephala pectoralis	Golden Whistler			
Pachycephala rufiventris	Rufous Whistler			
Pardalotus striatus	Striated Pardalote			
Phaps chalcoptera	Common Bronzewing			
Philemon corniculatus	Noisy Friarbird			
Platycercus elegans	Crimson Rosella			

Scientific name	Common name	Introduced (*)	TSC Act Status	EPBC Act Status
Platycercus eximius	Eastern Rosella			
Plectorhyncha lanceolata	Striped Honeyeater			
Podargus strigoides	Tawny Frogmouth			
Rhipidura albiscapa	Grey Fantail			
Rhipidura leucophrys	Willie Wagtail			
Scythrops novaehollandiae	Channel-billed Cuckoo			
Smicrornis brevirostris	Weebill			
Strepera graculina	Pied Currawong			
Sturnus vulgaris	Common Starling	*		
Taeniopygia bichenovii	Double-barred Finch			
Todiramphus sanctus	Sacred Kingfisher			
Zosterops lateralis	Silvereye			
Mammals				
Capra hircus	Feral Goat	*		
Lepus capensis	European Rabbit	*		
Macropus giganteus	Eastern Grey Kangaroo			
Macropus robustus	Wallaroo			
Sus scrofa	Feral Pig	*		
Tachyglossus aculeatus	Short-beaked Echidna			
Trichosurus vulpecula	Brush-tailed Possum			
Reptiles				
Anomalopus leuckartii	Two-clawed Worm-skink			
Cryptoblepharus virgatus	Wall Skink			
Gehyra variegata	Varied Dtella			
Oedura robusta	Robust Velvet Gecko			
Underwoodisaurus millii	Wood Gecko			

Appendix B Flora species list

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Acacia paradoxa	Kangaroo Thorn		1																								
Acaena novae-zelandiae	Bidgee-widgee														1		x	x		1		5					1
Acaena spp.																1							1				
Ajuga australis	Austral Bugle													1							1						
Amaranthus mitchellii	Boggabri Weed			1	1	1	1	1	1	1		1	1														
Amyema spp.										1										5							5
Anagallis arvensis	Scarlet/Blue Pimpernel	*														2				2			20				50
Angophora floribunda	Rough-barked Apple		1																	5							1
Apiaceae species (unidentified)																2							50				
Aristida ramosa	Purple Wiregrass		2						2			1	4														
Aristida spp.																		x	20							40	
Aristida vagans	Threeawn Speargrass																x										
Asperula asthenes	Trailing Woodruff																x		2							50	
Asperula conferta	Common Woodruff					1		1	2	1	1																
Asteraceae species (unidentified)																		x									
Austrostipa scabra	Speargrass			2			4	2	2	3	2		2														
Austrostipa verticillata	Slender Bamboo Grass			1	1	4		3	3	3			3														
Bidens subalternans	Greater Beggar's Ticks	*																	2							10	
Boerhavia dominii	Tarvine			2	1	1				1		2															
Bothriochloa macra	Red Grass		2	2	4		2				1									5							50
Bothriochloa spp.																	x										
Brachychiton populneus	Kurrajong							2																			
Brassica rapa		*											1														

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Brassica spp.		*													1	2	x					2	100				
Brunoniella australis	Blue Trumpet													1						2	5						2
Bulbine bulbosa	Bulbine Lily													2							10						
Bulbine spp.																	x										
Bursaria spinosa	Native Blackthorn							1												2							1
Calotis cuneata	Mountain Burr-Daisy																			2							5
Calotis lappulacea	Yellow Burr-daisy		2	2	1	1	2	1	2	3		1	1	1					2		5					5	
Carex inversa	Knob Sedge		1		1	1	2	2		2	2		2			2		x	5				50			50	
Carthamus lanatus	Saffron Thistle	*																	5							10	
Cassinia quinquefaria			1																								
Centaurea solstitialis	St Barnabys Thistle	*		1						1	4																
Centaurea spp.		*												2	2	5	x	x	2	2	20	10	50			30	30
Centaurium tenuiflorum		*										1															
Chamaesyce drummondii	Caustic Weed		2	3				1	2	2			2														
Cheilanthes sieberi			2	1		1	1	2		2										2							20
Chenopodium pumilio	Small Crumbweed			4	2	4	3	3	2	1	2	2	3														
Chloris truncata	Windmill Grass			1		2							2														
Chloris ventricosa	Tall Chloris			1				2	2		1	2	2							3							10
Chondrilla juncea	Skeleton Weed	*			1						2																
Chrysocephalum apiculatum	Common Everlasting							2						1						1	1						1
Cichorium intybus	Chicory	*												2							20						
Cirsium vulgare	Spear Thistle	*									2	1															
Citrullus colocynthis	Colocynth	*		1	1		1				2		2														
Commelina cyanea	Native Wandering Jew				1		1	3			1		1														
Convolvulus erubescens						1			2				1														
Conyza bonariensis	Flaxleaf Fleabane	*								1		1	1														

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Conyza spp.		*																		1							1
Cymbidium canaliculatum	Tiger Orchid													1							1						
Cymbonotus lawsonianus	Bear's Ear					1			2	1		2	2			2	x						40				
Cymbopogon refractus	Barbed Wire Grass		2					1								5							1				
Cynodon dactylon	Common Couch				1						1		1														
Cyperus gracilis	Slender Flat-sedge			2	1	1		2		3	2	2	2														
Cyperus lucidus					1																						
Danthonia spp.	Wallaby Grass																x	x									
Datura spp.						1	2						1														
Desmodium brachypodum	Large Tick-trefoil		1			1		1												2							5
Desmodium varians	Slender Tick-trefoil		2	1																							
Dianella spp.																				1							2
Dichanthium sericeum	Queensland Bluegrass		2			3	2	2	3	3	2	4	3														
Dichondra repens	Kidney Weed		2	1	1		2	3	2	2		1	1							2							100
Dichopogon fimbriatus	Nodding Chocolate Lily									1																	
Digitaria brownii	Cotton Panic Grass								2																		
Echinopogon ovatus	Forest Hedgehog Grass							1																			
Echium spp.		*														1	x	x					1				
Ehrharta erecta	Panic Veldtgrass	*						1																			
Einadia hastata	Berry Saltbush			1	1	1	1	2		3	1																
Einadia nutans	Climbing Saltbush													2			x	x	2	1	20					5	30
Einadia polygonoides				3	1	1	2	2	2	3	2		3														
Einadia trigonos	Fishweed														<5							20					
Eleusine indica	Crowsfoot Grass	*											1														
Eleusine tristachya	Goose Grass	*			1							1	1														
Enneapogon nigricans	Niggerheads							2																			

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Enteropogon acicularis				1	1	3	2	2	2	2	2	3	2														
Eragrostis benthamii																1	x	x					1				
Eragrostis brownii	Brown's Lovegrass																		2							10	
Eragrostis cilianensis	Stinkgrass	*			1	1	2		2			2	1														
Erodium crinitum	Blue Storksbill			1			1																				
Eucalyptus albens	White Box		3	1				3		3				25						20	4						3
Fallopia convolvulus	Black Bindweed	*					1				1																
Galium aparine	Goosegrass	*												3		2			5	5	50		50			5	50
Galium migrans			1																								
Galium propinquum	Maori Bedstraw																			2							5
Geranium homeanum						1	1																				
Geranium solanderi	Native Geranium										2			5	2	10	x	x	2	2	20	10	200			10	50
Geranium spp.															<5							5					
Glossogyne tannensis	Cobbler's Tack			2																							
Glycine clandestina			2											1		5	x			2	15		1				10
Glycine tabacina	Glycine		2	2		2	1	2	2		2	1	1														
Heliotropium amplexicaule	Blue Heliotrope	*			1	1			1			1	1														
Hibbertia obtusifolia	Hoary guinea flower		1																								
Hibiscus trionum	Bladder Ketmia												1														
Hordeum spp.		*													1				1				1				1	
Hypericum gramineum	Small St John's Wort		2																								
Hypericum perforatum	St. Johns Wort	*	1																								
Hypochaeris radicata	Catsear	*																x									
Jasminum suavissimum										1																	
Juncus usitatus											1																
Lactuca serriola	Prickly Lettuce	*								1																	

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Lepidium africanum		*		1	1	1	3	2	2	2	2		1		<5							50					
Lepidium bonariense		*								2																	
Lepidium spp.																2	x	x	5				30			50	
Lolium spp.																		x	1							1	
Lomandra glauca	Pale Mat-rush							2																			
Lomandra multiflora	Many-flowered Mat-rush													1							1						
Maireana spp.																2							1				
Marrubium vulgare	Horehound	*								1																	
Medicago polymorpha	Burr Medic	*																	5							50	
Medicago sativa	Lucerne	*								1	2	1		2					2		5					4	
Medicago spp.		*													<5		x	x	5			100				20	
Mentha satureioides	Native Pennyroyal			1		1	1		2	1		2				1	x	x	2				1			20	
Microlaena stipoides								2			1	1	3	2	2	2	x	x	5	2	15	10	25			50	20
Modiola caroliniana	Red-flowered Mallow	*			1	1	2	1	1	1	1	1	1														
Modiola spp.		*													<5				1			100				1	
Notelaea microcarpa	Native Olive		1					1						1						10	1						30
Olearia elliptica	Sticky Daisy Bush			2										1						15	2						15
Oncinocalyx betchei			2	1		1	1	3																			
Opuntia aurantiaca	Tiger Pear	*	1	1		1	1	2		1			1		2	2	x					3	8				
Opuntia stricta		*		1		1		1				1		2		2			2		2		1			1	
Oxalis perennans			1		1	1	3	2		1	2	2	3	1		2	x	x	2	1	10		10			10	10
Panicum effusum	Poison or Hairy Panic					1	2	1	2	2	2	2	2														
Panicum queenslandicum	Yadbila Grass				1																						
Panicum simile	Two-colour Panic					2	1		2																		
Paronychia brasiliana	Chilean Whitlow Wort	*		1	1		1				2	1					x										
Pennisetum clandestinum	Kikuyu Grass	*																x									

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Phyllanthus virgatus			2					1																			
Pimelea curviflora var. *sericea*					2			1																			
Plantago debilis				1		1				1		1	1														
Plantago spp.														1				x			5						
Poa sieberiana			2																								
Poaceae species (unidentified)		*																	5							10	
Portulaca oleracea	Pigweed			1	1	3	3	1	2	2	2	3	3														
Pseuderanthemum variabile	Pastel Flower							2																			
Rytidosperma pilosum	Smooth-flowered Wallaby Grass			1				2	2	2		2	2														
Rosa rubiginosa	Sweet Briar	*						1			1																
Rostellularia adscendens			2	1			1	1		2																	
Rumex brownii	Swamp Dock		1	1	1	1	1	2	2	2	2		2	1	2	2		x	1	2	5	10	20			4	10
Sarga leiocladum			1																								
Schinus areira	Pepper Tree	*						1																			
Schoenus brevifolius														2						5	30						100
Senecio madagascariensis	Fireweed	*													2				1			1				5	
Setaria sphacelata	South African Pigeon Grass	*									3																
Sida corrugata				1	1	2	2	2	2	2	1	2	2														
Sida rhombifolia	Paddy's Lucerne	*									2	1	1														
Sida spinosa														1							1						
Sigesbeckia orientalis																				3							20
Silybum spp.		*												1	5	5	x	x	10	2	5	40	30			30	5
Sisymbrium irio	London Rocket	*																	35							500	
Solanum cinereum	Narrawa Burr				1	1			1	1			1														
Solanum nigrum	Black-berry Nightshade	*								1				1						2	2						5
Sonchus oleraceus	Common Sowthistle	*								1				1						2	10						10

Scientific name	Common name	Exotic (*)	Biometric plots (Niche) – Braun-Blanquet cover abundance											Biometric plots (ELA) – cover (%)							Biometric plots (ELA) – abundance						
			1	2	3	4	5	6	7	8	9	10	11	1a1	1b1	1b2	1b3	1b4	1b5	2a1	1a1	1b1	1b2	1b3	1b4	1b5	2a1
Sporobolus creber	Slender Rat's Tail Grass					1		1		2	3	2	1														
Stachys arvensis	Stagger Weed	*							2																		
Stellaria media	Common Chickweed	*												2	2						30	5					
Stipa scabra															2	2	x	x		5		20	20				20
Stipa verticillata														50	15	40		x	5	15	300	100	200			10	100
Swainsona behriana			2																								
Swainsona oroboides			2																								
Tagetes spp.		*													1				2			2				20	
Themeda triandra	Kangaroo Grass		2																								
Tribulus micrococcus	Yellow Vine		1																								
Tricoryne elatior	Yellow Autumn-lily		2																								
Trifolium repens	White Clover	*												2	20	5					10	500	200				
Unidentified shrub																				5							1
Urtica incisa	Stinging Nettle					1	1	1		1				1	<5	2		x	5		5	2	5			1	
Verbena spp.														1							5						
Veronica plebeia	Trailing Speedwell													1							5						
Vittadinia cuneata	Fuzzweed			1			1					1	1				x										
Vittadinia muelleri								2	2	1							x										
Vittadinia sulcata				1																							
Wahlenbergia communis	Tufted Bluebell						1						1														
Wahlenbergia luteola			2	2	1	1		2	2	2	2	1	2														
Xanthium occidentale	Noogoora Burr	*													1	2		x	5			3	2			10	
Xanthium spinosum	Bathurst Burr	*		1	1	1	2	1			2	2	2														

Braun-Blanquet cover abundance:

1 = 1-5% cover – rare
2 = 1-5% cover – common
3 = 6-25% cover
4 = 26-50% cover
5 = 51-75% cover
6 = 76-100% cover

Appendix C BioMetric Plot Data

Biometric Plot no.	No. native plant species	Native overstorey cover (%)	Native midstorey cover (%)	Native groundcover - grass (%)	Native groundcover - shrubs (%)	Native groundcover - other (%)	Exotic plant cover (%)	Overstorey regeneration	No. hollow-bearing trees	Total length fallen logs >10 cm diameter (m)
Niche (2015)										
1	44	10.2	0	76	24	14	4	3	1	48
2	21	0	0	32	80	0	2	0	0	0
3	31	0	0	80	24	0	14	0	0	0
4	24	0	0	58	61	0	0	0	0	1
5	13	0	0	54	66	0	6	0	0	0
6	9	9.5	1.6	40	28	4	2	2	1	25
7	13	0	0	48	78	0	2	0	0	0
8	8	6	0	52	56	0	8	5	0	3
9	10	0	0	2	26	0	74	0	0	0
10	9	0	0	90	28	0	2	0	0	0
11	11	0	0	42	52	0	20	0	0	0

Biometric Plot no.	No. native plant species	Native overstorey cover (%)	Native midstorey cover (%)	Native groundcover - grass (%)	Native groundcover - shrubs (%)	Native groundcover - other (%)	Exotic plant cover (%)	Overstorey regeneration	No. hollow-bearing trees	Total length fallen logs >10 cm diameter (m)
ELA (2015)										
1a1	22	6.5	0	82	0	36	18	2	0	31.5
1b1	10	0	0	32	0	8	70	0	1	0
1b2	15	0	0	70	9	0	56	0	0	0
1b3	18	0	0	64	0	6	58	0	0	0
1b4	13	0	0	38	0	10	88	0	0	1
1b5	11	0	0	60	0	0	70	0	0	0
2a1	30	1	2.5	70	14	26	30	0	1	22

Appendix D Threatened species likelihood table

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. This assessment applies to the impact area (subject site) only, not to the entire study area. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposed development site, results of the field survey and professional judgement. The terms for likelihood of occurrence are defined below:

- "known" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species.

Species, populations and communities considered to have the potential, are likely or are known to occur are highlighted blue.

Key to the table:

- TSC Act = Listing under the NSW *Threatened Species Conservation Act 1995*
- EPBC Act = Listing under the *Environment Protection* and *Biodiversity Conservation Act 1999*
- CE = Critically Endangered
- E = Endangered (EPBC Act)
- E1 = Endangered (TSC Act)
- E2 = Endangered Population (TSC Act)
- E4 = Extinct (TSC Act)
- V = Vulnerable
- M = Migratory (EPBC Act)
- Mar = Marine (EPBC Act)

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Flora						
Dichanthium setosum	Bluegrass	V	V	In NSW, found on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes. Cleared woodland, grassy roadside remnants and highly disturbed pasture, on heavy basaltic black soils and red-brown loams with clay subsoil.	Unlikely – species not recorded during targeted surveys	No
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	New England Tablelands from Nundle to north of Tenterfield. Dry grassy woodland, on shallow soils of slopes and ridges.	No	No
Euphrasia arguta		E4A	CE	In NSW, recently recorded only from Nundle area of the north western slopes and tablelands, from near the Hastings River and from the Barrington Tops. Eucalypt forest with a mixed grass and shrub understorey, disturbed areas, along roadsides.	Unlikely – only recently rediscovered at several sites in NSW	
Picris evae	Hawkweed	V	V	In NSW, north from the Inverell area, in the north-western slopes and plains regions. Recorded from Elsmore (16 km east of Inverell), Oxley Park (Tamworth) and Dangar Falls in the Oxley Wild Rivers National Park. *Eucalyptus* forest and *Dichanthium* grassland, roadsides and paddocks.	Potential	Yes

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Prasophyllum petilum	Tarengo Leek Orchid	E1	E	Four sites in NSW: at Boorowa, Captains Flat, Ilford and Delegate. Also experimentally introduced at Bowning Cemetery NSW. Natural Temperate Grassland, grassy woodland, and Box-Gum woodland.	No	No
Prasophyllum sp. Wybong		E	CE	Endemic to NSW. Known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Open eucalypt woodland and grassland.	Unlikely – species not known from region	No
Thesium australe	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast.	Unlikely – species not recorded during targeted surveys	No
Tylophora linearis		V	E	In NSW, found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes. Records include Crow Mountain near Barraba, Goonoo, Pilliga West, Cumbil, and Eura State Forests, Coolbaggie Nature Reserve, Goobang National Park, and Beni Conservation Area. Dry scrub, open forest, dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii.*	Potential	Yes

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Amphibians						
Litoria booroolongensis	Booroolong Frog	E1	E	Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Several populations have recently been recorded in the Namoi catchment. Permanent streams with some fringing vegetation cover such as ferns, sedges or grasses.	No. No habitat present.	No
Reptiles						
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	In NSW, only known from the Central and Southern Tablelands, and the South Western Slopes. Sloping, open woodland areas with predominantly native grassy groundlayers, rocky outcrops or scattered, partially-buried rocks.	Unlikely – species not known from the region.	No
Elseya belli	Bell's Turtle	V	V	In NSW, currently found only in the upper reaches of the Namoi and Gwydir River systems, on the escarpment of the North West Slopes. Shallow to deep pools in upper reaches or small tributaries of major rivers in granite country.	No. No habitat present.	No
Underwoodisaurus sphyrurus	Border Thick-tailed Gecko	V	V	Found only on the tablelands and slopes of northern NSW and southern Qld, reaching south to Tamworth and west to Moree. Forest and woodland areas with boulders and rock slabs, often on steep rocky or scree slopes.	Unlikely – preferred habitat not present on site.	No

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Birds						
Anthochaera phrygia	Regent Honeyeater	E4A	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).	Potential	Yes
Apus pacificus	Fork-tailed Swift		M, Mar	Recorded in all regions of NSW. Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Potential	Yes
Ardea alba	Great Egret		M, Mar	Widespread, occurring across all states/territories. Also a vagrant on Lord Howe and Norfolk Island. Swamps and marshes, grasslands, margins of rivers and lakes, salt pans, estuarine mudflats and other wetland habitats.	Unlikely. Preferred habitat is not present.	No
Ardea ibis	Cattle Egret		M, Mar	Widespread and common across NSW. Grasslands, wooded lands and terrestrial wetlands.	Potential	Yes
Botaurus poiciloptilus	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. (bullrushes) and *Eleocharis* spp. (spikerushes).	No. No habitat present.	No

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Gallinago hardwickii	Latham's Snipe		M, Mar	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	No. No habitat present.	No
Grantiella picta	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	Potential	Yes
Haliaeetus leucogaster	White-bellied Sea-Eagle		M, Mar	Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Unlikely. Preferred habitat is not present.	No
Hirundapus caudacutus	White-throated Needletail		M, Mar	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	Potential	Yes
Lathamus discolor	Swift Parrot	E1	E, Mar	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia maculata* (Spotted Gum), *C. gummifera* (Red Bloodwood), *E. sideroxylon* (Mugga Ironbark), and *E. albens* (White Box).	Likely. Observed within study area but outside subject site.	Yes

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Merops ornatus	Rainbow Bee-eater		M, Mar	Distributed across much of mainland Australia, including NSW. Open forests and woodlands, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.	Potential	Yes
Motacilla flava	Yellow Wagtail		M, Mar	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	No. No habitat present.	No
Myiagra cyanoleuca	Satin Flycatcher		M, Mar	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely. Preferred habitat is not present.	No
Rhipidura rufifrons	Rufous Fantail		M, Mar	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	Unlikely. Preferred habitat is not present.	No
Rostratula australis	Australian Painted Snipe	E1	E, Mar	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	No. No habitat present.	No

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Mammals						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	Potential	Yes
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Potential	Yes
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Distribution coincides approximately with the Murray Darling Basin; the Pilliga Scrub region is the distinct stronghold for this species. Mallee, *Allocasuarina luehmannii* (bulloke) and box eucalypt-dominated communities, especially box/ironbark/cypress-pine vegetation.	Potential	Yes
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	No. No habitat present.	No

Scientific name	Common name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	Likelihood of occurrence	Impact Assessment required?
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	Potential	Yes
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Potential	Yes
Fish						
Maccullochella peelii	Murray Cod		V	Throughout most of the Murray Darling Basin with the exception of some localised extinctions. Some translocated populations exist outside the species' natural distribution in impoundments and waterways (Cataract Dam and the Nepean River system in NSW). Clear rocky streams to slow flowing, turbid rivers and billabongs. Frequently found in the main river channel and larger tributaries; also in floodplain channels when they contain water.	No. No habitat present.	No

Community Name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	TSC listing equivalent	Likelihood of occurrence	Impact Assessment Required?
Endangered Ecological Communities						
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	E	CE	In NSW, mainly occurs on the Liverpool Plains and Moree Plains of northern NSW, within the Brigalow Belt South bioregion, but also extends into the Nandewar, Sydney Basin and Darling Riverine Plains bioregions. Mainly associated with fine textured, often cracking clay soils derived from either basalt or alluvium. Typically occurs on flat to very low slopes.	Native vegetation on cracking clay soils of the Liverpool Plains	No	No
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands	CE	CE	Tablelands and slopes of northeastern NSW. The national ecological community mainly occurs in the New England Tableland Bioregion with minor occurrences extending into adjacent subregions of the NSW North Coast and the Nandewar bioregions. Generally occurs on valley flats and lower slopes subject to cold air drainage at elevations of 900 to 1400 m. Two forms of the ecological community are currently recognised, each associated with a particular substrate. One form is on poorly drained loam-clay soils, derived from basalt, fine-grained sedimentary and acid volcanic substrates, and the other form is on coarse sandy soils overlying granitic substrates.	New England Peppermint (*Eucalyptus nova-anglica*) Woodland on Basalts and Sediments in the New England Tableland Bioregion	No	No

Community Name	TSC Act Status	EPBC Act Status	Habitat associations [1,2,3,4]	TSC listing equivalent	Likelihood of occurrence	Impact Assessment Required?
Weeping Myall Woodlands	E	E	Inland alluvial plains west of the Great Dividing Range. In NSW, it occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Murray-Darling Depression, Nandewar and Cobar Peneplain Bioregions. Generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. Occurs on black, brown, red-brown or grey clay or clay loam soils.	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions.	No	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	E	CE	Occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria. In NSW, it occurs in the Brigalow Belt South, Nandewar, New England Tableland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes and Riverina Bioregions. Found in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 m to 1200 m.	White Box Yellow Box Blakely's Red Gum Woodland	Known	Yes

[1] DoE 2016c, [2] OEH 2016b, [3] Pizzey, G. and Knight, F. (2007), [4] The Royal Botanic Gardens and Domain Trust 2014.

Appendix E EPBC Significant impact criteria assessments

This appendix provides an assessment of the potential significance of impacts from the proposed activity on Matters of National Environmental Significance (MNES). The EPBC Act Administrative Guidelines on Significance set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance.

An action will require federal approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- extinct in the wild
- critically endangered
- endangered
- vulnerable
- migratory

MNES considered relevant to this assessment are provided in **Tables Table** 8**,**

Table 9 and **Table** 10**.**

Table 8: MNES flora species

Scientific Name	Common Name	Impact assessment
Picris evae	Hawkweed	Vulnerable
Tylophora linearis		Endangered

Table 9: MNES fauna species

Scientific Name	Common Name	Impact assessment
Anthochaera phrygia	Regent Honeyeater	Critically Endangered
Apus pacificus	Fork-tailed Swift	Migratory
Ardea ibis	Cattle Egret	Migratory
Grantiella picta	Painted Honeyeater	Vulnerable
Hirundapus caudacutus	White-throated Needletail	Migratory
Lathamus discolor	Swift Parrot	Endangered
Merops ornatus	Rainbow Bee-eater	Migratory
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable

Scientific Name	Common Name	Impact assessment
Dasyurus maculatus	Spotted-tailed Quoll	Endangered
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable
Phascolarctos cinereus	Koala	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable

Table 10: MNES Ecological Communities

Community Name	Impact assessment
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered

The following definitions are used in the significant impact critera and are obtained from the EPBC Act Significant Impact Guidelines:

- Extent of an ecological community: refers to the geographic extent.
- Habitat critical to the survival of a species: areas that are necessary for activities such as foraging, breeding, roosting or dispersal; for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators); to maintain genetic diversity and long-term evolutionary development; or for the reintroduction of populations or recovery of the species or ecological community. Such habitat may be, but is not limited to, habitat identified in a recovery plan for the species or ecological community as habitat critical for the species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.
- Important habitat: habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or habitat that is of critical importance to the species at particular life cycle stages, and/or habitat utilised by a migratory species which is at the limit of the species range, and/or habitat within an area where the species is declining.
- Important population: a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are key source populations either for breeding or dispersal; populations that are necessary for maintaining genetic diversity; and/or populations that are near the limit of the species range.
- Population: an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable species, occurrences include but are not limited to: a geographically distinct regional population, or collection of local populations or a population, or collection of local populations, that occurs within a particular bioregion. In relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.
- Invasive species: an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species.

