Singleton Council - Planning Proposal for Lot 4 DP 533318 & Lots 31-33 DP 571275, Dalwood Road, Branxton – Revision 1 - August 2012 (File: LA4/2010)

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1. Introduction

This planning proposal identifies the potential issues associated with rezoning the subject land from Rural 1(a) to zones which will provide for residential and rural residential development and for conservation purposes. The information contained within the proposal explains the intended effect of the proposed amending LEP and the justification for making it.

In preparing this planning proposal Council staff have extensively used material submitted by JW Planning Pty Ltd in support of the rezoning request.

This planning proposal has been revised to include additional information requested by the Gateway Determination dated 22 December 2011 and clarified in subsequent meetings held with the Regional Office of the Department of Planning & Infrastructure.

2. Site Description

The legal description of the subject site is Lot 4 DP 533318 & Lots 31-33 DP 571275, Dalwood Road, Branxton. The site is irregular in shape and has an area of approximately 30 hectares. It could be considered as "infill" development since it adjoins existing rural residential development in the north, south, and west. It also adjoins existing urban residential to the south-west, in the Cessnock City Council LGA. The site has a total area of approximately 32 hectares, with a 440 metre frontage to Dalwood Road along its southern side.

The site is predominately cleared, but does contain some stands of vegetation, particularly in the northwest corner of the site and along drainage lines. The site falls gradually towards Dalwood Road and two 1st order drainage lines, with existing farm dams, drain the land in a southeasterly direction.

A dwelling is located within both Lots 31 and 32, and a redundant machinery shed is located within Lot 33.

The location of the subject site is shown in **Attachment 1.**

An aerial view of the property is provided in **Attachment 2**.

3. The Amending LEP

The following matters address the requirements of a planning proposal as detailed in the Department of Planning "A guide to preparing planning proposals".

3.1 Objective / Intended Outcomes

The objective of the planning proposal is to amend Singleton Local Environmental Plan (LEP) 1996 to permit (with consent) the subdivision of the subject land for residential, rural residential and conservation purposes.

The site has previously been considered for rural residential development (as part of preparation of the Singleton Rural Residential Development Strategy) but was considered more appropriately developed for urban purposes. Subsequently, in light of the Huntlee proposal and discussions with the Department of Planning, additional residential sites at Branxton were not included in the final Singleton Land Use Strategy 2008. However, the site has merit for residential development because:

- It adjoins existing development;
- It is located within three kilometres of the Branxton railway station and has access to the New England Highway;
- It will deliver new housing opportunities;
- Services are available;
- The owners are willing to proceed;
- Council is not in a position to amend its Strategy to review development at Branxton more broadly at this point in time.

The intended outcomes of rezoning the subject land are derived from the relevant Principles of the *Singleton Land Use Strategy (*adopted by Council, April 2008 and endorsed by DoP, June 2008*)*. The Strategy does not contain specific Strategic directions for urban development in the Branxton area, however, the directions for rural residential development are still largely relevant. These are:

- *rural residential development on small allotments should be provided with a* ***good quality water supply and the staging of the provision of this service should determine the sequencing*** *of developing additional areas;*
- ***development should be encouraged as close as possible to existing urban areas*** *in order to minimise the cost of providing essential services,*
- *reduce travel time and costs and to* ***improve accessibility to community services*** *for residents;*
- *a* ***balance should be achieved between setting land aside for future urban development and land for future rural residential development***
- *on the basis that* ***between 5 and 10 years' supply of land should be identified***
- ***land that is identified as potentially suitable for future urban development should not be developed for rural residential purposes*** ***as future re-subdivision would be difficult to achieve;***

In response to the Strategy Principles, the following outcomes are intended by the proposal:

- To ensure there is no disruption to the supply of affordable residential lots in Branxton (supply is likely to be exhausted in 2011 - refer **Section 4.1**);
- To ensure housing choice, price competition and product quality in Branxton by providing an alternative release area to those already identified in the Singleton and Cessnock Settlement Strategies, and the Lower Hunter Regional Strategy;
- To provide for the orderly roll-out of unconstrained land for housing in logical sequence with the most recent release of land for this purpose;
- To provide for the economic use of unconstrained land no-longer viable for agriculture;
- To access existing public and private infrastructure, reducing costs to the community and home buyers.

It is considered that the site can most appropriately support residential lots, including some rural residential lots, given the location of the site at the transition between rural, rural residential and residential land uses. The main riparian corridor through the site and the denser area of native vegetation in the north-west corner may be zoned for conservation. The actual zoning, internal zone boundaries and street and lot layout etc will be resolved as part of the planning proposal process.

A concept plan showing proposed zonings for the site is appended as **Attachment 6**. The consultant has estimated a yield of approximately 190 lots. This would consist mostly of residential lots with some larger transitional rural residential lots in areas adjoining existing rural residential development or proposed conservation zones. A minimum lot size map for the site would be developed, consistent with the proposed zones, with the assessment of the planning proposal.

3.2 Provisions

Although Council's Draft (Standard) Singleton LEP 2012 is currently on exhibition, it is not expected to take effect (be published on the NSW Legislation website) for another 12 months. Therefore, the rezoning proposal needs to be progressed as an amendment to Singleton LEP 1996.

It is anticipated that the draft LEP will be along the following lines:

1 Name of plan

This plan is *Singleton Local Environmental Plan 1996 (Amendment No ??).*

2 Aims of plan

This plan aims:

(a) to rezone land referred to in clause 4 from Zone 1 (a) (Rural Zone) to Zone 2 (Residential Zone), Zone 1(d) (Rural Small Holdings Zone) and Zone 7 (Environment Protection Zone) under *Singleton Local Environmental Plan 1996*,
(b) to provide a minimum lot size for lots resulting from the subdivision of the land,
(c) to require a development control plan to be prepared to the satisfaction of Council before consent may be granted to development on the land to which this plan applies.

3 Commencement

This Plan commences on the day on which it is published on the NSW legislation website.

4 Land to which plan applies

This plan applies to Lot 4 DP 533318 & Lots 31-33 DP 571275, Dalwood Road, Branxton, as shown edged heavy black on the map marked "Singleton Local Environmental Plan 1996 (Amendment No ??)" deposited in the office of Singleton Council.

Schedule 1 Amendment of Singleton Local Environmental Plan 1996

[1] Clause 9(1)How are terms defined in this plan?

Insert in the definition of "Lot Size Map" in appropriate order:

Singleton Local Environmental Plan (Amendment No ??) Sheet 2 Lot Size Map

Insert in the definition of "the map" in appropriate order:

Singleton Local Environmental Plan (Amendment No ??) Sheet 1

[2] Clause 14F

Insert after clause 14E:

14E What provisions apply generally to the Sedgefield Rural Residential development area?

(1) This clause applies to the following land:

Lot 4 DP 533318 & Lots 31-33 DP 571275, Dalwood Road, Branxton, as shown edged heavy black on the map marked "Singleton Local Environmental Plan 1996 (Amendment No ??)" deposited in the office of Singleton Council.

(2) Development consent must not be granted for any development on land to which this clause applies unless a development control plan has been prepared for the land in accordance with subclause (3).

(3) The development control plan must, to the satisfaction of Council:

(a) contain a subdivision layout plan that provides for the conservation, enhancement and regeneration of areas of native vegetation with significant biodiversity value (including riparian corridors), and
(b) contain provisions to conserve, enhance and encourage the regeneration of areas of native vegetation with significant biodiversity value (including riparian corridors), and
(c) contain a staging plan which makes provision for necessary infrastructure and sequencing to ensure that the development occurs in a timely and efficient manner, and
(d) provide for an overall movement hierarchy showing the major circulation routes and connections to achieve a simple and safe movement system for private vehicles and public transport, and
(e) contain stormwater and water quality management controls, and

(f) provide for amelioration of natural and environmental hazards, including bushfire, flooding, landslip, erosion, salinity, and potential contamination, and
(g) contain measures to conserve any identified heritage.

Attachment 3 illustrates the existing zoning of the Dalwood Road area, including the subject site.

Alternatively, if Council's Draft Standard Local Environmental Plan (LEP) were to be finalised prior to this planning proposal, Standard LEP would be amended in a similar fashion, utilising the Standard Instrument zones R1, R5 and E3.

3.3 Justification for Amending LEP

3.3.1 Section A - Need for the planning proposal

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

In liaison with the then Department of Planning (DoP) in finalising the Singleton Land Use Strategy 2008, Council was directed to avoid identifying land for residential development at Branxton, as the proposed Huntlee new town was to provide for all new residential development in the vicinity of Branxton. Otherwise, Council would have given consideration to providing for some residential development along Dalwood Road. This concept originated with the exhibition of the Draft Lower Hunter Regional Strategy in 2006, which identified a radius of three kilometres from railway stations, including Branxton, for consideration for residential development.

The proponent for the planning proposal has submitted a report which includes a strategic assessment of the Branxton area. Part of this is reproduced directly below:

> *This planning proposal serves two purposes. Firstly, it provides Council technical information and analysis of the subject land and a strategic residential land demand and supply analysis in the Branxton area to allow Council to consider the inclusion of the subject land into Singleton Land Use Strategy [2008] (currently undergoing review). Secondly, as a planning proposal, it is seeking to rezone the subject land parallel to Council's preparation of a comprehensive LEP – either as part of the comprehensive LEP, or as an amendment to the existing LEP.*
>
> *<u>Council Land Use Strategy</u>*
> *The planning proposal is a response to favorable comments by Council following a submission to the draft Singleton Land Use Strategy in 2007, and more recently, a submission made during Council's preparation of the comprehensive Singleton LEP.*
>
> *Consultants preparing the Land Use Strategy for Council noted the following in their 2008 report to Council in response to the 2007 submission:*
>
> *The Lower Hunter Regional Strategy supports the Huntlee proposal to provide for urban residential development in the Branxton area. [The site] needs further*

investigation as no documentary information is provided in relation to infrastructure servicing and development constraints.

In response to this view, and following discussions with Department of Planning and Council staff, additional investigations have been completed to allow for a full and proper assessment of the in-fill development prospect offered by the land.

In the 2007 submission to the draft Strategy, we identified that the site should be investigated for the purpose of urban infill development to ensure:

- *efficient sequencing and use of existing public and private infrastructure investment;*
- *reduced pressure to extend into un-serviced green field release areas to cater for predicted population growth;*
- *affordable development (given comparative advantages of the site and access to existing infrastructure) without lowering the standard of the built environment.*

Specific merits of the subject site, as noted in our former submission, include:

- *The site adjoins existing urban development, being land zoned 2(a) Residential under the Cessnock LEP (1989);*
- *The site is within 2km from the town centre of Branxton. Large portions of land between the site and the town centre are constrained by flooding and necessary odour buffers from a sewerage treatment plant and chicken farms (see **Figure 1**);*
- *Mapping prepared for the [draft] Singleton Rural Residential Development Control Plan (2004) (now repealed) illustrates that there is no physical constraint to the use of the land for urban purposes;*
- *The site has access to existing services and facilities within both the Singleton and Cessnock LGA's, reducing pressure on public and private funds to extend or provide new services and facilities; and*
- *Access to the subject area is already constructed, with two streets currently terminating (without cul-de-sac or turning head treatment) at the property boundary of Lot 4 clearly indicating Council's intention in the future of extending these streets into the subject land.*

The proposal is consistent with the Department of Planning's advice to Council concerning Branxton that states:

*"Via its local strategy, **Singleton Council should consider opportunities for intensifying** (or making minor adjustments to) **existing and proposed rural residential zones close to Branxton"**. (Singleton Land Use Strategy page 84)*

The 2007 submission to Council also identified the obvious shortcomings of relying on one primary release area (Huntlee under one land owner) for housing land supply:

a) *creating a monopoly on supply of housing to the market, which reduces the affordability, choice and quality of development which only comes from having competition from a number of release fronts;*
b) *delays in meeting housing demand given the inertia in providing new infrastructure to large new release areas, relative to infill development*

tapping into, or only requiring minor upgrades to, existing infrastructure (The LHRS makes allowance, and has a preference for, infill development within existing centres – this ensures maximum use of existing infrastructure and bolsters the existing population service levels); and

c) *Relying on one large release area at the exclusion of small infill opportunities is to place "all eggs in the one basket" in maintaining lot supply and remaining economically and socially sustainable in the interim and the future.*

The uncertainty and likely future delays of the Huntlee release area given recent court decisions vindicate these concerns.

Land Supply and Demand Analysis

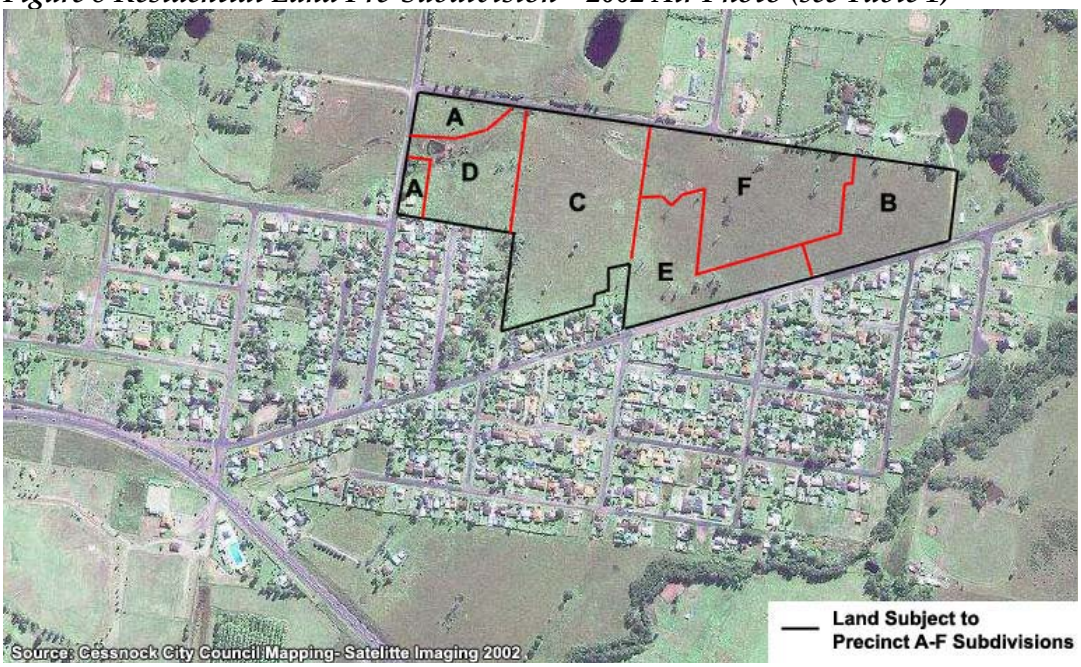
There is no information within the Singleton Land Use Strategy in relation to the actual existing demand for residential allotments in the Branxton Urban area. Our own investigations into the supply and demand for residential land in Branxton indicate that:

a) *demand for land in Branxton area is very strong (about 32 lots per annum) Indeed the demand for lots has accelerated with lot take up averaging 40 lots per year since 2008;*

a) *the supply of land is likely to be exhausted in 2011. This timing is consistent with that identified by Cessnock Council's City Wide Settlement Strategy (2003).*

Our analysis is based on an assessment of the broader Branxton area, where the only available low density residential land supply in Branxton since 1998 was found to immediately adjoin the subject site, a function of the constraints to development illustrated by ***Figure 1*** *(refer* ***Figure 8****).*

Figure 8 Residential Land Pre-Subdivision – 2002 Air Photo (see Table 1)



Annotated by JWP

Precincts A to F generally represent the parent lots subdivided to create conventional residential allotments during the period between 2004 and 2006. The lot 'take-up' during that period is illustrated in ***Figure 9***

Figure 9 Residential Land Subdivision & Take Up – 2008 Air Photo (see Table 1)

*Recent aerial photography taken in June 2010 illustrates the take up of allotments in the last two years (****Figure 10****).*

Figure 10 Residential Land Subdivision & Take Up – June 2010 Air Photo (see Table 1)

Table 1 Residential Subdivisions within Branxton

Precinct	*Plan Reg. No.*	*Lots Created*	*Year Lot Creation*	*Vacant Lots 2008*	*Vacant lots 2010*	*Lot Demand over 6 yrs*
A	*DP 1062013*	*16*	*3.2.2004*	*5*	*4*	*12*
B	*DP 1068504*	*30*	*25.6.2004*	*2*	*0*	*30*
C	*DP 1077419*	*54*	*30.3.2005*	*31*	*8*	*46*
D	*DP 1083192*	*34*	*11.7.2005*	*13*	*4*	*30*
E	*DP 1087580*	*29*	*9.9.2005*	*9*	*0*	*29*
F	*DP 1103185*	*46*	*29.6.2006*	*36*	*0*	*46*

	TOTAL SUPPLY	***209***		***96***	***16***	***193***

Table 1 *illustrates the lot demand over the 6 year period between 2004 (first lots created) and June 2010. If the subject site proceeds to a rezoning as a result of this Planning Proposal, the lead times involved in the rezoning, design, development consent and construction phases could supply land to the market significantly faster than Huntlee and the uncertainties of that proposal. This would help maintain an affordable residential land supply in Branxton.*

It is worth reiterating that the lot take-up rate identified in this report is consistent with the findings of the Cessnock City Wide Settlement Strategy (2003) which indicated demand would outstrip supply for residential land within Anvil Creek catchment (including Branxton) in 2011.

The lot take-up rate also correlates with the findings of the Macro Plan report prepared for the Huntlee proposed development, which notes that between January 2005 and August 2007, there were a total of 520 sales of houses (286) and land (234) within the Branxton and Greta areas, equating to an average of 17 sales per month (8 sales per month land only) (Macroplan Australia, 2007).

*Our research suggests that the forecast expiry of vacant land (12 months from now) is reliable and highly likely. There are very few vacant residential lots currently available within Branxton generally. Our observations are confirmed in advice received from Mr. Allan Jurd Director of Jurds Real Estate, Cessnock (**Attachment E** [of supporting JW Planning Pty Ltd Report]).*

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

The planning proposal is seen to be the most appropriate way to provide for the residential development of the site. It is best considered as a single amendment to the Singleton LEP 1996, since the timeframe for completion of Council's new comprehensive Standard LEP is very tight and tied to funding milestones. Attempting to include spot rezonings in Council's Standard LEP would risk extending the timeframe and making milestones unachievable. If the Standard LEP were to proceed to finalisation prior to this planning proposal, this proposal could then be converted to an amendment of the Standard LEP.

The consideration of this proposal concurrently with other rezoning requests is consistent with Department of Planning guidelines that seek to reduce the overall number of LEP amendments by requiring minor amendments to be grouped together. However, grouping should be left to the final stages to avoid unnecessary delays and complications.

Is there a net community benefit?

It is considered that support for the proposed rezoning, which has may have the potential to yield about 190 lots, would result in a net community benefit.

The net community benefits include:

- Safer, more cost effective and more sustainable travel to work, and improved living conditions through delivery of affordable housing land located close to places of employment demand (mines and associated industry related employment areas);
- Contributing to the social mix of Branxton and the Singleton LGA, helping to maintain a vibrant and sustainable community;
- Increase in eligible volunteers for community service;
- Contribution to the economic strength of Branxton through increased economic activity directly attributable to population growth;
- Multiplier effects throughout the region as a result of construction employment;
- Jobs in the supply industry as a result of construction activity; and
- Increased trade and economic activity in the surrounding area including more customers for the town of Branxton and existing businesses and services.

3.3.2 Section B - Relationship to strategic planning framework

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

There is no regional or sub regional strategy that applies to the subject land. However, there is a link to the Lower Hunter Regional Strategy 2006, in two ways.

Firstly, the Regional Strategy refers to the Huntlee urban development proposal, which straddles the local government boundaries of Cessnock and Singleton in the Branxton area. Secondly, the exhibited draft of the Regional Strategy identified the land (within 3 kilometre radius of the railway station) as having potential for urban development. On this basis the Sustainability Criteria from the Regional Strategy has been addressed in relation to the site as follows:

> Response to Sustainability Criteria – Lot 31, 32 & 33 DP 571275 and Lot 4 DP 533318
>
> 1. Infrastructure Provision
> *Mechanisms in place to ensure utilities, transport, open space and communication are provided in a timely and efficient way*
> Infrastructure provision currently exists in the sites context that can be extended into the subject site easily, subject to confirmation from Hunter Water. Any development of the land will involve the preparation of a developer agreement to ensure all required infrastructure is available to the subject site. See section 3.3.4 for further detail.
>
> 2. Access
> *Accessible transport options for efficient and sustainable travel between homes, jobs, services and recreation to be existing or provided*
> Development of the subject site and its context will assist in providing a transport network that will encourage more efficient provision of public transport. The site location in reasonable proximity to the services provided within Branxton, reducing the number and length of vehicle

movements required by any future residents of the subject site. Residential development of the subject site will significantly improve the catchment of Branxton that will further add to the viability of public transport servicing the area. **Attachment 7** shows how the site immediately adjoins residential land which has recently been developed in the Cessnock LGA. The proposal will have no negative impact on any sub regional road, bus, rail or freight network.

3. Housing Diversity

Provide a range of housing choices to ensure a broad population can be housed

The subject site will provide an opportunity for a diversity of housing options within the LGA. Housing types could range from smaller units or dwellings, through standard three or four bedroom dwellings to larger rural residential dwellings. Rezoning of the land will provide a significantly different location and community to the one provided within close proximity to Singleton and will also provide for development in two separate areas to ensure housing affordability is achieved.

4. Employment Lands

Provide regional/local employment opportunities to support the Lower Hunter's expanding role in the wider regional and NSW economies

The land is not considered suitable for the provision of employment land.