- Ecologically significant proportion: listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

Picris evae *(Hawkweed) – Vulnerable species assessment*

In NSW, *Picris evae* occurs north from the Inverell area, in the north-western slopes and plains regions. The species has been recorded from Elsmore (16 km east of Inverell), Oxley Park (Tamworth) and Dangar Falls in the Oxley Wild Rivers National Park (DoE 2016c). Habitat for the species includes *Eucalyptus* forest and *Dichanthium* grassland, roadsides and paddocks.

The species has not been recorded on site; however, flora surveys (Niche 2015) were conducted outside of the peak flowering time for the species, so ELA has assumed presence on site.

Potential habitat for the species in the study area includes all woodland, forest and grassland areas. 39 ha of potential habitat will be directly impacted by the proposal, with 344.5 ha of potential habitat retained.

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 study area is not likely to support an important population of *Picris evae*.

There is no recovery plan for the species, meaning that no important populations have been identified. However, important populations are defined under the EPBC Act as those that are necessary for a species' long-term survival and recovery. This includes populations that are key source populations for breeding or dispersal, populations that are necessary for maintaining genetic diversity, or populations that are near the limit of the species range. Any *Picris evae* population that may occur in the study area would not meet any of the above criteria for an important population.

Reduce the area of occupancy of an important population

The study area is not likely to support an important population.

Fragment an existing important population into two or more populations

The study area is not likely to support an important population.

Adversely affect habitat critical to the survival of a species

Habitat for *Picris evae* is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act, and there is no recovery plan for this species. Using the definition for this assessment, however, any occupied habitat for this species in the study area could be considered critical to the survival of the species as it is necessary for foraging, breeding, roosting and dispersal and supports the genetic diversity and long-term evolutionary development of the species.

It is not known whether *P. evae* occupies the subject site; however, assuming it is present, 10.2% of its potential habitat in the study area would be affected by the proposed development. Of this, only a proportion would be occupied and providing habitat critical to the survival of this species.

The significant impact criteria for this assessment requires that significance of impact should consider the context and intensity of the impact (DoE 2013). Given that the study area would continue to support approximately 89.8% of the potential habitat, which is connected to habitat beyond the study area, it is not considered that this proposal would have a significant adverse impact on habitat critical to the survival of *Picris evae*.

Disrupt the breeding cycle of an important population

The study area is not likely to support an important 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 project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Approximately 89.8% of potential habitat would be maintained in the study area. The quality of the remaining habitat would likely improve following the cessation of agricultural use. Livestock grazing is listed as a threat to *Picris evae*, so the species may benefit overall from the proposal. The scale of the proposed development means that it would not inhibit the breeding cycle for *P. evae* and, being a wind-dispersed species, patches of potential habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential habitat of *Picris evae*. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which are likely to degrade its habitat through grazing (e.g. feral goats, rabbits) are known to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support habitat for *Picris evae*. The study area is located within a known susceptible climatic zone (DoE 2014a).

Control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures. Thus the proposal is unlikely to result in the introduction of disease that may cause decline of *P. evae*.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of *Picris evae*. Potential habitat for this species would remain present and accessible in the study area. The proposal would not inhibit the species from establishing in the study area.

Conclusion

The proposal is unlikely to significantly impact *Picris evae* in the study area. The mitigation measures proposed would ensure that the potential habitat that would remain in the study area would continue to provide habitat for this species.

Tylophora linearis –*Endangered species assessment*

In NSW, *Tylophora linearis* is found in the Barraba, Mendooran, Temora and West Wyalong districts in the northern and central western slopes. Records include Crow Mountain near Barraba, Goonoo, Pilliga West, Cumbil, and Eura State Forests, Coolbaggie Nature Reserve, Goobang National Park, and Beni Conservation Area (DoE 2016c). Habitat for the species is dry scrub, open forest, and dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*. It also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum* species and *Casuarina* species.

The closest records of *T. linearis* are located approximately 60 km from the study area at Doona State Forest and Breeza State Forest, and 70 km away near Kelvin (OEH 2016a). The species has not been recorded on site; however, flora surveys (Niche 2015) were conducted outside of the peak flowering time for the species. Given its cryptic nature, ELA has assumed that the species is present on site.

Potential habitat for *T. linearis* in the study area is forest and woodland. The study area supports 266.2 ha of potential habitat, of which 8.9 ha (3.3%) will be impacted by the proposal.

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

The project is unlikely to lead to a long-term decrease in the size of the *Tylophora linearis* population. 96.7% of the potential habitat in the study area would not be directly or indirectly impacted, and the quality of the remaining habitat would likely improve following the cessation of agricultural use. Livestock grazing is listed as a threat to *T. linearis* (DoE 2016c), so any population of species in the study area may benefit overall from the proposal.

Reduce the area of occupancy of the species

It is possible that the proposal could reduce the area of occupancy for *Tylophora linearis* within the subject site; since no targeted surveys have been conducted, it must be assumed that the species occupies the site. As such, the proposal has the potential to reduce the area of occupancy for the species by 8.9 ha, which is 3.3% of its potential area of occupancy in the study area.

However, removal of livestock from the proposed offset area will increase the quality of the remaining habitat, which would allow *T. linearis* to expand its area of occupancy if present in the study area.

Fragment an existing population into two or more populations

The proposal is unlikely to fragment any existing population of *Tylophora linearis* into two or more populations.

Due to the scale of the proposal, no patches are considered likely to become isolated and pollination and dispersal could still occur between patches. In addition, the proposal has been designed to

maintain the majority of the intact vegetation in the study area, which would remain connected to vegetation to the north of the study area.

Adversely affect habitat critical to the survival of a species

Habitat for *Tylophora linearis* is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act, and there is no recovery plan for the species. Using the definition for this assessment, however, any occupied habitat for this species in the study area is considered habitat critical to the survival of the species as it is necessary for dispersal and supports the genetic diversity and long-term evolutionary development of the species.

It is not known whether *T. linearis* occupies the subject site; however, assuming it is present, 3.3% of its potential habitat in the study area would be affected by the proposed development. Of this, only a proportion would be occupied and providing habitat critical to the survival of this species.

The significant impact criteria for this assessment requires that significance of impact should consider the context and intensity of the impact (DoE, 2013). Given that the study area would continue to support approximately 96.7% of the potential habitat which is connected to habitat beyond the study area, it is not considered that this proposal would have a significant adverse impact on habitat critical to the survival of *T. linearis*.

Disrupt the breeding cycle of a population

The project is unlikely to disrupt the breeding cycle (pollination, seed development, dispersal and germination) of any *Tylophora linearis* population. The removal of potential habitat for this species in the study area is not considered to be of a scale that would isolate habitat patches such that pollination and dispersal could not occur between patches.

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

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

The scale of the proposed project means that it would not significantly inhibit the breeding cycle for this species and hence any patches of occupied and unoccupied habitat would not be isolated. Approximately 96.7% of potential habitat in the study area will be maintained. The quality of the remaining habitat would likely improve following the cessation of agricultural use. Livestock grazing is listed as a threat to *T. linearis*, so the species may benefit overall from the proposal.

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

The proposal is unlikely to result in establishment of invasive species in potential habitat of *Tylophora linearis*. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which are likely to degrade its habitat through grazing (e.g. feral goats, rabbits) are known to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support habitat for *Tylophora linearis*. The study area is located within a known susceptible climatic zone (DoE 2014a).

Control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures. Thus the proposal is unlikely to result in the introduction of disease that may cause decline of *T. linearis*.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of *Tylophora linearis*. Potential habitat for this species would remain present and accessible in the study area. The proposal would not inhibit the species from establishing in the study area.

Conclusion

The project is unlikely to significantly impact *Tylophora linearis* in the study area. The mitigation measures proposed would ensure that the potential habitat that would remain in the study area would continue to provide habitat for this species.

Anthochaera phrygia *(Regent Honeyeater) – Critically Endangered species assessment*

The Regent Honeyeater has an extremely patchy distribution across the inland slopes of south-east Australia between north-eastern Victoria and south-eastern Queensland (OEH 2016b). The species is also found in drier coastal woodlands and forests in some years. In NSW, most records are from the Great Dividing Range, mainly on the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; as well as the Central Coast and Hunter Valley regions.

The Regent Honeyeater is associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak) (Garnett, 1993). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes. As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar (Garnett & Crowley, 2000). Insects make up about 15% of the species' total diet, and lerp and honeydew are important when nectar is scarce (OEH 2016b).

The Regent Honeyeater has not been recorded on the subject site but has been recorded within 5 km. There are also numerous scattered records within 10 km (OEH 2016a). The subject site contains stands of *Eucalyptus albens* (White Box), one of several eucalypt species which the Regent Honeyeater is known to rely upon as a nectar source.

The proposal would directly impact approximately 8.8 ha of intact White Box woodland and 0.06 of intact White Box shrubby open forest which represent potential foraging habitat for the Regent Honeyeater. A further 257.3 ha of potential foraging habitat would remain in the study area.

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

The proposal is unlikely to lead to a long-term decrease in the size of the Regent Honeyeater population. The study area does not support a breeding site for the species. Removal of 8.9 ha of potential foraging habitat in the study area would not impact significantly on the availability of preferred foraging habitat for this species.

Reduce the area of occupancy of the species

The proposal is unlikely to reduce the area of occupancy of the Regent Honeyeater. This species is not known to occupy the study area and hence no habitat in the study area is considered an area of occupancy for this species.

Fragment an existing population into two or more populations

The proposal is unlikely to fragment an existing population of Regent Honeyeater into two or more populations. This species is not known to occur in the study area, with an existing population considered to potentially use the study area for infrequent foraging.

Fragmentation under the EPBC Act has not been defined. The effects of fragmentation are species specific, with the scale of the barrier effect being affected by gap width, traffic volume and behaviour of the species (van der Ree et al., 2008). Due to the scale of the proposal, no patches are considered isolated as the species would have the mobility to move through and around the proposal to access habitat. The proposal has been designed to maintain the majority of the intact vegetation in the study area, which would remain connected to vegetation to the north. This would allow the species to move through the study area and locality to access foraging resources.

Adversely affect habitat critical to the survival of a species

Habitat for Regent Honeyeater is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act. The 1999-2003 recovery plan (DNRE 1999) describes habitat that is critical to the survival of this species as: stands of *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box), *E. leucoxylon* (Yellow Gum) and *E. sideroxylon* (Mugga Ironbark) growing on high quality sites where nectar production is copious and relatively predictable. This would indicate that the stands of White Box woodland and forest in the study area may be considered critical to the survival of the Regent Honeyeater.

The new draft national recovery plan (DoE 2015) describes habitat that is critical to the survival of this species as “any breeding areas or regions where the species is likely’ to occur” (as mapped in the recovery plan), and “Any newly discovered breeding or foraging locations that extend the likely range of the regent honeyeater”. The study area falls within an area where the species has been mapped as ‘likely to occur’, and thus the subject site can be considered habitat critical to the survival of the Regent Honeyeater.

The significant impact criteria for this assessment requires that significance of impact should consider the context and intensity of the impact (DoE, 2013). Given that the study area would continue to support approximately 96.7% of the potential foraging habitat for the Regent Honeyeater, it is not considered that this proposal would have a significant adverse impact on habitat critical to the survival of the Regent Honeyeater. In addition, the quality of the remaining 257.3 ha of foraging habitat is likely to improve following the cessation of cattle grazing, and the proposed development would not present a barrier to movement of the species between areas of foraging habitat.

Disrupt the breeding cycle of a population

The proposal is will not disrupt the breeding cycle (mating, egg laying, egg hatching, chick rearing, fledging) of a Regent Honeyeater population. The study area does not support breeding for this species and hence any impact to the study area would not impact the breeding cycle.

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

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

The Regent Honeyeater has not been recorded in the study area and is not considered likely to use habitat in the study area as a reliable foraging resource. The scale and location of the proposed subdivision would not significantly inhibit the movement for this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging habitat of the Regent Honeyeater. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which are known to prey upon the Regent Honeyeater (e.g. European Fox, Feral Cat) or degrade its habitat (e.g. feral goats, rabbits) are known or are highly likely to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support foraging habitat for the Regent Honeyeater. The study area is located within a known susceptible climatic zone (DoE 2014a).

Control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures. Thus the proposal is unlikely to result in the introduction of disease that may cause decline of Regent Honeyeater.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of the Regent Honeyeater. Foraging habitat present in the study area would remain present and accessible in the study area. No breeding would occur in the study area. The proposal would not inhibit the species from moving among foraging sites.

Conclusion

The results from this assessment indicate that the proposal is unlikely to significantly impact the Regent Honeyeater in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide potential foraging habitat for this species.

Apus pacificus *(Fork-tailed Swift) – Migratory species assessment*

The Fork-tailed Swift is listed migratory under the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA), and the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) (DoE 2016c). It is a non-breeding visitor to all states and territories of Australia (Higgins 1999), arriving from its breeding grounds in Siberia around October, and departing in April. The species is thought to be highly mobile within Australia, moving across the country in search of food. In NSW, the Fork-tailed Swift is recorded in all regions. There are a number of records of the species within the Tamworth Regional LGA, to the south-east and north-west of the study area (OEH 2016a).

The species has been recorded using a wide variety of habitats, with a tendency to occur over inland plains but also over coasts and urban areas (Simpson & Day 2010). It mostly occurs over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh, as well as treeless grassland, *Spinifex* sandplains, open farmland and inland and coastal sand-dunes. Less commonly, they are seen above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999).

The Fork-tailed Swift is an aerial forager, often feeding along the edge of low-pressure systems to hundreds of metres above the ground. It may also forage aerially at less than one metre above open areas or over water, or sometimes among tree-tops in open forest (Higgins 1999). It probably roosts aerially, but is occasionally observed to land (Higgins 1999).

The Fork-tailed Swift was not recorded during surveys; however, the study area could potentially provide foraging habitat for the species. Approximately 39 ha of potential foraging habitat (30.2 ha of grassland habitat and 8.9 ha of forest / woodland habitat) occurs in the subject site. Approximately 344.5 ha of potential foraging habitat in the remainder of the study area will not be impacted by the proposal.

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

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

The project is unlikely to substantially modify, destroy or isolate an area of important habitat for the Fork-tailed Swift.

Using the definition for this assessment, important habitat does not occur in the study area as the study area is not considered to support an ecologically significant proportion of the population of the species. Additionally, the habitat in the study area is not of critical importance to the species during the life cycle, especially given that the species does not breed in Australia. The species is not at the limit of its range in the study area, nor is it known to be declining in the study area.

Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

The project is unlikely to result in an invasive species that is harmful to the Fork-tailed Swift becoming established in an area of important habitat. Important habitat for the species does not occur in the study area.

The study area already contains a substantial number of exotic flora and fauna species, commensurate with its past agricultural land use, and it is not considered likely that the proposed subdivision would result in the introduction of any additional invasive species.

Seriously disrupt the life cycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Using the definition for this assessment, there is not considered to be an ecologically significant proportion of the species' population that would rely on the study area for any stage of the life cycle such that its life cycle is seriously disrupted by the project.

Conclusion

The project is unlikely to significantly impact the Fork-tailed Swift in the study area. The study area is not considered to support important habitat for the species and hence the project would not substantially modify, destroy or isolate any area of important habitat. In addition, the study area is not known to support an ecologically significant proportion of the population of the species.

Ardea ibis *(Cattle Egret) – Migratory species assessment*

The Cattle Egret is listed under the Japan-Australia Migratory Bird Agreement (JAMBA) as *Bubulcus ibis*, and the China-Australia Migratory Bird Agreement (CAMBA) as *Ardeola ibis* (DoE 2016c). It is a widespread and common species in Australia.

The Cattle Egret occurs in tropical and temperate grasslands, woodlands and terrestrial wetlands, and very rarely in arid and semi-arid regions. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. The Cattle Egret often forages away from water on low lying grasslands, improved pastures and croplands. It is commonly found amongst livestock (Marchant & Higgins 1990). The Cattle Egret roosts in trees, or amongst ground vegetation in or near lakes and swamps. It breeds in colonies in wooded swamps such as mangrove forests, Melaleuca swamps and the eucalypt/lignum swamps of the Murray-Darling Basin (DoE 2016c).

The Cattle Egret was not recorded during surveys, although potential foraging habitat for the species within the study area includes grasslands and woodlands. Approximately 38.9 ha of potential foraging habitat (30.2 ha of grassland habitat and 8.8 ha of woodland habitat) occurs in the subject site. Approximately 165.9 ha (81%) of potential foraging habitat in the remainder of the study area will not be impacted by the proposal. No potential breeding habitat occurs in the study area.

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

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

The project is unlikely to substantially modify, destroy or isolate an area of important habitat for the Cattle Egret.

Using the definition for this assessment, important habitat does not occur in the study area as the study area is not considered to support an ecologically significant proportion of the population of the species.

Additionally, the habitat in the study area is not of critical importance to the species during the life cycle, especially as no breeding habitat is present. The species is not at the limit of its range in the study area, nor is it known to be declining in the study area.

Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

The project is unlikely to result in an invasive species that is harmful to the Cattle Egret becoming established in an area of important habitat. Important habitat for the species does not occur in the study area.

The study area already contains a substantial number of exotic flora and fauna species, commensurate with its past agricultural land use, and it is not considered likely that the proposed subdivision would result in the introduction of any additional invasive species.

Seriously disrupt the life cycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Using the definition for this assessment, there is not considered to be an ecologically significant proportion of the species' population that would rely on the study area for any stage of the life cycle such that its life cycle is seriously disrupted by the project.

Conclusion

The project is unlikely to significantly impact the Cattle Egret in the study area. The study area is not considered to support important habitat for the species and hence the project would not substantially modify, destroy or isolate any area of important habitat. In addition, the study area is not known to support an ecologically significant proportion of the population of the species.

Grantiella picta *(Painted Honeyeater) – Vulnerable species assessment*

The Painted Honeyeater occurs in the eastern half of Australia, from the eastern Northern Territory, through Queensland, New South Wales and Victoria to south-eastern South Australia (DSE 2003). It occurs predominantly on the inland side of the Great Dividing Range but avoids arid areas (Blakers et al. 1984). It is a nomadic species and occurs at low densities throughout its range. The greatest concentrations of the bird (and almost all breeding), occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution, in the semi-arid woodlands of inland and northern Australia (OEH 2016b). The species has not been observed within the study area. The closest records are from west of Manilla, around 50 km north-west of the study area.

The Painted Honeyeater is a specialist feeder on mistletoe berries, particularly those of the genus *Amyema* growing on woodland eucalypts and acacias (DSE 2003). It inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests (OEH 2016b). It is considered that the study area provides potential foraging and breeding habitat for the species where White Box woodland and forest occurs. These vegetation types in the study area were observed to support mistletoe. Approximately 8.9 ha of potential foraging habitat will be impacted by the proposed development, with approximately 257.3 ha retained.

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 study area is not likely to support an important population of the Painted Honeyeater.

There is no recovery plan for the species, meaning that no important populations have been identified. However, important populations are defined under the EPBC Act as those that are necessary for a species' long-term survival and recovery. This includes populations that are key source populations for breeding or dispersal, populations that are necessary for maintaining genetic diversity, or populations that are near the limit of the species range. Any Painted Honeyeater population that may occur in the study area would not meet any of the above criteria for an important population.

Reduce the area of occupancy of an important population

The study area is not likely to support an important population.

Fragment an existing important population into two or more populations

The study area is not likely to support an important population.

Adversely affect habitat critical to the survival of a species

Habitat for the Painted Honeyeater is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act, and there is no recovery plan for this species.

The Painted Honeyeater has not been recorded within the study area during surveys, so no habitat is known to be occupied by the species. Therefore, there is no habitat in the study area which can be considered critical to the survival of the species.

Disrupt the breeding cycle of an important population

The study area is not likely to support an important 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 is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The Painted Honeyeater has not been recorded in the study area but is considered to have the potential to use habitat in the study area for foraging and breeding. Within the impact site, approximately 8.9 ha of potential foraging and breeding habitat will be impacted by the proposal. However, within the study area as a whole, approximately 257.3 ha of potential foraging and breeding habitat will be maintained. The foraging and breeding in the habitat in this northern portion of the study area would remain connected to habitat beyond the study area. The scale and nature of the proposed development would not inhibit the movement of this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging habitat of the Painted Honeyeater. Historical agricultural land use in the locality has led to the establishment of

invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which are known to prey upon the Painted Honeyeater (e.g. European Fox, Feral Cat) or degrade its habitat (e.g. feral goats, rabbits) are known or are highly likely to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that support potential foraging habitat for the Painted Honeyeater. The study area is located within a known susceptible climatic zone (DoE 2014a).

Control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures. Thus the proposal is unlikely to result in the introduction of disease that may cause decline of Painted Honeyeater.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of the Painted Honeyeater. Foraging habitat present in the study area would remain present and accessible in the study area. No breeding would occur in the study area. The proposal would not inhibit the species from moving among foraging sites.

Conclusion

The proposal is unlikely to significantly impact the Painted Honeyeater in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide potential foraging habitat for this species.

Hirundapus caudacutus *(White-throated Needletail) – Migratory species assessment*

The White-throated Needletail is included in the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA), and as *Chaetura caudacuta* under the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) (DoE 2016c). It breeds in eastern Siberia, north-eastern China and Japan (DoE 2016c). The species arrives in Australia in September–October, and most depart by April. During this non-breeding season, it is widespread in eastern and south-eastern Australia, recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains.

In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 metre up to more than 1000 metres above the ground. Despite being aerial, the species exhibits certain habitat preferences. Although they occur over most types of habitat, they are probably recorded most often open forest and rainforest, and are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas like grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks (DoE 2016c).

The White-throated Needletail almost always forages aerially. The species has been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows. It has been suggested that it sometimes roosts aerially (DoE 2016c).

The White-throated Needletail was not recorded during surveys; however, the study area could potentially provide foraging and roosting habitat for the species. Approximately 39 ha of potential foraging habitat (30.2 ha of grassland habitat and 8.9 ha of forest / woodland habitat) occurs in the subject site. Approximately 344.5 ha of potential foraging habitat in the remainder of the study area will not be impacted by the proposal. Potential roosting habitat occurs in woodlands and forests and of this, 8.9 ha falls within the subject site.

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

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

The project is unlikely to substantially modify, destroy or isolate an area of important habitat for the White-throated Needletail.

Using the definition for this assessment, important habitat does not occur in the study area as the study area is not considered to support an ecologically significant proportion of the population of the species. Additionally, the habitat in the study area is not of critical importance to the species during the life cycle. The species is not at the limit of its range in the study area, nor is it known to be declining in the study area.

Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

The project is unlikely to result in an invasive species that is harmful to the White-throated Needletail becoming established in an area of important habitat. Important habitat for the species does not occur in the study area.

The study area already contains a substantial number of exotic flora and fauna species, commensurate with its past agricultural land use, and it is not considered likely that the proposed subdivision would result in the introduction of any additional invasive species.

Seriously disrupt the life cycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Using the definition for this assessment, there is not considered to be an ecologically significant proportion of the species' population that would rely on the study area for any stage of the life cycle such that its life cycle is seriously disrupted by the project.

Conclusion

The project is unlikely to significantly impact the White-throated Needletail in the study area. The study area is not considered to support important habitat for the species and hence the project would not substantially modify, destroy or isolate any area of important habitat. In addition, the study area is not known to support an ecologically significant proportion of the population of the species.

Lathamus discolor (Swift Parrot) – Endangered species assessment

The Swift Parrot is endemic to south-eastern Australia. It breeds in Tasmania during spring and summer, migrating in the autumn and winter months to the box-ironbark forests and woodlands of

south-eastern mainland Australia, from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW, the species mostly occurs on the coast and south west slopes (OEH 2016b).

Whilst overwintering on the mainland, Swift Parrots are semi-nomadic, foraging in areas where eucalypts are flowering profusely or where there are abundant psyllid infestations as they feed extensively on nectar and lerps during the non-breeding season (DoE 2016c). In the Western Slopes of NSW, key Swift Parrot foraging habitat includes Mugga Ironbark (*Eucalyptus sideroxylon*), Grey Box (*Eucalyptus macrocarpa*), White Box (*Eucalyptus albens*) and Yellow Box (*Eucalyptus melliodora*) (DoE 2016c; Saunders & Heinsohn 2008).

Ten Swift Parrots were recorded foraging in the study area, within the proposed offset area. Whilst the Swift Parrot wasn't recorded within the subject site, it is considered highly likely that the species would utilise the subject site for foraging and movement, given that it too supports stands of White Box.

The proposal would directly impact approximately 8.9 ha (3.3%) of potential winter foraging habitat.

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

The proposal is unlikely to lead to a long-term decrease in the size of the Swift Parrot population. Whilst the species has been recorded in the study area, the study area does not support breeding. Approximately 96.7% of the potential winter foraging habitat would be retained in the study area, which would continue to support foraging in study area and maintain connectivity with other foraging habitat in the surrounding locality.

Reduce the area of occupancy of the species

The proposal will not reduce the migratory range of the Swift Parrot. The Swift Parrot moves erratically from year to year in search of winter flowering eucalypts. Winter flowering eucalypts are scattered across the study area. The removal of winter flowering eucalypts from the subject site will have a negligible impact on the available resources in the study area.

Fragment an existing population into two or more populations

The proposal is unlikely to fragment an existing population of Swift Parrot into two or more populations. The species was recorded in the study, and it is likely that this existing population uses the subject site for foraging. However, due to the scale and location of the proposed subdivision, no patches of habitat will be isolated and the species would have the mobility to move through and around the proposal to access habitat. The proposal has been designed to maintain the majority of the foraging habitat on the site, which would remain connected to habitat north of the study area.