5. Avoidance of Risk

Land use conflicts, and risk to human health and life, avoided

The site is not within the 1 to 100 year floodplain (as depicted in **Attachment 8**), nor constrained by high slope or highly erodible soils. The use of the site for residential purposes will be consistent with the context of the site.

6. Natural Resources

Natural resource limits not exceeded/environmental footprint minimized

Site is not located in an area identified as being suitable for agricultural production, extractive industries or the like. Subject to confirmation, the land can be serviced with water infrastructure without creating an over burden on the existing supply system.

7. Environmental Protection

Protect and enhance biodiversity, air quality, heritage and waterway health

Any areas where vegetation currently exists will be assessed during the rezoning and Development Application processes to ensure all high quality habitat is retained post development of the land. Areas which may have significant biodiversity value, such as the native vegetation in the northwest corner and in the riparian corridor are proposed to be protected with a conservation zoning.

8. Quality and Equity in Services

Quality health, education, legal, recreational, cultural and community development and other Government services are accessible

An infill development opportunity provided by the subject site will ensure all services available within Branxton remain viable and will provide opportunities for the economic expansion of these services, where required.

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

Council adopted its Community Strategic Plan (CSP) in January 2012. The part of the Plan which is relevant to the planning proposal is "Our Places" found on page 23 of the Plan. The planning proposal is consistent with the CSP in that it proposes residential development as a natural extension to existing residential development, and will be able to utilise existing capacity in civil infrastructure and social services and facilities at Branxton.

The Singleton Land Use Strategy 2008 is the relevant (adopted and endorsed) local strategic plan under which the proposal should be considered.

The *Singleton Land Use Strategy* 2008 indicates that all demand for lots within Branxton will be supplied from the Huntlee proposal, effectively ruling out any further requirements for rezoning of land for residential purposes in this area.

However, both state and local governments have approved a significant number of employment generating developments, such as mines in the Upper Hunter, and large tourist developments in the Cessnock and Branxton area over the last 10 years. Despite the Huntlee proposal, there remains a shortfall in the supply of residential land required by current and future employees of these activities. This shortfall leads to higher land prices and higher housing costs which in turn affects the broader economy.

The identification of land, other than Huntlee, to provide for residential development in the Branxton area in the short to mid-term, will assist in the provision of affordable housing in the district.

The objectives of the Land Use Strategy 2008 for residential development are:

- *Singleton will have urban land that is zoned and serviced to meet projected housing needs up to 2032.*
- *Housing will vary in size and form to meet changing household formations and the needs of an ageing population.*

This planning proposal satisfies these objectives and therefore is consistent with the Strategy as follows:

- The area is identified for reticulated sewer and water provision (Hunter Water - Preliminary Service Advise, 2009) and would facilitate development contiguous with the urban areas of Branxton.
- The infill area has ready access to existing public and private infrastructure and should be sequenced to occur logically ahead of green field release areas.

- Due to the above points, the site will provide new residential land at reasonable development costs and hence affordable lots. This is the basis for meeting the varying needs of a changing population in a more sustainable manner.
- The proposal will contribute to the diversity of living areas available in the Singleton and Cessnock LGAs.

Is the planning proposal consistent with applicable state environmental planning policies?

State Environmental Planning Policy (Rural Lands) 2008 applies to the proposal. Clause 7 sets out eight "Rural Planning Principles" that must be considered in preparing any LEP amendments affecting Rural Lands.

1. *The promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas,*
2. *Recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State,*
3. *Recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development,*
4. *In planning for rural lands, to balance the social, economic and environmental interests of the community,*
5. *The identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land,*
6. *The provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities,*
7. *The consideration of impacts on services and infrastructure and appropriate location when providing for rural housing,*
8. *Ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.*

The proposal for the subject site addresses these principles as follows:

- The site has been identified in the Singleton Rural Residential Development Strategy (2005) (now repealed) as being not suitable for regular cultivation. The size of the site, combined with the constraints to ongoing agricultural activities (soil quality, proximity to residential dwellings preventing using of farming inputs including pesticides and fertilisers), precludes primary production significant to the local economy. The current use of the land for horse agistment reflects these factors.
- For the above reasons, any future owner wishing to pursue agricultural activities on the subject land would find it difficult to generate produce from the land and would be reliant on off farm income. In effect, the subject land is already used largely as "rural residential lots".
- Previous zoning and development decisions have lead to surrounding land being subdivided for rural residential and urban development. These lands and the subject land are likely to have common bio physical attributes that are not conducive to agricultural production.

- No natural resources would be adversely impacted by the proposal. The proposed environmental protection zoning over a portion of the site provides for the conservation of biodiversity.
- Urban services and infrastructure will be available.

Future residential development of the site has the potential to be affected by the following state environmental planning policies:

- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004.
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

Full consideration of the impacts of these policies will be considered at the development application stage.

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

Direction 1.2 – Rural Zones

The Direction requires that councils (including Singleton) must not rezone land from a rural zone to a residential, business, industrial, village or tourist zone.

> ***Objective***
> *The objective of this direction is to protect the agricultural production value of rural land.*
>
> ***Consistency***
> *A planning proposal may be inconsistent with the terms of this direction (the objective) only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:*
> *(a) justified by a strategy which:*
> *(i) gives consideration to the objectives of this direction,*
> *(ii) identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and*
> *(iii) is approved by the Director-General of the Department of Planning, or*
> *(b) justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or*
> *(c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or*
> *(d) is of minor significance.*

The Singleton Rural Residential Development Strategy (2005) identifies the subject land as Agricultural Suitability Class 3 – *Not suited to regular cultivation - some pasture & arable. Moderate production.* Not being suited for regular cultivation, its relatively small size and being largely surrounded by residential and rural

residential dwellings, means that the subject site is rural land with low production values. The proposal is therefore considered to be of minor significance, and that any inconsistency with Direction No 1.2 is fully justified.

Direction 1.5 – Rural Lands

The objectives of Direction 1.5 are to protect the agricultural production value of rural land and facilitate the orderly and economic development of rural lands for rural and related purposes. This Direction applies when a council prepares a planning proposal that affects land within an existing or proposed rural or environmental protection zones and when a planning proposal changes the existing minimum lot size on land within a rural or environmental protection zone.

The Direction states that this planning proposal must be consistent with the Rural Planning Principles listed in State Environmental Planning Policy (Rural Lands) 2008. This has been addressed in the previous section on State Environmental Planning Policies.

The Direction states that a planning proposal may be inconsistent with the terms of this direction only if Council can satisfy the Director-General of the Department of Planning that the provisions of the planning proposal that are inconsistent are:

- justified by a strategy that considers the objective of this directive, identifies the land and is approved by the Director-General, or
- is of a minor significance.

It is considered that the planning proposal is consistent with Direction No. 1.5

Direction 2.1 – Environment Protection Zones

> ***Objective***
>
> *The objective of this direction is to protect and conserve environmentally sensitive areas.*

To be consistent with this Direction, planning proposals are required to include provisions that facilitate the protection and conservation of environmentally sensitive areas.

Areas identified as being ecologically significant will be addressed by the amending LEP requiring relevant DCP provision to be prepared for the development of the site. The use of a conservation zone may also be considered.

The proposal is considered to be consistent with this Direction.

Direction 2.3 – Heritage Conservation

The objective of Direction 2.3 is to conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance. This direction applies when a council prepares a planning proposal.

The Direction states that a planning proposal must contain provisions that facilitate the conservation of:

- items, places, buildings, works, relics, moveable objects or precincts of environmental heritage;
- Aboriginal objects or Aboriginal places that are protected under the national Parks and Wildlife Act 1979; and
- Aboriginal areas, Aboriginal objects, Aboriginal places or landscapes identified by an Aboriginal heritage survey prepared by or on behalf of an Aboriginal Land Council, Aboriginal body or public authority and provided to the relevant planning authority, which identifies the area, object, place or landscape as being of heritage significance to Aboriginal culture and peoples.

The Direction states that a planning proposal may be inconsistent with the terms of this direction only if Council can satisfy the Director-General of the Department of Planning that:

- The environmental or indigenous heritage significance of the item, areas, object or place is conserved by existing or draft environmental planning instruments, legislation or regulations that apply to the land, or
- The provisions of the planning proposal that are inconsistent are of minor significance.

The planning proposal will not impact on any known item of environmental heritage. Further investigation would be required to establish whether there are any Aboriginal items or objects on site which require protection. It is possible that further investigation on this aspect of the planning proposal may be required.

It is considered that the planning proposal will be consistent with Direction No. 2.3.

Direction 3.1 Residential Zones

Objective

The objectives of this direction are:

(a) to encourage a variety and choice of housing types to provide for existing and future housing needs,

(b) to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and

(c) to minimise the impact of residential development on the environment and resource lands.

The proposal is considered to be consistent with this Direction.

Direction 3.4 Integrating Land Use and Transport

> ***Objective***
>
> *The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:*
>
> *(a) improving access to housing, jobs and services by walking, cycling and public transport, and*
>
> *(b) increasing the choice of available transport and reducing dependence on cars, and*
>
> *(c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and*
>
> *(d) supporting the efficient and viable operation of public transport services, and*
>
> *(e) providing for the efficient movement of freight.*

Residential development of the subject site will improve the permeability of the existing street network for walking, cycling and buses. This also means access to Branxton rail station and the Hunter rail corridor. This allows for greater viability of any existing and future public transport servicing the area.

The site provides relatively easy access to the large employment providers within the wine and coal industries that necessitate being located considerable distance from residential land uses. Large numbers of employees are required to travel from Maitland, Newcastle and Lake Macquarie to service these industries and an increase in available land within Branxton will assist in reducing the distances travelled for employment.

These issues will also be addressed in the provisions of the DCP which will be required to be prepared. It is therefore considered that the proposal is consistent with this Direction.

Direction 4.4 - Planning for Bush Fire Protection

The objectives of Direction 4.4 are 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 to encourage sound management of bush fire prone areas.

The Direction applies when a Council prepares a planning proposal that will affect, or is in proximity to land mapped as bushfire prone. The subject site is affected by Category 1, 2 and Buffer lands in the north. A small area in the south-east is affected by Buffer (see **Attachment 4**). The remainder of the site is free of bushfire hazard. It is envisaged that future development of the site will be able to

comply with Planning for Bushfire Protection 2006 and any subsequent proposal for subdivision will be support by a Bushfire Protection Assessment.

It is considered that the proposed rezoning is consistent with Direction No. 4.4.

Direction 5.1 Implementation of Regional Strategies

> ***Objective***
> *The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies.*

The proposal is consistent with the Lower Hunter Regional Strategy (see Relationship to Strategic Planning Framework section above), consistent with this Direction.

Direction 6.1 Approval and referral requirements

> ***Objective***
> *The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development.*

The Planning Proposal will not require the concurrence, consultation or consent of a minister or public authority, consistent with this Direction.

Direction 6.3 Site Specific Provisions

Objective
The objective of this direction is to discourage unnecessarily restrictive site specific planning controls.

No site specific planning controls are proposed, consistent with this Direction.

3.3.3 Section C - Environmental, social and economic impact

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 location of Endangered Ecological Communities on site is depicted in **Attachment 5**.

An ecological assessment has been prepared by Pacific Environmental Associates outlining the likelihood of endangered species, populations or communities occurring within the site. The assessment recorded one (1) threatened species, the Grey-crowned Babbler on the site. Habitat was also found for seven (7) other threatened species and one community which had affinities with the Central Hunter Spotted gum Ironbark Grey box forest, an Endangered Ecological

Community, and, as such the site could be seen as carrying a moderate level of conservation significance.

Surveys of vegetation communities using quantitative measures was limited by access to the entire study area. Surveys "over the fence" on Lot 4 were undertaken and this vegetation appears to be floristically and structurally more diverse than Lot 31-33.

The 7-part tests conducted on the species at risk concluded that the proposal would not have a significant impact provided the following recommendations are implemented:

- That regional planning incorporate the guidelines for regional species movements;
- The areas shown as conservation (see **Attachment 6**), being the heavy vegetation to the north-west and the main riparian corridor, should become reserved and rehabilitated to form "reserves" as part of the structure plan for the site;
- A best-practice erosion and sediment control plan would be developed;
- Appropriate stormwater and nutrient control systems would be incorporated into the proposal designed to reduce the effects of runoff and ensure water flowing off the proposal area is of a suitable quality;
- The construction site would be managed to ensure that there is no accidental incursions into areas which are not subject to the proposal; and,
- Any landscaping associated with the proposal would comprise of endemic native plants.

A copy of the report is provided at **Attachment C** of the supporting JW Planning Pty Ltd Report (see **Attachment 10**).

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

The site contains areas along drainage lines that may be locally flood liable, however, it is not shown as being affected by the 1:100 flood on Council mapping (see **Attachment 8**). It is not intended to develop these areas for residential purposes. The DCP required to be prepared by the amending LEP will include provisions to address this issue.
Bushfire buffers required for residential development will be determined during the preparation of detailed studies to accompany any future development applications, or additional information requested by the Minister. Any required APZ would be accommodated within each allotment, allowing for ongoing maintenance of the APZ without burden on public authorities.

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

The proposal is likely to only have positive social and economic outcomes, as indicated in the net community benefit test.

3.3.4 Section D - State and Commonwealth interests

Is there adequate public infrastructure for the planning proposal?

The proposal responds to the requirements for public infrastructure as follows.

Roads

The site is accessed from Dalwood Road, a typical rural road with no kerb and guttering. It is expected that the stretch of Dalwood Road fronting the site will be upgraded to be consistent with the treatment provided to this road within the adjoining residential development. This will include kerb and gutter and widening as deemed necessary.

Dalwood Road terminates at the New England Highway via an existing signalised intersection. It is unlikely that this intersection will require an upgrade following development of the site given the imminent construction of the F3 extension that will significantly reduce traffic loads moving through this intersection.

The bypass of Branxton by the Hunter Expressway will remove all regional traffic from the New England Highway such that local and district traffic will only use the latter highway.

Construction of the expressway will be complete by the end of 2013.
Branxton Interchange will be a full interchange.

Likely Traffic generation of some 190 residential lots at 9.0 vehicle trips per day (24hr) equals some 1710 trips. In accordance with RTA guidelines, some 25% of these trips will be local and within Branxton proper with the remainder dispersed onto the higher order roads including the Hunter Expressway via the Branxton interchange. It is anticipated that the removal of regional traffic from the New England highway and the increase of traffic from the proposed development will leave a traffic load upon the Dalwood Road intersection with the New England Hwy that would be less than it is currently. The circumstances indicate that local traffic issues would be best addressed at the DA stage. This and the satisfactory arrangements clause 40 in the Singleton LEP for infrastructure provision for urban release areas ensures that the need for infrastructure provision will be clarified and resolved through the planning proposal and DA processes.

This will also be true for the similar development proposed on the southern side of Dalwood Road, which would increase the above lot estimate and vehicle trips by approximately 50%.

Water and Sewer

Correspondence from Hunter Water dated June 2009 was lodged with the planning proposal in relation to sewer and water servicing of the proposal. The advice indicates that, subject to detailed investigations, the site will be afforded water servicing following the upgrade of the Maitland-North Rothbury water supply system, scheduled to be completed in 2013.

Some capacity does exist for the site to be serviced with sewer, however should additional capacity be required it will be available following the upgrade of the Branxton Waste Water Treatment System that is proposed to be completed by 2011.

Council has sought updated comments from Hunter Water, which were received 5 July 2012. These comments confirm that Hunter Water expects that there will be sufficient capacity to service the proposed development. Some developer funded upgrades may be required, but Hunter Water expects that these would not compromise the potential of the proposed development (see **Attachment 9**).

Electricity and Telecommunications Services
It is expected that the existing telecommunications and electricity networks servicing the site and adjoining development are able to be augmented to support the proposal.

Waste Management and Recycling Services
The proposed development will serve to improve the viability of the existing waste disposal services afforded within the adjoining rural residential development.

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

A response to this Section can be provided following the gateway determination.

3.4 Community Consultation

The gateway determination will specify the community consultation requirements for this planning proposal.

4. Conclusion

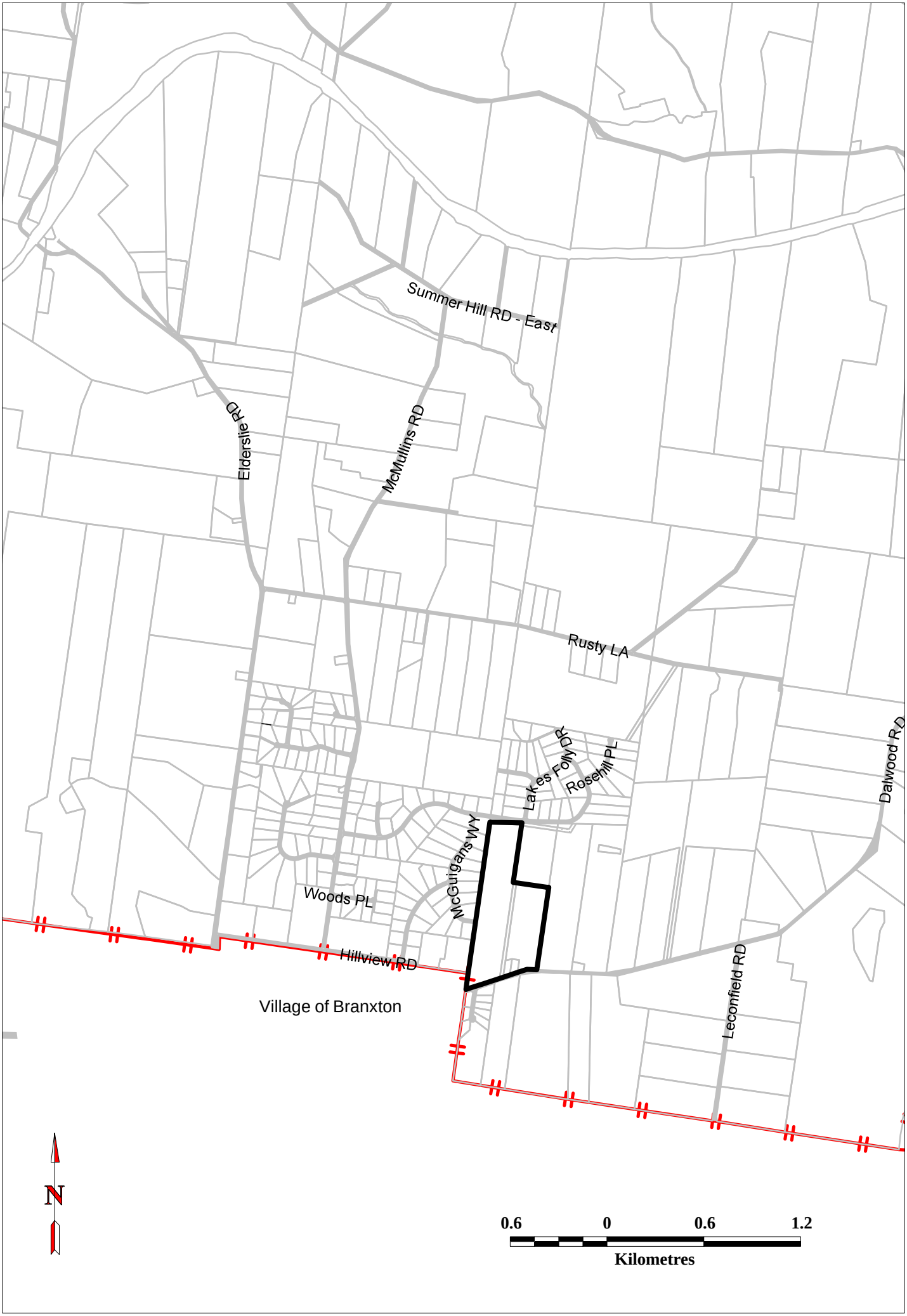
The planning proposal is generally consistent with the Council adopted and Department of Planning endorsed Singleton Land Use Strategy 2008. Although the site is not specifically identified in the Strategy, the proposal generally falls within the sustainability criteria for both the Land Use Strategy and the Department of Planning's Lower Hunter Regional Strategy 2006 for small sites (less than 50 hectares).

The site was identified as a Candidate Area for rural residential development in an earlier draft of Council's former Rural Residential Development Strategy 2005, but was subsequently excluded in consultation with the Department of Planning on the grounds of its future potential for urban residential development.

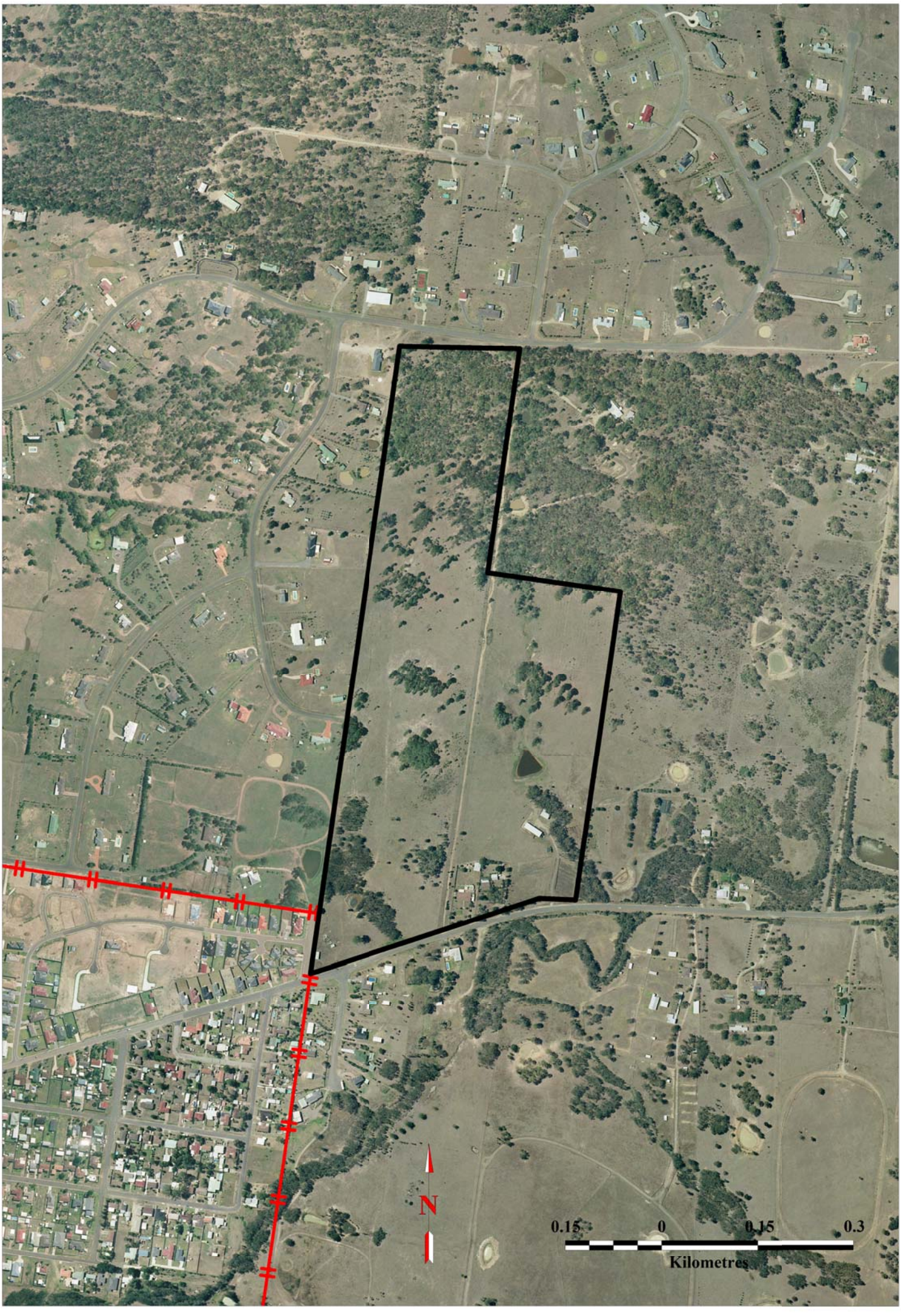
The supply and demand analysis presented by the consultant for the proponent (JW Planning) and quoted in this planning proposal indicates a strong need for further residential land in this area in the short term.

The preliminary investigations undertaken for this planning proposal indicate that the subject site is suitable for rezoning for residential / rural residential purposes, with minimum constraints to development.

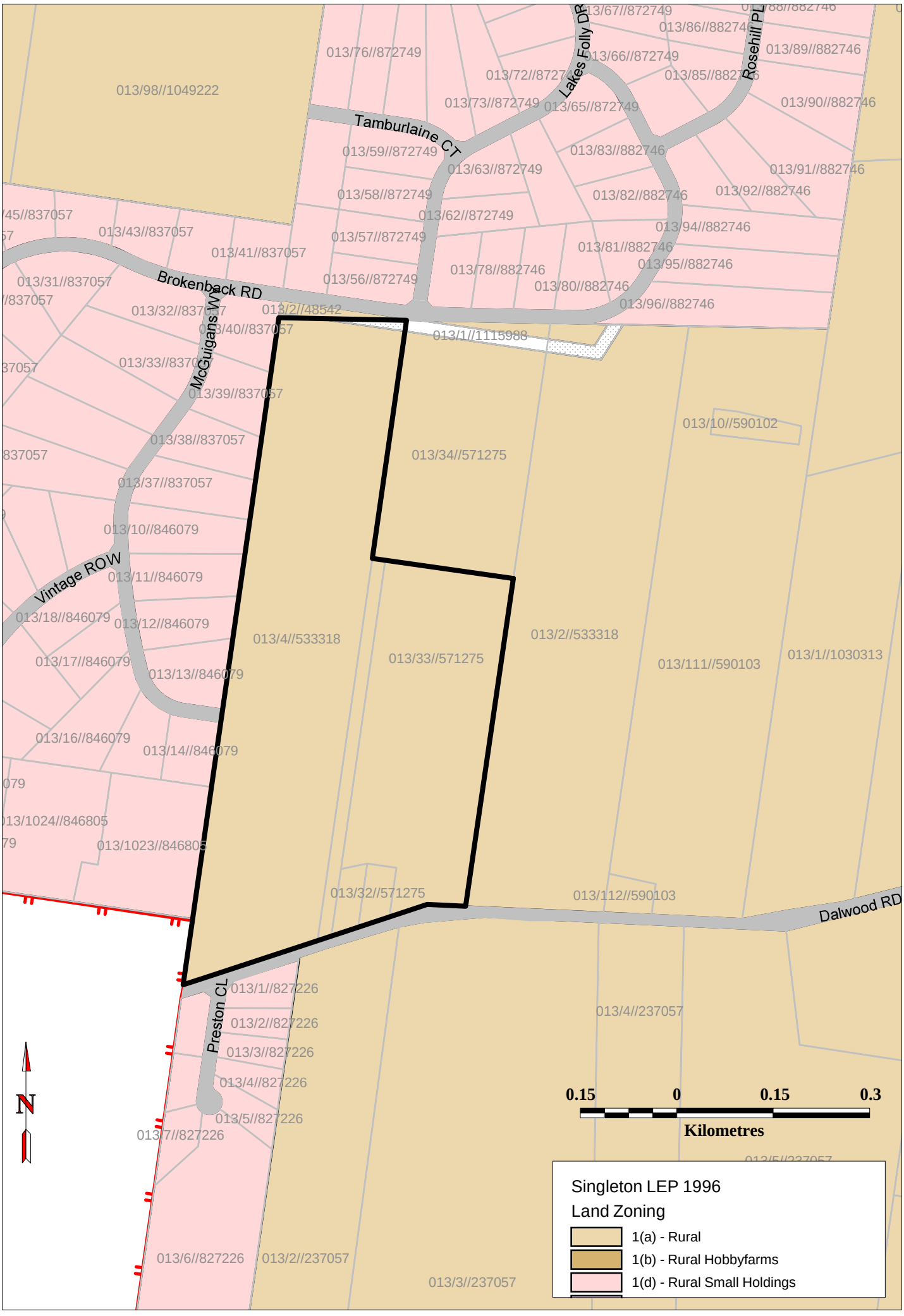
ATTACHMENT 1 - LOCALITY PLAN - SINGLETON 1996 LEP AM - LA4/2010



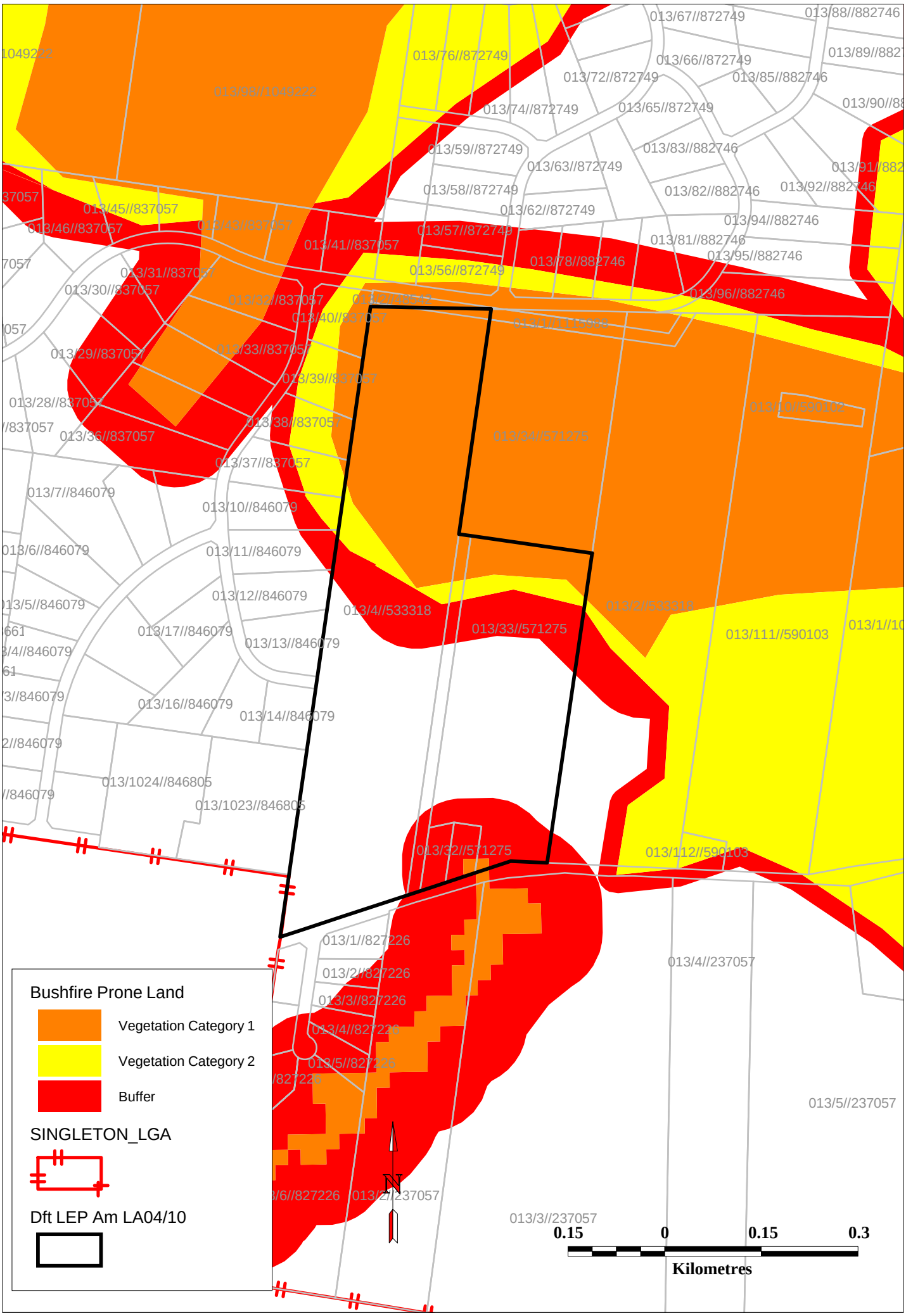
ATTACHMENT 2 - AERIAL VIEW - SINGLETON LEP 1996 AMENDMENT- LA 4/2010



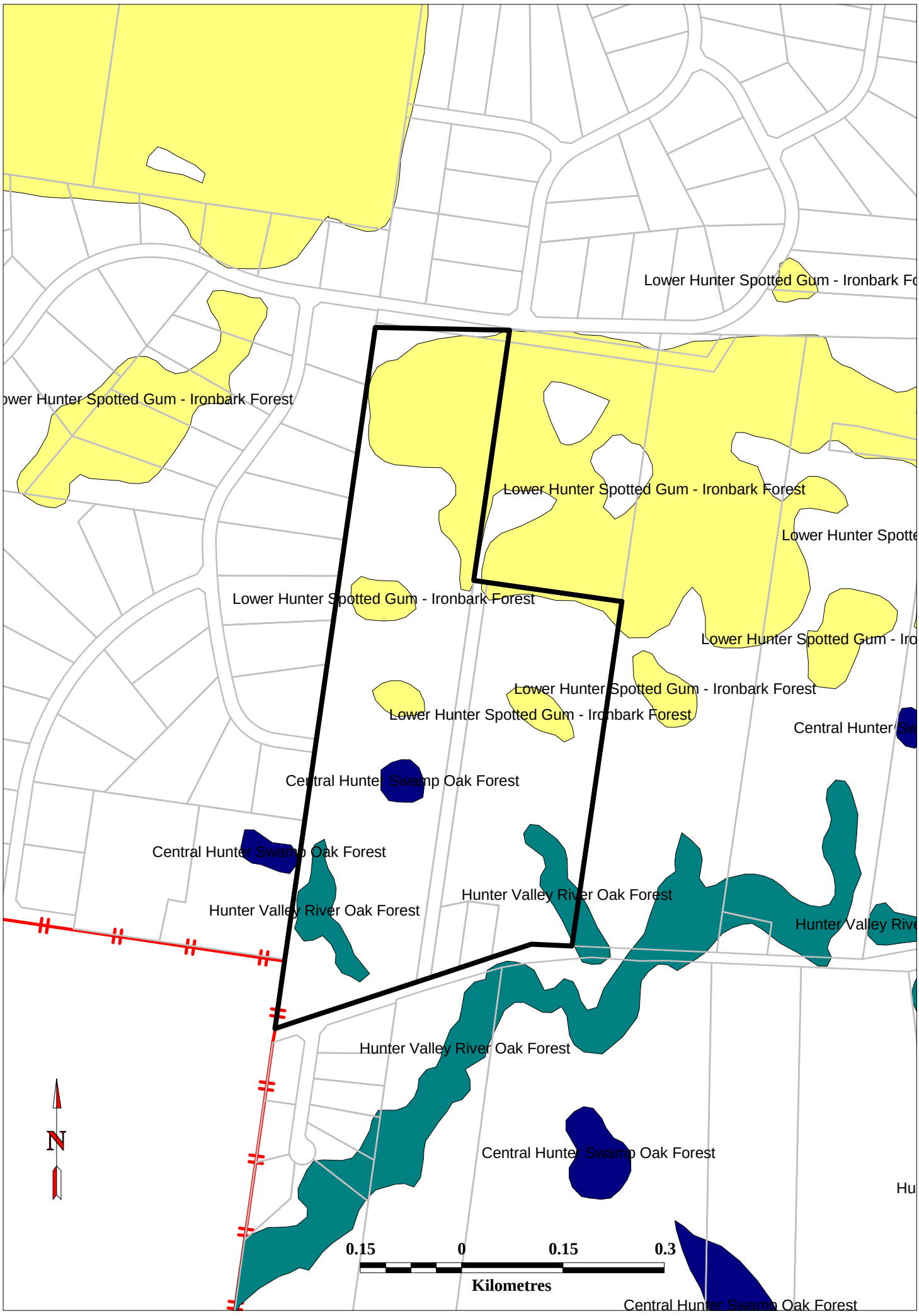
ATTACHMENT 3 - EXISTING LEP ZONING - SINGLETON LEP AM - LA4/2010



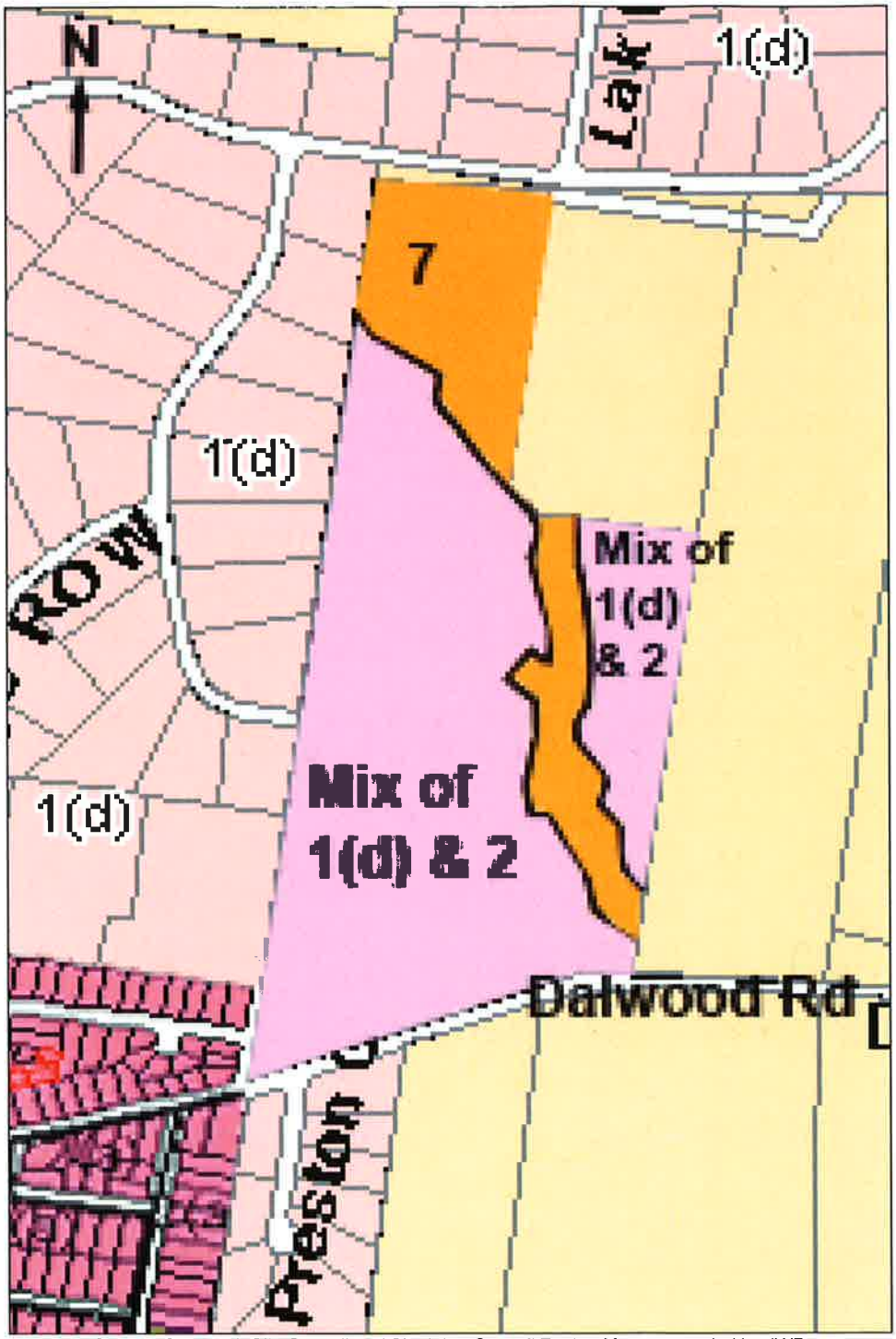
ATTACHMENT 4 - BUSHFIRE PRONE MAP - SINGLETON LEP AM - LA4/2010



ATTACHMENT 5 - EEC MAP - SINGLETON LEP AM - LA4/2010

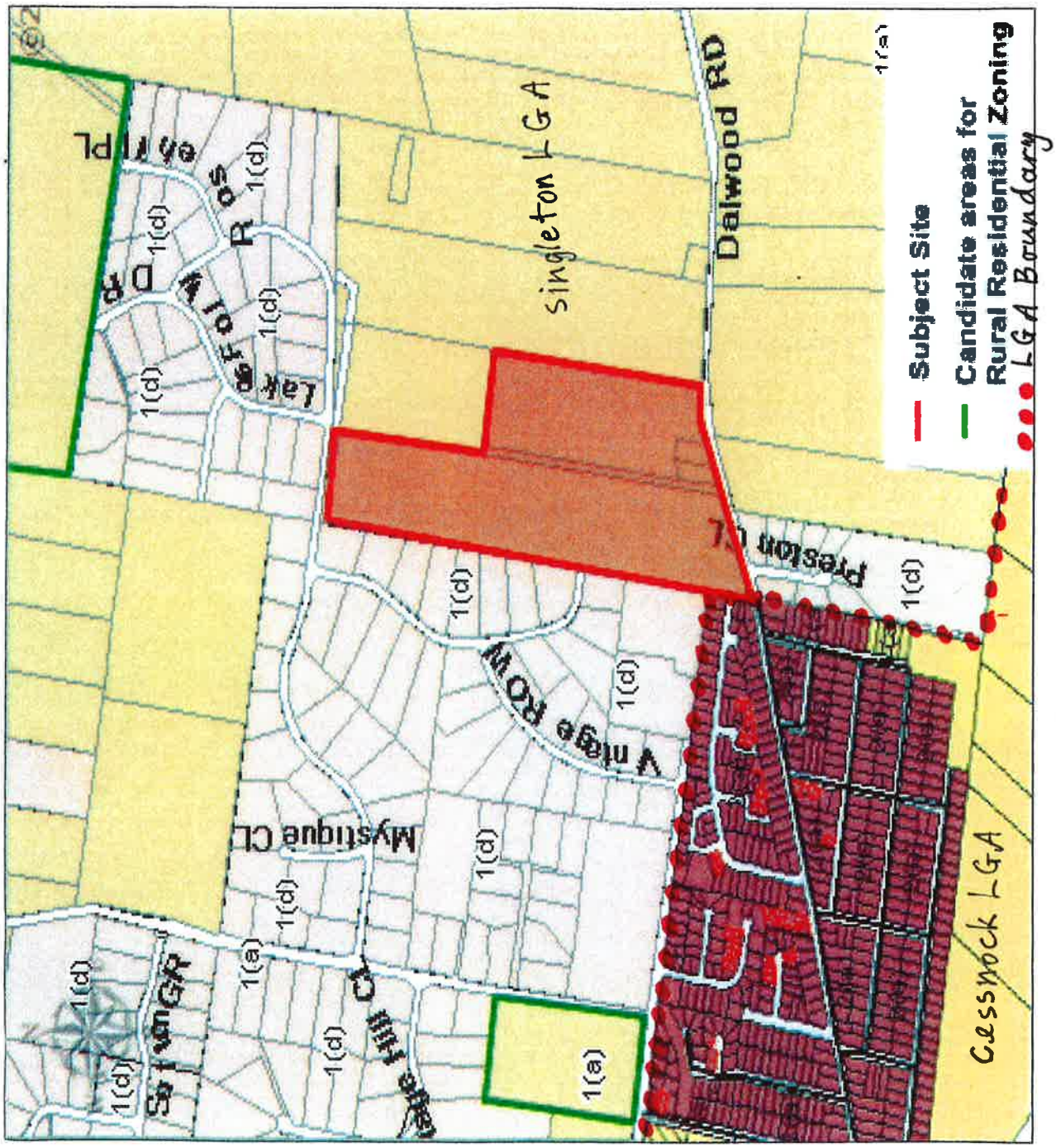


ATTACHMENT 6 – CONCEPTUAL PROPOSED ZONING (LA4/2010)