Adversely affect habitat critical to the survival of a species

The proposal is unlikely to adversely affect habitat critical to the survival of the Swift Parrot. Habitat for Swift Parrot is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act. The recovery plan (Swift Parrot Recovery Team 2011) describes habitat that is critical to the survival of this species as those areas of priority habitat for which the species has a level of site fidelity or which possess phonological characteristics likely to be of importance to the Swift Parrot, or are otherwise identified by the recovery team. The study area is not located within a priority region and is not known as an area with site fidelity for this species. The foraging habitat in the study area is,

therefore, not considered to have characteristics likely to be of importance to the Swift Parrot such that it is critical it the survival of the species.

Disrupt the breeding cycle of a population

The proposal is unlikely to disrupt the breeding cycle (mating, egg laying, egg hatching, chick rearing, fledging) of a Swift Parrot population. The study area does not support breeding for this species and hence any impact to the study area would not impact the breeding cycle.

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

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

The Swift Parrot has been recorded in the study area but is not considered to use habitat in the study area as a reliable foraging resource. Approximately 96.7% of the foraging habitat in the study area would be maintained, with likely improvement in the quality of this habitat due to cessation of grazing. This habitat would remain connected to habitat to the north of the study area. The impacts to the vegetation in the subject site will not significantly inhibit the movement for this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging habitat of the Swift Parrot. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which are known to prey upon the Swift Parrot (e.g. feral cat) or degrade its habitat through overgrazing (e.g. feral goats, rabbits) are known or are highly likely to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that support potential foraging habitat for the Swift Parrot. The study area is located within a known susceptible climatic zone (DoE 2014a). However, control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures.

Beak and feather disease is a common infectious disease affecting parrots, caused by the disease circovirus. The disease is capable of causing very high death rates in nestlings. The beak and feather disease virus can be introduced to endangered populations of parrots via the movements of common species carrying the disease. Lesions suggestive of the virus have been reported in the Swift Parrot (DoE 2016c). The proposed development is not likely to increase the potential for this disease to occur in the study region.

Thus the proposal is unlikely to result in the introduction of disease that may cause decline of Swift Parrot.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of the Swift Parrot. Foraging habitat present in the study area would remain present and accessible. No breeding occurs in the study area. The proposal would not inhibit the species from moving among foraging sites.

Conclusion

The proposal is unlikely to significantly impact the Swift Parrot in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide potential winter foraging habitat for this species.

Merops ornatus *(Rainbow Bee-eater) – Migratory species assessment*

The Rainbow Bee-eater is included in the Japan-Australia Migratory Bird Agreement (JAMBA). It is distributed across much of mainland Australia and several near-shore islands, although it is only sparsely distributed in the most arid regions of central and Western Australia.

The species mainly occurs in open forests and woodlands, shrublands, and various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches (DoE 2016c).

Populations that breed in southern Australia are migratory, with birds moving north to northern Australia, Papua New Guinea and eastern Indonesia after breeding, and remaining there for the duration of the Australian winter (Higgins, 1999). Conversely, populations that breed in northern Australia are considered to be resident, and in many northern localities the Rainbow Bee-eater is present throughout the year (DoE 2016c).

No Rainbow Bee-eaters were recorded during surveys for this assessment but there are scattered records of this species in the locality. It is possible that the species uses the study area for foraging and breeding. Potential habitat for the species in the study area includes all forest, woodland, grassland and exotic pasture. Therefore, the entire subject site (39 ha) represents potential habitat for the species, with approximately 344.5 ha of potential habitat to be retained.

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

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

The proposal is unlikely to substantially modify, destroy or isolate an area of important habitat for the Rainbow Bee-eater.

Using the definition for this assessment, important habitat for the Rainbow Bea-eater does not occur in the study area as the study area is not considered to support an ecologically significant proportion of the population of this species. Additionally, the habitat in the study area is not of critical importance to the species during the life cycle. This species is not at the limit of its range in the study area, nor is it known to be declining in the study area.

Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

The project is unlikely to result in an invasive species that is harmful to the Rainbow Bee-eater becoming established in an area of important habitat. Important habitat for the species does not occur in the study area.

The study area already contains a substantial number of exotic flora and fauna species, commensurate with its past agricultural land use, and it is not considered likely that the proposed subdivision would result in the introduction of any additional invasive species.

Seriously disrupt the life cycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Using the definition for this assessment, there is not considered to be an ecologically significant proportion of a Rainbow Bee-eater population that would rely on the study area for any stage of the life cycle such that their life cycles are seriously disrupted by the proposal.

Conclusion

The proposal is unlikely to significantly impact the Rainbow Bee-eater. The study area is not considered to support important habitat for the Rainbow Bee-eater and hence the proposal would not substantially modify, destroy or isolate any area of important habitat. In addition, the study area is not known to support an ecologically significant proportion of the population of this species.

Chalinolobus dwyeri *(Large-eared Pied Bat) – Vulnerable species assessment*

The distribution of the Large-eared Pied Bat is poorly known. Records exist from Rockhampton in Queensland south to Ulladulla in NSW. Much of the known range of the species is within NSW, although it is uncommon with a very patchy distribution. Available records suggest that the largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the north-west slopes (DoE 2016c).

The Large-eared Pied Bat has been recorded in a variety of habitats, including wet and dry sclerophyll forests, cypress pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country (DoE 2016c). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 2008). It also possibly roosts in the hollows of trees (Duncan et al. 1999). The species is thought to require roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river corridors, which are used for foraging.

The closest records of the Large-eared Pied Bat are approximately 20 km away to the north of Tamworth (OEH 2016a). Since no targeted survey has been undertaken (Niche 2015), the species is assumed to be present on site. The study area supports potential foraging habitat for the species but no preferred roosting or breeding habitat.

It is thought that the Large-eared Pied Bat forages predominantly below the canopy, and it has been recorded foraging in a range of forest and woodland types (DERM 2011). The proposal would directly impact approximately 8.9 ha of potential foraging habitat for the species (woodland and forest) which constitutes approximately 3.3% of potential foraging habitat in the study area.

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 study area is not likely to support an important population of the Large-eared Pied Bat, as it does not provide key breeding or roosting habitat. Additionally, the species is not at the limit of its range in the study area.

Reduce the area of occupancy of an important population

The study area is not likely to support an important population.

Fragment an existing important population into two or more populations

The study area is not likely to support an important population.

Adversely affect habitat critical to the survival of a species

The proposal is unlikely to adversely affect habitat critical to the survival of the Large-eared Pied Bat. Habitat for Large-eared Pied Bat is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act. The recovery plan (DERM 2011) identifies areas with diurnal roosts for shelter, any maternity roosts, and sandstone cliffs or rocky terrain in proximity to fertile wooded valleys as habitat that is critical to the survival of this species. The study area does not support the above types of habitat.

Disrupt the breeding cycle of an important population

The study area is not likely to support an important 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 is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Large-eared Pied Bat is likely to decline.

No preferred breeding or roosting habitat is present in the study area, and thus will not be affected by the proposal. The majority of potential foraging habitat retained in the study area would remain connected to potential foraging habitat in the wider locality. The scale and nature of the proposed development would not significantly inhibit the movement of this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging habitat of the Large-eared Pied Bat. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which potentially prey upon the species (e.g. European Fox, Feral Cat) are highly likely to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support foraging habitat for the Large-eared Pied Bat. The study area is located within a known susceptible climatic zone (DoE 2014a).

Control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures. Thus the proposal is unlikely to result in the introduction of disease that may cause decline of the Large-eared Pied Bat.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of Large-eared Pied Bat. No preferred breeding or roosting habitat would be modified as a result of the proposal. The proposal would not inhibit the species from moving between foraging and roosting sites.

Conclusion

The proposal is unlikely to significantly impact the Large-eared Pied Bat in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide foraging habitat for this species.

Dasyurus maculatus *(Spotted-tailed Quoll) – Endangered species assessment*

The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It now has a disjunct distribution along the east coast of Australia, extending from south-eastern Queensland through NSW and Victoria to Tasmania (OEH 2016b).

The Spotted-tailed Quoll inhabits a range of environments including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline (DoE 2016c). The Spotted-tailed Quoll uses a range of habitat within its large home range (up to 750 ha for females and up to 3,500 ha for males; OEH 2016b). Important habitat features include densely-vegetated creek lines for movement; hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky cliff-faces for den sites; and flat rocks among boulder fields and rocky cliff-faces for latrine sites. The species requires habitat that supports a wide range of prey including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits and insects (OEH 2016b).

This species has not been recorded in the study area but there are several records within 5 km of the study area, including one record less than 1 km away (OEH 2016a). The wider study area supports potential habitat features for this species including hollow-bearing trees and fallen logs and also supports prey populations. The subject site has minimal hollow-bearing trees and logs, and so is unlikely to support habitat suitable for denning or breeding; however, given the close proximity of previous records of the species, it could potentially support foraging habitat and be used for movement between other areas of habitat.

Whilst the species is considered to have the potential to use the subject site, an important population is not likely to be supported by habitat in the study area as it does not provide key breeding habitat. Additionally, habitat in the study area is not contributing to the maintenance of genetic diversity or allowing the species to exist at the limit of its range.

The proposal would directly impact approximately 39 ha (10.2%) of potential foraging habitat in the study area. No potential breeding habitat would be impacted.

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

The proposal is unlikely to lead to a long-term decrease in the size of the Spotted-tailed Quoll population. The subject site supports potential foraging and movement habitat but the species has not been recorded in the study area. The remainder of the study area would still support foraging and breeding habitat with approximately 89.8% of the potential habitat for this species remaining. This non-impacted habitat is connected to additional foraging and breeding habitat in the locality.

Reduce the area of occupancy of the species

The proposal is unlikely to reduce the area of occupancy of the Spotted-tailed Quoll. This species is not known to occupy the study area and hence no habitat in the study area is considered an area of occupancy for this species.

Fragment an existing population into two or more populations

The proposal is unlikely to fragment an existing population of Spotted-tailed Quoll into two or more populations. This species is not known to occur in the study area, with an existing population considered to potentially use the study area for foraging or breeding.

Fragmentation has not been defined under the EPBC Act. The effects of fragmentation are species specific, with the scale of the barrier effect being affected by gap width, traffic volume and behaviour of the species (van der Ree et al., 2008). The removal of up to 39 ha of potential foraging / movement habitat for this species would not inhibit movement of the species in the locality, and the habitat that would remain in the study area would still be connected to habitat in the locality.

Adversely affect habitat critical to the survival of a species

The proposal is unlikely to adversely affect habitat critical to the survival of the Spotted-tailed Quoll. Habitat for Spotted-tailed Quoll is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act. There is no recovery plan for this species.

Using the definition for this assessment, any occupied habitat for this species in the study area is considered critical to the survival of the species as it is necessary for foraging, breeding, roosting and dispersal and supports the genetic diversity and long-term evolutionary development of the species. No known occupied habitat occurs in the study area and habitat that could be used on occasion for foraging or breeding is not considered to be critical to the survival of this species.

Disrupt the breeding cycle of a population

The proposal is unlikely to disrupt the breeding cycle (mating, pregnancy, birth, lactating and rearing and dispersal) of any Spotted-tailed Quoll population.

The breeding cycle can be impacted by direct impacts of habitat removal or by indirect impacts which are undertaken during important stages of the species' life cycle or which reduce habitat quality. Successful completion of the breeding cycle requires adequate numbers of individuals to occur within proximity such that genetic diversity is maintained through mating. For the breeding cycle to be disrupted, any stage of the cycle would have to be inhibited over consecutive seasons for a significant proportion of the population. In this case, the birth of young and the regeneration of the population would be significantly prevented.

The proposal wouldn't inhibit movement of Spotted-tailed Quoll thorough the locality such that genetic diversity would be impacted on. Suitable breeding habitat is not present within the subject site. Additionally, foraging and breeding habitat would remain in the study area and would remain connected to habitat beyond the study area.

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

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

The Spotted-tailed Quoll has not been recorded in the study area but is considered to potentially use habitat in the study area for foraging and breeding. Within the impact site, approximately 39 ha of potential foraging habitat will be impacted by the proposal. However, within the study area as a whole, approximately 344.5 ha of potential foraging habitat will be maintained, of which approximately 257.3 ha is also potential breeding habitat (intact woodland and forest). The foraging and breeding in the habitat in this northern portion of the study area would remain connected to habitat beyond the study area. The scale and nature of the proposed development would not significantly inhibit the movement of this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging and breeding habitat of the Spotted-tailed Quoll. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (Appendix B), and a number of feral animals which are known to prey upon the Spotted-tailed Quoll (e.g. European Fox, Feral Cat) are highly likely to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support foraging habitat for the Spotted-tailed Quoll. The study area is located within a known susceptible climatic zone (DoE 2014a). However, control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures.

Spotted-tailed Quolls are susceptible to the spread of epidemics, such as a parasitic protozoan, by cats (NPWS 1999). However, feral cat populations are highly likely to already be well-established in the study area and the proposed activity is unlikely to exacerbate cat populations and the spread of disease.

Thus the proposal is unlikely to result in the introduction of disease that may cause decline of the Spotted-tailed Quoll.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of the Spotted-tailed Quoll. Important habitat features (hollows, fallen logs and prey populations) would remain present and accessible in habitat that would remain in the study area. No signs of den or latrine sites were evident

in the study area and no caves or rock structures are present. The proposal is not likely to inhibit the species from moving between foraging and breeding sites.

Conclusion

The proposal is unlikely to significantly impact the Spotted-tailed Quoll in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide potential foraging and breeding habitat for this species.

Nyctophilus corbeni *(Corben's Long-eared Bat) – Vulnerable species assessment*

The distribution of Corben's Long-eared Bat coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species (OEH 2016b). Corben's Long-eared Bat inhabits a range of vegetation types including mallee, buloke, brigalow, belah and box eucalypt-dominated communities. However, it is more common in the box, ironbark, and cypress pine woodlands that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland (OEH 2016b). The species roosts in tree hollows, crevices and under loose bark (DoE 2016c).

Corben's Long-eared Bat has been recorded north of Tamworth, around 30 km from the study area (OEH 2016a). Since no targeted survey has been undertaken (Niche 2015), the species is assumed to be present on site. The study area supports approximately 383.5 ha of potential foraging habitat (woodland, forest, derived native grassland and exotic grassland), of which 266.2 ha is potential breeding / roosting habitat (woodland and forest). Up to 39 ha of potential habitat would be directly impacted by the proposal (39 ha foraging habitat which includes 8.9 ha breeding / roosting habitat). However, the species will still be able to utilise the majority of the subdivision site for foraging and movement; given the large lot sizes proposed, the development will not present a significant barrier to movement.

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

Across its range, Corben's Long-eared Bat is considered rare; however, in some areas it can be locally more abundant. The species typically makes up around 7-9% of all bat capture rates within the Nandewar Bioregion, one of the highest capture rates recorded across the species distribution. Given that capture rates for the species within the Nandewar Bioregion are one of the highest, the bioregion is likely to be considered a stronghold for the species. Populations within the Nandewar Bioregion could be considered important populations of the species as they may be key source populations for breeding and dispersal.

It is possible that the study area supports part of an important population of the species, given the presence of suitable breeding and roosting habitat and the location of the study area within the Nandewar Bioregion. However, while the study area may support an important population of the species, the loss of a very small amount (3.3%) of the potential breeding and roosting habitat within the study area is unlikely to lead to a long term decrease in the size of an important population.

Reduce the area of occupancy of an important population

The loss of a very small amount (3.3%) of the potential breeding and roosting habitat within the study area is unlikely to reduce the area of occupancy for Corben's Long-eared Bat given the abundance of similar habitats in the locality

Fragment an existing important population into two or more populations

The proposed action will not fragment an important population of Corben's Long-eared Bat as the species is highly mobile capable of travelling up to 7km a night. The majority of foraging habitat for the species is to be retained within a conservation reserve, and impacts to habitat for the species have been avoided and mitigated through the project planning process.

Adversely affect habitat critical to the survival of a species

The project is not likely to affect habitat critical to the survival of Corben's Long-eared Bat.

Habitat for the species is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act, and there is no recovery plan for this species. Using the definition for this assessment, however, all occupied habitat for this species in the study area could be considered critical to the survival of the species as it is necessary for foraging, breeding, roosting and dispersal and supports the genetic diversity and long-term evolutionary development of the species.

It is not known whether Corben's Long-eared Bat occupies the subject site; however, assuming it is present, approximately 10.2% of its potential foraging habitat and 3.3% of its potential breeding / roosting habitat in the study area would be affected by the proposed development. Of this, only a proportion would be occupied and providing habitat critical to the survival of this species.

The significant impact criteria for this assessment requires that significance of impact should consider the context and intensity of the impact (DoE 2013). Given that the study area would continue to support approximately 89.8% of the potential foraging habitat and 96.7% of potential roosting / breeding habitat, which is connected to habitat beyond the study area, it is not considered that this proposal would have a significant adverse impact on habitat critical to the survival of Corben's Long-eared Bat.

Disrupt the breeding cycle of an important population

Corben's Long-eared Bat has the potential to breed within the project area; however, following the application of mitigation and management measures around timing of vegetation clearance the proposed action is unlikely to disrupt the breeding cycle for an important 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 project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Corben's Long-eared Bat has been recorded in the study area and is considered to use habitat in the study area for foraging and breeding. Approximately 89.8% of foraging and breeding habitat in the study area would be maintained with no adverse impacts to the quality and availability of the maintained habitat. The scale of the development would not significantly inhibit the movement for this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The project is unlikely to result in establishment of invasive species in potential habitat of Corben's Long-eared Bat. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which potentially prey upon the species (e.g. European Fox, Feral Cat), degrade its habitat (e.g. Feral Goat, European Rabbit) or compete for tree hollows (e.g. Common Starling) are known or are highly likely to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support foraging habitat for Corben's Long-eared Bat. The study area is located within a known susceptible climatic zone (DoE 2014a).

Control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures. Thus the proposal is unlikely to result in the introduction of disease that may cause decline of Corben's Long-eared Bat.

Interfere substantially with the recovery of the species.

The project is unlikely to interfere substantially with the recovery of Corben's Long-eared Bat. Potential foraging and breeding habitat present in the study area would remain present and accessible in the study area. The scale of the proposal would not inhibit movement or foraging for the species within the study area.

Conclusion

The project is unlikely to significantly impact Corben's Long-eared Bat in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide foraging and breeding habitat for this species.

Phascolarctos cinereus *(Koala) – Vulnerable species assessment*

The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW, it mainly occurs on the central and north coast with some populations occurring west of the Great Dividing Range. Koalas are also known from several sites on the southern tablelands (OEH 2016b). No Koalas have been observed within the study area, but there are numerous recent records within 10−20 km of the study area, including records close to Dungowan, Kootingal and Tamworth (OEH 2016a).

Koalas are associated with both wet and dry eucalypt forest and woodland with a canopy cover of approximately 10 – 70% (Reed et al. 1990), that contains acceptable eucalypt food trees. *Eucalyptus albens* (White Box) and *E. blakelyi* (Blakely's Red Gum) are secondary food trees in the Northern Tablelands koala management area under the Approved Koala recovery plan (DECC 2008) and are both present in the study area. White Box is also listed as a feed tree under the State Environmental Planning Policy 44. *Callitris glaucophylla* is common in the study area, and is a species known to be used for daytime shelter (Smith 1992).

Within the study area, 266.2 ha of potential foraging and breeding habitat is present (White Box forest and woodland). Up to 8.9 ha (3.3%) of this potential habitat would be impacted by the proposal.

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 study area is not likely to support an important population of the Koala.

The study area is not within a region identified as having an important koala population in the Approved Koala Plan of Management, and no Koalas have been sighted in the study area. Important populations are defined under the EPBC Act as those that are necessary for a species' long-term survival and recovery. This includes populations that are key source populations for breeding or dispersal, populations that are necessary for maintaining genetic diversity, or populations that are near the limit of the species range. Any Koala population that may occur in the study area would not meet any of the above criteria for an important population.

Reduce the area of occupancy of an important population

The study area is not likely to support an important population.

Fragment an existing important population into two or more populations

The study area is not likely to support an important population.

Adversely affect habitat critical to the survival of a species

Using the Koala habitat assessment tool (DoE, 2013b), which takes into account koala occurrence, vegetation composition, habitat connectivity, existing threats and recovery value, habitat in the study area was determined to constitute habitat critical to the survival of the Koala, with a score of 7.

The assessment on adverse effects was then undertaken (DoE 2014b) and the results indicate that impacts of the proposal are uncertain and the significance of the impact depends on the nature of the action. Taking into account the habitat assessment score for the impact area (7), the amount of habitat being cleared (8.9 ha), the absence of Koalas on site and the level of fragmentation to occur (proposal not likely to isolate patches of habitat), it was determined that the proposed action will not adversely affect habitat critical to the survival of the Koala.

Disrupt the breeding cycle of an important population

The study area is not likely to support an important 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 is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The Koala has not been recorded in the study area but is considered to have the potential to use habitat in the study area for foraging and breeding. Within the impact site, 8.9 ha of potential foraging and breeding habitat will be impacted by the proposal. However, within the study area as a whole, 257.3 ha of potential foraging and breeding habitat will be maintained. The foraging and breeding habitat in the northern portion of the study area would remain connected to habitat beyond the study area. The scale

and nature of the proposed development would not significantly inhibit the movement of this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging and breeding habitat of the Koala. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**). Free-roaming domestic dogs, which are known to prey upon the Koala, are highly likely to be present in the study area. It is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision. Mitigation measures such as fencing of the proposed lots will prevent potential domestic dog attacks from occurring.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support foraging habitat for the Koala. The study area is located within a known susceptible climatic zone (DoE 2014a). However, control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures.

Koala populations in NSW carry the pathogens *Chlamydia* spp. Clinical signs of this infection (chlamydiosis) are expressed when animals are exposed to environmental stresses such as loss of habitat, harassment by predators, nutritional stress or overcrowding (DECC 2008). It is unlikely that the proposed works will cause additional stress to the species, as the works are minimal in extent and no koalas have been recorded in the study area.

Another recently identified disease, Koala Retrovirus (KoRV), is present in up to 100% of Koalas in Queensland and NSW (DoE 2016c). KoRV is thought to be responsible for a range of conditions, including leukaemia and an immunodeficiency syndrome, and there is some evidence that chlamydiosis may be exacerbated by KoRV (DoE 2016c). It has been suggested that the effects of disease may be exacerbated by the effects of habitat fragmentation and associated stress (TSSC 2012). As the proposed works will not fragment patches of habitat, and as no Koalas have been observed in the study area, it is unlikely that the proposal will cause stress to the species.

Thus the proposal is unlikely to result in the introduction of disease that may cause decline of the Koala.

Interfere substantially with the recovery of the species.

The EPBC Act referral guidelines for the Koala (DoE 2014b) provides a guide to impacts which are likely to substantially interfere with their recovery. The project is not considered likely to interfere substantially with the recovery of the Koala as the avoidance, minimisation and mitigation measures to be implemented as part of the project mean that it is unlikely to result in increased Koala fatalities due to dog attack or vehicle strike, result in the spread of disease or pathogens, create a barrier to movement to, between or within habitat critical to the survival of the Koala or change the hydrology of the study area. The project is therefore unlikely to interfere substantially with the recovery of the Koala.

Conclusion

The project is unlikely to significantly impact Koala in the study area, despite the potential for the project to adversely affect habitat critical to the survival of the Koala. Approximately 96.7% of the potential

foraging and breeding habitat in the study area would not be directly or indirectly impacted. The loss of up to 3.3% of potential habitat in the study area is unlikely to adversely affect the long-term survival of Koala due to the small percentage of potential habitat that would be impacted. There are no sightings of Koala in the study area, and the study area is unlikely to support an important population of Koala.

Pteropus poliocephalus *(Grey-headed Flying-fox) – Vulnerable species assessment*

Grey-headed Flying-fox are distributed along the eastern coast of Australia from Bundaberg in Queensland to Melbourne in Victoria. They are found in a range of habitats of subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.

Grey-headed Flying-fox roost in camps which are generally located within 20 km of a regular food source. The camps are generally in gullies, close to water and in vegetation with a dense canopy. They can travel up to 50 km from the camp to forage on the nectar and pollen of Eucalypts, Melaleucas and Banksias. They also feed on fruits from rainforest trees and vines and cultivated gardens and fruit crops.

No camps or evidence of camps has been recorded in the study area, and no individuals were recorded in the study area during surveys for this assessment. However, the study area supports foraging habitat for the species and there is an active Grey-headed Flying-fox camp located approximately 10 km away in Tamworth (DoE 2016a). On the northwest slopes, the species is generally associated with flowering *Eucalyptus albens* (White Box) or *E. sideroxylon* (Mugga Ironbark) (DECCW 2009). White Box occurs extensively in the study area, including within the subject site.

The proposal would impact up to 8.9 ha of potential foraging habitat, which constitutes approximately 3.3% of potential foraging habitat in the study area.

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 study area is not likely to support an important population of the Grey-headed Flying-fox.

The draft recovery plan (DECCW 2009) does not identify any important populations of the species. However, important populations are defined under the EPBC Act as those that are necessary for a species' long-term survival and recovery. This includes populations that are key source populations for breeding or dispersal, populations that are necessary for maintaining genetic diversity, or populations that are near the limit of the species range. Any Grey-headed Flying-fox population that may occur in the study area would not meet any of the above criteria for an important population, especially given that it does not support any breeding habitat for the species.

Reduce the area of occupancy of an important population

The study area is not likely to support an important population.

Fragment an existing important population into two or more populations

The study area is not likely to support an important population.

Adversely affect habitat critical to the survival of a species

Habitat for Grey-headed Flying-fox is not listed on the Register of Critical Habitat maintained by the minister under the EPBC Act. The draft recovery plan (DECCW 2009) describes foraging habitat that is critical to the survival of this species as areas with foraging resources that are productive during food bottlenecks (winter and spring) or during final weeks of gestation and weeks of birth, lactation and conception (September to May), or are known to support populations of >30,000 individuals within an area of 50 km radius. The study area is dominated by *Eucalyptus albens* (White Box) which flowers in winter / spring (when food bottlenecks for the species occur). The Grey-headed Flying-fox camp at Tamworth is within a 50 km radius of the study area and as of August 2015 supported over 50,000 individuals (DoE 2016a). Hence using the above description, the foraging habitat in the study area is critical to the survival of the species.