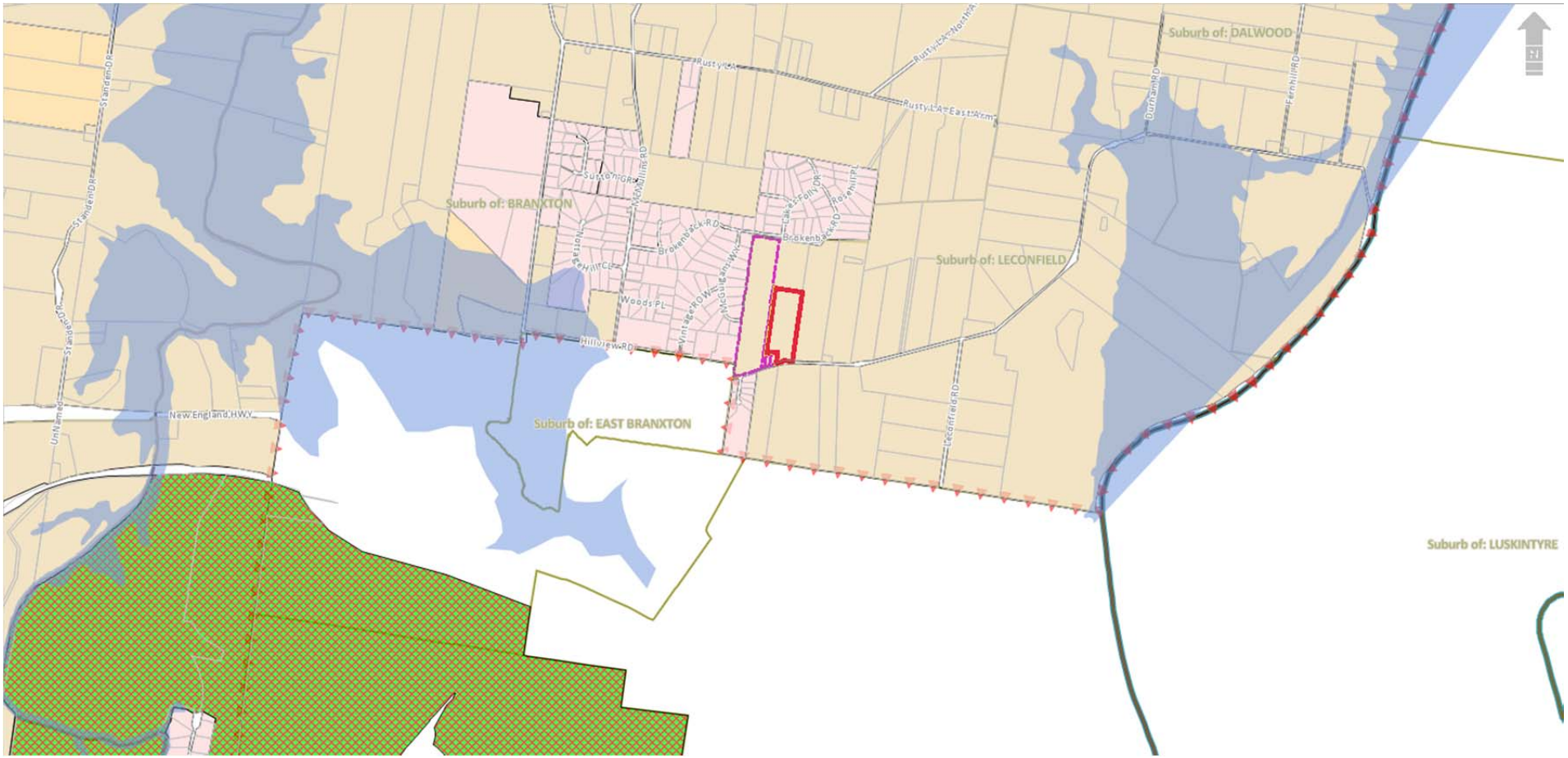


Source: Cessnock City Council and Singleton Council Zoning Maps, amended by JWP

ATTACHMENT 7 – ADJOINING RESIDENTIAL ZONE IN CESSNOCK LGA (Crimson Colour)



ATTACHMENT 8 – FLOODPRONE LAND (1 in 100 years)



ATTACHMENT 9 – HUNTER WATER COMMENTS

E-mail Message

From: Barry Calderwood [SMTP:barry.calderwood@hunterwater.com.au]
To: Horner, Ken [SMTP:khorner@singleton.nsw.gov.au]
Cc:
Sent: 5/7/2012 at 8:09 AM
Received: 5/7/2012 at 11:47 AM
Subject: FW: Request to update Hunter Water Indicative Requirements for Proposed Development at Dalwood Road Branxton (Your Ref:2009-417)

Ken

Further to Hunter Water's previous advice regarding for the 250 lot subdivision development at Lot 4 DP 533318 & Lot 33 DP 571275 Dalwood Road, Branxton, Hunter Water offers the additional advice detailed below.

Water Supply

After the completion of the upgrades to the Maitland-North Rothbury water supply system in the 2013-14 financial year, Hunter Water expects that there will be sufficient capacity to service the proposed development.

Wastewater Transportation

The proposed development is located in two wastewater pumping station catchments.

Branxton 2 WWPS has limited spare capacity to service the development. Hunter Water next scheduled upgrade is 2026/27. If necessary the developer will be required to fund an upgrade of Branxton 2 WWPS to service the development.

Branxton 3 WWPS is currently being upgraded by Hunter Water with these upgrades anticipated to be completed in 2012. Once the upgrades are completed there should be sufficient capacity to service the proposed development.

Some pipe work upgrades may be required to service the development, and if

necessary the developer would be required to fund these upgrades.

In conclusion, whilst some developer funded wastewater transportation system upgrades may be required to service the development, Hunter Water expects that these would not be such to compromise the potential for this development.

Wastewater Treatment

Hunter Water has recently completed an upgrade at the Branxton Wastewater Treatment Works (WWTW's) to provide additional capacity for the catchment. However, it is expected that the Huntlee New Town development will utilise a significant proportion of this spare capacity. The WWTW's currently has capacity for approximately 900 equivalent tenements (residential lots). The availability of capacity at the WWTW's to service the Dalwood Rd development, is wholly dependant on the timing of Huntlee, other proposed developments and this development, however it is expected that there should be some capacity to service the initial stages of the Dalwood Rd development.

An additional upgrade of the Branxton WWTW's which will increase the plant capacity for an additional 2000 ET is likely to occur between 2017-21. These upgrades should be sufficient to service the ultimate Dalwood Rd development.

Regards

Barry Calderwood | Acting Developer Services Supervisor | Hunter Water Corporation
36 Honeysuckle Drive Newcastle West NSW 2300 | PO Box 5171 HRMC 2310
T 02 4979 9721 | F 02 4979 9711 | barry.calderwood@hunterwater.com.au

From: Calderwood Barry
Sent: Tuesday, 5 June 2012 2:47 PM
To: 'Horner, Ken'
Cc: Michael Breedon
Subject: RE: Request to update Hunter Water Indicative Requirements for Proposed Development at Dalwood Road Branxton (Your Ref:2009-417)

Ken

Yes that is correct, the advice would apply to the proposed 50 lot subdivision at Lot 2 DP 237057 & Lot 6 DP 827226, Dalwood Road & Preston Close, Branxton.

Regards

Barry Calderwood | Acting Developer Services Supervisor | Hunter Water Corporation
36 Honeysuckle Drive Newcastle West NSW 2300 | PO Box 5171 HRMC 2310
T 02 4979 9721 | F 02 4979 9711 | barry.calderwood@hunterwater.com.au

From: Horner, Ken [mailto:khorner@singleton.nsw.gov.au]
Sent: Tuesday, 5 June 2012 2:23 PM
To: Calderwood Barry
Subject: RE: Request to update Hunter Water Indicative Requirements for Proposed Development at Dalwood Road Branxton (Your Ref:2009-417)

Hi Barry

Many thanks for the comments below. Could you please also confirm that they also apply to the other proposal on the southern side of Dalwood Road (see copy of my email and your letter attached).

Regards

Ken Horner
B. Urban & Regional Planning, BA (Maths & Science)
Coordinator Strategic Land Use Planning

Singleton Council

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DX 7063, SINGLETON NSW 2330

E HYPERLINK
"blocked::blocked::mailto:khorner@singleton.nsw.gov.au"khorner@singleton.nsw.gov.au u HYPERLINK
"blocked::http://www.singleton.nsw.gov.au/"www.singleton.nsw.gov.au

From: Calderwood Barry [mailto:barry.calderwood@hunterwater.com.au]
Sent: Tuesday, 5 June 2012 10:55 AM
To: Horner, Ken
Subject: FW: Request to update Hunter Water Indicative Requirements for Proposed Development at Dalwood Road Branxton (Your Ref:2009-417)
Importance: High

Subject: RE: Request to update Hunter Water Indicative Requirements for Proposed Development at Dalwood Road Branxton (Your Ref:2009-417)

Ken,

Thank you for your request for Hunter Water's requirements for a proposed development at Dalwood Road Branxton. I sincerely apologize for the delay in responding.

In response to your request for updated servicing advice for the 250 lot subdivision development at Lot 4 DP 533318 & Lot 33 DP 571275 Dalwood Road, Branxton, Hunter Water offers the following advice on water and sewer issues relevant to the proposal. This information is based on Hunter Water’s knowledge of its system performance and other potential development in the area at the present time.

As you will appreciate, there may be significant changes that occur by the time the development proceeds to the lodging of a development application, therefore this advice is not a commitment by Hunter Water and may be subject to significant change prior to the development proceeding.

When you proceed with a development application you will need to lodge a further application with Hunter Water to then determine the formal requirements that shall apply. Hunter Water will then issue a Notice of Formal Requirements. You will need to comply with each of the requirements in this Notice for the issue of a Section 50 Compliance Certificate for the specific development.

Water Supply

The site of the proposed subdivision is located in the Maitland-North Rothbury Water Supply System, and is supplied from the Harpers Hill Reservoir.

Currently the water supply system has insufficient capacity to service this development.

In order to meet regional capacity requirements, Hunter Water is planning on completing upgrades to the Maitland-North Rothbury water supply system in the 2013-14 financial year. Whilst these upgrades will result in improved capacity for growth in the area, Hunter Water can not guarantee capacity will be available to service this development. In order to confirm system capacity is available the developer will be required to prepare a developer funded water servicing strategy.

Wastewater Transportation

The development may be serviced by two existing wastewater pump stations, Branxton No 2 WWPS and Branxton No 3 WWPS. Neither of these pump stations have sufficient capacity to service the total development. The extent to which the development can be serviced will depend on which stages are developed first and which WWPS they connect to.

Branxton 2 WWPS is not scheduled for an upgrade prior to 2025. Infrastructure between the WWPS and the development site may also need to be augmented to provide sufficient capacity to service the development. Hunter Water expects that any necessary WWPS and system upgrades would be developer funded.

Branxton 3 WWPS has recently been upgraded but may not have sufficient spare capacity for the total development. Infrastructure between the WWPS and the development site may also need to be augmented to provide sufficient capacity to service the development. Hunter Water expects that any necessary WWPS and system upgrades would be developer funded.

In order to confirm the specific servicing requirements for the development, the developer will be required to prepare a developer funded wastewater servicing strategy.

Wastewater Treatment

The development area is located in the Branxton WWTW catchment. Currently there is spare capacity at WWTW to service some development within the catchment. Hunter Water can not confirm that sufficient capacity will be available to service the total development at the time of connection.

Summary

The pump station constraints are dependent on the staging, timing and preparation of a servicing strategy for the proposed development and updated advice can be provided when this information is available. Ultimately the wastewater transport issues may be overcome with developer funded upgrades to the reticulated sewers and the wastewater pump stations.

Please call if you have any further enquiries.

Regards

Michael Breedon| Developer Services | Hunter Water Corporation
36 Honeysuckle Drive Newcastle West NSW 2300 | PO Box 5171 HRMC 2310
T 02 4979 9784 F 02 4979 9711 HYPERLINK
"mailto:michael.breedon@hunterwater.com.au"michael.breedon@hunterwater.com.au

From: Horner, Ken HYPERLINK
"mailto:[mailto:khorner@singleton.nsw.gov.au]"[mailto:khorner@singleton.nsw.gov.au]
Sent: Monday, 7 May 2012 2:47 PM
To: Lewis Brett
Cc: Ihlein, Mark
Subject: Request to update Hunter Water Indicative Requirements for Proposed Development at Dalwood Road Branxton (Your Ref:2009-417)
Importance: High

Hi Brett

You issued a letter (attached) to JW Planning on the above, dated 12 June 2009. I’ve just spoken to Barry Calderwood, who was the contact person, on the phone and he suggested I email a request to you, as it will have to be processed by your Planning section.

The subject letter was used in support of a Planning Proposal for land adjoining the existing urban development, which Council supported in

September last year. However, the Department of Planning & Infrastructure Gateway Determination did not support the proposal at this stage and requested further strategic information to be submitted prior to any reconsideration of the proposal. This request included an update of Hunter Water advice. The advice indicated that the proposal would be depended upon a proposed upgrade of the water supply system, scheduled for 2013/14 and both wastewater transport and wastewater treatment would be depended upon upgrades scheduled for 2010/11. It would be appreciated if you could give me revised timeframes for these upgrades so Council can further inform the Planning Proposal for reconsideration of the Gateway Determination.

It would also be appreciated if you could give me an estimate of the timeframe in which I might be able to receive this advice, as the Department of Planning & Infrastructure has requested Council to advise a timeframe of when it will resubmit the proposal.

Regards

Ken Horner
B. Urban & Regional Planning, BA (Maths & Science)
Coordinator Strategic Land Use Planning

Singleton Council

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"blocked::http://www.singleton.nsw.gov.au/"www.singleton.nsw.gov.au

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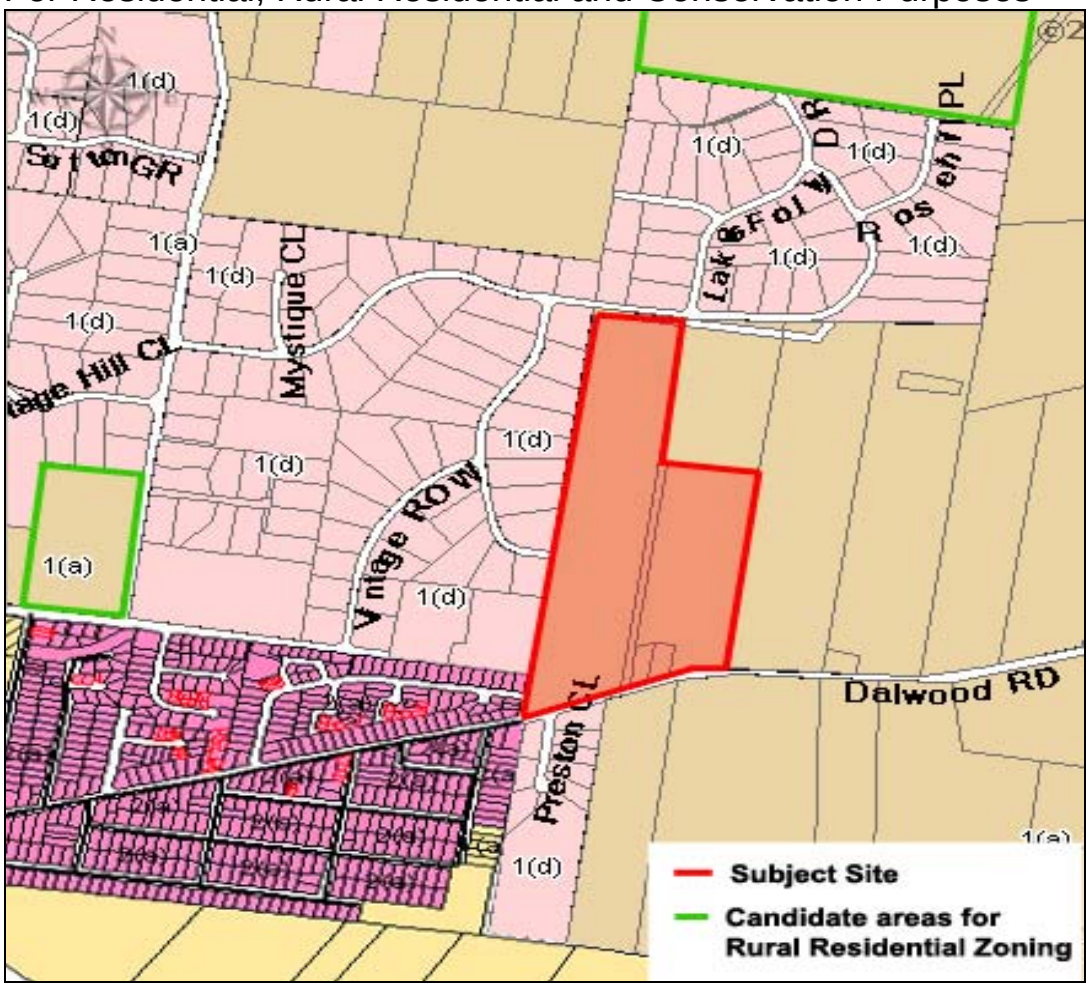
Planning Proposal

Pursuant to Section 55 of the Environmental Planning & Assessment Act 1979

Proposed Rezoning

For Residential, Rural Residential and Conservation Purposes



Lot 4 DP 533318 & Lots 31-33 DP 571275

Dalwood Road, Branxton
Gemmell Pty Ltd

JW Planning Pty Ltd

Town Planning

Level 1, Suite 13/478 The Esplanade
WARNERS BAY NSW 2282
Tel: 02 4948 4322
Fax: 02 4948 4366
Email: email@jwplanning.com.au

CONTENTS

ATTACHMENTS

FIGURES

1.0 Background

The planning proposal involves rezoning fragmented and redundant rural zoned land to a residential and/or rural residential zone to accommodate demand for affordable residential land in the Branxton area. This demand stems from increased coal mining in the Upper Hunter and associated employment industries. It is foreseeable that future demand will continue to derive from further growth in mining activity and the F3 extension to Branxton.

The planning proposal has been prepared in accordance with Section 55 of the Environmental Planning and Assessment Act (the Act, 1979) and *A Guide to Preparing Planning Proposals* (Department of Planning, July 2009).

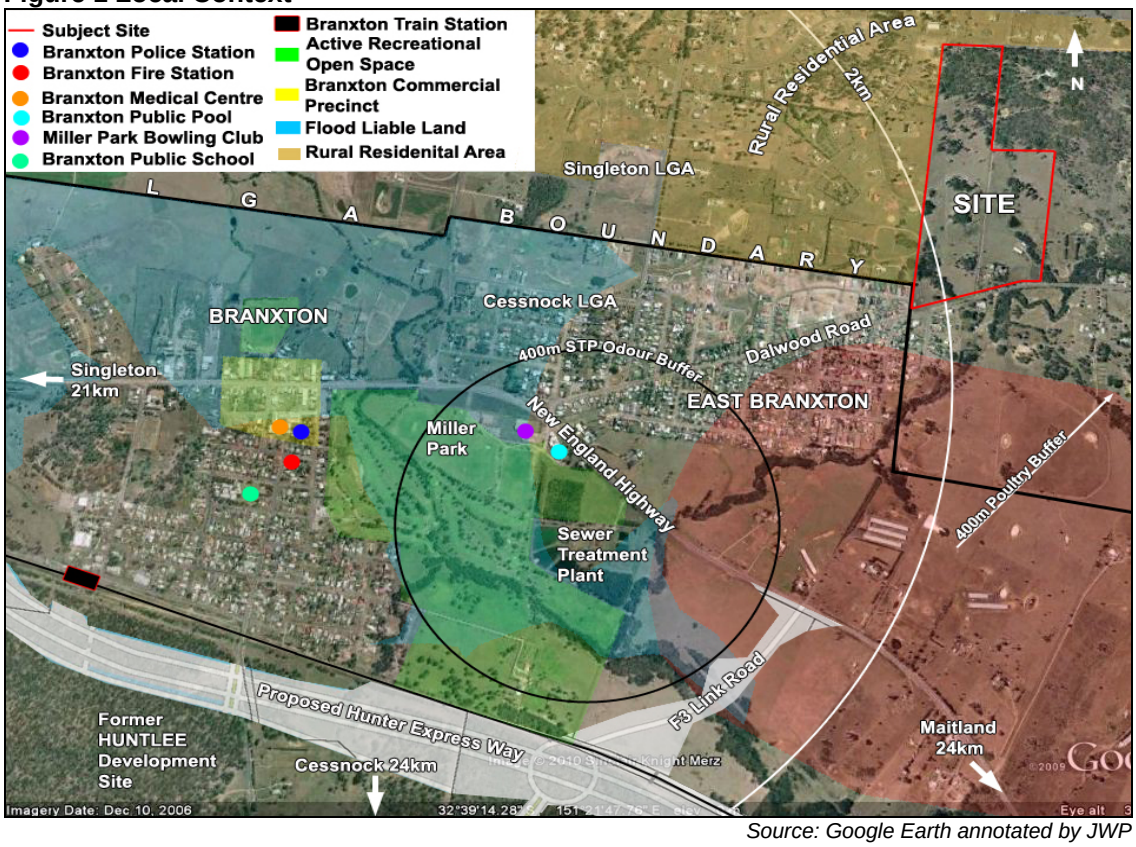
This document will facilitate Singleton Council's consideration, as the relevant planning authority under Section 55 of the Act, and the Minister for Planning's consideration of the proposal in accordance with Section 56 of the Act.

The Minister for Planning, Mr. Tony Kelly, is aware of the proposal and he has issued correspondence specific to this site dated 17 August 2010 (**Attachment F**).

1.1 Site Context

The subject site is located in the Singleton LGA approximately 2km from the town centre of Branxton (refer **Figure 1**).

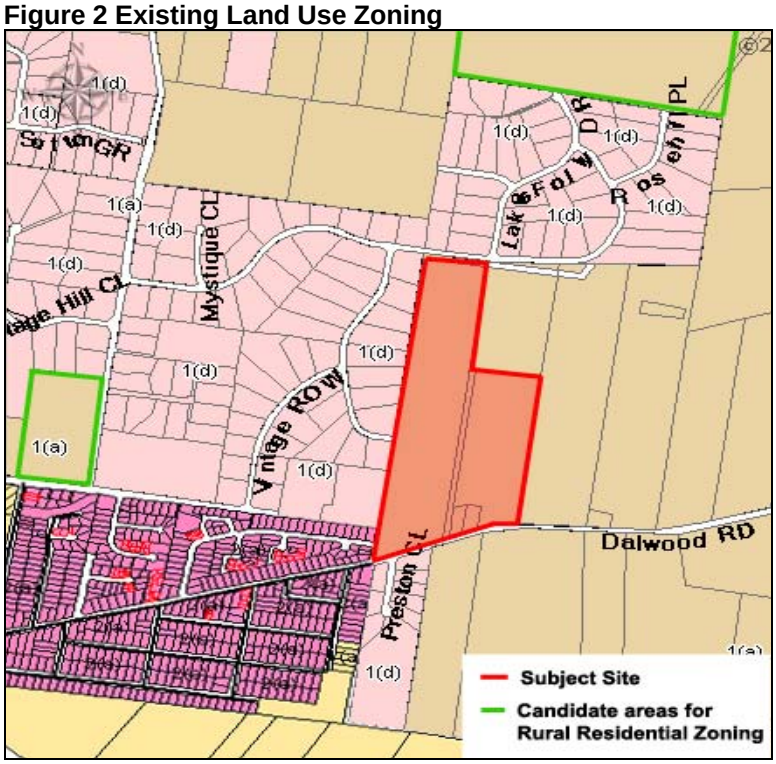
Figure 1 Local Context



Source: Google Earth annotated by JWP

Existing land uses and environmental constraints are illustrated in **Figure 1**. These constraints either preclude development or give rise to land use conflicts, effectively curtailing opportunities for future standard density residential land supply close to Branxton town centre. The site provides an infill development opportunity given its location between existing residential zoned land off Dalwood Road (Cessnock LGA), and adjacent Rural Residential development within the Singleton LGA.

Figure 2 Existing Land Use Zoning

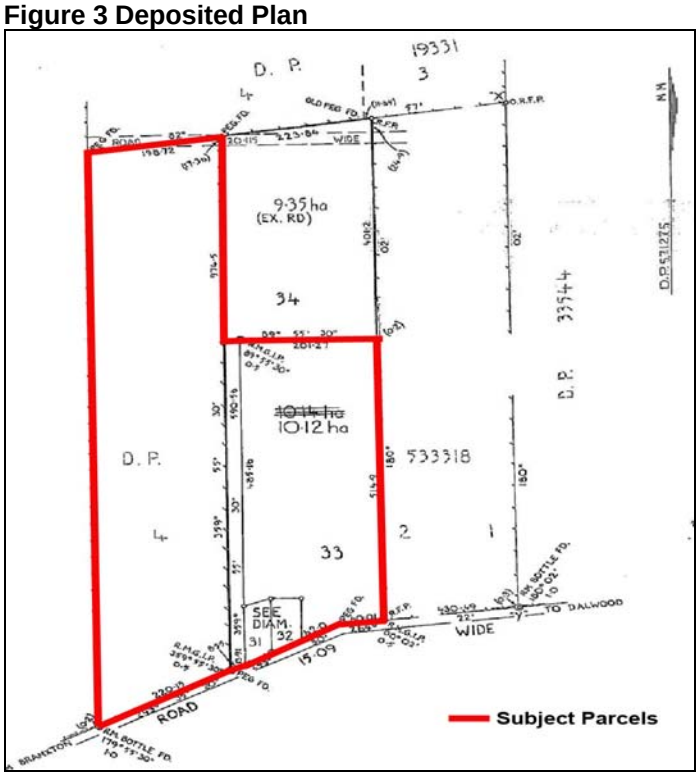


Source: Singleton LEP 1996 & Cessnock LEP 1989 (annotated by JWP)

1.2 Site Description

The subject site is legally described as Lot 31, Lot 32 and Lot 33 DP 571275 (and the handle of Lot 34 DP 571275), and Lot 4 DP 533318 (refer **Figure 3**). The site is approximately 30 hectares in area.

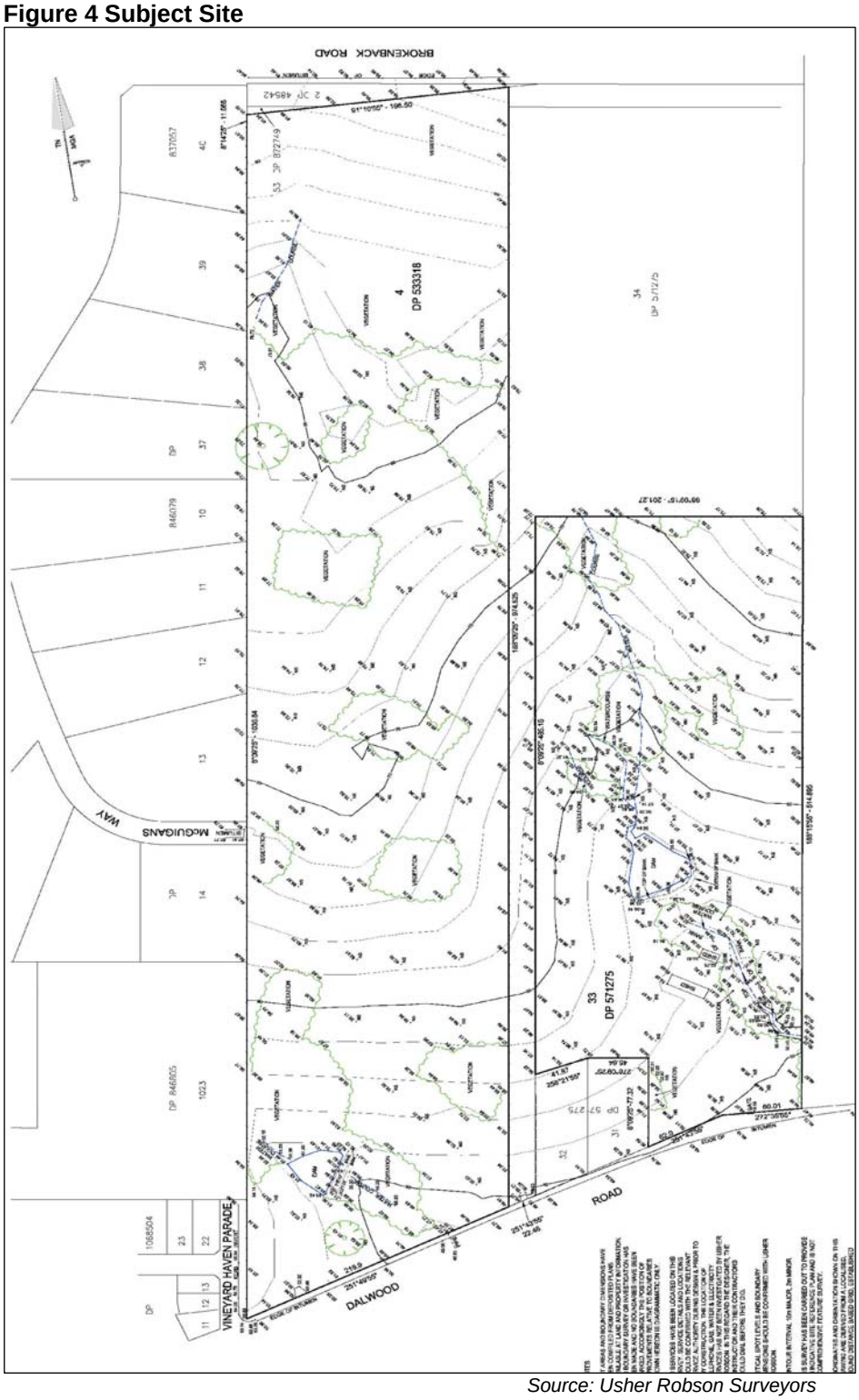
Figure 3 Deposited Plan



Source: Registered Plan annotated by JWP

The site is predominately cleared, but does contain isolated stands of vegetation. The site falls gradually toward Dalwood Road and two drainage lines with existing dams form part of the land (refer **Figure 4**).

Figure 4 Subject Site



Source: Usher Robson Surveyors

A dwelling is located within both Lot 31 and 32; a redundant machinery shed is located within Lot 33.

Figure 5 Site Attributes

Source: Spatial Information Exchange (Dept of Lands 2008)

2.0 Intended Outcomes

The site was identified as a candidate area for rural residential development in the *draft Singleton Rural Residential Development Strategy*, but it is understood to have been excluded from the draft Strategy by Council given that it has potential for urban development; that is, a higher and better use given its urban context.

The intended outcomes of rezoning the subject land are derived from the relevant Principles of the adopted *Singleton Land Use Strategy (*adopted by Council, April 2008 and DoP, 2008*)*. This Strategy is referenced given the absence of specific Strategic directions adopted by Council for urban development in the Branxton area. These are:

- *rural residential development on small allotments should be provided with a* ***good quality water supply and the staging of the provision of this service should determine the sequencing*** *of developing additional areas;*
- ***development should be encouraged as close as possible to existing urban areas*** *in order to minimise the cost of providing essential services,*
- *reduce travel time and costs and to* ***improve accessibility to community services*** *for residents;*
- *a* ***balance should be achieved between setting land aside for future urban development and land for future rural residential development***
- *on the basis that* ***between 5 and 10 years' supply of land should be identified***
- ***land that is identified as potentially suitable for future urban development should not be developed for rural residential purposes*** ***as future re-subdivision would be difficult to achieve;***

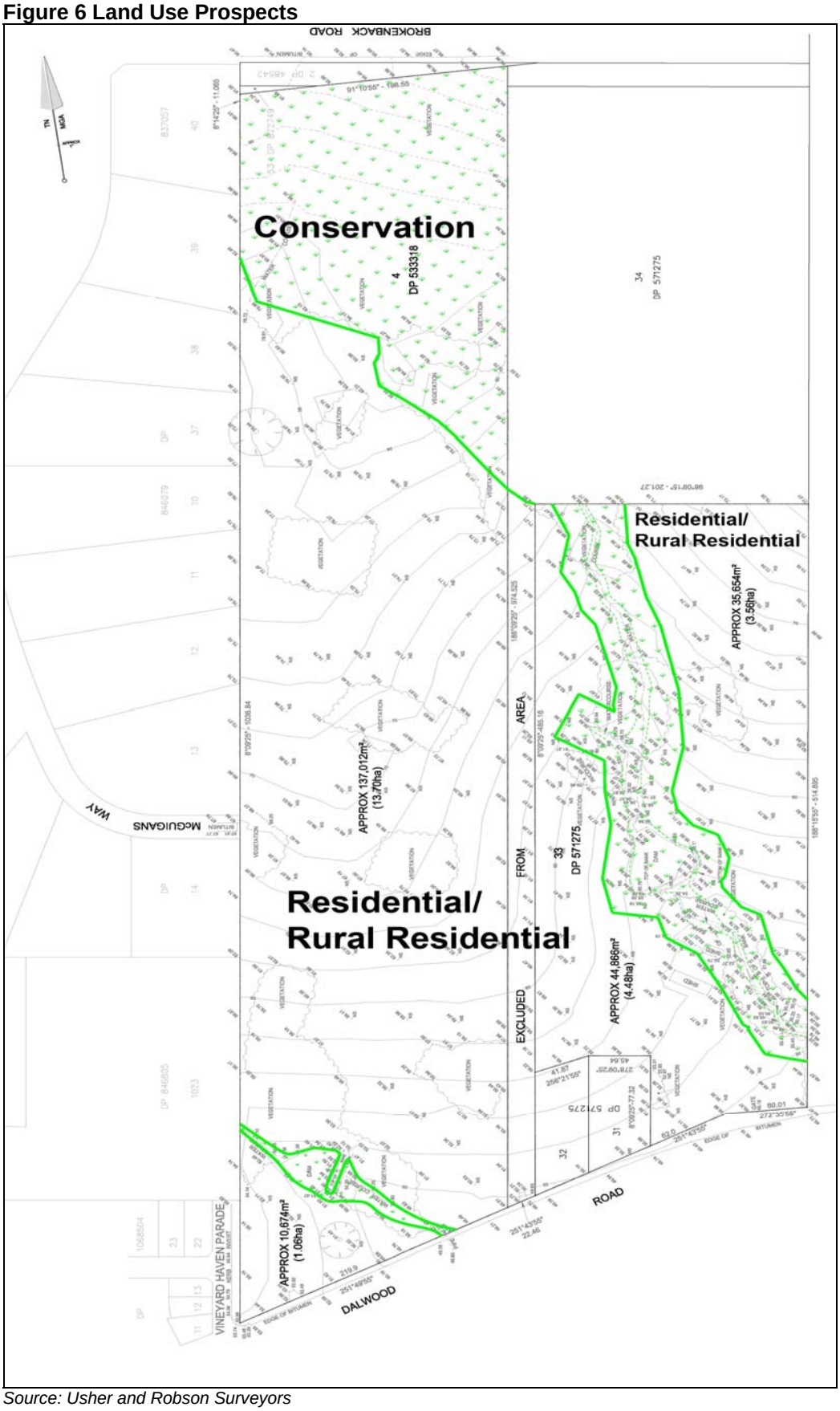
In response to the Strategy Principles, the following outcomes are intended by the proposal:

- To ensure there is no disruption to the supply of affordable residential lots in Branxton (supply expires 2011 - refer **Section 4.1**);
- To ensure housing choice, price competition and product quality in Branxton by providing an alternative release area to those already identified in the Singleton and Cessnock Settlement Strategies;
- To provide for the orderly roll-out of unconstrained land for housing in logical sequence with the most recent release of land for this purpose;
- To provide for the economic use of unconstrained land no-longer viable for agriculture;
- To access existing public and private infrastructure, reducing costs to the community and home buyers.

It is our view that the site can most appropriately support residential lots, including some rural residential lots, given the location of the site at the transition between rural, rural residential and residential land uses. The actual zoning, internal zone boundaries and street and lot layout etc will be resolved as part of the planning proposal process.

Land use provisions that can achieve these outcomes on this site are summarised in **Figure 6**, based on initial stormwater and ecological assessments of the site (refer **Attachment C** & **D**).

Figure 6 Land Use Prospects

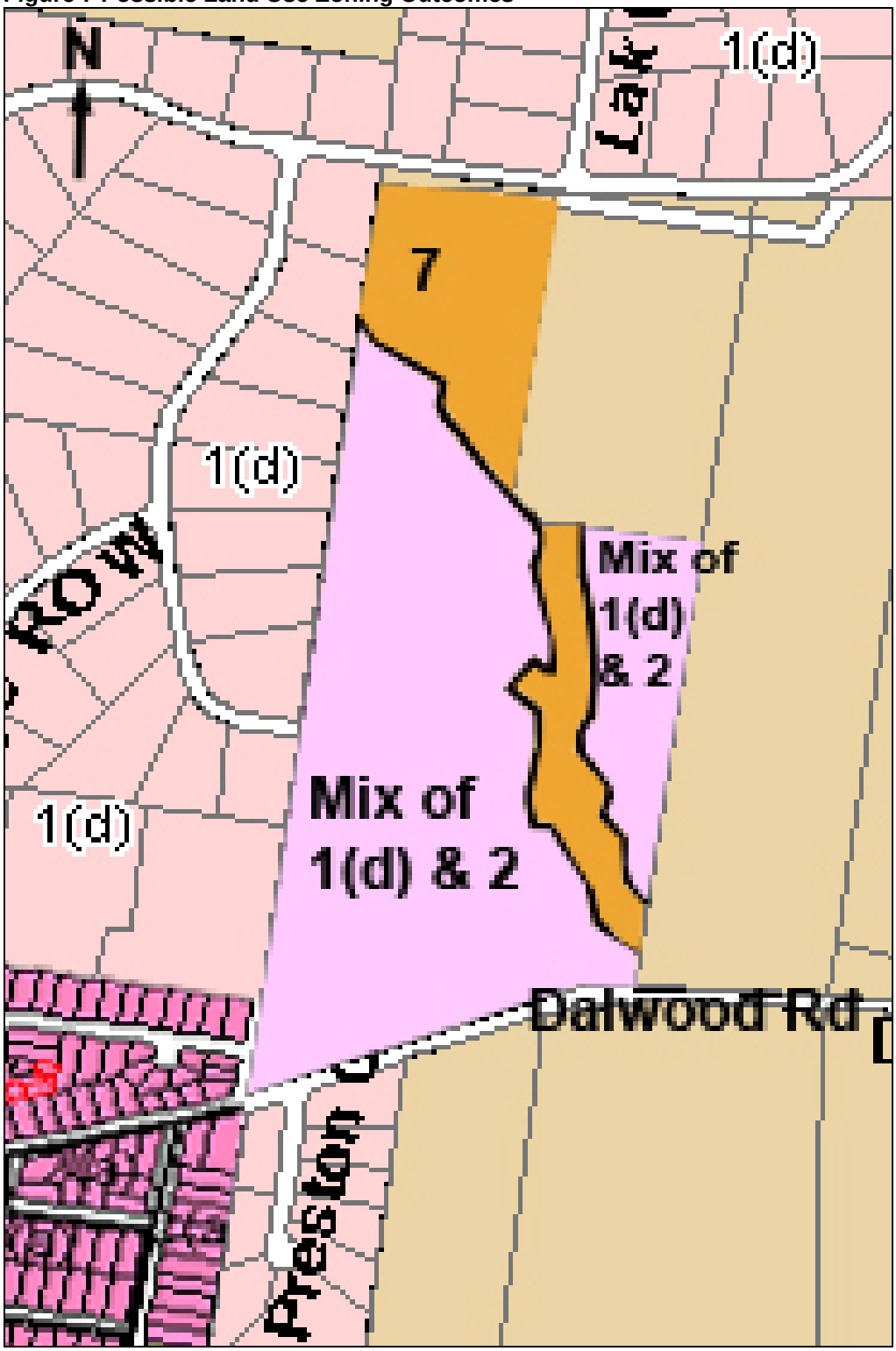


Source: Usher and Robson Surveyors

3.0 Explanation of Provisions

The proposal seeks the amendment of the Singleton Local Environmental Plan (1996) generally in accordance with the proposed zoning map provided at **Figure 7**. The actual boundary of zones will be finalised through the planning proposal process.

Figure 7 Possible Land Use Zoning Outcomes



Source: Cessnock City Council and Singleton Council Zoning Maps, amended by JWP

4.0 Proposal Justification

4.1 Need for the Planning Proposal

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

Yes. This planning proposal serves two purposes. Firstly, it provides Council technical information and analysis of the subject land and a strategic residential land demand and supply analysis in the Branxton area to allow Council to consider the inclusion of the subject land into Singleton Land Use Strategy 2007 (currently undergoing review). Secondly, as a planning proposal, it is seeking to rezone the subject land parallel to Council's preparation of a comprehensive LEP – either as part of the comprehensive LEP, or as an amendment to the existing LEP.

Council Land Use Strategy
The planning proposal is a response to favorable comments by Council following a submission to the draft Singleton Land Use Strategy in 2007, and more recently, a submission made during Council's preparation of the comprehensive Singleton LEP.

Consultants preparing the Land Use Strategy for Council noted the following in their 2008 report to Council in response to the 2007 submission:

The Lower Hunter Regional Strategy supports the Huntlee proposal to provide for urban residential development in the Branxton area. [The site] *needs further investigation as no documentary information is provided in relation to infrastructure servicing and development constraints.*

In response to this view, and following discussions with Department of Planning and Council staff, additional investigations have been completed to allow for a full and proper assessment of the in-fill development prospect offered by the land.

In the 2007 submission to the draft Strategy, we identified that the site should be investigated for the purpose of urban infill development to ensure:

- efficient sequencing and use of existing public and private infrastructure investment;
- reduced pressure to extend into un-serviced green field release areas to cater for predicted population growth;
- affordable development (given comparative advantages of the site and access to existing infrastructure) without lowering the standard of the built environment.

Specific merits of the subject site, as noted in our former submission, include:

- The site adjoins existing urban development, being land zoned 2(a) Residential under the Cessnock LEP (1989);
- The site is within 2km from the town centre of Branxton. Large portions of land between the site and the town centre are constrained by flooding and necessary odour buffers from a sewerage treatment plant and chicken farms (see **Figure 1**);
- Mapping prepared for the *Singleton Rural Residential Development Control Plan (2004)* (now repealed) illustrates that there is no physical constraint to the use of the land for urban purposes;
- The site has access to existing services and facilities within both the Singleton and Cessnock LGA's, reducing pressure on public and private funds to extend or provide new services and facilities; and
- Access to the subject area is already constructed, with two streets currently terminating (without cul-de-sac or turning head treatment) at the property boundary of Lot 4 clearly indicating Council's intention in the future of extending these streets into the subject land.