Regardless, the significant impact criteria for this assessment requires that significance of impact should consider the context and intensity of the impact (DoE 2013). Given that the study area would continue to support approximately 96.7% of the potential foraging habitat which is connected to foraging habitat beyond the study area, it is not considered that this proposal would have a significant adverse impact on habitat critical to the survival of the Grey-headed Flying-fox.

Disrupt the breeding cycle of an important population

The study area is not likely to support an important 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 is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The Grey-headed Flying-fox has not been recorded in the study area and is not considered to use habitat in the study area as a reliable foraging resource. The majority of potential foraging habitat retained in the study area would remain connected to other potential foraging habitat in the locality. The scale and nature of the proposed development would not significantly inhibit the movement for this species and hence patches of occupied and unoccupied habitat would not be isolated.

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

The proposal is unlikely to result in establishment of invasive species in potential foraging habitat of the Grey-headed Flying-fox. Historical agricultural land use in the locality has led to the establishment of invasive weed species that are potentially harmful to this species' habitat (**Appendix B**), and a number of feral animals which may degrade its habitat (e.g. feral goats, rabbits) are known to be present in the study area. However, it is unlikely that additional invasive species would become established in the study area as a result of the proposed subdivision.

Introduce disease that may cause the species to decline, or

There is potential for the soil-borne plant pathogen *Phytophthora cinnamomi* to be brought into the study area as a result of the proposal. The disease caused by this pathogen could impact on the vegetation communities that could support foraging habitat for the Grey-headed Flying-fox. The study area is located within a known susceptible climatic zone (DoE 2014a). However, control of transportation of the pathogen would occur by controlling soil transportation into the study area through mitigation measures.

Grey-headed Flying-foxes are reservoirs of three zoonotic diseases, of which one — Australian bat lyssavirus (ABL) — can cause clinical disease and mortality in the species. ABL incidence in the species is low (<1%) and generally is in equilibrium with the population. However, when flying-foxes undergo significant ecological stress, the incidence of ABL can increase to the point where the disease is no longer in equilibrium and the population is impacted (DECCW 2009). The proposal is unlikely to cause significant stress to the species given that the works are minimal in extent and no Grey-headed Flying Foxes have been recorded in the study area.

Thus the proposal is unlikely to result in the introduction of disease that may cause decline of the Grey-headed Flying-fox.

Interfere substantially with the recovery of the species.

The proposal is unlikely to interfere substantially with the recovery of Grey-headed Flying-fox. No key breeding or roosting camps would be modified as a result of the proposal. The proposal would not inhibit the species from moving between foraging and roosting sites.

Conclusion

The results from this assessment indicate that the proposal is unlikely to significantly impact Grey-headed Flying-fox in the study area. The mitigation measures proposed would ensure that the habitat that would remain in the study area would continue to provide foraging habitat for this species.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland – Critically endangered ecological community assessment

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Grassy Woodland) is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum). The tree-cover is generally discontinuous and consists of widely-spaced trees of medium height in which the canopies are clearly separated (DoE 2016c).

The community occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through New South Wales (NSW) to central Victoria. In NSW, it occurs in the Brigalow Belt South, Nandewar, New England Tableland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes and Riverina Bioregions (DoE 2016c). The community is found in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 m to 1200 m.

Within the study area, 193.2 ha of vegetation correspond to the Box-Gum Grassy Woodland community, as defined by the listing advice (TSSC 2006) and Policy Statement (DEH 2006). 31.9 ha (19.8%) of the CEEC in the study area will be impacted by the proposed development, with the remaining 161.3 ha retained.

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

Reduce the extent of an ecological community

The proposed development will reduce the extent of the ecological community by 31.9 ha.

Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

The action would not increase fragmentation of the ecological community. The area of vegetation to be impacted is not currently providing important connectivity between other patches of the community, the subject site being surrounded by mainly cleared agricultural land.

Adversely affect habitat critical to the survival of an ecological community

According to the recovery plan for the critically endangered ecological community (DECCW 2010), habitat critical to the survival of Box-Gum Grassy Woodland encompasses the moderate to highly fertile soils of the western slopes of NSW and Queensland, the northern slopes of Victoria, and the tablelands of the Great Dividing Range from southern Queensland through NSW and the ACT. All areas of Box-Gum Grassy Woodland which meet the minimum condition criteria described in Appendix 2 of the recovery plan can be considered critical to the survival of this ecological community. Thus all areas White Box Grassy Woodland within the study area that meet the criteria can be considered critical habitat. A total of 31.9 ha will be impacted by the proposed development, corresponding to 19.8% of the critical habitat for the ecological community in the study area.

Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The project is unlikely to modify or destroy abiotic factors necessary for the Box-Gum Grassy Woodland ecological community's continued survival in the study area. Impacts to soil will be limited to the development footprint. There will be no indirect impacts to the soil within areas of CEEC in the rest of the study area.

The flow of surface water is unlikely to be significantly affected by the proposal. Outside of the building envelope on each lot, there is unlikely to be any significant alteration to the ground surface such that drainage patterns would be affected. Groundwater levels will also not be affected by the proposed development.

Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The proposed development will result in the removal of the majority of the vegetation comprising the ecological community within the subject site, thus causing a change in the species composition of this area of the ecological community.

Outside of the area of vegetation to be directly impacted, however, the project is unlikely to cause a substantial change in the species composition of the Box-Gum Grassy Woodland ecological community in the study area.

The remaining 161.3 ha of this community in the study area would not be directly or indirectly impacted and hence would not be adversely modified in composition. No changes in fire regime would occur as a result of the proposal, and no other factors that could significantly modify community composition are expected to be affected by the proposal.

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

– assisting invasive species, that are harmful to the listed ecological community, to become established, or

The project is unlikely to cause a substantial reduction in the quality or integrity of the Box-Gum Grassy Woodland ecological community in the study area. Invasive species that have potential to impact this ecological community are already established in the study area (including rabbits, feral goats, and weeds). It is possible that the spread of additional weed species could occur by increased movement of people and machinery in the study area. However, the weed management plan and wash down procedures proposed to be implemented as part of the project would help to ensure that quality or integrity of this ecological community is not substantially reduced.

– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

The project is unlikely to cause regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community.

Accidental spills and leaks of cement, hydrocarbons and other substances during the construction phase have the potential to impact this ecological community. However, provided adequate bunding and erosion and sediment control protection is installed prior to construction commencing, accidental spills and leaks are unlikely to significantly affect surrounding vegetation including this ecological community.

Interfere with the recovery of an ecological community.

The loss of any habitat area could be considered to be interfering within the recovery of the ecological community. However, compensatory measures would conserve and manage the remaining 161.3 ha, the condition of which would improve through removal of agricultural uses and the implementation of weed management, thus contributing towards the recovery of this ecological community. Thus it is considered unlikely that the proposal would significantly interfere with the recovery of the ecological community.

Conclusion

The proposed development has the potential to have a significant impact on Box-Gum Grassy Woodland, as it will reduce the extent of the ecological community and will adversely affect habitat critical to the survival of an ecological community.

Appendix F Clearing procedure

The following clearing procedure has been developed to minimise potential impacts or risk to fauna during construction. The purpose of the procedure is to encourage fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively move fauna during clearing. A pre-clearing survey by appropriately trained ecologists is required to be undertaken prior to commencing clearing. The pre-clearing survey includes marking all hollow-bearing trees or other significant fauna habitat features (nests, hollow bearing logs and stags) with yellow and black striped flagging tape and recording the location using a GPS.

The clearing procedure outlines best practise and is designed to be adaptive depending on site-specific conditions that arise during clearing. The clearing procedure will follow four steps:

1. Planning
2. Slash shrub and ground layer
3. Tap hollow-bearing trees
4. Remove hollow-bearing trees
5. Relocate suitable hollows

Prior to the commencement of clearing, the boundary of the active works area should be clearly marked in the field to ensure all clearing and construction activities occur within the approved footprint. All access to active work areas should be through designated roads.

Step 1: Planning

1. All appropriate licences with respect to working with native fauna are to be obtained prior to any clearing.
    a. Ecologists working with fauna require a current scientific licence issued by the NSW Office of Environment and Heritage and ethics approval issued by the Animal Welfare Unit of the NSW Department of Primary Industries.
    b. Project Approval is required.
2. The nearest veterinary clinic should be notified of the clearing works prior to clearing commencing and their phone number on hand if any fauna are injured or distressed.
    a. WIRES: 13 000 WIRES or 13 000 94737
3. Discuss clearing procedure, equipment / machinery required, schedule. All staff and contractors involved in the clearing will undertake the ecological induction prior to commencing work.

Step 2: Slash shrub and ground layer

Clearing of shrub and groundcover vegetation (under-scrubbing) around the hollow-bearing trees can commence once habitat features have been surveyed and marked to encourage dispersal of fauna from the active features. Under-scrubbing should be undertaken at least one day prior to removal of hollow-bearing trees to allow any fauna time to self-relocate from the disturbance footprint.

Step 3: Tap hollow-bearing trees

1. Hollow-bearing trees are to be agitated (nudged by heavy machinery or with a chainsaw) the day prior to felling and left over night.

2. Active roosts, dens or dormitories are to be re-inspected following agitation to confirm absence of fauna prior to clearing.

Step 4: Removing HBTs

1. A suitably qualified fauna ecologist with training/experience in fauna capture and rescue is to be present during the felling process.
2. Pre-felling procedures for all trees to be felled will include a visual inspection for fauna immediately prior to tree removal and care should be taken to allow all fauna to vacate a given tree prior to felling. Each tree is to be nudged and shaken immediately prior to felling to encourage fauna such as birds to vacate the tree. Felling cannot commence until the supervising ecologist has signalled that it is safe to do so.
3. The "slow drop" technique is to be attempted when removing all hollow-bearing trees. This technique aims to lower hollow-bearing trees to the ground whilst minimising disturbance to hollows. This involves nudging and shaking the tree, followed by lowering of the tree to the ground. Practical execution of this method may involve the use of the bull dozer blade or mulcher bar to push the tree mid-trunk to initiate felling, followed by lowering the blade / bar to the base of the tree trunk. It is essential to ensure that suitable exclusion zones are implemented during these activities and personnel are not exposed to increased risk by implementing these procedures. A safety check such as a Job Hazard Analyses (JHAs) or stepback are to be completed prior to completing felling activities.
4. Once on the ground, any hollows are to be inspected for resident fauna. If any injured or juvenile fauna are present they must be cared for. Injured fauna should be taken to the veterinary clinic (details above). Juvenile fauna should be taken to WIRES if it is not possible to relocate them to a suitable location. The ability for the parents to continue to care for the juvenile fauna should be considered at this stage. Fauna captured and not requiring treatment are to be relocated into the same habitat near the point of rescue at dusk or left inside the hollow. Trees are to be left on the ground overnight giving any fauna trapped in the trees an opportunity to escape. Any hollows with fauna left inside should be re-checked the following day to ensure the fauna have self-relocated during the evening.
5. All data on species and number of hollow dependent fauna are to be recorded.
6. Some of the hollow-bearing trees or other significant fauna habitat features should be relocated to adjoining vegetation where feasible.
7. Note that if fauna are observed to be in the tree that cannot self-relocate (e.g. chicks that haven't yet fledged) it may be necessary to maintain the tree until the fauna can self-relocate or contact an appropriately trained ecologist and/or wildlife carer to be present to encourage the removal and provide care for the animal/s. While translocation of fauna is not ideal, the DECCW Guidelines for Fauna Translocation are to be followed in these circumstances.

Communication

Positive communication between the ecologist supervising the clearing and the machinery operator is paramount to clearing being undertaken in a safe and efficient manner. Communication will operate by the following procedure:

1. Daily discussion prior to work commencing, outlining the areas of operation for the day.
2. A 2-way radio will be used for communication which will be set on a dedicated channel.
3. The ecologist will outline the clearing procedure to be followed. This will include outlining the following communication points during the clearing process:
    a. Confirm location ecologist should stand to observe felling. The minimum safe distance when felling will be determined by the height of the tree plus an extra 10 m for observer safety (expected to be 30 m).
    b. 'Ok to tap' to nudge the tree.
    c. 'Ok to start' to start felling the tree.
    d. 'Ok to access' for ecologist to inspect hollows in felled tree (once felling has been completed and machinery has been switched off).
    e. 'Stop work' to stop clearing due to fauna observed or a safety concern.

Lessons learnt

Previous experience in tree-felling operations has informed us of potential risks involved in the clearing operations. Areas of high risk are:

- Lack of positive communication increases the risk associated with the ecologist entering the exclusion zones and the risk of potentially injuring fauna during the clearing process.
- Not allowing adequate time between slashing vegetation, hollow-bearing tree tapping and hollow-bearing tree removal can increase the occurrence of fauna during felling.
- Not allowing adequate time for felled hollow-bearing trees to remain undisturbed can lead to increased risk to fauna.

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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Appendix D Market Value Impact Study

Taylor Byrne Pty Ltd, 2017

MARKET VALUE IMPACT STUDY

FOR EXISTING STAGES 1 AND 2

'OAKLANDS ESTATE'
NUNDLE ROAD
NEMINGHA NSW 2340

27 February 2017

File Number: TAM-280736/JL

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NSW Albury Wodonga | Bathurst | Coffs Harbour | Grafton | Inverell | Lismore Newcastle | Orange | Port Macquarie | Tamworth | Taree

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ANNEXURES

- Instruction

1 EXECUTIVE SUMMARY

The following document is based on certain conditions and contains a number of qualifications. Do not rely on this executive summary alone. This executive summary should be read in conjunction with and subject to our complete Report.

1.1	**Subject Property**	Existing Stages 1 and 2 'Oaklands Estate' Nundle Road Nemingha NSW 2340
1.2	**Instructions**	In this matter we have been instructed by Mr Tim McLean of Mitchel Hanlon Consulting Pty Ltd, to examine the potential impacts to Market Value of existing properties within Stages 1 and 2 of the 'Oaklands Estate', Nundle Road, Nemingha NSW 2340, upon reduction in minimum lot size (Stage 3) from 2 hectares down to 1 hectare.
1.3	**Prepared For**	Mitchel Hanlon Consulting Pty Ltd 121 Bridge Street Tamworth NSW 2340 Attention: Mr Tim McLean
1.4	**Client Reference**	Nunworth Pty Ltd

2 OVERVIEW/BACKGROUND

Taylor Byrne has been engaged by Mitchel Hanlon Consulting Pty Ltd to review the potential impacts to exiting property values within Stages 1 and 2 of the 'Oaklands Estate', located at Nemingha. The proposal is to reduce minimum lot sizes from 2 hectares to 1 hectare. The proposed amendment to the Tamworth Regional Council Local Environmental Plan 2010 has been brought about by the existence of Critically Endangered Ecological Community, including White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box–Gum Woodland) found on the existing Lot 18 DP1199163, within areas originally proposed to be developed to Stage 3 of the estate.

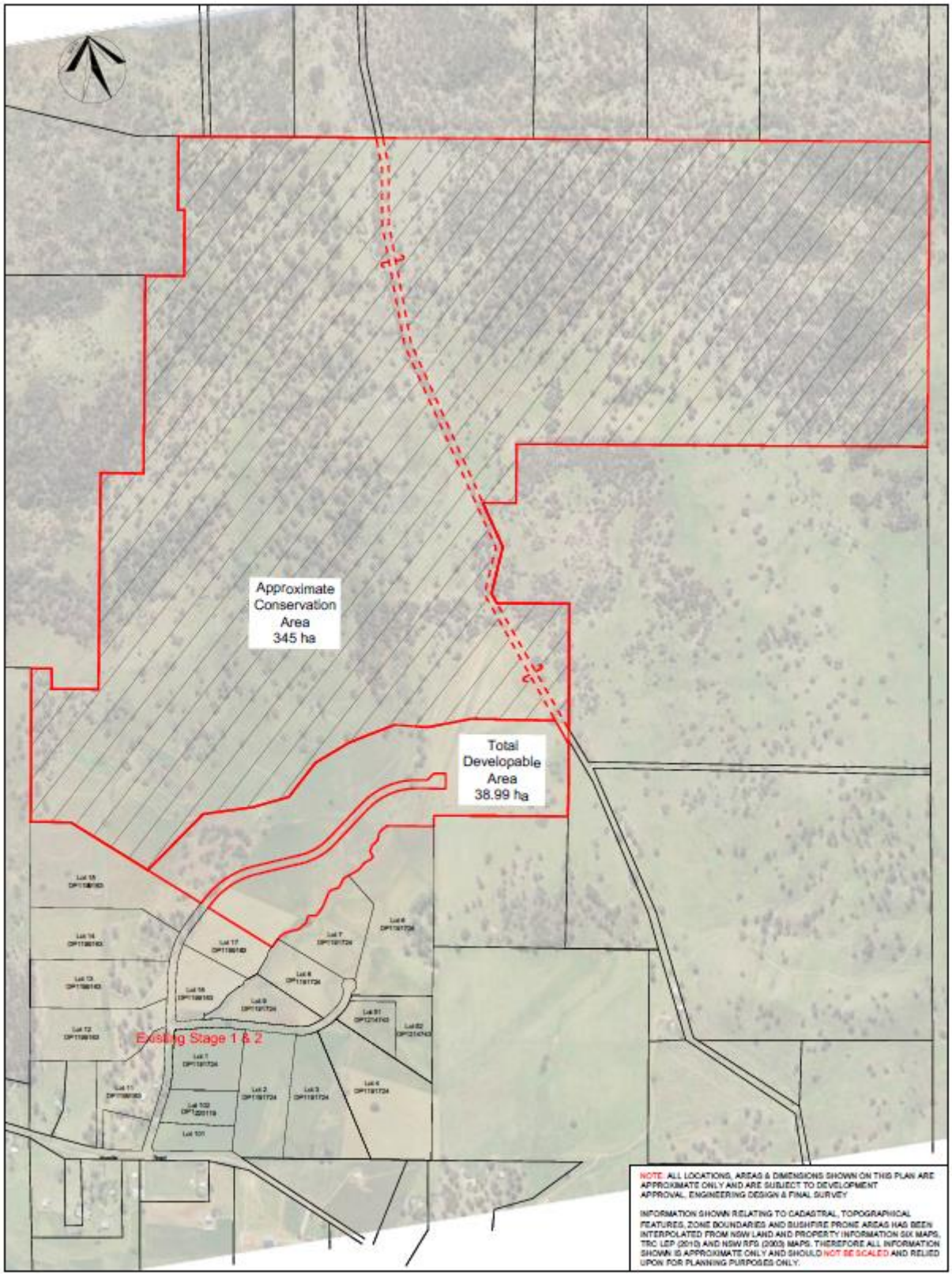
Stages 1 and 2 of the 'Oaklands Estate' originally was approved as 17 rural residential lots, including Stage 1, registered 28 May 2014 consisting of 10 lots and Stage 2, registered 17 November 2014 consisting of 7 lots.

Stage 3 Concept Plan provides an extension of Oaklands Drive for 28 lots including the residual lot. We have been advised by our instructing part that the reconfiguration is the most feasible and functional use of both existing infrastructure and parent lot topography, having particular regard to environmental considerations.

Information provided to us by representatives of Mitchel Hanlon Consulting Pty Ltd indicate the proposed reconfiguration of lots will not increase potential lot numbers within the Estate to that within the original Master Plan of the development.

In its current form the site is zoned 'R5 Large Lot Residential', with minimum lot size for both the existing and proposed Stages noted at 2 hectares. We note original Lots 5 and 10 within the development have been subdivided post purchase, creating an increased density within the estate over and above that originally planned by the developer.

In completing our assessment, we have firstly attempted to provide an overview of the Tamworth residential property market, including summarised analysis of property sales by land area breakdown. Additionally, we have undertaken case study analysis in an attempt to capture any potential impacts created on larger scale property adjoining more intensely developed estates, with our summary of findings noted within Section 7 of our report.



Development Footprint

3 CRITICAL CONDITIONS

Our report should not be treated as valuation advice specific to individual lots within the development. Our assessment has been made based upon external inspection of both existing and proposed development only. Should formal valuation advice for individual properties be required, we strongly recommend independent assessment be completed.

4 QUALIFICATION AND DISCLAIMERS

(i) This correspondence has been prepared on specific instructions from Mr Tim McLean of Mitchel Hanlon Consulting Pty Ltd, for consultancy purposes. The report is not to be relied upon by any other person, or for any other purpose. We accept no liability to third parties, nor do we contemplate that this report will be relied upon by third parties. Any parties who may seek to rely on this report must seek the specific written consent of the valuer. We reserve the right to withhold our consent or to review the contents of this report in the event that our consent is sought.

(ii) We state that this report is for the use only of Mitchel Hanlon Consulting Pty Ltd. The report is to be used for no other purpose, and no responsibility is accepted to any third party for the whole or part of its contents and annexures. No responsibility will be accepted for photocopied signatures.

(iii) This correspondence cannot be relied upon for mortgage security purposes.

(iv) This correspondence is current as at the date of correspondence only. The information provided herein may change significantly and unexpectedly over a relatively short period (including as a result of general market movements or factors specific to the particular property). We do not accept liability for losses arising from such subsequent changes in value. Without limiting the generality of the above comment, we do not assume any responsibility or accept any liability where this valuation is relied upon after the expiration of three (3) months from the date of the valuation, or such earlier date if you become aware of any factors that have any effect on the valuation.

(v) We advise we do not have a pecuniary or other interest that would conflict with the proper valuation of the property.

(vi) Taylor Byrne provides no warranty for claims arising out of, based upon directly or indirectly resulting from or in consequence of, or in any way involving the depreciation, failure to appreciate, or loss of any investments and/or property for investment purposes when such depreciation, failure to appreciate or loss is a result of normal or abnormal fluctuations in any financial, stock or commodity, or other markets which are outside the influence or control of the valuer.

(vii) Unless stated as otherwise in this report we advise that we have not searched or been provided with a copy of the current Title or Registered Plans and that any dimensions or land areas quoted in this report have been obtained from third party information sources and whilst every endeavour has been made to verify such information we accept no responsibility for inaccuracy of any information provided and relied upon.

(viii) The instructing party acknowledges its responsibility for full disclosure of all relevant information and undertakes to provide all relevant documents in its possession that may have an effect on the service to be provided. This correspondence is based upon information reasonably available to the valuer as at the date of issue in accordance with usual valuation practices.

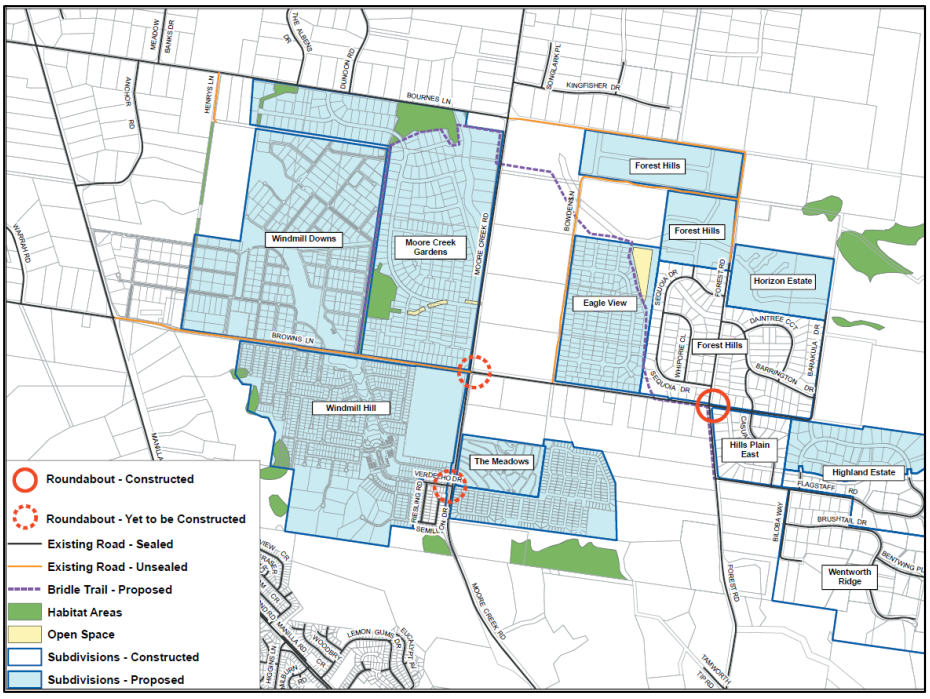
5 OVERVIEW OF THE TAMWORTH MARKET

The following section focuses on recent development undertaken in the Tamworth area. It includes brief commentary on both residential development sites, and commercial and government based development which have, and will have, an influence on Tamworth.

Tamworth has seen significant development within the residential, commercial and industrial markets. Tamworth Council has identified strategic areas to ensure the development of the city is sustainable and at the same time facilitating the communities needs into the future development of the city.

The major area for residential development within the Tamworth area has been identified as the Hills Plain Master Plan which is 5km north west of the Tamworth CBD. The area comprises approximately 1,150ha of land considered suitable for further residential development and has experienced significant investment and rapid development of a range of residential focused developments from 700m² to 4,000m² allotments catering to a wide range of potential purchasers. The Tamworth Council have estimated within the Hill Plain Master Plan 2006 the potential for approximately 4,000 residential lots to be released over a 30 year period with an estimated population draw of 10,000 people over this time period (Tamworth Regional Council, 2010). The Hills Plain development is the largest focus point currently for the Tamworth Council, with this Master Plan considered to be one of the largest of its kind in Northern New South Wales.

Nine estates are currently active in the Hills Plain locality including Bellefields, Windmill Hill, Windmill Downs, Forest Hills and the Highlands Estates, each of which have multiple stages completed and ongoing stages being released. Moore Creek Gardens, Eagle View and Horizon Estates are or will commence civil work and infrastructure in the immediate future.

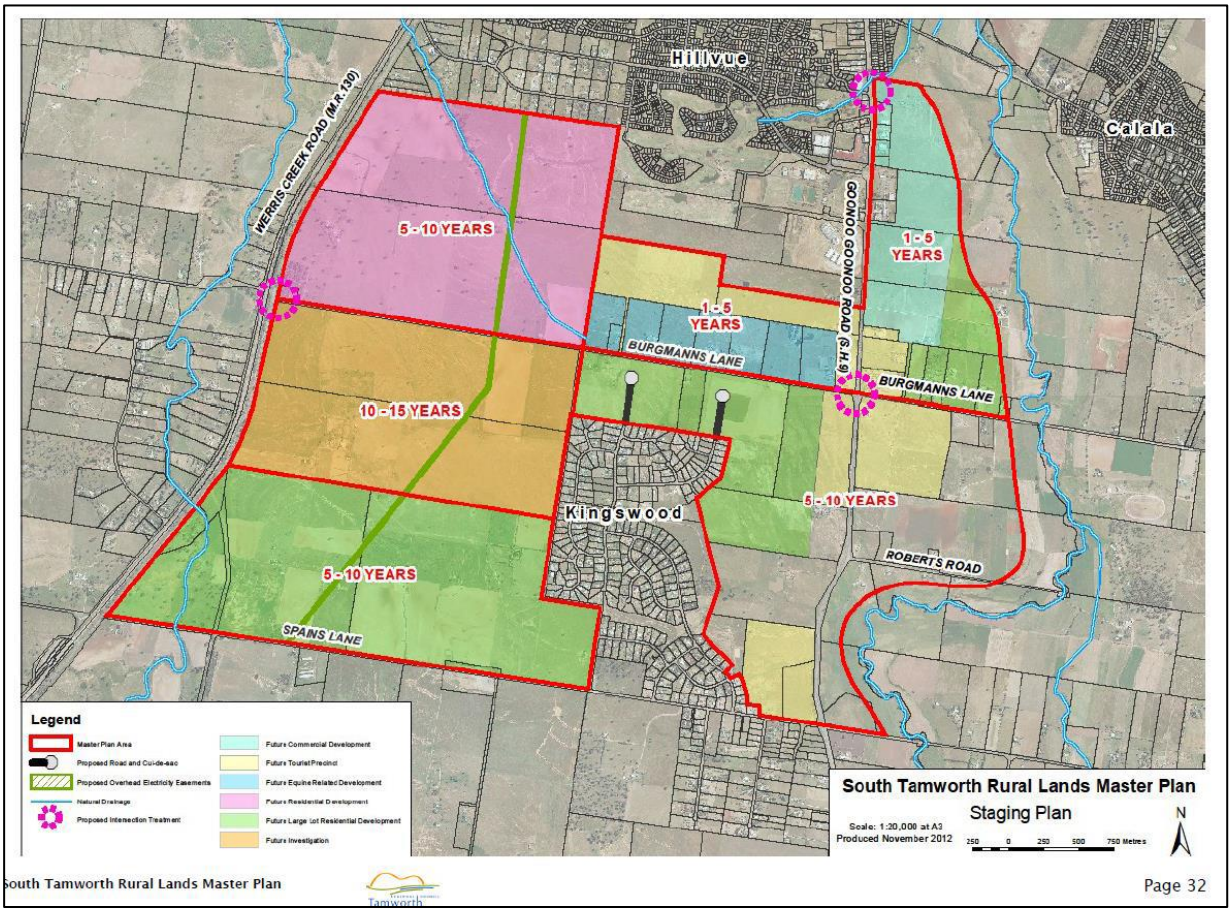


Source: Tamworth Regional Council Hills Plain Brochure

Future Development

Tamworth Regional Council as of 2012 identified a further development location for future residential, tourism and commercial growth and development. This newly identified locality is situated to the south of the established Hillvue suburb and the sporting and entertainment precinct. The identified rural land which will make up the new South Tamworth Rural Land Masterplan residential component which consists of approximately 320ha of 'RU4 Primary Production Small Lots' and 'R5 Large Lot Residential' zoned land. This land is currently under initial planning and is at gateway approval stage with intent to rezone these areas into 'R1 General Residential' (178ha), 'R2 Low Density Residential' (97ha), 'R5 Large Lot Residential' (43ha) and 'B1 Neighbourhood Centre' (2ha) (Tamworth Regional Council, 2012).

The aim of the rezoning is to provide an increased availability of residential, rural residential and commercial land to the southern portions of Tamworth. Within the Master Plan the aim is to further complement the rapidly increasing equine industry within the Tamworth area especially with the completion of the Australian Equine and Livestock Events Centre (AELEC) in 2008, has seen a rapid growth and development of equine and livestock based operations in the area and is responsible for hosting world class events.



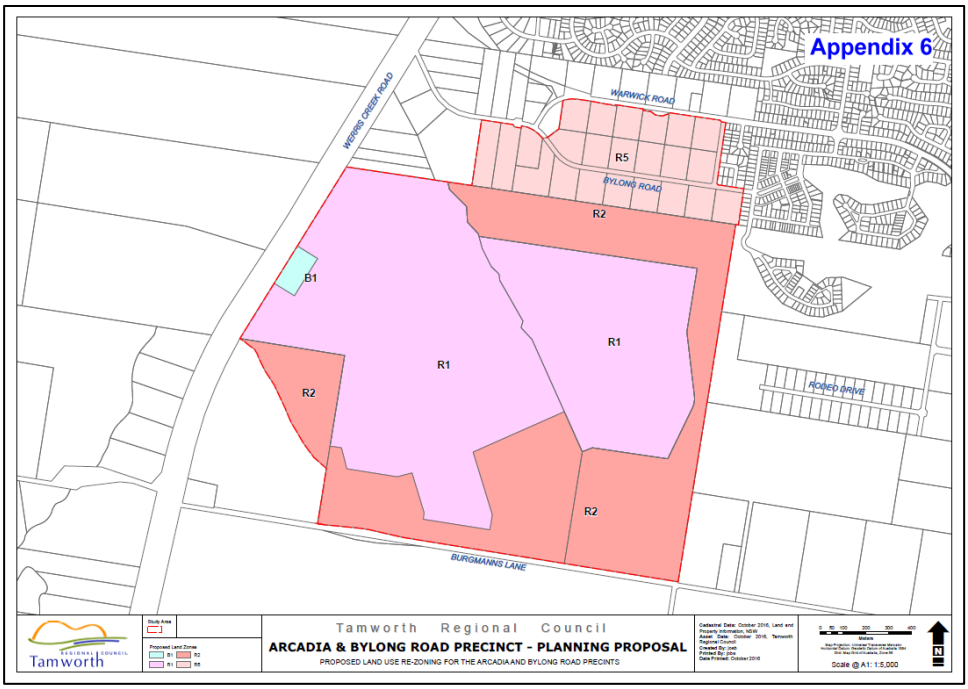
Source: South Tamworth Rural Land Master Plan

The aim of the South Tamworth Rural Land Masterplan (STRLM) is to undertake staged land releases in 5 year increments over a 15 year plan period. The first stage of the Master Plan has been the rezoning of the central and north eastern portion of the identified area. This will comprise approximately 29.6ha of commercial land with the zonings consisting of 'B5 Business Development' and 'B7 Business Park' (Tamworth Regional Council, 2012). This rezoning is aimed to complement the current and well established Long Yard Business Park precinct located 250m north of the STRLM to meet the increasing demand for zoned land suitable for bulky goods within Tamworth. This stage of the Master Plan will also provide further land allocations focused towards Tourist zonings and designated equine and livestock based areas with proximity to AELEC to further supplement the development of the area and further establish Tamworth's presence as a major centre for equine and livestock industries. The business and tourism zoned locations will be situated on both sides of the New England Highway giving high exposure and services round the AELEC and sporting facilities (Tamworth Regional Council, 2012).

The second major focus within the STRLM is the development of a further residential presence within the area in the next 5 to 10 years. The aim is to enable further residential development away from the city, to reduce congestion on the main roads by expanding southwards (McArthur, 2016). Tamworth Council has identified 320ha within the Arcadia Estate/precinct which has the potential to allow for a further 1,660 home sites within the Master Plan however the estate is in the early stages of planning (Tamworth Regional Council, 2012.

The Arcadia Estate will comprise of a combination of the following zonings 'R1 General Residential', 'R2 Low Density Residential' and 'R5 Large Lot Residential'. The table cross referenced with the proposed zoning map below shows the breakdown of the proposed apportioned land and the possible layout for the zoning. As provided within the table, the most significant zoning within the identified area is 'R1 General Residential'. Noting the northern portions zoned 'R5' have already been developed. Located on the western periphery will be a 2ha site zoned 'B1 Local Centre' and facilitating services including a small scale supermarket, tavern, medical clinic, child care centre and basic shops suitable to service the local neighbourhood (Tamworth Regional Council, 2016). This neighbourhood centre would be required to service between 3,000 to 5,000 people.

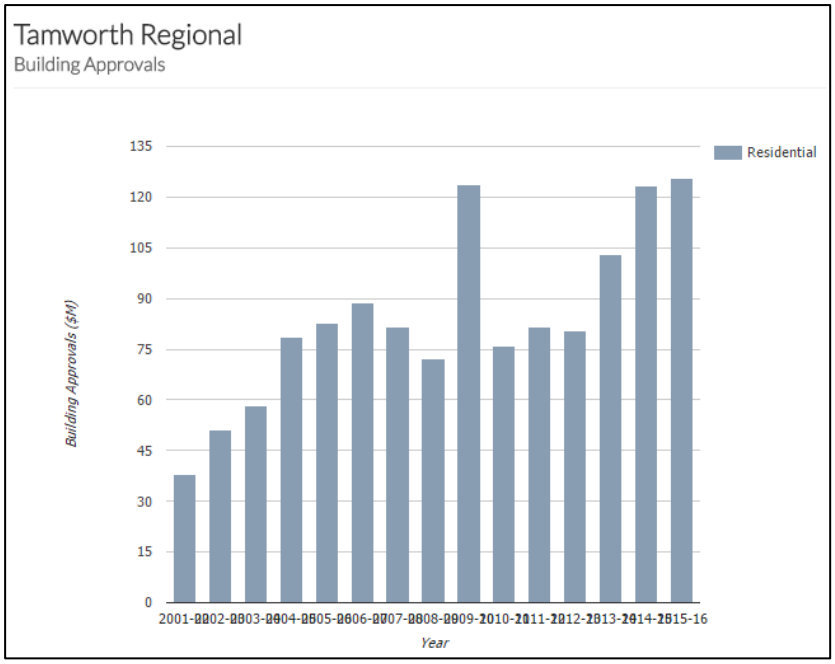
Zoning	**Land Area**	**Minimal Lot Size**
R1 General Residential	178ha	600m²
R2 Low Density Residential	97ha	2,000m² to 4,000m²
R5 Large Lot Residential	43ha	4,000m²



Source: South Tamworth Rural Land Masterplan

Building Approvals

The number of residential dwellings being approved and developed, is a key indicator for demand of home sites. Tamworth has experienced increased demand for vacant residential home sites. Demand over the past three years has resulted in increased approvals compared to the turbulent 2007 to 2012 years and approvals are following current growth trends.



Source: Economy.ID

Building approvals for residential development within Tamworth over the past 3 years has seen a recovery in demand for residential development post the turbulent periods post GFC. This can be seen above with the spike of building approvals in 2009 followed by a significant drop through 2013-15 with approval levels returning back to 2009 levels over the past 2 years.

Historical Sales Rates

In undertaking our analysis of market conditions, we have reviewed the property market for '2340' postcode and more specifically included total breakdown of sales based upon land area. The analysis has utilised historical market evidence gained by third party data basis, including Red Square and RP Data. We acknowledge analysis includes varying property types and zoning controls however does provide a generally consistent trend which is useful within our assessment.

2340 Postcode Sales Analysis by Land Area					
	2012	2013	2014	2015	2016
500 to 2,000 m^2	640	773	827	956	979
2,000 to 4,000 m^2	51	55	92	102	89
4,000 to 10,000 m^2	67	80	80	126	94
1 to 2 ha	41	32	32	40	53
2 to 10 ha	61	61	78	73	97
10 to 40 ha	23	22	25	53	24

- 500m² to 2,000m² property has seen a consistently increasing sale volume trend for the 2012 to 2016 period. Consists of the majority of residential accommodation within the Tamworth township itself.

- 2,000m² to 4,000m² property has seen a significant increment in sales volumes from the 2012/2013 period, ranging from 51 to 55 sales per calendar year, through to 89 to 102 sales per calendar year for the 2014 to 2016 period. This increment is a result of an increase in supply throughout the Moore Creek area and in particular Forest Hills and Windmill Downs Estates.

- 4,000m² to 10,000m² property has again seen a steady increment in sales volume from lows at 67 sales per year (2012), through to a high of 126 sales per year (2015). This again captures the popular Moore Creek rural residential estates.

- 1ha to 2ha property provide a generally consistent sale volume for the 2012 through to 2016-year period. Sales rates range from the lows of 32 sales per year for the 2013/2014 period, through to highs of 53 sales for the 2016 calendar year. Limited growth in turnover primarily results from a lack of newly released rural residential estates offering this land size, with pent up demand considered to be apparent, as evidenced by strong value growth for vacant 2ha home sites in the preceding 6 months, particularly in the Moore Creek area.

- 2h to 10ha property again reflects a generally consistent upward trend in volumes through the reporting period, to a high of 97 sales for the 2016 calendar year. Increased popularity of property of this type, particular acknowledging lack of supply being created, has seen a generally consistent growth in achievable values.

- 10ha to 40ha property again shows a generally consistent level of turnover through the 5 year reporting period. Significant variation in value quantum's have been noted within this asset class, being more dependent upon soil quality, locational attributes (distance from town) and availability of water.

Overall, we have seen a generally consistent upward trend of sales volumes from 2012 through to 2016, with the exception considered to be within the 1ha to 2ha land size bandwidth.

As previously mentioned, we consider pent up demand is apparent for properties over 4,000m² and up to 3ha, with limited released vacant land of this size being brought to the market. During the second half of 2016 and continuing into 2017, we have seen significant growth in land values of this property asset class.

Potential purchasers for lots of a similar size as that proposed within Stage 3 (1ha to 3.4ha) of the 'Oaklands' development, are likely to be required to pay a premium to secure allotments of this size. This in turn is expected to place upward pressure on achievable values for property within existing Stages 1 and 2.

We note a lack of supply is currently available for property which offers allotments of a similar size to Stages 1 and 2 of the 'Oaklands' development (2.915ha to 10.51ha). Any reduction in minimum allotment size for Stage 3 as proposed, may place a greater premium on existing property values within Stages 1 and 2, given this lack of supply of larger lots.

6 CASE STUDY ANALYSIS

In completing our assessment, we have undertaken three case studies, in an attempt to review impacts created on property values within close proximity to high density or smaller lot size estates. We have utilised a mix of developed and vacant land analysis as follows.

6.1 Case Study 1 - 16 Kingfisher Drive, Moore Creek

Reviewed sale of 16 Kingfisher Drive, Moore Creek, consisting of a 1.95ha parcel of land which sold 10/05/2016 for $755,000. As noted below, the subject property consisted of a 4 bedroom, 2 bathroom residence, along with inground pool, landscaping and detached shedding, adjoining low density residential development to the south. Smaller allotments are located within the northern periphery of the Forest Hills development (in close proximity to the south of subject lot).

The properties located at 1 Bowden Lane, 7 Barakula Drive and 29 Sequoia Drive, Moore Creek provide a generally consistent bandwidth of value, ranging from $615,000, through to $655,000. Differentiation between the subject property, 16 Kingfisher Drive and the three sale properites is primarily land area, indicating a premium land value component is retained for the Kingfisher Drive property in comparison to the smaller scale sale properties.

We therefore conclude within Case Study 1, no impact to achievable sale values is created by the sale properties' proximity to more intense development.

Address - Subject	**Sale Price**	**Sale Date**
16 Kingfisher Drive, Moore Creek NSW 2340	$755,000	10/05/2016
Brief Description: 	Property comprises a regular shaped 1.95ha, 'R5 Large Lot Residential' zoned parcel of land, adjoining 'R2 Low Density Residential' (minimum lot size 4,000m^2) to the southern elevation. Improvements include a modern low set rendered brick and colorbond dwelling of four bedroom, two bathroom design including double lock up garage. Ancillary improvements include landscaping, inground pool and detached shed.	

Address	**Sale Price**	**Sale Date**
1 Bowden Lane, Moore Creek NSW 2340	$615,000	06/05/2016
Brief Description: 	A 4,100m^2 corner allotment which is moderate to steeply sloping below road height. Improvments include a modern lowset rendered brick and sheet metal dwelling of five bedroom, two bathroom design which includes a double lock up garage and detached shed. A basic level of landscaping have been completed.	

Address	Sale Price	Sale Date
7 Barakula Drive, Moore Creek NSW 2340	$617,500	01/12/2016
Brief Description: 	A 4,000m^2 corner allotment which is moderate to steeply sloping below road height. Improvments include a modern lowset rendered brick and sheet metal dwelling of four bedroom, two bathroom design which includes a double lock up garage and inground pool. A sound level of landscaping has been completed.	

Address	Sale Price	Sale Date
29 Sequoia Drive, Moore Creek NSW 2340	$655,000	15/06/2016
Brief Description: 	A 6,516m^2 allotment offers gentle topography. Improvments include a modern lowset rendered brick and sheet metal dwelling of four bedroom, two bathroom plus study design which includes a triple lock up garage and a sound level of landscaping.	

6.2 Case Study 2 - Proposed Lot 1 Thornbill Road, Moore Creek

In reviewing our second Case Study analysis, we have attempted to assess potential impacts again created by the proximity of higher density development on larger scale lot values. The subject property is identified as Proposed Lot 1 Thornbill Road, Moore Creek, forming a 2ha 'R5 Large Lot Residential' zoned parcel. The subject is bounded by Bournes Lane to the south which, in effect, is the minimum lot size boundary between 'R2 Low Density Residential' land immediately to the south. The subject lot recently achieved 'offer and acceptance' status at $265,000 and remains subject to registration.

Sales evidence has been derived from within close proximity to the south of the subject lot for lots ranging in size from 4,000m², through to 4,098m² in land area. Allotments maintain similar topography, with most significant variation considered land size. The sale properties are within close proximity to the subject lot, positioned to the northern periphery of the Forest Hills development.

The sale property formed by Proposed Lot 1 Thornbill Road, Moore Creek has achieved a premium sale price (above smaller lots with similar attributes) as previously discussed for property within the 1ha to 2ha land size. Agreed purchase price has been achieved despite proximity to smaller scale allotments immediately to the south of the subject property.

We therefore conclude no impact is apparent to land value achieved for the Property 2 as a result of its proximity to higher density (smaller s) development.

Address- Subject	Sale Price	Sale Date
Proposed Lot 1 Thornbill Road, Moore Creek	$265,000	Under Contract January 2017
Brief Description: 	Property comprises a proposed regular shaped corner allotment including a land area of 2 ha. 'R5 Large Lot Residential' zoned parcel of land, adjoining 'R2 Low Density Residential' (minimum lot size 4,000m^2) to the southern side of Bournes Lane which bounds the allotment. Sale subject to registration of plan.	

Address	Sale Price	Sale Date
15 Benandarah Court, Moore Creek NSW 2340	$170,000	04/04/2016
Brief Description: 	A 4,000m^2 inside allotment which includes a gentle slope away from road height. Vacant allotment of 'R2 Low Density Residential' zoning, positioned to the northern areas of the Forest Hills development.	

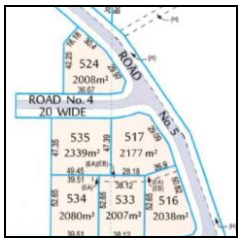
Address	Sale Price	Sale Date
2 Bowdens Lane, Moore Creek NSW 2340	$169,000	16/09/2016
Brief Description: 	A 4,099m^2 corner allotment which includes a gentle slope away from road height. Vacant allotment of 'R2 Low Density Residential' zoning, positioned to the northern areas of the Forest Hills development.	

Address	Sale Price	Sale Date
10 Benandarah Court, Moore Creek NSW 2340	$175,000	07/06/2016
Brief Description: 	A 4,098m² inside allotment which includes a gentle slope. Vacant allotment of 'R2 Low Density Residential' zoning, positioned to the northern areas of the Forest Hills development.	

6.3 Case Study 3 - Proposed Lot 535, Stage 5, Windmill Downs, Moore Creek NSW 2340

In completing a third Case Study, we have again utilised vacant land, however of a smaller size. The subject lot consists of a proposed 2,339m² 'R2 Low Density Residential' zoned parcel within Stage 5 of the Windmill Downs development. Minimum lot size of 2,000m² noted in this area. The subject property is located within close proximity to the north of the sale properties, which are positioned within Stages 5 and 6 of the Windmill Hill development. As noted below, the sale properties range from 661.1m² through to 900m², achieving a value bandwidth of $118,000 through to $120,000.

Despite close proximity to the sale properties, the subject lot has achieved agreed purchase price which is not considered to be impacted by the close proximity of high density (smaller lot size) development.

Address- Subject	Sale Price	Sale Date
Proposed Lot 535, Stage 5, Windmill Downs, Moore Creek NSW 2340	$178,000	Under Contract 01/02/2017
Brief Description: 	A proposed 2,339m² inside allotment, located within the newly developed Stage 5 of the popular Windmill Downs development. Vacant allotment of 'R2 Low Density Residential' zoning, positioned within close proximity to the northern extremity of the 'R1 General Residential' zoned Windmill Hill estate (minimum lot size of 600m²).	

Address	Sale Price	Sale Date
9 Burgundy Way, North Tamworth NSW 2340	$120,000	10/06/2016
Brief Description: 	A 661.1m^2 vacant allotment of gentle topography, zoned 'R1 General Residential'and positioned to the northern areas of Windmill Hill estate.	

Address	Sale Price	Sale Date
1 Burgundy Way, North Tamworth NSW 2340	$118,000	09/08/2016
Brief Description: 	A 749.7m^2 vacant corner allotment of gentle topography, zoned 'R1 General Residential'and positioned to the northern areas of Windmill Hill estate.	

Address	Sale Price	Sale Date
110 Verdelho Drive, North Tamworth NSW 2340	$118,000	09/08/2016
Brief Description: 	A 900m^2 vacant inside allotment of gentle topography, zoned 'R1 General Residential'and positioned to the northern areas of Windmill Hill estate.	

7 CONCLUSION

In line with our specific instruction, we have attempted to review potential impact on existing property values within Stages 1 and 2 of the 'Oaklands' development at Nemingha, as a result of a reduction in the minimum lot size for Stage 3, from 2 hectares down to 1 hectare.

Investigations indicate little, if any, impacts are created on existing property values which can be directly attributed to the existence of higher density development as that proposed within the subject development.

Sales analysis undertaken indicates existing lot values, particularly of a larger size, often achieve premium, primarily resulting from a low supply within the '2340' postcode.

Consultation with representatives of Mitchel Hanlon Consulting Pty Ltd indicate the adjustment to the planning proposal, by virtue of reducing minimum lot size has not increased the potential number of saleable lots within the 'Oaklands Estate' to that originally approved under the Estate Master Plan. The reduction in the proposed minimum lot size, in conjunction with the proposed Stage 3 lot layout will also limit any further piecemeal style subdivision within the estate, which has previously occurred within Stages 1 and 2, reducing planning risk of associated piecemeal development.

In line with traditional property considerations, impact to a property's value is created from a wide range of variables, including however not limited to:

- Quality, scale, age and configuration of improvements.
- Extent of ancillary improvements.
- Locational attributes and proximity to services.
- Topography and scale of land.

Whilst quality of adjoining development is a consideration on a property's overall value, we do not consider it as a single consideration.

Based upon considerations and investigations undertaken, we conclude that any reduction in minimum lot size within Stage 3 of the 'Oaklands Estate' is unlikely to create a negative impact to achievable property values within existing Stages 1 and 2 of the development beyond that already to be achieved through the existing 2ha minimum lot size.

VALUER

James Lockwood, AAPI
Certified Practising Valuer
Director
TAYLOR BYRNE

INSTRUCTION

From: Tim Mclean [mailto:tmclean@mitchelhanlon.com.au]
Sent: Wednesday, 15 February, 2017 5:01 PM
To: James Lockwood <JLockwood@taylorbyrne.com.au>
Subject: Request For Quotation: Property Valuation Report - Oaklands Estate, Nundle Road Nemingha

James,

We are currently preparing a planning proposal to the NSW Department of Planning and Environment seeking approval to change the current minimum lot size required associated with Stage 3 of Oaklands Estate, Nundle Road Nemingha.

The proposal seek to reduce the current R5 – Large Lot Residential (2ha minimum) zoning under the Tamworth Regional Local Environmental Plan 2010 to R5 – Large Lot Residential (1ha minimum).

As part of the planning proposal we wish to have identify any impact this change may have on the surrounding property values.

As such, can you please provide us with a quotation to undertake such an assessment.

Please do not hesitate to contact our office should you have any queries or require any further information specific to the project.