The proposal is consistent with the Department of Planning's advice to Council concerning Branxton that states:

"Via its local strategy, ***Singleton Council should consider opportunities for intensifying*** *(or making minor adjustments to)* ***existing and proposed rural residential zones close to Branxton".*** (Singleton Land Use Strategy page 84)

The 2007 submission to Council also identified the obvious shortcomings of relying on one primary release area (Huntlee under one land owner) for housing land supply:

a) creating a monopoly on supply of housing to the market, which reduces the affordability, choice and quality of development which only comes from having competition from a number of release fronts;

b) delays in meeting housing demand given the inertia in providing new infrastructure to large new release areas, relative to infill development tapping into, or only requiring minor upgrades to, existing infrastructure (*The LHRS makes allowance, and has a preference for, infill development within existing centres – this ensures maximum use of existing infrastructure and bolsters the existing population service levels*); and

c) Relying on one large release area at the exclusion of small infill opportunities is to place "all eggs in the one basket" in maintaining lot supply and remaining economically and socially sustainable in the interim and the future.

The uncertainty and likely future delays of the Huntlee release area given recent court decisions vindicate these concerns.

Land Supply and Demand Analysis

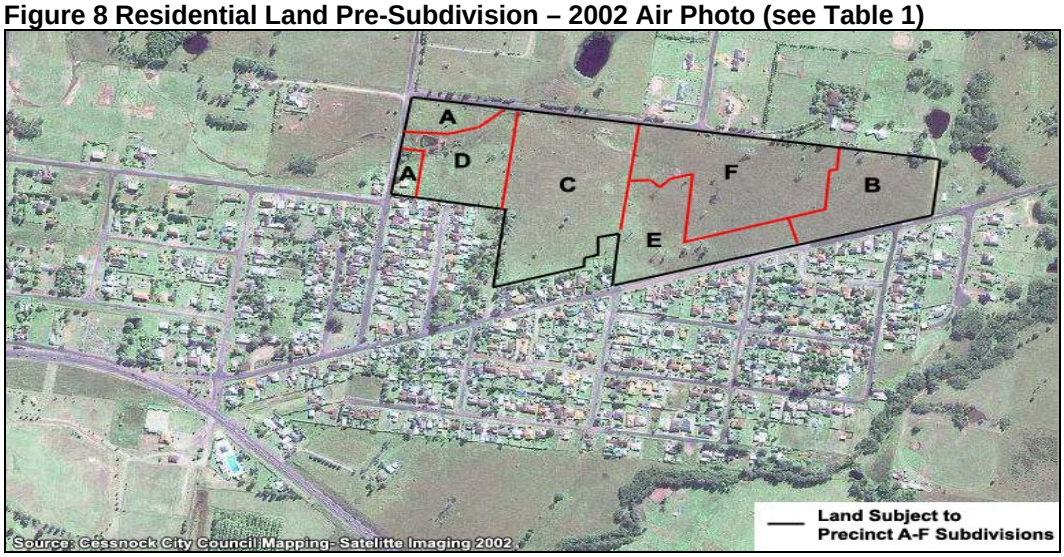
There is no information within the *Singleton Land Use Strategy* in relation to the actual existing demand for residential allotments in the Branxton Urban area. Our own investigations into the supply and demand for residential land in Branxton indicate that:

a) demand for land in Branxton area is very strong (about 32 lots per annum) Indeed the demand for lots has accelerated with lot take up averaging 40 lots per year since 2008;

a) the supply of land is likely to be exhausted in 2011. This timing is consistent with that identified by Cessnock Council's City Wide Settlement Strategy (2003).

Our analysis is based on an assessment of the broader Branxton area, where the only available low density residential land supply in Branxton since 1998 was found to immediately adjoin the subject site, a function of the constraints to development illustrated by **Figure 1** (refer **Figure 8**).

Figure 8 Residential Land Pre-Subdivision – 2002 Air Photo (see Table 1)



Annotated by JWP

Precincts A to F generally represent the parent lots subdivided to create conventional residential allotments during the period between 2004 and 2006. The lot 'take-up' during that period is illustrated in **Figure 9**

Figure 9 Residential Land Subdivision & Take Up – 2008 Air Photo (see Table 1)

Recent aerial photography taken in June 2010 illustrates the take up of allotments in the last two years (**Figure 10**).

Figure 10 Residential Land Subdivision & Take Up – June 2010 Air Photo (see Table 1)

Table 1 Residential Subdivisions within Branxton

Precinct	Plan Reg. No.	Lots Created	Year Lot Creation	Vacant Lots 2008	Vacant lots 2010	Lot Demand over 6 yrs
A	DP 1062013	16	3.2.2004	5	4	12
B	DP 1068504	30	25.6.2004	2	0	30
C	DP 1077419	54	30.3.2005	31	8	46
D	DP 1083192	34	11.7.2005	13	4	30
E	DP 1087580	29	9.9.2005	9	0	29
F	DP 1103185	46	29.6.2006	36	0	46
	TOTAL SUPPLY	**209**		**96**	**16**	**193**

Table 1 illustrates the lot demand over the 6 year period between 2004 (first lots created) and June 2010. If the subject site proceeds to a rezoning as a result of this Planning Proposal, the lead times involved in the rezoning, design, development consent and construction phases could supply land to the market significantly faster than Huntlee and the uncertainties of that proposal. This would help maintain an affordable residential land supply in Branxton.

It is worth reiterating that the lot take-up rate identified in this report is consistent with the findings of the Cessnock City Wide Settlement Strategy (2003) which indicated demand would outstrip supply for residential land within Anvil Creek catchment (including Branxton) in 2011.

The lot take-up rate also correlates with the findings of the Macro Plan report prepared for the Huntlee proposed development, which notes that between January 2005 and August 2007, there were a total of 520 sales of houses (286) and land (234) within the Branxton and Greta areas, equating to an average of 17 sales per month (8 sales per month land only) (Macroplan Australia, 2007).

Our research suggests that the forecast expiry of vacant land (12 months from now) is reliable and highly likely. There are very few vacant residential lots currently available within Branxton generally. Our observations are confirmed in advice received from Mr. Allan Jurd Director of Jurds Real Estate, Cessnock (**Attachment E**).

2. Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?
The amendment to the existing LEP, as a stand alone amendment, is the most appropriate mechanism to allow for residential development of the site.

Council is currently working through the conversion of the existing LEP to the Standard Instrument comprehensive LEP. Council has advised that to achieve Department of Planning timeframes, no site specific rezonings are likely to be considered as a part of this process. The spot rezoning of the land is therefore the best means of achieving the intended outcomes of the proposal.

3. Is there a net community benefit?
The net community benefits include:

- Safer, more cost effective and more sustainable travel to work, and improved living conditions through delivery of affordable housing land located close to places of employment demand (mines and associated industry related employment areas);
- Contributing to the social mix of Branxton and the Singleton LGA, helping to maintain a vibrant and sustainable community;
- Increase in eligible volunteers for community service;
- Contribution to the economic strength of Branxton through increased economic activity directly attributable to population growth;

- Multiplier effects throughout the region as a result of construction employment;
- Jobs in the supply industry as result of construction activity; and
- Increased trade and economic activity in the surrounding area including more customers for the town of Branxton and existing businesses and services.

4.2 Relationship to strategic planning framework

4. Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy?

The proposal involves the rezoning of land that is less than 50 hectares in area. In this manner, and in accordance with the Lower Hunter Regional Strategy (LHRS), the proposal does not need to be identified in the strategy for it to proceed provided the proposal is consistent with the LHRS sustainability criteria.

A response to the LHRS sustainability criteria (**Attachment B**) demonstrates that the proposal is consistent with intended regional planning outcomes. The proposal also responds to the Neighbourhood Planning Principles of the Strategy as outlined in **Table 2**.

Table 2 Response to Neighbourhood Planning Principles

Principle	**Response**
A range of land uses to provide the right mix of houses, jobs, open space, recreational space and green space.	The proposal provides an opportunity for a diversity of residential lot sizes given the site's location at the transition between the rural residential development to the north and conventional residential development to the west. There is also the prospect of a passive recreation area within the land to be zoned conservation. This adds to the mix of land uses within the context of the site. It is not considered appropriate to provide employment land within the site given its proximity to these land uses elsewhere in Branxton. The planning proposal process and more detailed neighbourhood design at the development application stage will determine lot sizes and need and capacity for the provision of open space.
Easy access to major town centres with a full range of shops, recreational facilities and services along with smaller village centres and neighbourhood shops.	The site will form part of Branxton East and hence future residents will have easy access to all the services and facilities of Branxton. In turn, the proposal will increase the primary trade area of Branxton businesses and shops including the recently approved supermarket. The site's proximity to the future Hunter Expressway and roads leading to Cessnock will provide easy access to the major town centres of the Lower Hunter Valley.
Jobs available locally and regionally - reducing the demand for transport services.	The demand for housing within Branxton is a result of the expansion of the vineyard district and the coal mining industry, and their associated serviced. Each of these industries drives demand for housing.
Streets and suburbs planned so that residents can walk to shops for their daily needs.	Existing streets terminate at the boundary of the site. The development of the site will allow for the completion, and further connection, of these streets increasing permeability and access opportunities for existing and future residents.

A wide range of housing choices to provide for different needs and different incomes.	With vacant lots expected to be exhausted by 2011, the proposal is vital in ensuring residential land demand can be supplied does not lead to does not become a scarcity within Branxton, inflating costs above real market value.
Traditional houses on individual blocks will be available along with smaller, lower maintenance homes, units and terraces for older people and young singles or couples.	Diversity of lot sizes is intended and will be clarified through the planning proposal process. It is unlikely that attached dwellings will be achieved on the site as areas closer to the centre of Branxton are intended to be zoned for medium density development under the comprehensive Cessnock LEP.
Conservation lands in-and around the development sites, to help protect biodiversity and provide open space for recreation.	The proposal includes the identification of land for conservation purposes that could serve as part of a passive recreation/open space network.
Public transport networks that link frequent buses into the rail system.	Additional patronage expected from the development of the site, in combination with the connection of existing streets at the property boundaries, will improve the viability of any existing, or future, bus networks servicing the residential areas of Branxton. Branxton is serviced by rail line and additional population will help maintain rail services to the area.

The uncertainty regarding the likelihood of the Huntlee project proceeding, or the uncertain yield achieved from the site should it eventually proceed, serves to underline the importance of potential housing supply provided by the subject site.

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

Singleton Council is currently preparing a Community Strategic Plan (CSP) under Group 2 for completion by June 2011 as required by the NSW Department of Local Government. It is reasonable to conclude that the Singleton Land Use Strategy 2008 principles and outcomes will be directly transferred into the CSP.

In the interim, the *Singleton Land Use Strategy* 2008 indicated that all demand for lots within Branxton will be supplied from the Huntlee proposal (in Cessnock LGA), effectively ruling out any further requirements for rezoning of land for residential purposes in this area. The Huntlee proposal was in response to the both local and state governments having approved a significant number of employment generating mines in the Upper Hunter, and large tourist developments in the Cessnock and Branxton area over the last 10 years. However, there remains a shortfall in the supply of residential land required by current and future employees of these activities. This shortfall leads to higher land prices and higher housing costs which in turn affects the broader economy.

The uncertainty of Huntlee requires the identification of other lands to provide residential land more quickly in the short to mid term.

The objectives of the Land Use Strategy 2008 for residential development are:

- *Singleton will have urban land that is zoned and serviced to meet projected housing needs up to 2032.*
- *Housing will vary in size and form to meet changing household formations and the needs of an ageing population.*

The subject site and this planning proposal satisfy these objectives and therefore, is consistent with the Strategy as follows:

- The area is identified for reticulated sewer and water provision (Hunter Water - Preliminary Service Advise, 2009) and would facilitate development contiguous with the urban areas of Branxton.
- The infill area has ready access to existing public and private infrastructure and should be sequenced to occur logically ahead of green field release areas.
- The advantage of the site is that its location provides new residential land at reasonable development costs and hence affordable lots. This is the basis for meeting the varying needs of a changing population in a more sustainable manner.
- The area will help contribute to the diversity of living areas available in the Singleton LGA.

6. Is the planning proposal consistent with applicable state environmental planning policies?

State Environmental Planning Policy (Rural Lands) 2008 applies to the proposal. Clause 7 sets out 8 "Rural Planning Principles" that must be considered in preparing any LEP amendments affecting Rural Lands.

1. The promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas,

2. Recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State,

3. Recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development,

4. In planning for rural lands, to balance the social, economic and environmental interests of the community,

5. The identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land,

6. The provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities,

7. The consideration of impacts on services and infrastructure and appropriate location when providing for rural housing,

8. Ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.

The proposal for the subject site addresses these principles as follows:

- The site has been identified in the Singleton Rural Residential Development Strategy (2004) (now repealed) as being not suitable for regular cultivation. The size of the site, combined with the constraints to ongoing agricultural activities (soil quality, proximity to residential dwellings preventing using of farming inputs including pesticides and fertilisers), precludes primary production significant to the local economy. The current use of the land for horse agistment reflects these factors.
- For the above reasons, any future owner wishing to pursue agricultural activities on the subject land would find it difficult to generate produce from the land and would be reliant on off farm income. In effect, the subject land is already used largely as "rural residential lots".
- Previous zoning and development decisions have lead to surrounding land being subdivided for rural residential and urban development. These lands and the subject land are likely to have common bio physical attributes that are not conducive to agricultural production.
- No natural resources or areas of significant biodiversity or native vegetation would be adversely impacted by the proposal. The proposed environmental protection zoning over a portion of the site provides for the conservation of biodiversity; and

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

The following s117 directions are deemed to be applicable to the proposal:

1.2 Rural Zones

Objective
The objective of this direction is to protect the agricultural production value of rural land.

Consistency
A planning proposal may be inconsistent with the terms of this direction (the objective) only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

(a) justified by a strategy which:

(i) gives consideration to the objectives of this direction,

(ii) identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and

(iii) is approved by the Director-General of the Department of Planning, or

(b) justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or

(c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or

(d) is of minor significance.

The Singleton Rural Residential Development Strategy (2004) identifies the subject land as Agricultural Suitability Class 3 – *Not suited to regular cultivation - some pasture & arable. Moderate production.* Not being suited for regular cultivation, its relatively small size and mostly surrounded by residential and rural residential dwellings, means that the subject site is rural land with low production values.

Despite this, an agricultural feasibility study can be prepared should the Minister deem it to be necessary.

1.5 Rural Lands

Objective
The objectives of this direction are to:

(a) protect the agricultural production value of rural land,

(b) facilitate the orderly and economic development of rural lands for rural and related purposes.

The site is not identified as being prime agricultural land and will therefore not impact on the orderly and economic development of rural land within the Singleton LGA.

2.1 Environmental Protection Zones

Objective
The objective of this direction is to protect and conserve environmentally sensitive areas.

The proposal is to zone land deemed to be ecologically significant as Environmental Protection.

2.3 Heritage conservation

Objective

The objective of this direction is to conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance.

No items of European heritage significance exist within the subject site. However, an aboriginal heritage assessment can be completed over the subject site should it be deemed necessary by the minister.

3.1 Residential Zones

Objective

The objectives of this direction are:

(a) to encourage a variety and choice of housing types to provide for existing and future housing needs,

(b) to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and

(c) to minimise the impact of residential development on the environment and resource lands.

The proposal is deemed to appropriately respond to the objectives of this direction.

3.4 Integrating Land Use and Transport

Objective

The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:

(a) improving access to housing, jobs and services by walking, cycling and public transport, and

(b) increasing the choice of available transport and reducing dependence on cars, and

(c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and

(d) supporting the efficient and viable operation of public transport services, and

(e) providing for the efficient movement of freight.

Residential development of the subject site will improve the permeability of the existing street network for walking, cycling and buses. This also means access to Branxton rail station and the Hunter rail corridor. This allows for greater viability of any existing and future public transport servicing the area.

The site provides relatively easy access to the large employment providers within the wine and coal industries that necessitate being located considerable distance from residential land uses. Large numbers of employees are required to travel from Maitland, Newcastle and Lake Macquarie to service these industries and an increase in available land within Branxton will assist in reducing the distances travelled for employment.

4.2 Mine subsidence and Unstable Land

Objective

The objective of this direction is to prevent damage to life, property and the environment on land identified as unstable or potentially subject to mine subsidence.

According to the *Singleton Land Use Strategy* the site is outside of a mine subsidence district.

4.3 Flood Prone Land

Objective

The objectives of this direction are:

(a) to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, and

(b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.

The proposal suggests zoning the flood affected land within the site as environmental protection.

4.4 Planning for Bushfire Protection

Objective

The objectives of this direction are:

(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

(b) to encourage sound management of bush fire prone areas.

It will be necessary to consult with the Rural Fire Services following the gateway determination of the proposal.

It is expected that any asset protection zone required within the development will be accommodated within each separate allotment.

5.1 Implementation of Regional Strategies

Objective

The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies.

The proposal is consistent with the Lower Hunter Regional Strategy see Item 4.2 Relationship to strategic planning framework above.

6.1 Approval and referral requirements

Objective

The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development.

The Planning Proposal is unlikely to require the concurrence, consultation or consent of a minister or public authority at the Development Application stage.

6.3 Site Specific Provisions

Objective
The objective of this direction is to discourage unnecessarily restrictive site specific planning controls.

No site specific planning controls are proposed.

4.3 Environmental, social and economic impact

8. 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?

An ecological assessment has been prepared by Pacific Environmental Associates outlining the likelihood of endangered species, populations or communities occurring within the site. The assessment recorded one (1) threatened species, the Grey-crowned Babbler on the site. Habitat was also found for seven (7) other threatened species and one community which had affinities with the Central Hunter Spotted gum Ironbark Grey box forest, an Endangered Ecological Community, and, as such the site could be seen as carrying a moderate level of conservation significance.

Surveys of vegetation communities using quantitative measures was limited by access to the entire study area. Surveys "over the fence" on Lot 4 were undertaken and this vegetation appears to be floristically and structurally more diverse than Lot 31-33.

The 7-part tests conducted on the species at risk, concluded that the proposal would not have a significant impact provided the following recommendations are implemented:

- That regional planning incorporate the guidelines for regional species movements;
- The areas shown as conservation (**Figure 7**) should become reserved and rehabilitated to form "reserves" as part of the structure plan for the site;
- A best-practice erosion and sediment control plan would be developed;
- Appropriate stormwater and nutrient control systems would be incorporated into the proposal designed to reduce the effects of runoff and ensure water flowing off the proposal area is of a suitable quality;
- The construction site would be managed to ensure that there is no accidental incursions into areas which are not subject to the proposal; and,
- Any landscaping associated with the proposal would comprise of endemic native plants.

A copy of the report is provided at **Attachment C**.

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

The site does contain areas that are flood liable but it is not intended to develop these areas for residential purposes (refer **Attachment D**). Inundated portions of the site may carry an environmental protection zoning.

Bushfire buffers required for residential development will be determined during the preparation of detailed studies to accompany any future development applications, or additional information requested by the Minister. Any required APZ would be accommodated within each allotment, allowing for ongoing maintenance of the APZ without burden on public authorities.

10. How has the planning proposal adequately addressed any social and economic effects?

The proposal is likely to only have positive social and economic outcomes, as indicated in the net community benefit test.

4.4 State and Commonwealth interests

11. Is there adequate public infrastructure for the planning proposal?
The proposal responds to the requirements for public infrastructure as follows.

Roads
The site is accessed from Dalwood Road, a typical rural road with no kerb and guttering. It is expected that the stretch of Dalwood Road fronting the site will be upgraded to be consistent with the treatment provided to this road within the adjoining residential development. This will include kerb and gutter and widening as deemed necessary.

Dalwood Road terminates at the New England Highway via an existing signalized intersection. It is unlikely that this intersection will require an upgrade following development of the site given the imminent construction of the F3 extension that will significantly reduce traffic loads moving through this intersection.

Water and Sewer
Correspondence has been received from Hunter Water in relation to sewer and water servicing of the proposal. The advice indicates that, subject to detailed investigations, the site will be afforded water servicing following the upgrade of the Maitland-North Rothbury water supply system, scheduled to be completed in 2013.

Some capacity does exist for the site to be serviced with sewer, however should additional capacity be required it will be available following the upgrade of the Branxton Waste Water Treatment System that is proposed to be completed by 2011.

Electricity and Telecommunications Services
It is expected that the existing telecommunications and electricity networks servicing the site and adjoining development are able to be augmented to support the proposal.

Waste Management and Recycling Services
The proposed development will serve to improve the viability of the existing waste disposal services afforded within the adjoining rural residential development.

12. What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?
No formal consultation has been carried out at this stage. It is anticipated that consultation will occur with all relevant agencies deemed relevant following the gateway determination.