Regards

Tim McLean
Environmental Engineer
BEng Tech (Environmental) (UNE), Dip.Proj.Mgt, MAIGA

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Appendix E Servicing Strategy

Mitchel Hanlon Consulting Pty

OAKLANDS ESTATE STAGE 3

PRELIMINARY SERVICING STRATEGY

For the Proposed

AMENDMENT TO MINIMUM LOT SIZE

Lot 18 in DP 1199163
Oaklands Estate, Oaklands Drive,
Nemingha NSW 2340

Prepared for: Nunworth Pty Ltd

Our reference: 14111

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FS 555072

Ref.: 14111

ISSUE	REV.	DATE	AUTHOR	APPROVED	ISSUED TO
DRAFT	01	1 Sept 2017	T McLean	M Hanlon	Nunworth Pty Limited for Review
DRAFT	02	5 Oct 2017	T McLean	M Hanlon	Tamworth Regional Council for Review
FINAL	03	31 Oct 2017	T McLean	M Hanlon	Tamworth Regional Council
FINAL	04	16 Nov 2017	T McLean	M Hanlon	Tamworth Regional Council

File path: J:\2014\14111 Nunworth Stage 3 - DA & SEE\02 Planning\Servicing Strategy\14111 Oaklands Stage 3 - Servicing Strategy_v04 Final.docx

CONTENTS

FIGURES

TABLES

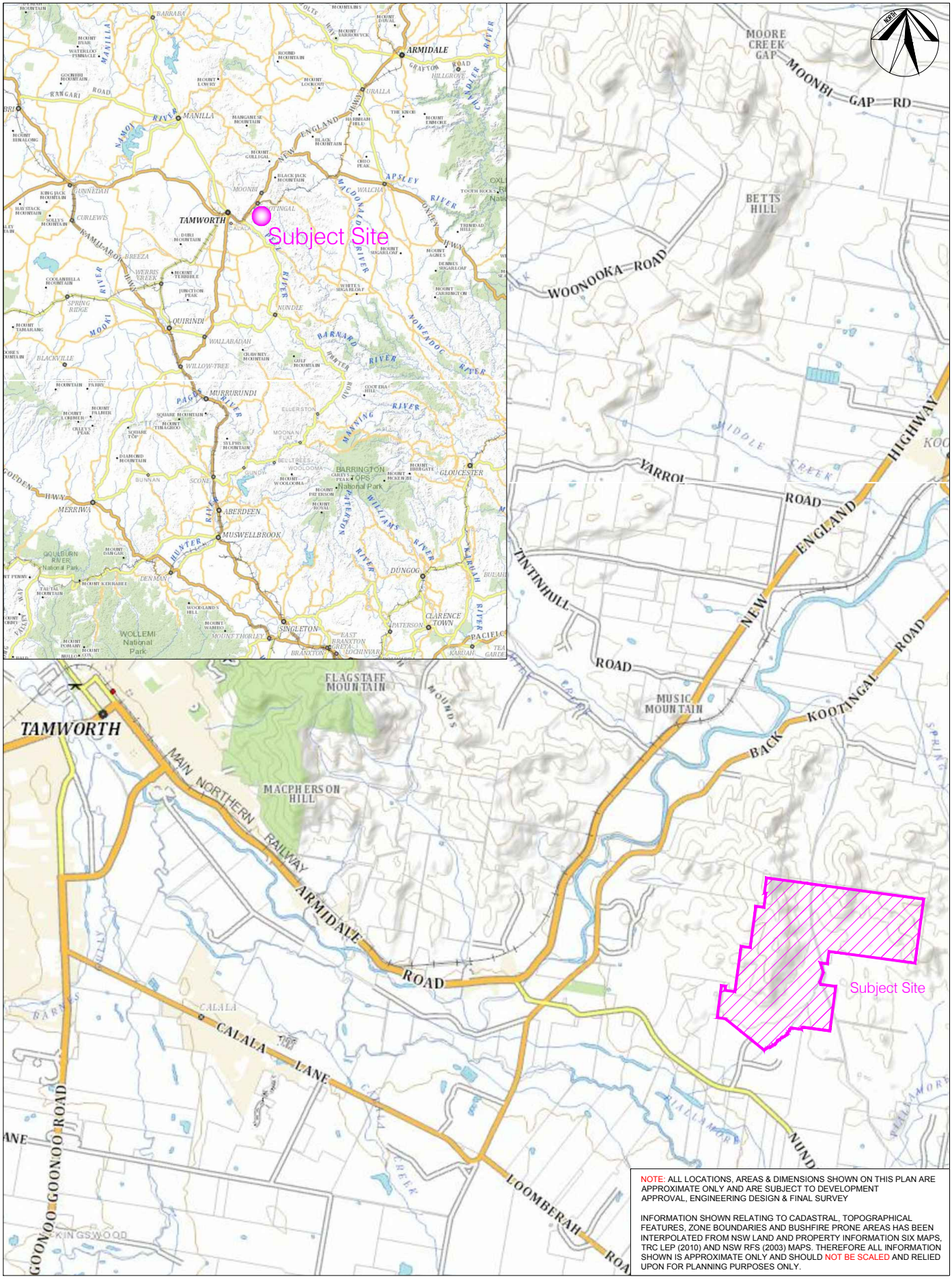
1.0 Introduction

Mitchel Hanlon Consulting Pty Ltd has been engaged to prepare a planning proposal to amend the Tamworth Regional Local Environmental Plan 2010 (TRLEP 2010).

The proposed amendment will amend the TRLEP 2010 Lot Size Map. The subject land is currently zoned *R5 Large Lot Residential* and *E3 Environmental Management*.

The site is owned by Nunworth Pty Ltd and forms part of the 'Oaklands' rural-residential estate development. Existing infrastructure is present in the front portion of the estate with frontage to Nundle Road, which forms Stage 1 and 2 of the development.

The regional context in which the development is situated is illustrated in Figure 1. The proposed development is illustrated on in Figure 2.



Nunworth Pty Limited

PRELIMINARY SERVICING STRATEGY, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 1

Mitchel Hanlon Consulting Pty Ltd

Plot Date: 4 May 2018
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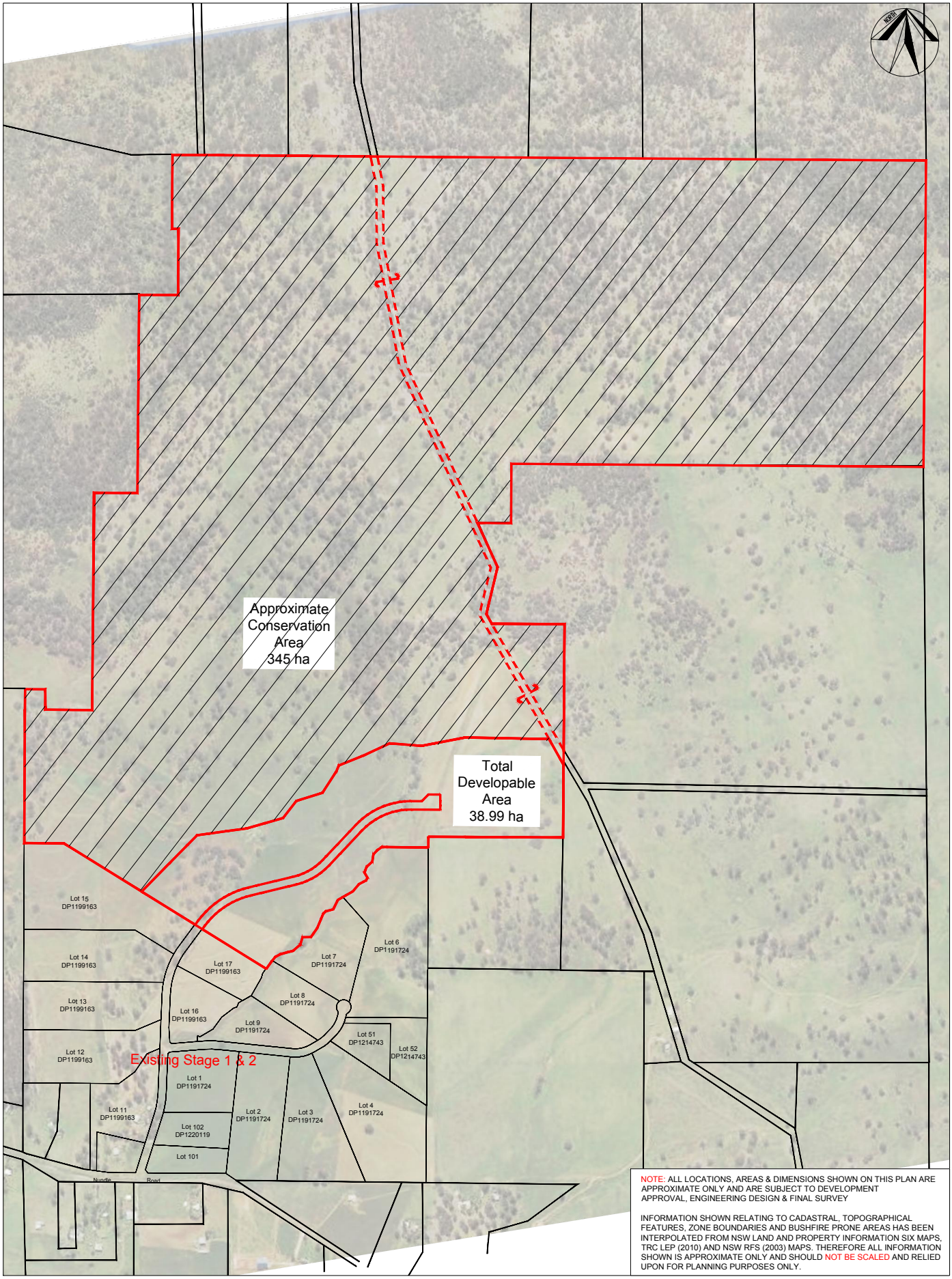

NOTE: ALL LOCATIONS, AREAS & DIMENSIONS SHOWN ON THIS PLAN ARE APPROXIMATE ONLY AND ARE SUBJECT TO DEVELOPMENT APPROVAL, ENGINEERING DESIGN & FINAL SURVEY

INFORMATION SHOWN RELATING TO CADASTRAL, TOPOGRAPHICAL FEATURES, ZONE BOUNDARIES AND BUSHFIRE PRONE AREAS HAS BEEN INTERPOLATED FROM NSW LAND AND PROPERTY INFORMATION SIX MAPS, TRC LEP (2010) AND NSW RFS (2003) MAPS. THEREFORE ALL INFORMATION SHOWN IS APPROXIMATE ONLY AND SHOULD NOT BE SCALED AND RELIED UPON FOR PLANNING PURPOSES ONLY.

Nunworth Pty Limited

PRELIMINARY SERVICING STRATEGY, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 2

Mitchel Hanlon Consulting Pty Ltd

Plot Date: 4 May 2018
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2.0 Existing Servicing

2.1 Stormwater Drainage

Based upon a review of the servicing information provided, existing stormwater management is understood to be as follows:

Oaklands Drive (Stage 1)

All stormwater generated within the lots located to the west of Oaklands Drive is directed to a suitably sized tabledrain located within Oaklands Drive. The lots to the east of Oaklands Drive and the intersection of Valleyview Grove drain to the existing natural ephemeral drainage line.

This tabledrain conveys the stormwater flows towards the intersection of Oaklands Drive and Valleyview Grove. At this point the tabledrain discharges into the ephemeral drainage line.

The existing box culvert in Oaklands Drive was sized to cater for the 100 year storm event.

Lots to the south of the intersection of Valleyview Grove drain to the existing tabledrain in Nundle Road.

Valleyview Grove (Stage 2)

All stormwater generated within the lots located to the north of Valleyview Grove is directed to a suitably sized tabledrain located within Valleyview Grove.

This tabledrain conveys the stormwater flows towards the intersection of Oaklands Drive and Valleyview Grove. At this point the tabledrain discharge into the ephemeral drainage line.

This drainage line flows through the existing box culverts within Oaklands Drive towards the Piallamore Anabranch

Lots to the south of Valleyview Grove generally drain to the existing tabledrain in Nundle Road via overland flow.

It is noted that all tabledrains and drainage structures required were sized in accordance with TRC's *Engineering Design Guidelines for Subdivisions & Developments* and any other relevant guideline at the time of design and construction.

2.2 Water Supply

Based upon a review of the various construction drawings and servicing information provided, water reticulation to the existing development within Stage 1 & 2 is provided via a Council owned 100mm diameter low flow (trickle feed) water main situated within Oaklands Drive. This main is serviced via a 200mm diameter water main in Nundle Road. This main is feed by existing Council reservoirs.

2.3 Sewerage

Based upon a review of the servicing information provided, the existing residential lots situated within Stages 1 & 2 of Oaklands Estate are currently serviced via a variety of Onsite Wastewater Management Systems.

It is assumed that these systems have been installed and are currently maintained in accordance with the relevant standards and guidelines.

3.0 Proposed Development

The objective of the planning proposal is to amend the Tamworth Regional Local Environmental Plan 2010 (TRLEP 2010) Lot Size Map.

The site in relation to the Tamworth locality is presented in Figure 1. A site plan is shown in Figure 2.

The subject site is zoned as *R5 Large Lot Residential, RU1 Primary Production* and *E3 Environmental Management* per the TRLEP 2010. It is proposed to reduce the minimum lot size on the *R5 Large Lot Residential* zone from 2 hectares (*Z*) to 1 hectare (*Y*).

Reducing the minimum lot size will result in an increased lot yield from the site. This will increase properties that are able to utilise the present infrastructure.

The total development footprint of 39 hectares will not be altered by the change in minimum lot size.

The aim of the amendment is to allow a future subdivision of the site to potentially create 27 allotments with a lot size of 1ha and one lot with a lot area of approximately 345ha.

The reason for the proposed amendment to the LEP is as follows:

- Compliance with the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999;*
- Compliance with the Matters of National Environmental Significance (MNES) for the Critically Endangered Ecological Community (CEEC) White Box - Yellow Box – Blakely's Red Gum Grassy Woodland;
- Supply of sufficient lot yield to offset the costs associated with the ongoing maintenance and management of the CEEC conservation area; and
- To increase the efficient use of infrastructure (in particular water supply infrastructure) to the site.

4.0 Proposed Servicing

4.1 Stormwater

4.1.1 Concept Stormwater

It is proposed that all stormwater generated within the potential Lots to the south of Oaklands Drive (and including Oaklands Drive) will be directed as overland flow to the existing drainage line located along the southern boundary of these lots [Refer to Figure 4].

This drainage line flows through the existing box culverts within Oaklands Drive towards the Piallamore Anabranch. It is noted that the existing box culverts within Oaklands Drive were sized to cater for the expected flows generated by this stage of the development.

It is proposed that all stormwater generated within the potential Lots to the north of Oaklands Drive will be directed to a suitably sized tabledrain located along the western alignment of Oaklands Drive [Refer to Figure 3 and Figure 4].

This tabledrain will join the existing tabledrain within Oaklands Drive and convey the stormwater flows towards the intersection of Oaklands Drive and Valleyview Grove. At this point the tabledrain will discharge into the ephemeral drainage line along with the flows from Lots 1 to 9.

All tabledrains and drainage structures required will be sized in accordance with TRC's *Engineering Design Guidelines for Subdivisions & Developments* and any other relevant guideline.

It is should be noted that the above mentioned provisions are concept only and are subject to change as a result of the design phase.

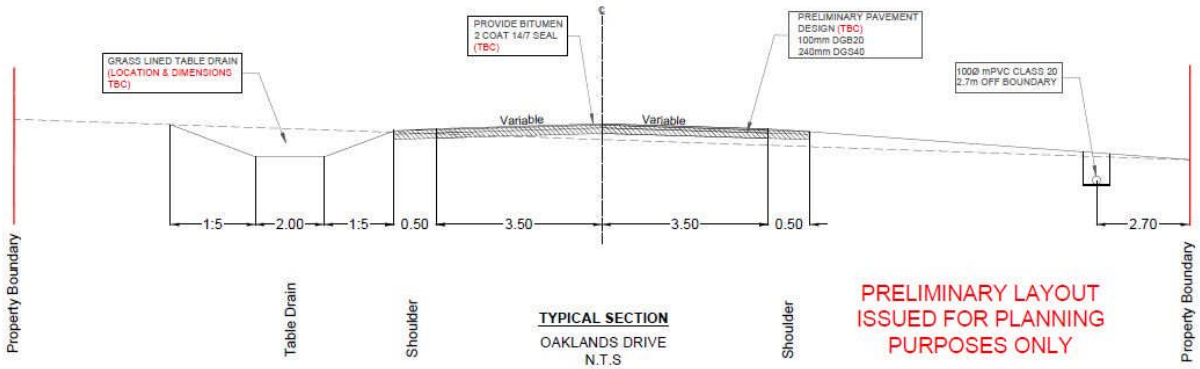
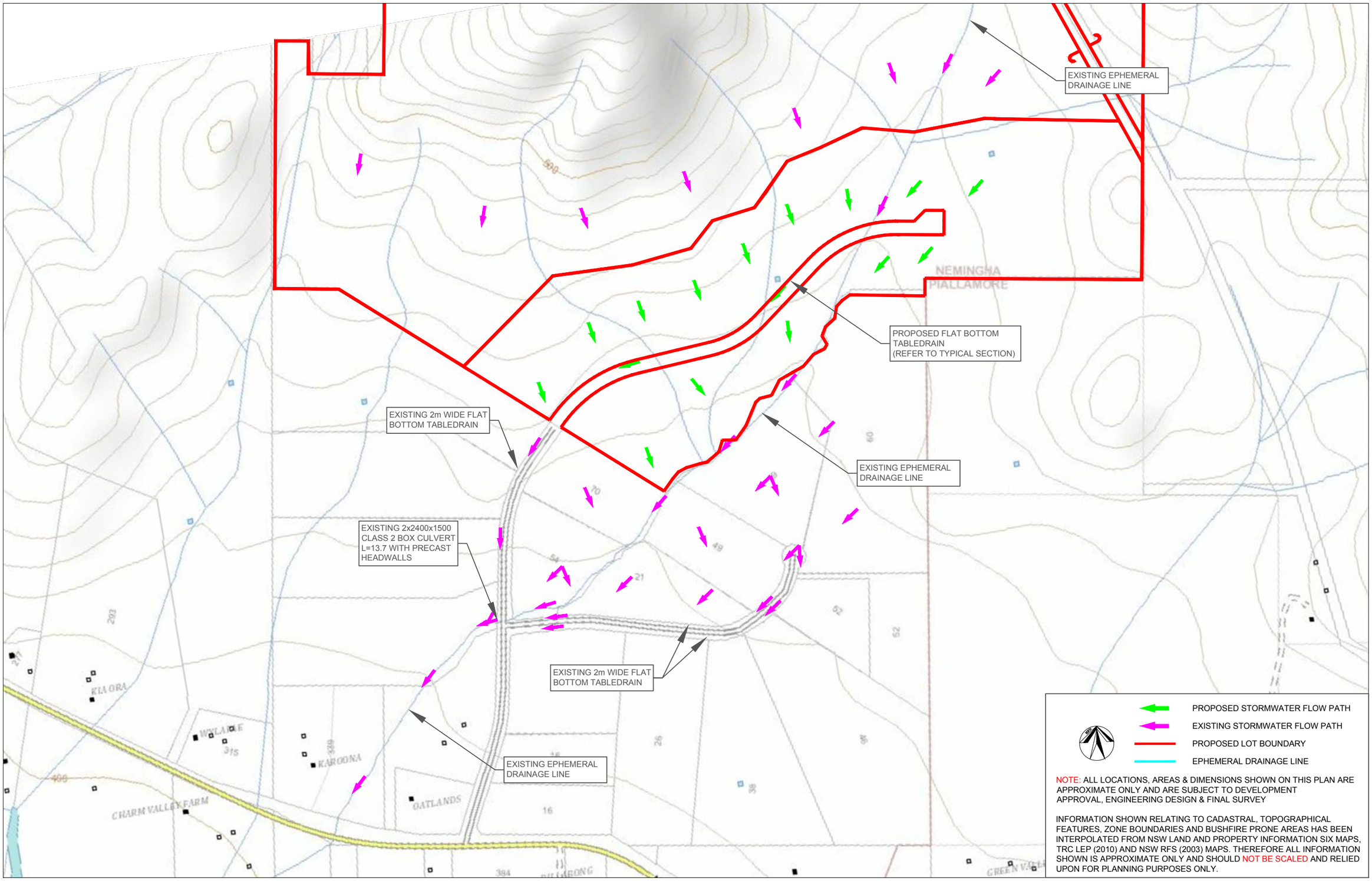


Figure 3: Typical Cross Section – Oaklands Drive (Stage 3)



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Nunworth Pty Limited

PRELIMINARY SERVICING STRATEGY, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 4

Plot Date: 4 May 2018
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4.2 Water Supply

4.2.1 Concept Water Supply

To allow the determination of a preliminary water strategy for the development initial discussions were held with TRC's Water Directorate. These discussions indicate that under current conditions low flow (0.06L/s) reticulation is available to the 450m contour.

Based upon the outcome of the initial discussions, it is proposed that the lots contained within Stage 3 will be serviced via the extension of the existing 100mm diameter (low flow) water main located within Oaklands Drive.

It is our understanding that the proposed services would be required to comply with Council's Policies including:

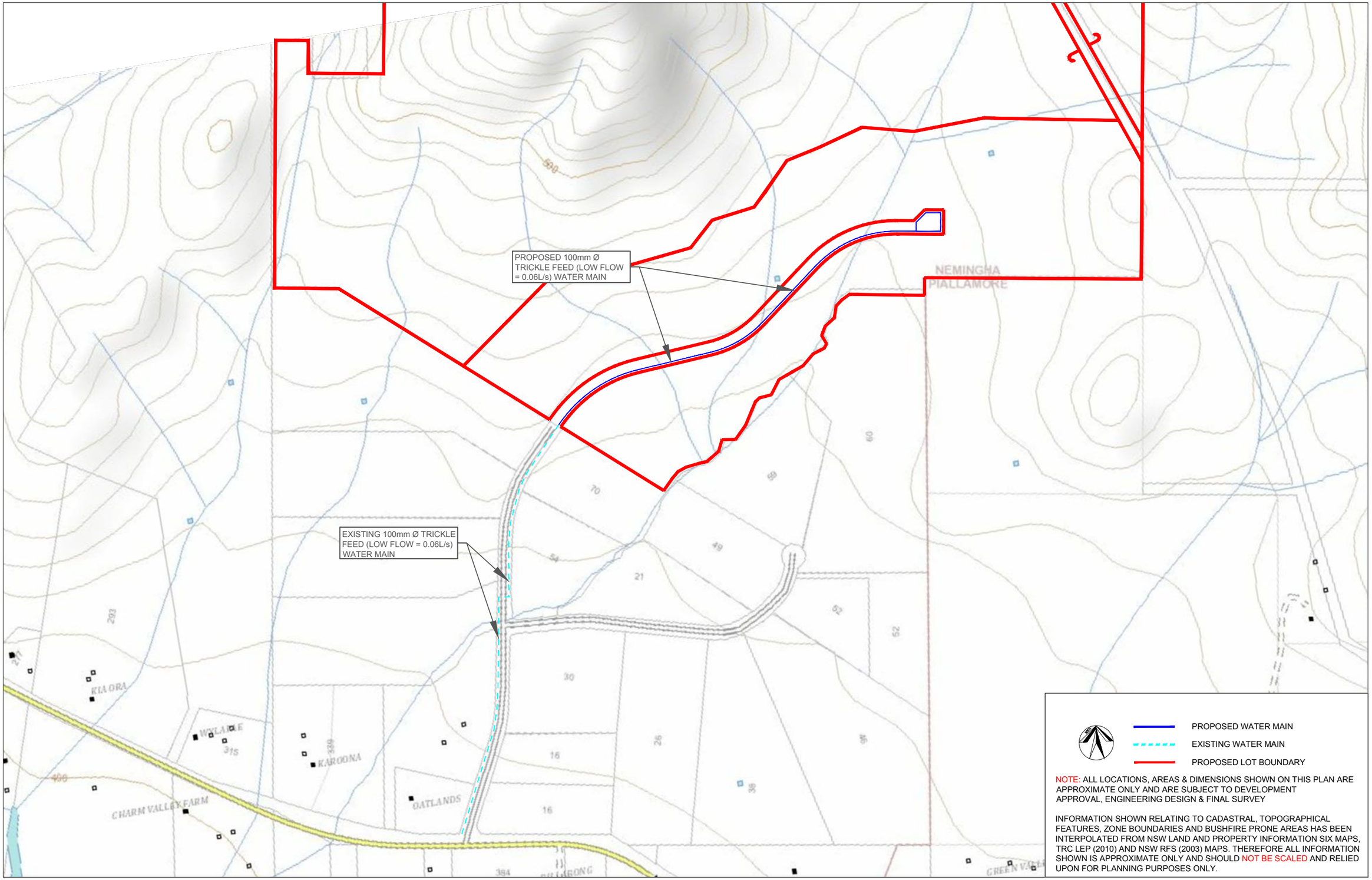
- Policy 19.4 – *Water – Requirements for Provision of Reticulation Supplying Treated Water Under Trickle Flow Conditions*; and
- Policy 19.13 – *Low Flow (Trickle Feed) Water Supply.*

It should be noted that, as stated in Policy 19.13, a low level of flow (approximately 0.06 L/s) will be supplied at the water meter. There is a possibility of zero flow occurring during times of peak demand.

In addition to the requirements stated in the policies above, the following will relate to the location of the minimum 5,000L on-site storage tank:

- Within the Oaklands Estate, the minimum 5,000L on-site storage tank for the town water supply shall be such that the top water level is at or below RL 452.
- All other conditions relating to the Low Flow (Trickle Feed) Water Supply Policy remain applicable; and
- Contributions towards the Nundle Road Trunk Water main would be required to be paid at the time of subdivision.

It is should be noted that the above mentioned provisions are concept only and are subject to change as a result of the design phase.



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PRELIMINARY SERVICING STRATEGY, STAGE 3, OAKLAND ESTATE, NEMINGHA

FIGURE 5

Plot Date: 4 May 2018

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4.3 Sewerage

4.3.1 Concept Sewerage Provisions

Council sewer is not presently available to the site or the surrounding area and as such on-site wastewater disposal will be required on each proposed lot. It is proposed that each lot will be serviced by On-site Sewage Management Systems (OSMS).

Each individual disposal system will need to comply with Council's '*On-site Sewage Management Strategy*' and the Department of Local Governments '*On-site Sewage Management for Single Households*'. The proposed lots are considered adequate in area to be able to contain an on-site wastewater treatment and disposal system. The details of the specific onsite wastewater system are dependent upon future dwelling location and household populations.

Mitchel Hanlon Consulting has undertaken a preliminary site assessment to determine the suitability of the lots contained within Stage 3 to be serviced via OSMS. The preliminary site suitability assessment is contained within Table 1.

It is noted that no site specific soil analysis has been undertaken and all values used are based upon assumed, expected or nominal values obtained from relevant NSW guidelines, Australian Standards and from data obtained from the surrounding area.

Table 1: Site Assessment:

FEATURE	MINOR LIMITATION	MODERATE LIMITATION	MAJOR LIMITATION	OBTAINED RESULT	COMMENT
Suitable Lot Area (> than 4,000m^2)	Yes	-	No	**Yes 10,000m^2**	*Minor Limitation*
Average Slope	<6	6-12	>12	**8**	*Moderate Limitation*
Landform	Crests, Convex slopes and Plains	Concave slopes & Foot slopes	Drainage Lines & Incised Channels	**Concave slope**	*Moderate Limitation*
Depth to Bedrock or Hardpan	>1.0	0.5-1.0	<0.5	**>1.0**	*Minor Limitation*
Depth to Watertable	>1.0	0.5-1.0	<0.5	**>1.0**	*Minor Limitation*
Buffer Distances Achievable	Yes		No	**Yes**	*Minor Limitation*
Soil Permeability	2b, 3, 4	2a, 5	1, 6	**5 – 6**	*Moderate to Major Limitation*

Based upon the above it is deemed that the operation of an onsite wastewater disposal system will have limited impact upon the surrounding environment and residents provided all appropriate operation and best practice principles are followed.

It is should be noted that the above mentioned provisions are concept only and are subject to significant change as a result of the design phase.

4.3.1.1 Buffer Distances

The following buffer distances are recommended within Table 5 of the *NSW Environment and Health Protection guidelines: On-site Sewage Management for Single Households*. The recommended buffer distances for the site are outlined in Table 2. It is noted that the final buffer distances will vary depending upon the type of system installed within each lot.

Table 2: Buffer Distances:

ON-SITE SEWAGE MANAGEMENT SYSTEM	RECOMMENDED BUFFER DISTANCES
All land application systems	• 100 metres to permanent surface waters (eg river, streams, lakes etc) • 250 metres to domestic groundwater well; • 40 metres to other waters (eg farm dams, intermittent waterways and drainage channels, etc)
Surface spray irrigation	• 6 metres if area up-gradient and 3 metres if area down-gradient of driveways and property boundaries • 15 metres to dwellings • 3 metres to paths and walkways • 6 metres to swimming pools
Surface drip and trickle irrigation	• 6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, property boundaries, driveways and buildings
Subsurface irrigation	• 6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, property boundaries, driveways and buildings
Absorption system	• 12 metres if area up-gradient and 6 metres if area down-gradient of property boundary • 6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, property boundaries, driveways and buildings

4.4 Electricity

It is our understanding that at present electricity power supply is supplied to Stage 1 and 2 via underground reticulation. As such, it is intended to service Stage 3 by the extension of the existing underground reticulation.

A suitably qualified consultant will be engaged to undertake the necessary electrical reticulation design upon the issue of a Development Consent.

Confirmation that a suitable electricity supply is available for each lot will be obtained from Essential Energy upon the issue of Development Consent.

4.5 Telecommunications

All telecommunication services will be provided via the extension of the existing telecommunication infrastructure located within the vicinity of the site.

A suitably qualified consultant will be engaged to undertake the necessary telecommunication design upon the issue of a Development Consent. Subsequent confirmation that a suitable telecommunications supply is available for each lot will be obtained from Telstra/NBN following the construction of the infrastructure and forwarded to Council.

5.0 References

Bath, Stewart Associates Pty Ltd 2006, *Statement of Environmental Effects (and associated documentation) – Anvil Hills Rural Residential Subdivision Development, 'Oatlands', 355 Nundle Road Piallamore NSW*.

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Mitchel Hanlon Consulting Pty Ltd (2014), Oaklands – Nunworth Pty Ltd – Stage 1 & 2 Work As Executed Survey, Nundle Road, Nemingha (DA0397/2008)

NSW Environment and Health Protection guidelines: On-site Sewage Management for Single Households.

NSW Department of Local Governments '*On-site Sewage Management for Single Households*'

Tamworth Regional Council, *Engineering Design Guidelines for Subdivisions & Developments, Version 5, November 2016.*

Tamworth Regional Council, *Tamworth Regional Development Control Plan 2010 (Amendment 10).*

Tamworth Regional Council, *Tamworth Regional Local Environmental Plan 2010.*

Tamworth Regional Council, '*On-site Sewage Management Strategy*' (2014)

Tamworth Regional Council, General Policy Register (2017), Policy 19.4 – '*Water – Requirements for Provision of Reticulation Supplying Treated Water Under Trickle Flow Conditions*.

Tamworth Regional Council, General Policy Register (2017), Policy 19.13 – '*Low Flow (Trickle Feed) Water Supply*'.

Appendix F Traffic Assessment

Seca Solutions Pty Ltd

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Suite 1, 161 Scott Street,
Newcastle NSW 2300
Ph: (02) 4032-7979
admin@secasolution.com.au

13 November 2017

P0921 Oaklands Estate Letter

Mitchel Hanlon Consulting Pty Ltd
121 Bridge Street
Tamworth NSW 2340

Attn: Tim Mclean

Dear Tim,

Re: Proposed Rezoning of land at Oaklands Estate, Nemingha, NSW

This assessment has been undertaken to support the proposed Stage 3 extension to the Oaklands Rural-Residential Estate, located off Nundle Road, Nemingha, NSW. The estate currently consists of the previously approved Stages 1 and 2 for the subdivision, which involved construction of 17 residential housing lots. It is noted that a further 6 lots contained within the approved Stage 1 were not constructed. The land pertaining to these lots is now incorporated within the area subject to this planning proposal, being the Stage 3 plan for the implementation of an additional 28 lots.

The available land for the development was reduced from 80 ha to 39 ha to ensure the protection of the Box-Gum woodland found to the rear of the site. In order to maintain the lot yield for the site the proposal entails amendment to the current minimum lot size under the Tamworth Regional Local Council Environmental Plan 2010 (TRLEP 2010), from 2 hectares to 1 hectare. The original consent for Stage 3 of the development (for which the DA has lapsed) was for an additional 17 lots. The proposed rezoning will involve an increase to 28 additional lots, however given that 6 lots for the earlier stages of the development were never constructed, there will only be a net increase of 5 lots for the overall development over that previously assessed and approved.

Council has advised the capacity of the local road network to cater for the proposed development (28 residential lots) needs to be assessed. This assessment has been undertaken with reference to the RMS Guide to Traffic Generating Developments as well as Austroads Guidelines, with the results outlined in this report.

1 Existing Situation

1.1 Site Location

The proposed development is to be located on Oakland Drive, Nemingha. The site is owned by Nunworth Pty Ltd and will form part of the existing Oaklands rural-residential estate development.

The location of the site is shown below in Figure 1-1.

Figure 1-1: Subject site in the context of the local road network

1.2 Site Access

Access to the proposed allotments will be provided via an extension to the existing road (Oakland Drive) in the front portion of the estate. Oakland Drive is a no through road which runs to the north off Nundle Road. Each lot will have its own access driveway off Oakland Drive.

1.3 Existing Traffic Conditions

1.3.1 Road Hierarchy

The main road through the locality is **Nundle Road**, which is a regional road providing one lane of travel in each direction along the majority of its length, with no provision for stopping due to narrow shoulders. Nundle Road connects with the New England Highway 4 kilometres to the west of the subject site, with two lanes provided for turn and through movements at this intersection. These include a designated left-turn only lane for travel south / west toward Tamworth, and a further lane which allows for through movements toward Railway Street and right turn movements onto the New England Highway for northbound travel, as shown in Figure 1-2 to follow. An acceleration lane is provided on the New England Highway for the left turn off Nundle Road, this lane is also utilised as a bus stop. The speed limit on Nundle Road approaching the intersection is 60km/hr.

Figure 1-2: Left turn lane on Nundle Road approaching the New England Highway

The **New England Highway** is a state classified road providing access from the proposed development site to Tamworth city centre, as well as being the major connection through region centres in NSW including Armidale to the north and Muswellbrook to the south. The posted speed limit on the New England Highway passing Nundle Road is 60km/hr. It provides one lane of travel in each direction through the locality, with channelled turn lanes provided for right and left turn movements onto Nundle Road and Railway Street (opposite) travelling in both directions.

Oakland Drive is a local road that runs to the north off Nundle Road, providing one lane of travel in each direction with minimal shoulder width and no kerb or guttering. It meets Nundle Road at a priority controlled intersection with all movements available. It provides vehicle access to the Oaklands Estate residential allotments constructed as part of Stage 1 and 2 of the proposed development. There is an internal road (Valleyview Grove) that runs off Oakland Drive that provides further access to some of the residential allotments. There are no pedestrian facilities provided, as well as no street lighting, reflecting the rural nature of the area. At the intersection with Nundle Road the road width has been extended, allowing sufficient space for two vehicles to be side by side for right and left turn onto Nundle Road if necessary, as can be seen in Figure 1-3 following.

The posted speed limit on Nundle Road at Oakland Drive is 100km/hr, with no street lighting provided at this intersection. Travelling eastbound on Nundle Road a channelled turn lane is provided for left turns into Oakland Drive, beginning 120 metres before the intersection. Approaching westbound an auxiliary turn treatment is provided for the right-turn into Oaklands estate, as can be seen in Figure 1-4 following.

Figure 1-3: Oakland Drive looking north at the intersection with Nundle Road

Figure 1-4: Nundle Road to the west at the intersection with Oakland Drive

1.3.2 Roadworks

Road upgrades in the vicinity are undertaken by Tamworth Regional Council. Sections of Nundle Road have undergone general maintenance and surface rehabilitation in 2016 and early 2017. It has been advised that roadworks are currently being designed by Tamworth Regional Council for Nundle Road to the immediate east of the Oaklands Estate Access, with approximately 700 metres of the road to be modified.

1.3.3 Traffic Management Works

A review of Tamworth Regional Council and the RMS website shows there are no traffic management works currently underway in the vicinity of the subject site.

1.3.4 Pedestrian and Cyclist Facilities

There are no pedestrian or cyclist facilities provided on Oakland Drive or Nundle Road in the vicinity of the subject site.

1.4 Traffic Flows

As part of the project work, Seca Solution collected traffic data to obtain current traffic movements in the area during the typical afternoon peak period. Surveys were conducted on Wednesday 28th June 2017 in two locations, as detailed below:

Oakland Drive and Nundle Road

Traffic was observed at the intersection of Oakland Drive and Nundle Road, being the residential estate access. The survey was undertaken from 4:00 to 5:30PM to determine traffic flow passing the proposed development access and typical turning demands.

Nundle Road and the New England Highway

Traffic was observed at the intersection of Nundle Road and the New England Highway mid-afternoon (3.30pm) to gain an understanding of the current operation of this major intersection.

1.4.1 Peak hour flows

Oakland Drive and Nundle Road:

The traffic survey undertaken at the intersection of Oakland Drive and Nundle Road indicates a peak hour from 4:30 – 5:30PM, with the vehicle movements shown in Figure 1-5 below.

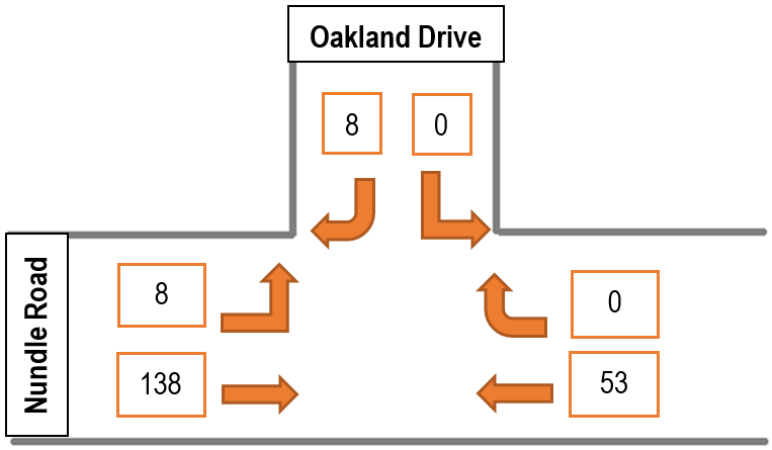


Figure 1-5: Recorded peak hour traffic flows at Oakland Drive and Nundle Road intersection

It can be seen from Figure 1-5 that there were a total of 207 vehicle movements recorded along Nundle Road, with a dominant flow eastbound in the PM. This reflects employment and schooling to the west of this location. It is anticipated that flows would be tidal with the opposite occurring during the morning peak.

Traffic movements associated with Oakland Drive had an origin/destination to the west with no eastbound traffic associated with the site during the survey period.

Nundle Road and the New England Highway:

Traffic observations on the New England Highway at Nundle Road showed that flows from Railway Street were minimal whilst flows on Nundle Road were in the order of 35% of the two way flows on the highway. Flows on the highway eastbound were in the order of 738vph whilst westbound flows were in the order of 400vph. Demand for right turns into Nundle Road and left turns out of Nundle Road were similar in volume whilst the demand for right turns out of Nundle Road represents approximately 25% of the northbound traffic.

The most popular turn movement was the left turn off Nundle Road with the acceleration lane on the highway allowing for this movement to be completed efficiently with minimal delays or queues.

1.4.2 Daily traffic flows

Peak hour flows typically represent 10% of the daily traffic flows. Therefore, traffic flow along Nundle Road in the vicinity of the subject site would be in the order of 2,070 vehicles per day.

1.4.3 AADT Data

Traffic data was recorded by the RMS in 2007 and again in 2011, on Armidale Road 410 metres west of the New England Highway (count station Id: 92175). This count station is located 1.25 kilometres to the west of the New England Highway intersection with Nundle Road. The two-way counts recorded are listed below in Table 1.

Table 1: RMS AADT data

	Vehicles per day Eastbound	Vehicles per day Westbound	Total Flow
2007	3,942	3,864	7,806
2011	4,538	4,706	9,244

It can be seen that in the four years between data collection the total traffic flow along this section of the New England Highway increased from 7,806 to 9,244 vehicles per day. This equates to an 18.4% increase in flows over the four year period. Assuming growth has remained constant at 4.6% per annum, the two-way flows in this location for 2017 would be in the order of 11,975 vehicles per day.

1.4.4 Daily traffic flow distribution

A review of the traffic survey shows that there is a dominant flow eastbound along Nundle Road in the PM, likely representing commuters travelling home from work in the Tamworth CBD. Based on AADT flows are generally evenly distributed throughout the day.

1.4.5 Existing Site Flows

The two way flow along Nundle Road immediately west of the site access was 207 vehicles in the afternoon peak. There were minimal movements recorded along Oakland Drive during the survey, with 8 vehicles observed turning right out of Oaklands Estate onto Nundle Road and 8 vehicles turning into the estate from the west.

Of the approved 23 lots for the previous stages of the development, 17 have been constructed. It has been noted that both Lot 5 and Lot 10 have since been subdivided into two lots, however both currently contain only one dwelling. Lot 12 from the initial stages is currently vacant, as such the existing site flows relate to 16 residential dwellings. Applying the RMS Guide traffic rate for residential dwellings the traffic flows associated with Stage 1 and 2 of the development could be in the order of 14 trips in the peak hour.

1.4.6 Current Road Network Operation

The estate access operates well, with low traffic flow through the locality. Vehicles turning onto Nundle Road from Oakland Drive are able to do so with minimal delays given the low traffic flows, meaning large and frequent gaps are available to ensure drivers can undertake turning manoeuvres safely.

The intersection of Nundle Road and the New England Highway has much higher traffic flows. From observations on site traffic flows well at this intersection, with minimal queueing occurring. Drivers can utilise adequate gaps in traffic flow along the New England Highway to undertake turning manoeuvres without taking unnecessary risks.

1.5 Traffic Safety and Accident History

A review of accident data provided by Transport for NSW Centre for Road Safety shows there has been 10 accidents recorded along Nundle Road, from the intersection with Springhill Drive (east of the site) to the New England Highway, in

the period between October 2011 and September 2016. No accidents were recorded at the intersection of Oakland Drive and Nundle Road, whilst three of these accidents occurred at the intersection of Nundle Road and the New England Highway. Of these, two related to right turns off Nundle Road onto the New England Highway which resulted in collision with a vehicle travelling westbound on the highway (right-near collision). The other accident related to a through movement off Nundle Road toward Railway Street that resulted in collision with a vehicle travelling westbound on the highway.

There have been no accidents recorded at this intersection since April 2015, as such it is considered that there are currently no safety concerns in this location.

1.6 Public Transport

The locality is not serviced by regular public transport, with a bus stop located near the intersection of Nundle Road and the New England Highway 4 kilometres to the west of the proposed development. An internal bus bay is also provided on both sides of the road on Oakland Drive, for set down and pick up, at a distance of 100 metres from the intersection with Nundle Road.

A school bus for the nearby Nemingha Public School operates along Nundle Road. This bus was observed to stop in the channelled left turn lane approaching Oakland Drive for set down.

2 Proposed Development

2.1 The Development

The plans for Stage 3 of the development (Attachment A) propose the construction of 28 residential allotments, to be provided in addition to the existing Oaklands Estate development. There was previous approval for Stage 3 of the development (DA0193/2010), which provided for 17 lots, this DA lapsed in 2015. The consent for Stages 1 and 2 of the development included approval for 23 rural residential allotments, of which only 17 were constructed. The new proposal for Stage 3 incorporates the area previously relating to the 6 lots that were approved, but not constructed.

As such, this proposal entails an increase of 5 lots over the previously assessed and approved development applications.

2.2 Access

Access into the residential estate will operate using Oakland Drive as per the existing situation, with the road to be extended to provide access to the proposed residential lots.

2.2.1 Sight Distances

There is good road alignment provided at the intersection of Oakland Drive and Nundle Road. Visibility for exit onto Nundle Road to the west is 200 metres as shown in Figure 2-1 below, with visibility to the east being 250 metres as shown in Figure 2-2 to follow.

Figure 2-1: Sight distance out of Oakland Drive to the right (west) along Nundle Road

Figure 2-2: Sight distance out of Oakland Drive to the left (east) along Nundle Road

There is no posted speed limit on Oakland Drive, however the road was designed to cater for a speed limit of 80km/hr plus. For this travel speed along the minor road (Oakland Drive), Austroads Guide to Road Design – Part 4A specifies an approach sight distance (ASD) of 114 metres, which is satisfied with 250 metres of ASD available along Oakland Drive. A minimum gap sight distance of 139 metres is required for the critical right-hand turn movement from Oakland Drive, which is satisfied with minimum visibility of 200 metres in each direction.

Safe intersection sight distance (SISD) provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation. Along the major road (Nundle Road) SISD of 248 metres is specified for the posted speed limit of 100km/hr. This requirement is satisfied to the east with 250 metres available however, sight distance to the west is only 200 metres. This sight distance is only adequate up to vehicle speeds in the order of 90km/hr. The RTA Road Design Guide (Section 2.1) provides values for stopping sight distance, which is the minimum distance required by an average driver of a vehicle to react and stop before reaching an object in the vehicle path. For the design speed of 100km/hr the maximum total stopping distance required is 175 metres, which is available along Nundle Road in this area.

A review of the accident data found no accidents relating to vehicles movements have occurred at this intersection. This is an existing recent intersection approved by the road authority and whilst the desirable intersection sight distance is not available, with the stopping sight distance available this means the intersection can continue to operate in a safe manner.

It can't be the responsibility of this project to upgrade this intersection to allow for full sight distance. The road authority could consider installing signage to warn of intersection ahead.

Figure 2-3 Signage to warn of intersection ahead

2.2.2 Service Vehicle Access

The proposed development will require access for waste collection services and occasional servicing, eg removalist vans. The existing road is designed to cater for the relevant service vehicles with the extension of Oakland Drive to be completed to the same specifications, including sufficient area at the end of the road for service vehicles to turn around.

2.3 Circulation

There are two roads in Oaklands Estate, both of which allow for two-way movements but provide no through passage. Valleyview Grove runs off Oakland Drive to the east and terminates in a cul-de-sac allowing for vehicles to turn around efficiently. Oakland Drive currently terminates in a similar manner as shown in Figure 2-4 however, the proposed development involves an extension of this road to provide access to the additional lots. The new road will also be designed to allow vehicles to turn around efficiently, in one movement, at the dead end of Oakland Drive.

Figure 2-4: Current road layout at the end of Oakland Drive (looking north)

3 Transportation Analysis

3.1 Traffic Generation

The development has been assessed against the RMS Guide for Traffic Generating Developments. The updated guidelines published by the RMS (TDT 2013 04a dated August 2013) indicate that for low density residential developments in regional areas, based on the proposed lot area, the traffic generation rates during the typical morning and afternoon peak periods are:

- 0.71 per dwelling in the AM peak (max 0.85)
- 0.78 per dwelling in the PM peak (max 0.90)
- 7.4 per dwelling per day

For the proposed development of 28 lots this gives

- 20 vehicle movements in the AM peak,
- 22 in the PM peak; and
- 208 vehicles per day.

3.1.1 Daily and Seasonal Factors

No seasonal variation is expected.

3.1.2 Pedestrian Movements

Given the isolated locality of the subject site, the proposed development is considered to be a very low generator of pedestrian movements.

3.2 Traffic Distribution and Assignment

It is considered the vast majority of traffic movements associated with the development will be to / from the west of the site, with minimal demands to the east. This is due to the presence of the New England Highway 4 kilometres to the west, which provides access to a range of regional centres including Tamworth, which is located approximately 10kms to the west of the subject site.

For the purpose of this assessment, it is assumed that all outbound trips from the proposed development will be to the west and will utilise the connection to the New England Highway. It is considered that any demand for trips to the east of the subject site can be easily accommodated by the existing road network given the minimal traffic flow in this rural area.

3.2.1 Origin / destinations assignment

The following distribution of development related traffic has been assumed at the intersection of Nundle Road and the New England Highway:

Outbound Traffic

- 70% of vehicles turn left at the New England Highway (toward Tamworth CBD)
- 30% of vehicles turn right at the New England Highway

The above figures correspond to the survey data at this intersection where 71.4% of vehicles turned left, 27.1% of vehicles turned right and just over 1% of vehicles undertook the through movement.

Inbound Traffic

- 70% of vehicles turn right onto Nundle Road, off the New England Highway
- 30% of vehicles turn left onto Nundle Road, off the New England Highway

3.3 Impact on Road Safety

The additional traffic flows associated with the development of the subject site will have a minimal impact upon traffic safety. From observations on site, the intersection of Oakland Drive and Nundle Road currently operates well, with safe movements able to be undertaken given the low traffic flow in the area and frequent gaps available.

The additional traffic flow at the intersection of Nundle Road and the New England Highway is not expected to significantly impact the operation of this intersection, which currently operates in a safe manner with no accidents occurring since 2015.

3.4 Impact of Generated Traffic

3.4.1 Impact on Daily Traffic Flows

From the traffic survey conducted, traffic flows along Nundle Road in the area passing Oakland Drive are in the order of 2,070 vehicles per day. The proposed development is expected to generate 208 additional vehicle movements per day along Nundle Road, resulting in a 10% increase in traffic flow in this location. This increase will have minimal impact upon the daily traffic flow along Nundle Road, which currently operates well within its capacity as a rural road.

The New England Highway at Nundle Road, offering one lane of travel in each direction undivided, currently operates well within its capacity with two-way hourly vehicle movements determined to be in the order of 1362 vehicles. Allowing the additional 22 movements associated with the proposed development will not have a significant impact upon these hourly flows and the performance of the highway in this location.

3.4.2 Peak Hour Impacts on Intersections

The traffic distribution for the 22 trips generated by the proposed development during the PM peak will be 18 inbound and 4 outbound movements, allowing for a standard 80/20 split for residential traffic inbound during the evening (which reverses in the morning). These movements will typically have an origin/destination to west and will impact on the intersection of Nundle Road and the New England Highway.

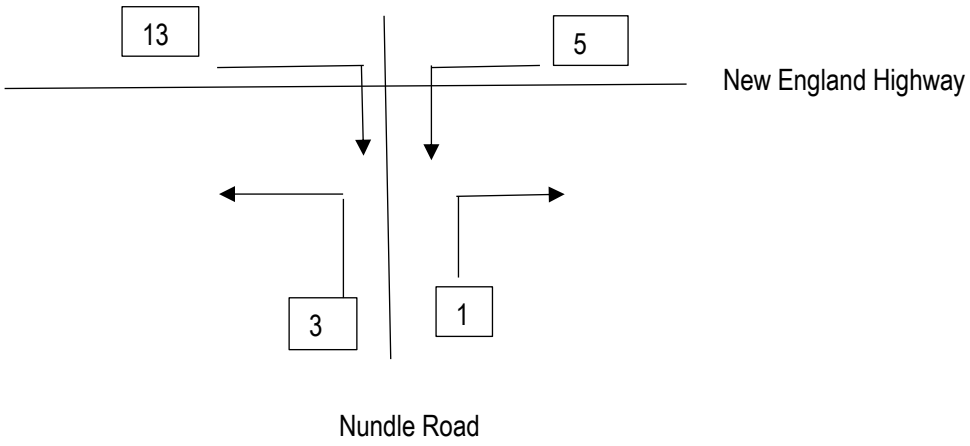


Figure 3-1 Peak hour (PM) development flows

The increase in turning movements at the intersection of Nundle Road and the New England Highway shall primarily impact in the afternoon when right turns into Nundle Road shall increase by 13 vph. This represents an increase of less than 5% over the existing traffic flows. The right turns are currently able to be accommodated without significant delay and these additional 13 vehicles shall not impact upon the road performance.

Left turn movements onto Nundle Road are currently in the order of 50 per hour during the evening, with the proposed development to generate an additional 5 left turn movements. This is a minimal increase in these movements.

Traffic flows at the intersection of Oakland Drive and Nundle Road are well within the capacity of this intersection with side road flows of less than 37 vph in the afternoon peak. Allowing for through traffic flows of 207 vph there is no requirement for Sidra analysis to assess this intersection.

3.4.3 Impact of Construction Traffic

The construction work will require a number of trucks to deliver materials to the site, and may potentially require heavy vehicles for land excavation. Given the road in this area currently has low traffic demands the additional flows related to construction work will be easily accounted for within the spare capacity. The proposed development is for a large portion of unoccupied land, as such it is considered there will be ample space for construction workers to park on-site.