ATTACHMENT A
Development Opportunities Plan

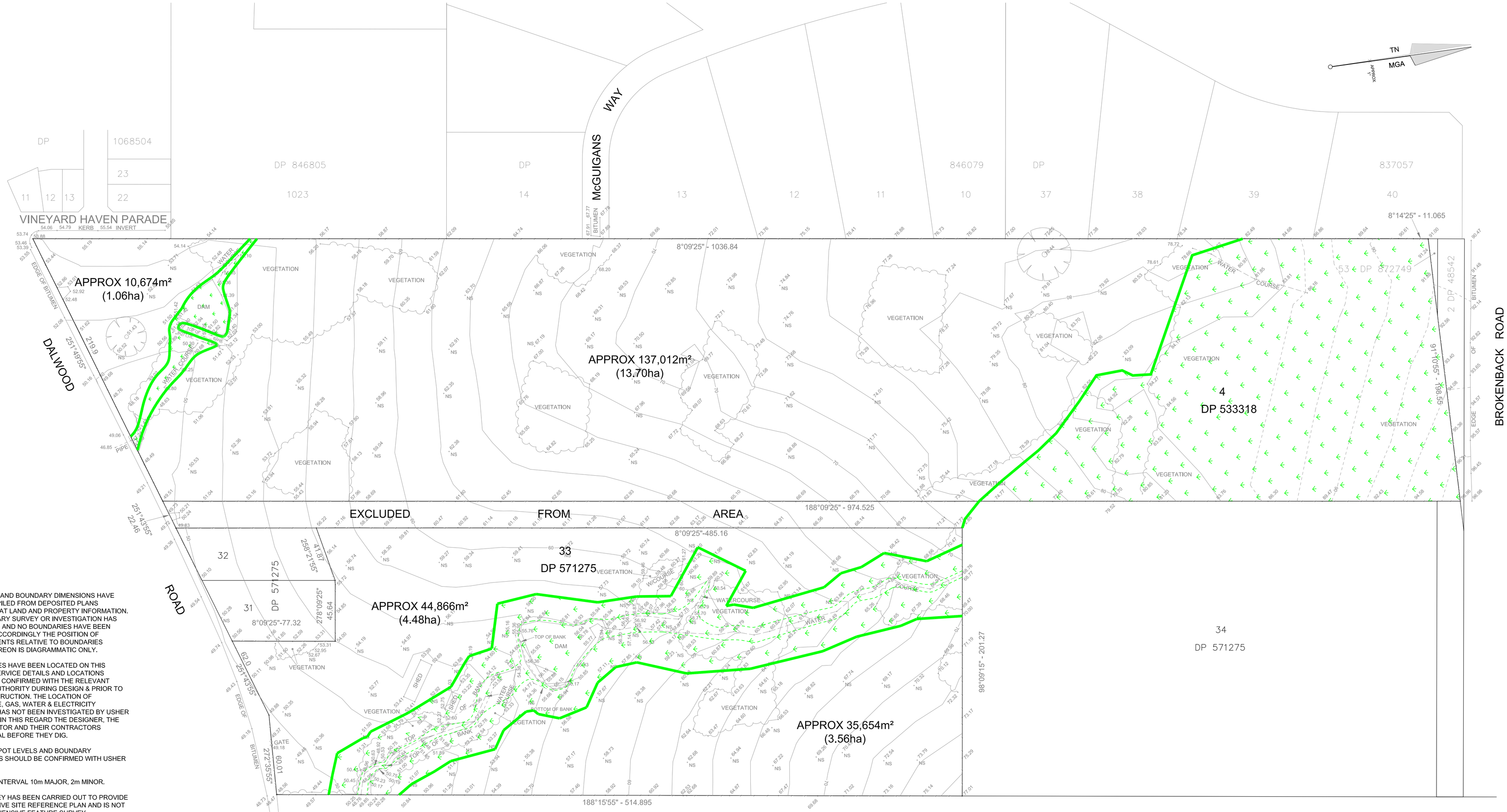
ATTACHMENT B
Response to LHRS Sustainability Criteria

ATTACHMENT C
Ecology Report

ATTACHMENT D
Stormwater and Flooding Assessment

ATTACHMENT E
Jurds Real Estate Advice

ATTACHMENT F
Letter from Minister for Planning



NOTES

LOT AREAS AND BOUNDARY DIMENSIONS HAVE BEEN COMPILED FROM DEPOSITED PLANS AVAILABLE AT LAND AND PROPERTY INFORMATION. NO BOUNDARY SURVEY OR INVESTIGATION HAS BEEN MADE AND NO BOUNDARIES HAVE BEEN MARKED. ACCORDINGLY THE POSITION OF IMPROVEMENTS RELATIVE TO BOUNDARIES SHOWN HEREON IS DIAGRAMMATIC ONLY.

NO SERVICES HAVE BEEN LOCATED ON THIS SURVEY. SERVICE DETAILS AND LOCATIONS SHOULD BE CONFIRMED WITH THE RELEVANT SERVICE AUTHORITY DURING DESIGN & PRIOR TO ANY CONSTRUCTION. THE LOCATION OF TELEPHONE, GAS, WATER & ELECTRICITY SERVICES HAS NOT BEEN INVESTIGATED BY USHER & ROBSON. IN THIS REGARD THE DESIGNER, THE CONSTRUCTOR AND THEIR CONTRACTORS SHOULD DIAL BEFORE THEY DIG.

CRITICAL SPOT LEVELS AND BOUNDARY DIMENSIONS SHOULD BE CONFIRMED WITH USHER & ROBSON.

CONTOUR INTERVAL 10m MAJOR, 2m MINOR.

THIS SURVEY HAS BEEN CARRIED OUT TO PROVIDE AN INDICATIVE SITE REFERENCE PLAN AND IS NOT A COMPREHENSIVE FEATURE SURVEY.

COORDINATES AND ORIENTATION SHOWN ON THIS DRAWING ARE DERIVED FROM A LOCALISED, GROUND DISTANCE BASED GRID, ESTABLISHED FROM THE M.G.A COORDINATES OF:

SSM 78822
MGA EASTING 347 609.002
MGA NORTHING 6387 026.130
RL (AHD) 84.874

SSM 75778
MGA EASTING 347 582.096
MGA NORTHING 6385 962.304

DENOTES CONSTRAINED AREA BY FLOODING AND ECOLOGY.

DIAL 1100 BEFORE YOU DIG

USHER & ROBSON
Surveying & Land Development Consultants
Unit 3A, 45 The Avenue, Maryville NSW 2293
PO Box 416, The Junction NSW 2291
Phone: (02) 4962 5344
Fax: (02) 4962 5355
Email: enquiries@usherandrobson.com.au
Usher & Company Pty Limited trading as Usher & Robson ABN 70 128 414 602

APPROVED

Amendments

ISSUE	DATE	DETAILS
INITIAL	23-04-2009	
REV 1	18-03-2010	DEVELOPMENT CONSTRAINTS - BY OTHERS - ADDED TO MODEL

PLAN:

SHOWING DETAIL AND LEVELS
AT DALWOOD ROAD, EAST BRANXTON
BEING LOT 4 IN DP 533318
AND LOT 33 IN DP 571275

LGA:	SINGLETON
SUBURB:	EAST BRANXTON
ORIGIN:	SSM 78822 RL 84.874 AHD CLASS LC, ORDER L3 SCIMS 06/04/2009

REDUCTION RATIO:	1:1500
DATUM:	AHD
DATE OF SURVEY:	16-04-2009
SURVEYED BY:	DSR/CJL
DRAWN BY:	AD

THIS PLAN IS FOR THE EXCLUSIVE USE OF
J. W. PLANNING

A1

PLAN REFERENCE
5349DETAIL

ISSUE
REV 1

Response to Sustainability Criteria – Lot 31, 32 & 33 DP 571275 and Lot 4 DP 533318

1. Infrastructure Provision

Mechanisms in place to ensure utilities, transport, open space and communication are provided in a timely and efficient way

Infrastructure provision currently exists in the sites context that can be extended into the subject site easily, subject to confirmation from Hunter Water.

Any development of the land will involve the preparation of a developer agreement to ensure all required infrastructure is available to the subject site.

2. Access

Accessible transport options for efficient and sustainable travel between homes, jobs, services and recreation to be existing or provided

Development of the subject site and its context will assist in providing a transport network that will encourage more efficient provision of public transport.

The site location in reasonable proximity to the services provided within Branxton, reducing the number and length of vehicle movements required by any future residents of the subject site.

Residential development of the subject site will significantly improve the catchment of Branxton that will further add to the viability of public transport servicing the area.

The proposal will have no negative impact on any sub regional road, bus, rail or freight network.

3. Housing Diversity

Provide a range of housing choices to ensure a broad population can be housed

Any residential development of the subject site will provide a diversity of housing options within the LGA given the sites location away from the other areas of urban expansion.

Rezoning of the land will provide a significantly different location and community to the one provided within close proximity to Singleton and will also provide for development in two separate areas fronts to ensure housing affordability is achieved.

4. Employment Lands

Provide regional/local employment opportunities to support the Lower Hunter's expanding role in the wider regional and NSW economies

The land is not considered suitable for the provision of employment land.

5. Avoidance of Risk

Land use conflicts, and risk to human health and life, avoided

The site is not within the 1 to 100 year floodplain, nor constrained by high slope or highly erodible soils.

The use of the site for residential purposes will be consistent with the context of the site.

6. Natural Resources

Natural resource limits not exceeded/environmental footprint minimized

Site is not located in an area identified as being suitable for agricultural production, extractive industries or the like.

Subject to confirmation, the land can be serviced with water infrastructure without creating an over burden on the existing supply system.

7. Environmental Protection
Protect and enhance biodiversity, air quality, heritage and waterway health

The site is not identified as containing significant biodiversity areas. Any areas where vegetation currently exists will be assessed during the rezoning and Development Application processes to ensure all high quality habitat is retained post development of the land.

8. Quality and Equity in Services
Quality health, education, legal, recreational, cultural and community development and other Government services are accessible
An infill development opportunity provided by the subject site will ensure all services available within Branxton remain viable and will provide opportunities for the economic expansion of these services, where required.

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Ecological Assessment Proposed Rezoning
Lot 4 & Lot 31-33 Dalwood Road, Branxton NSW

Prepared by John-Paul King

January 2010

Ecological Assessment Proposed Rezoning
Dalwood Road, Branxton NSW

Prepared by John-Paul King

January 2010

Ecological Assessment

1.0 Introduction

1.1 Background

This is an ecological assessment for the proposed rezoning of land for residential land at Dalwood Road, Branxton. The site is made up of four (4) separate parcels of land described as Lot 31-33 DP 571275. No site access was available to Lot 4 DP 533318 and therefore only indicative information is provided in regards to this allotment. The study area is approximately 40 hectares in size and is located 1.7km to the northeast from the centre of the township of Branxton. The study area for this ecological assessment comprises of the areas indicated in Figure 1.0

The investigations cover all terrestrial and wetland habitats such as, bushland, grassland, fauna habitat, creeks and rivers, including their immediate riparian habitats, and swamps and marshes.

1.2 Abbreviations and Definitions

The following definitions and abbreviations are used within this report:

Abbreviations:

- TSC Act = NSW Threatened Species Conservation Act (1995).
- EPBC Act = Commonwealth Environmental Protection and Biodiversity Conservation Act (1999).
- EP&A Act = Environmental Planning and Assessment Act (1979).
- DECC = NSW Department of Environment and Conservation.
- DEH = Commonwealth Department of Environment and Heritage.
- SEPP = State Environmental Planning Policy.
- CAMBA = China Australia Migratory Birds Agreement.
- JAMBA = Japan Australia Migratory Birds Agreement.
- ROTAP = Rare or Threatened Australian Plants (Briggs and Leigh 1995).
- GIS = Geographic Information System.

Definitions:

- Study Area = Area defined in Figure 1 as Study Area.
- Survey area = The survey area was limited on Lot 4 due to the unwillingness of the landholder to permit access. Surveys of the vegetation and observations of fauna usage were made from nearby properties
- Proposal Area = Area most likely to be subject to the activity

- Local Area = Area within a 10 kilometre radius of the study area.
- Sub-regional Area = the area that supports the sub-regional vegetation for regionally distributed significant species, this varies from site to site depending on spatial characteristics.
- Significant Species = species listed as threatened under the TSC Act, EPBC Act and migratory species listed under the international treaties CAMBA, JAMBA and the Bonn Convention, and regionally significant flora species listed on ROTAP or by HRPC.

1.3 Purpose of Report

This is an ecological assessment for the proposed rezoning of land from rural to low density residential development at Dalwood Road, Branxton. The study area for this ecological assessment comprises the areas indicated in Figure 1. The intention is to assist with the identification and assessment of the potential impact of the proposal on flora and fauna within the proposal area and the study area. Particular attention is given to the impact on significant species, populations and ecological communities.

The ecological investigations cover all wetland (such as creeks and rivers, including their immediate riparian habitats, and swamps and marshes) and non-wetland habitats.

2.0 Methods

Methods used in surveys followed local and DECC guidelines for survey and were only undertaken during appropriate weather conditions for the target species (Figure 5). Current databases were searched and when species, populations, or communities were found in the local area, these were compared to habitats onsite to formulate a range of targeted surveys. When habitat or a significant species populations, or communities was found to be impacted by the proposal, specific recommendations were made to reduce impacts.

3.0 Key results

3.1 Vegetation Communities

The vegetation communities within the study area comprise three communities (Figure 3). Map unit 1 has affinities with the Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions and Lower Hunter Spotted gum Ironbark Forest, and is considered here to be an ecotone of the two communities. A full list of the flora species observed during field surveys is provided in Appendix 1. A full description of communities is presented below.

Unit 1	**Spotted gum Ironbark/disturbed forest**
EEC:	Ecotone of the Central Hunter Ironbark-Spotted Gum-Grey Box Forest EEC/ Lower Hunter Spotted gum Ironbark Forest EEC
Mapped Area:	7.02ha
Dominant Species:	*Corymbia maculata, Eucalyptus crebra, Eucalyptus tereticornis, Angophora floribunda, Eucalyptus fibrosa, and Eucalyptus moluccana*
General Description:	
Woodland community formed on lot 31-33 by clearing of the original native forest and ongoing grazing/mowing to maintain a sparse mid-story of *Acacia decora, Allocasuarina torulosa and Casuarina gluaca*, and shrub layer of *Cassinia aculeate, Pimelea linifolia subsp.linifolia* and *Ozothammus diosmifolius*. The understorey in these Lots (31-33) is a mixture of native and exotic grasses and herbs, *Axonopus fissifolius, Cynodon dactylon* and *Microlaena stipoides* var. *stipoides*. Lot 4 whilst originally likely from the same community presents differently as a result of disturbance history. Flora plots 5 & 6 were recorded in these lots and clearly show increased floristic diversity and cover. Lot 4 forest community is still impacted by clearing, with the southern fragmented portions of this lot being similar in disturbance history to Lot 31-33. The northern remnant of Lot 4 (locations of plots 5 &6) is a less disturbed example of this remnant Eucalypt forest. Mid stratum species include, Acacia decora and regenerating Eucalyptus spp. Shrub layer species included *A.falcata, A.parvipinnula, A.elongata, Daviesa genistifolia, Bursaria spinosa, D. ulicifolia.* Grasses and ground layer included *Themeda australis, Lomandra multiflora subsp. multiflora*, *Eragrostis brownii, Goodenia rotundifolia* and *Fimbristylis dichotoma.*	

Unit 2	**Central Hunter Riparian Forest**
EEC:	n/a
Mapped Area, Option 1:	1.73ha
Dominant Species:	*Casuarina Cunninghamiana*
General Description:	
Vegetation along the creek dominated by riparian trees *Casuarina Cunninghamiana. Understorey of grasses, such as Cynodon dactylon, Ehrharta erecta, Pennisetum clandestinum, Bidens pilosa and Commelina cyanea.*	

Unit 3	**Pasture**
EEC:	n/a
Mapped Area:	12.7 ha
Dominant Species:	Various mostly introduced grasses and herbs
General Description:	
Pasture on poor quality soil dominated by introduced grasses and herbs, such as *Cynodon dactylon, Cymbopogon refractus*, *Hypochoeris radicata*, and *Plantago lanceolata.*	

3.2 Significant species, populations, communities

In total nine species were considered to have habitat on the site and could potentially be impacted by the proposal. These species were subjected to 7-parts (See Appendix 3) the results of which are shown in the conclusion:

- Grey-crowned Babbler *Pomatostomus temporalis temporalis (recorded onsite)*
- Speckled warbler *Sericornis sagittatus (recorded in local area)*
- Squirrel Glider *Petaurus norfolcensis*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis*

4.0 Conclusion

Surveys conducted on site recorded one threatened species, Grey-crowned Babbler. One troop (4 birds) was recorded onsite along with five other troops in the local area (See Figure 2). Habitat was also found for 7 other threatened species and one community had affinities with the Central Hunter Spotted gum Ironbark Grey box forest (ECC preliminary determination) and, as such has a moderate level of conservation significance.

Surveys of vegetation communities using quantitative measures was limited by access to the entire study area, nonetheless, surveys "over the fence" on Lot 4 were undertaken and this vegetation is shown in the data set to be floristically and structurally more diverse than Lot 31-33.

The 7-part tests conducted on these species at risk, concluded that the proposal would not have a significant impact, that is, given the implementation of the following recommendations:

- That regional planning (Figure 3) incorporate the guidelines for regional species movements;
- The areas shown in Figure 4 should become reserved and rehabilitated to form "reserves" as part of the structure plan for the site;
- A best-practice erosion and sediment control plan would be developed;
- Appropriate stormwater and nutrient control systems would be incorporated into the proposal designed to reduce the effects of runoff and ensure water flowing off the proposal area is of a suitable quality;
- The construction site would be managed to ensure that there is no accidental incursions into areas which are not subject to the proposal; and,
- Any landscaping associated with the proposal would comprise of endemic native plants.

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Figure 1 - Study Area

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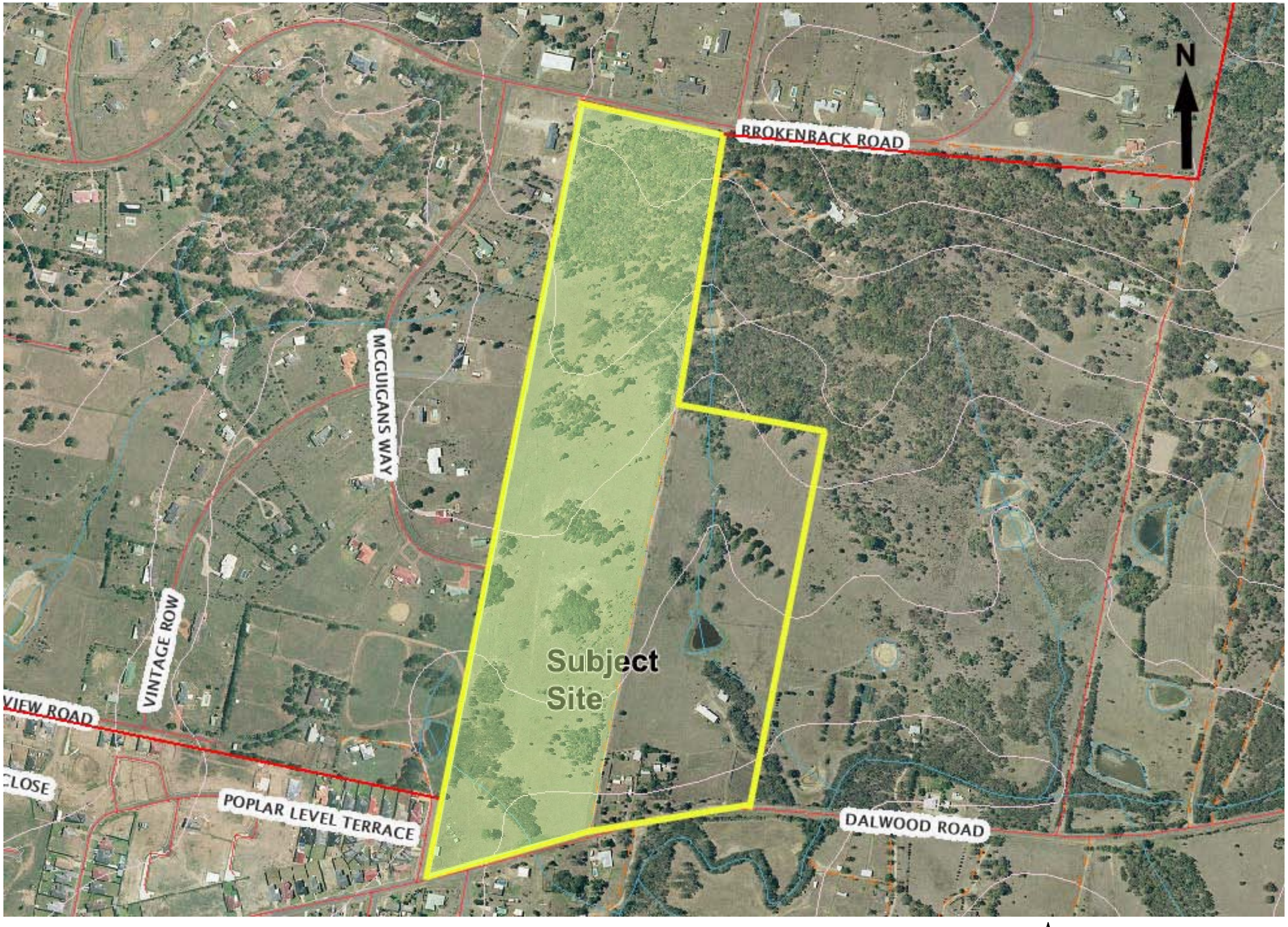

Subject site

Limited access for surveys, however visible surveys from across boundaries was possible

Scale unclear

Figure 1. Subject site

Figure 2 - Local Area Ecological Issues

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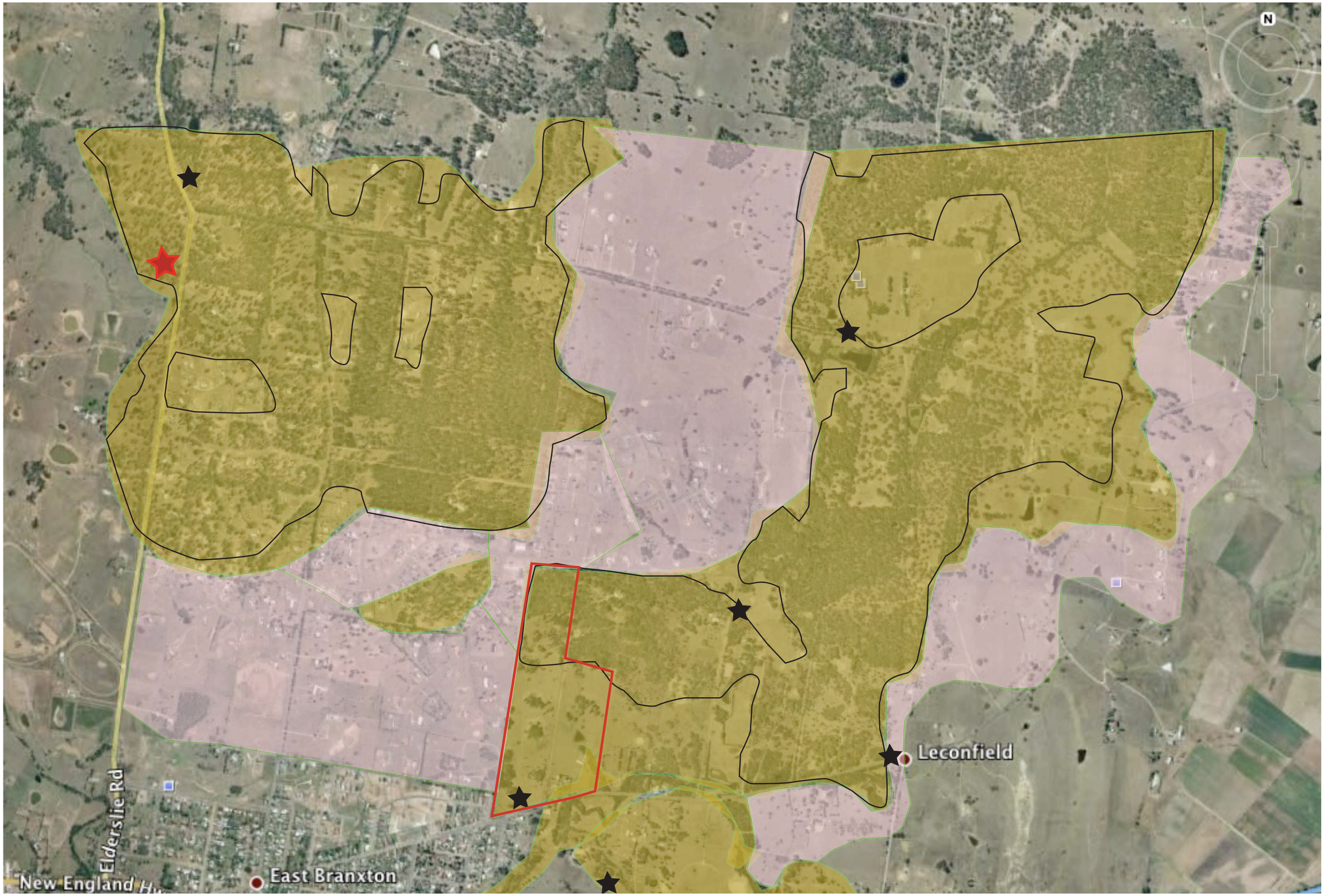

Low quality, disturbed habiat with scattered trees. Some relics but within the urban matrix.