3.4.4 Other Traffic

As mentioned previously, of the 17 lots constructed so far for the development, only 16 are occupied. It has also been noted that Lots 5 and 10 have been subdivided to provide two additional lots, however these lots currently contain only one dwelling. As such, there is the potential for additional vehicle movements associated with the development of these three approved but unoccupied lots. This would equate to a further 2-3 vehicles in the peak hour and 27 vehicles per day.

3.5 Public Transport

3.5.1 Options for Improving Services

Given the regional location of the development, it is not considered to be a high generator of public transport use. As such there is no need for improvement or extension of existing services.

3.6 Recommended Works

3.6.1 Improvements to Site Access

The estate access off Nundle Road currently services the existing residential dwellings associated with the earlier stages of the proposed development. This access currently operates efficiently with no safety concerns and it is considered this intersection will continue to offer an appropriate level of safety with the additional residential lots.

The existing auxiliary turn lane provided on Nundle Road travelling westbound past the subject site allows road users to pass a vehicle slowing to turn into Oakland Drive. This intersection was upgraded in conjunction with the earlier stages of development and this turn treatment required to accommodate the whole of the site development. Although the number of lots associated with Stage 3 has increased by 5 over those previously approved, the level of traffic generated remains minimal and this treatment is therefore still considered appropriate to accommodate the additional traffic associated with the implementation of Stage 3 for the development. This is further supported by the low volume of traffic utilising this lane, with no vehicles observed to undertake the right-hand turn manoeuvre during the survey. Therefore, this turn treatment is considered to provide an adequate level of safety for this intersection.

3.6.2 Improvements to Pedestrian Facilities

Given the isolated nature of the development there is no need to provide upgraded pedestrian facilities.

4 Conclusion

The additional traffic associated with the implementation of the proposed 28 residential lots will be easily accommodated by the existing road network. The site connection with the New England Highway operates well, a review of the accident data found no accidents have occurred since 2015, with only 3 recorded in the period between October 2011 and September 2016. Given the volume of traffic utilising this intersection it is considered to provide a good level of safety for road users, with the low flows generated by the proposed development not considered to have a significant impact on its current operation.

Nundle Road currently operates well with low traffic flow passing the subject site and will remain well within its capacity as a rural road with the additional traffic flow associated with the proposed development. The auxiliary turn treatment that currently exists at the intersection of Nundle Road and Oakland Drive has been upgraded as part of the earlier stages of this development and whilst no longer considered ideal by the RMS, given the low traffic flow through this area and the very low utilisation of this turn treatment, it is considered the intersection operates safely under its current configuration and will continue do so with the additional lots associated with Stage 3 of the development proposal.

The overall conclusion from the assessment is that access arrangements for the proposed development are sufficient and there are no traffic impediments to the development.

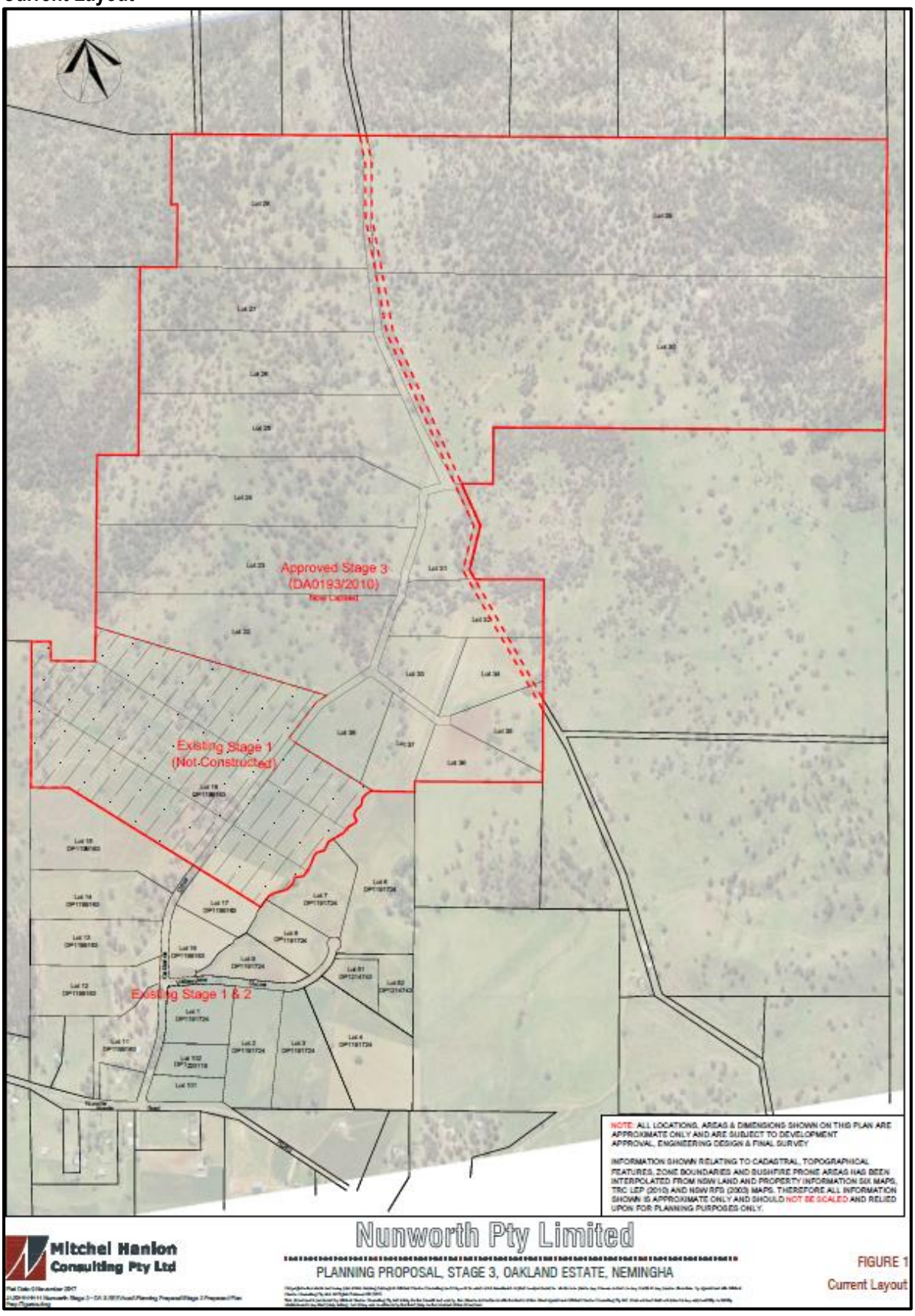
Yours sincerely

Sean Morgan

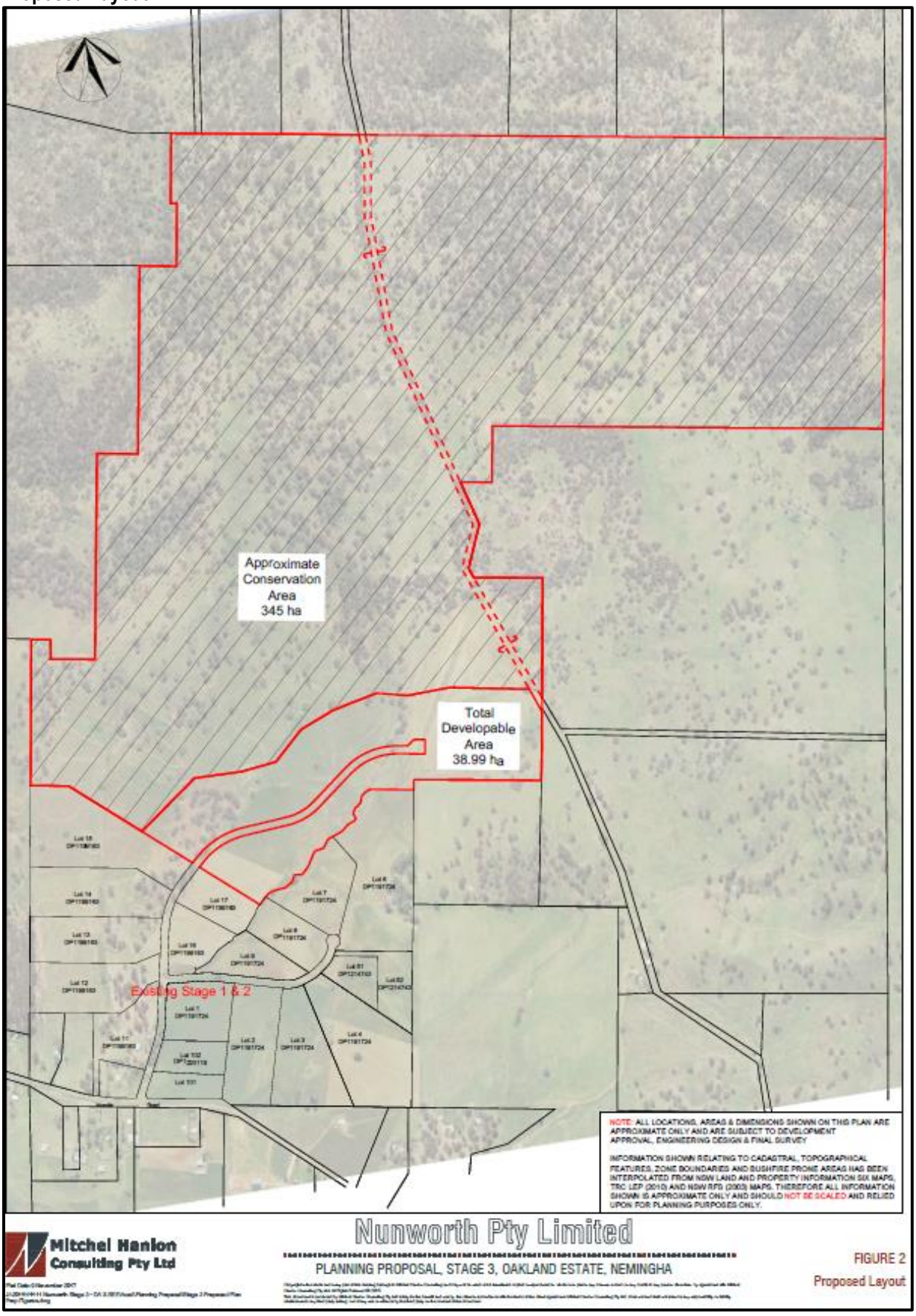
Director

Attachment A: Site Plans

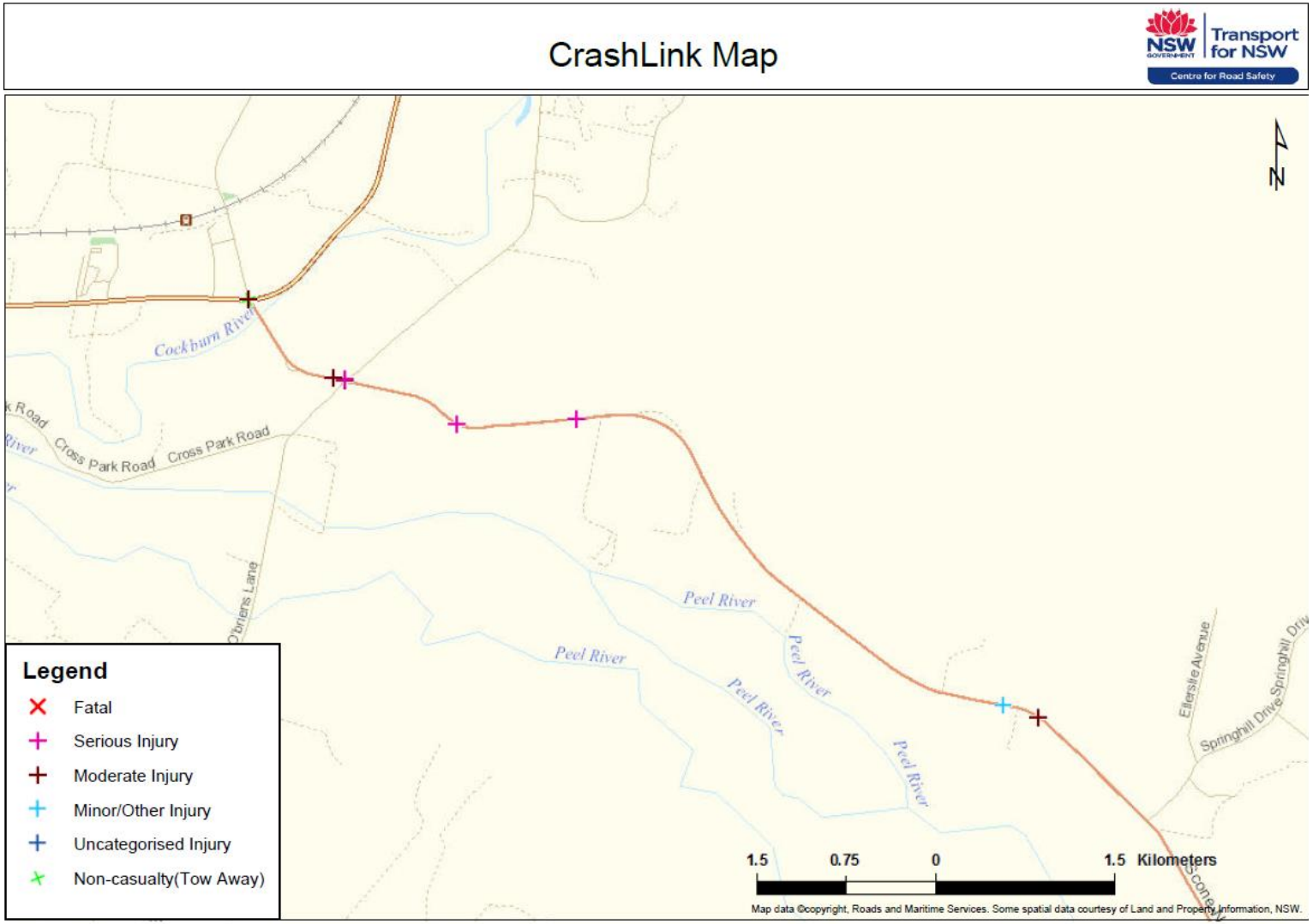
Current Layout



Proposed Layout



Attachment B: Accident Data



Nundle Road New England Highway Nemingha to Springhill Road

Detailed Crash Report

Transport for NSW
Centre for Road Safety

Crash No.	Data Source	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash-Detailed	Killed	Seriously Inj.	Moderately Inj.	Minor/Other Inj.	Uncateg'd Inj.	Factors
																									S F
Northern Region																									
Tamworth Regional LGA																									
Nemingha																									
New England Hwy																									
850349	P	25/08/2013	Sun	16:15		at	NUNDLE RD	XJN	CRV	Fine	Dry	60	2	CAR	M28	N in NUNDLE RD	20	Turning right	MC	0	0	1	0	0	
E52109814								RUM	13	Right near				CAR	F28	W in NEW ENGLAND HWY	60	Proceeding in lane							
1002490	P	31/10/2013	Thu	15:00		at	NUNDLE RD	XJN	STR	Fine	Dry	60	2	4WD	M69	N in NUNDLE RD	10	Turning right	MC	0	0	4	1	0	
E53424728								RUM	13	Right near				CAR	M33	W in NEW ENGLAND HWY	60	Proceeding in lane							
1067680	S	20/04/2015	Mon	16:00		at	NUNDLE RD	XJN	CRV	Overcast	Dry	60	2	CAR	M19	N in NUNDLE RD	Unk	Proceeding in lane	NC	0	0	0	0	0	
E58282567								RUM	10	Cross traffic				4WD	F66	W in NEW ENGLAND HWY	Unk	Proceeding in lane							
Nundle Rd																									
805915	P	19/07/2012	Thu	17:39		at	BACK KOOTINGAL RD	RDB	CRV	Fine	Dry	60	2	WAG	F37	S in BACK KOOTINGAL RD	10	Proceeding in lane	SC	0	1	2	3	0	
E48896729								RUM	10	Cross traffic				TRK	F28	E in NUNDLE RD	40	Proceeding in lane							
1107308	P	12/10/2015	Mon	07:45		at	BACK KOOTINGAL RD	RDB	STR	Fine	Dry	60	2	CAR	F22	S in BACK KOOTINGAL RD	40	Proceeding in lane	MC	0	0	1	0	0	
E58938305								RUM	10	Cross traffic				TRK	M54	E in NUNDLE RD	40	Proceeding in lane							
1086208	P	09/11/2015	Mon	19:00	3.4 km	E	BACK KOOTINGAL RD	2WY	CRV	Fine	Dry	100	1	CAR	F18	E in NUNDLE RD	100	Proceeding in lane	MC	0	0	1	0	0	S
E60468478								RUM	80	Off left/right bend															
1112591	P	28/07/2016	Thu	13:00		at	NUMBER 384 HN	2WY	STR	Fine	Dry	100	2	4WD	F47	S in NUNDLE RD	Unk	Turning right	OC	0	0	0	1	0	
E119369501								RUM	21	Right through				LOR	M44	N in NUNDLE RD	100	Proceeding in lane							
1080566	P	25/08/2015	Tue	08:50	500 m	E	OBRIENS LANE	2WY	CRV	Overcast	Dry	60	2	CAR	M77	W in NUNDLE RD	60	Proceeding in lane	SC	0	1	0	0	0	F
E58496052								RUM	81	Off left/rt bnd=>obj				TRK	M26	E in NUNDLE RD	Unk	Proceeding in lane							
																S/Barrier - Guardrail									
856846	P	03/11/2013	Sun	11:30	1 km	E	OBRIENS LANE	2WY	STR	Fine	Dry	60	2	TRK	M75	S in NUNDLE RD	20	Forward from drive	SC	0	2	0	0	0	
E53129361								RUM	47	Emerging from drive				M/C	M56	E in NUNDLE RD	60	Proceeding in lane							
781985	P	11/01/2012	Wed	12:10	30 m	W	OBRIENS LANE	2WY	STR	Fine	Dry	60	2	4WD	M35	W in NUNDLE RD	20	Incorrect side	MC	0	0	1	0	0	F
E48029255								RUM	20	Head on				LOR	M31	E in NUNDLE RD	50	Proceeding in lane							

Report Totals: Crashes: 10 Fatal Crashes(FC): 0 Serious Injury Crashes(SC):3 Moderate Injury Crashes(MC): 5 Minor/Other Injury Crashes(OC): 1 Uncategorised Injury Crashes(UC): 0 Non-Casualty Crashes(NC): 1

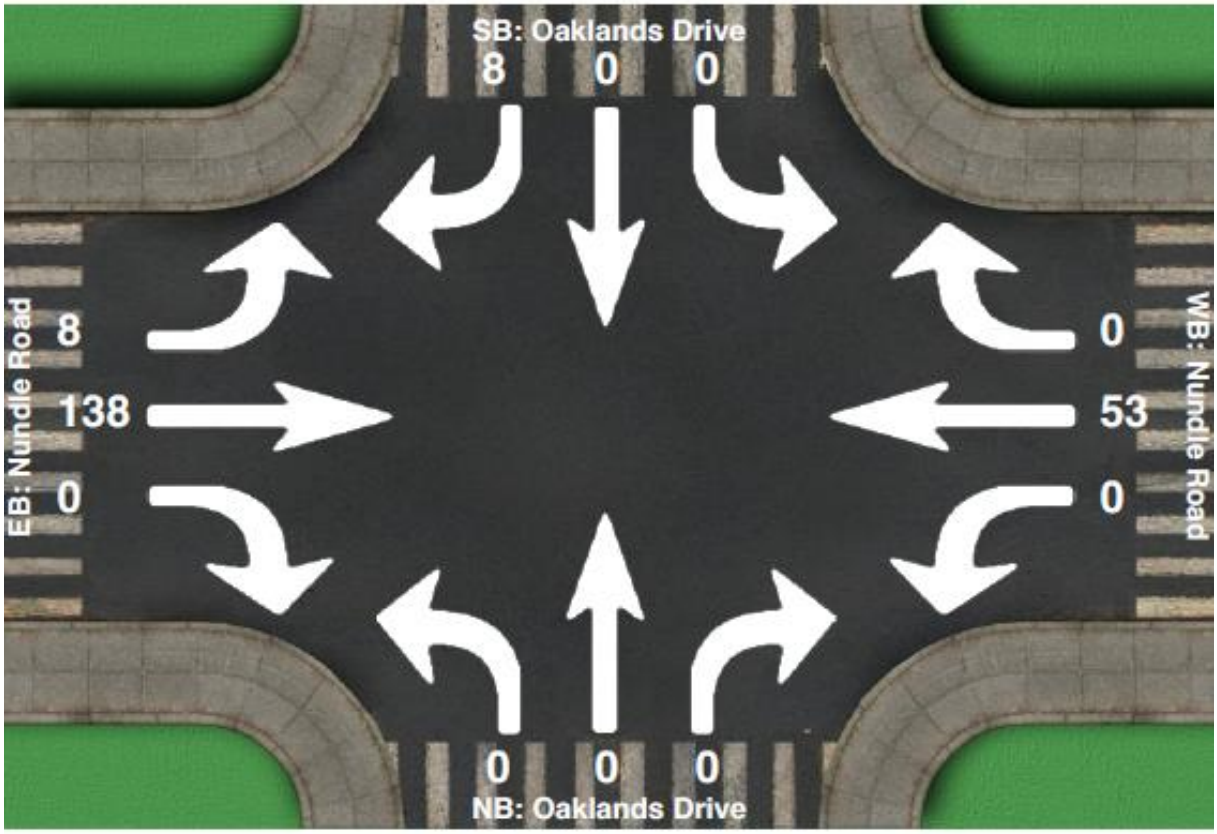
Killed(K): 0 Seriously Injured(S): 4 Moderately Injured(M): 10 Minor/Other Injured(O): 5 Uncategorised Injured(U): 0

Session dataset Tamworth Regional LGA all crashes for 01 Oct 2011 to 30 Sep 2016. Nundle Road New England Highway Nemingha to Springhill Road
Crash self reporting, including self reported injuries began Oct 2014. Trends from 2014 are expected to vary from previous yrs. More unknowns are expected in self reported data.
Reporting yrs 1996-2004 and 2017 onwards contain uncategorised inj crashes.

Attachment C: Traffic Survey Data

Intersection Peak Hour

Location: Oaklands Drive at Nundle Road, Tamworth
GPS Coordinates:
Date: 2017-06-28
Day of week: Wednesday
Weather: Raining
Analyst: TN



Intersection Peak Hour

16:30 - 17:30

	SouthBound			Westbound			Northbound			Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Vehicle Total	0	0	8	0	53	0	0	0	0	8	138	0	207
Factor	0.00	0.00	0.67	0.00	0.78	0.00	0.00	0.00	0.00	0.50	0.82	0.00	0.85
Approach Factor	0.67			0.78			0.00			0.81			

Appendix G Correspondence

Community Meeting Invitation – Mitchel Hanlon Consulting Pty Ltd; and

Draft Planning Proposal Comments – Tamworth Regional Council.

Oaklands
TAMWORTH
...owning your piece of paradise

COMMUNITY INFORMATION SESSION

Project Update for

Oaklands Development Stage 3

Friday 18 November 2016 between 4pm and 6pm

Onsite at Oaklands Estate at the cul-de-sac in Oaklands Drive, Nemingha

BBQ and refreshments will be provided

Come along and have the opportunity to meet the project team members, ask questions and receive information on the project

For further information contact Tim McLean at Mitchel Hanlon Consulting on 6762 4411

Mitchel Hanlon
Consulting Pty Ltd

REGIONAL COUNCIL
Tamworth

ABN: 52 631 074 450

More than just a city. More than just one place.

Mitchel Hanlon Consulting Pty Ltd
PO Box 1568
TAMWORTH NSW 2340

Dear Sir

PLANNING PROPOSAL FOR AMENDMENT TO MINIMUM LOT SIZE MAPPING, OAKLANDS ESTATE – STAGE 3, NUNDLE ROAD, NEMINGHA.

REQUEST FOR ADDITIONAL INFORMATION

Thank you for your application which seeks to amend the minimum lot size mapping, Oaklands Estate – Stage 3. A preliminary assessment of your application has been carried out and additional information is required to enable us to assess the application as follows:

Department of Primary Industries – Water (DPI)

A preliminary review of the proposal identifies a number of tributary streams (hydrological map attached) traversing parts of the southern portion of Lot 18 DP 1199163. It is considered, that the Department of Primary Industries – Water (DPI) should be contacted to discuss the planning proposal given the potential for the DPI to require an 80m wide riparian zone over the fourth order stream which runs along the south-east boundary. This may have a significant impact on the lot yield and the area of Lot 18 DP 1199163 identified for a reduction in the minimum lot size. If the planning proposal proceeds to a Gateway Determination, it is more than likely, referral to the DPI will be a requirement of the Department of Planning.

Servicing

Council require a preliminary servicing strategy to be prepared and submitted in conjunction with the planning proposal. The servicing strategy shall demonstrate the capacity of the existing trickle feed water network to cater for the additional allotments and the management of stormwater onsite and downstream. It is noted, that Onsite Sewerage Management System (OSSM) are utilised within Oaklands Estate - Stages 1 & 2.

Traffic

An assessment shall be undertaken on the capacity of the local road network to cater for the increased lot yield. The previously approved subdivision (DA0193/2010) for stage 3 included seventeen (17) residential allotments whilst the preliminary layout plan included as part of the planning proposal indicates twenty eight (28) residential allotments. The assessment of the likely traffic impacts shall be undertaken in accordance with the RTA's Guide to Traffic Generating Development.

To assist in the timely determination of the planning proposal, it would be appreciated if you would address the issues raised above as soon as possible.

It is advised that referrals remain outstanding and any issues arising from the referrals will be the subject of further correspondence.

If you have any enquires regarding this matter, please contact Council's Strategic Planning Division on the number below.

Yours faithfully

Genevieve Harrison
Manager – Strategic Planning

Contact: Mitch Gillogly (02) 6767 5462 or Email: m.gillogly@tamworth.nsw.gov.au

Reference: MG/SF8166

12 May 2017