Moderate to low quality habitat with some areas of scattered trees but close enough to provide better quality habitat.

Moderate to high quality habtiat with some areas of diturbed understorey and thinning with a reduced influence of the urban matrix.

Subject site

Speckled warbler

Grey-crowned babbler

Scale unclear

Figure 2. Local area ecology

Figure 3 - Vegetation

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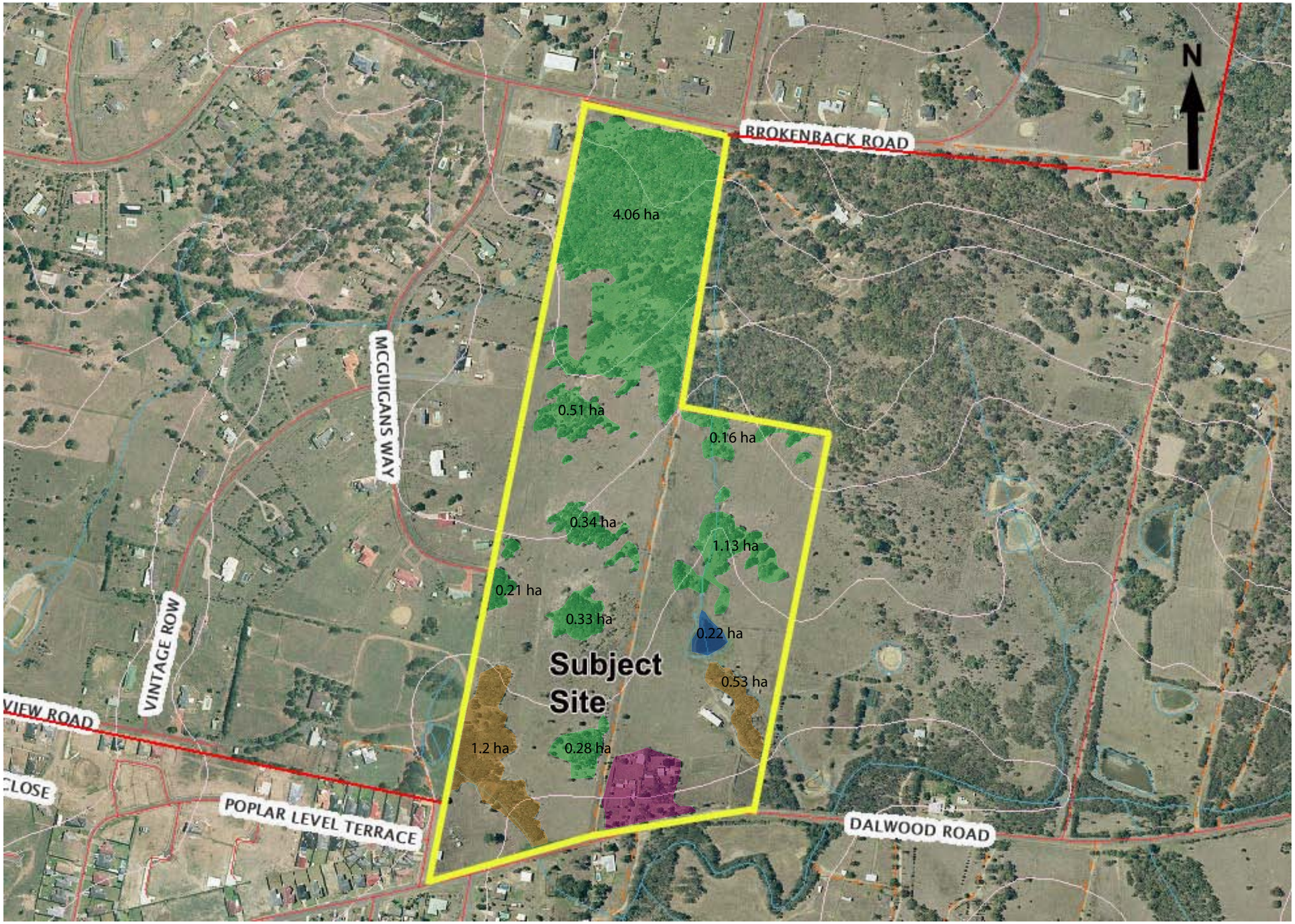


Central Hunter Spotted gum Ironbark Forest

Central Hunter Riparian Forest

Pasture

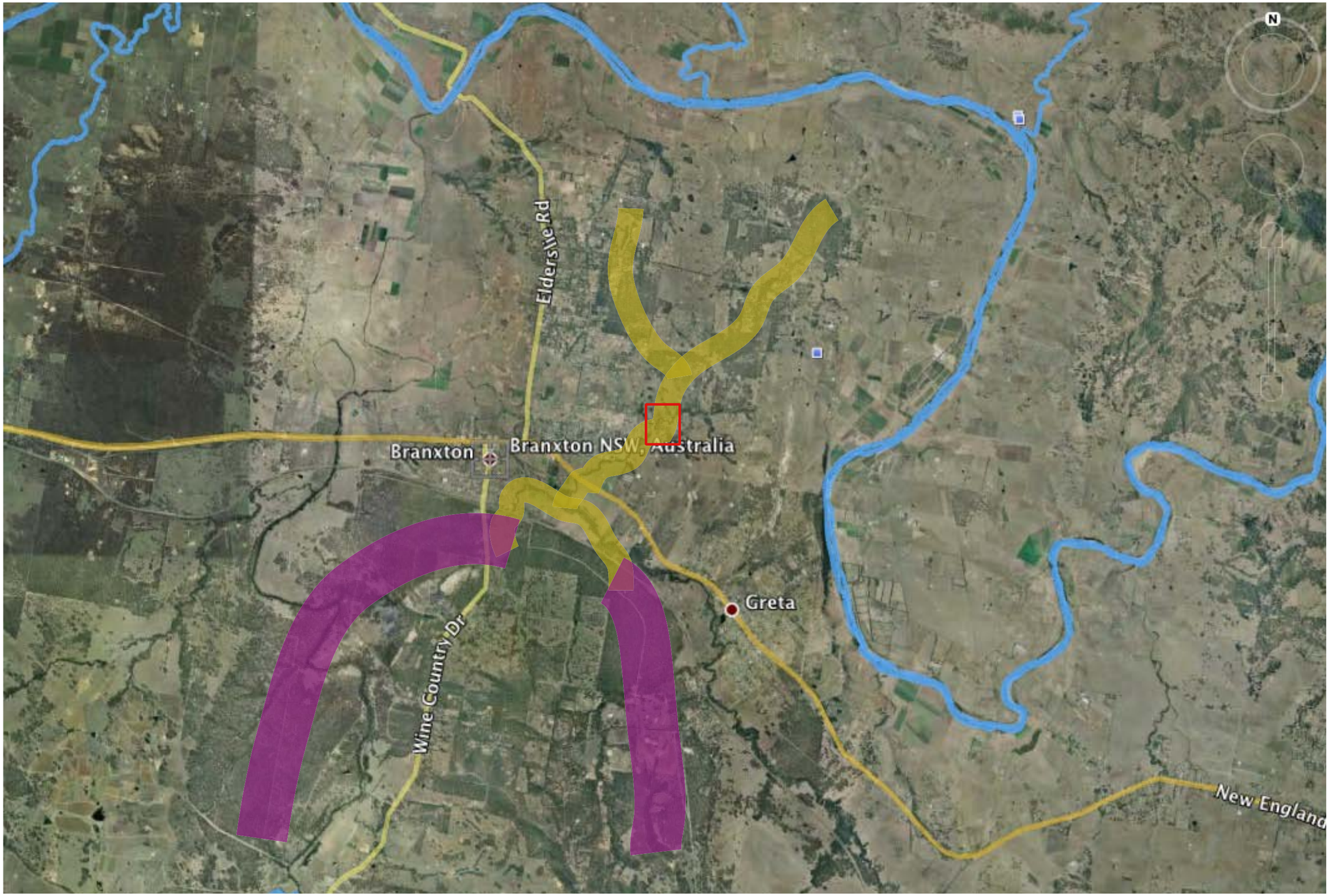
Farm dam

Subject site

Scale unclear

Figure 3. Vegetation

Figure 4 - Sub-regional Area Ecological Issues



Semi fragmented corridor that provides links for woodland species and joins healthy established regional habitat links.

Regional habitat links that run south to expansive areas of good quality habitat

Subject site

Scale unclear

Figure 2. Sub-regional area ecology

Figure 5. Recommendations

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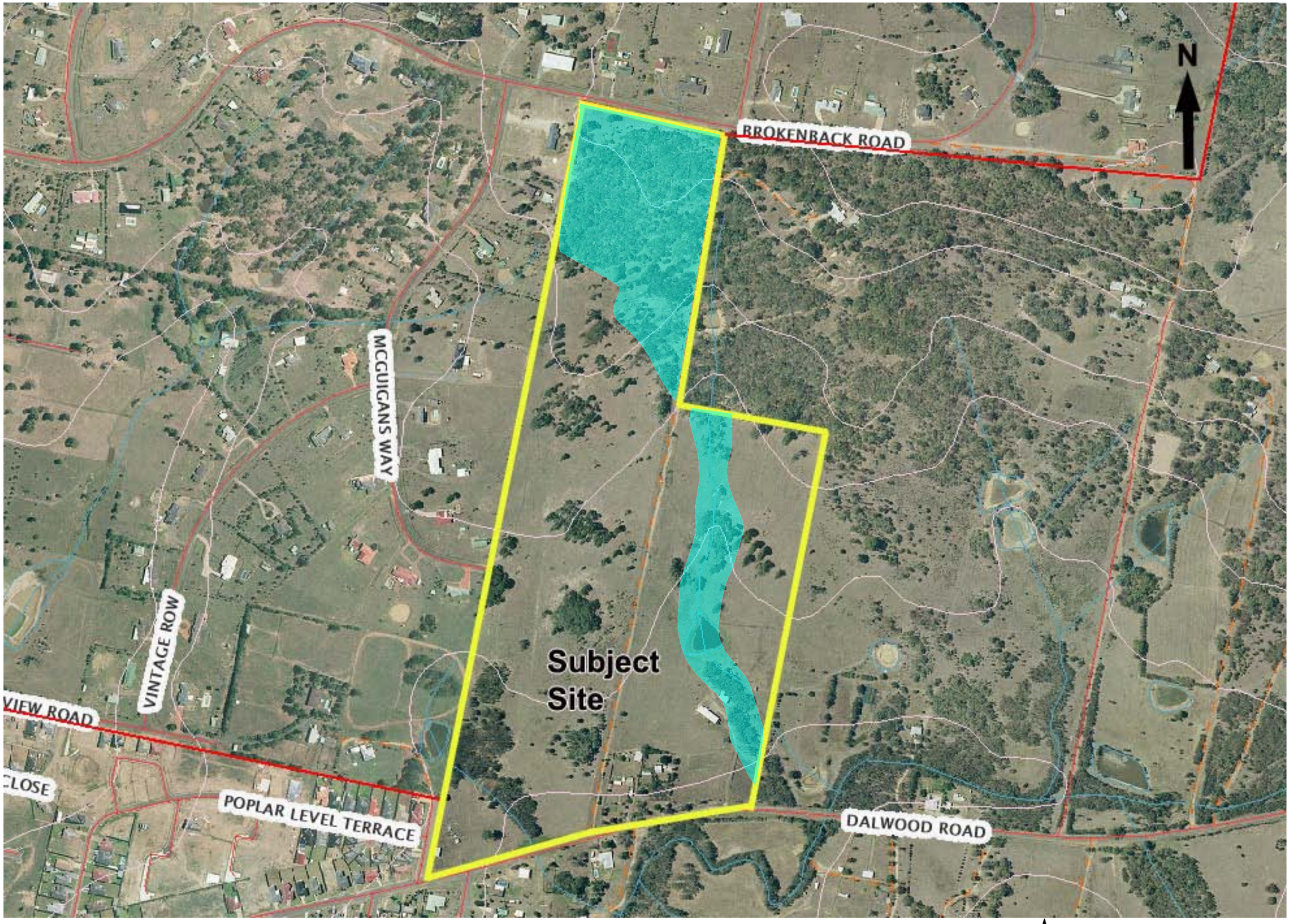

Reserve areas that will include regeneration and habitat enhancement

Subject site

Scale unclear

Figure. 5 Recommendations

Figure 6 Surveys

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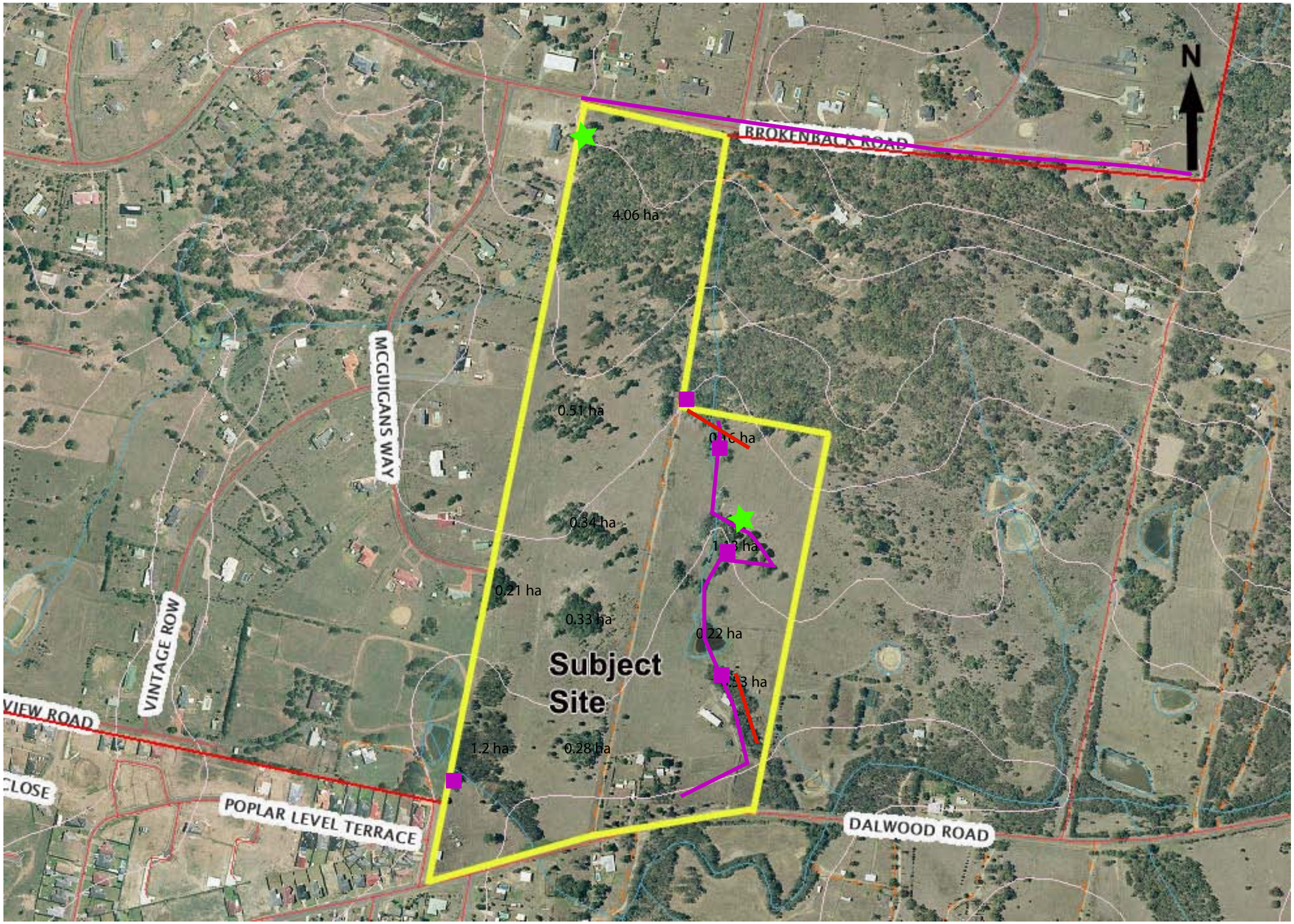

Flora quadrats (20 x20) and Koala pellet surveys

Walking transect: spotlighting, owl, Anabat, frogs and birds

Trapping transect (10 arboreal and ground traps)

Owl and Anabat stations

Subject site

Scale unclear

Figure 6. Surveys

Technical Report

1.0 Introduction

This report details survey methods, results gained, impact assessments undertaken, conclusions and recommendations made for the proposal. It is not essential to read this report to comprehend the ecological issues and recommended approach to management the subject site, this can be achieved by reading the above assessment: it does however provide greater detail.

1.1 Legislative framework

1.1.1 Threatened Species and Ecological Communities

The threatened species and ecological communities known to occur in the vicinity of the study area are associated with remnant vegetation, wetland and/or floodplain areas are included for assessment in this report. There is no statutory prohibition on harming or picking threatened species or ecological communities although approval to do so is required. Where any impact is deemed likely to significantly affect a threatened species or ecological community (following an assessment pursuant to s.5A of the *Environmental Planning and Assessment Act 1979* (EPA Act), it is necessary to prepare a species impact statement (SIS).

1.1.2 SEPP 14 Wetlands

State Environmental Planning Policy 14 - Coastal Wetlands (SEPP 14) was introduced to protect coastal wetlands in New South Wales (outside of the Sydney Metropolitan area). Any activity involving filling, draining, levee bank construction or clearing in a wetland shown on one of the SEPP 14 maps is designated development under the EPA Act. This would require consent by council and concurrence of the Director-General of Department of Infrastructure Planning and Natural Resources under Part 4 of the EPA Act. An EIS is required to be prepared for all designated development.

There are no several SEPP 14 wetlands in the local area and will not be dealt with any further in this assessment.

1.1.3 SEPP 44 Koala Habitat Protection

SEPP 44 provides that before a council may consent to a development it must satisfy itself as to the following:

Step 1 - A council must determine whether the land that is the subject of the development application is "potential Koala habitat", which is defined as areas of native vegetation where major Koala food trees (listed in Schedule 2) constitute at least 15% of the total number of trees. If the land is not potential Koala habitat the provisions of SEPP 44 do not apply to the proposed development. If the land is potential Koala habitat the council must consider the next step.

Step 2 - Where the land is potential Koala habitat, the council must determine whether it is "core Koala habitat", which is defined as "an area of land with a resident population of Koalas, evidenced by attributes such as breeding females and recent sightings of and historical records of a population". If the land is not core Koala habitat the provisions of SEPP 44 do not apply to the proposed development. If the land is core Koala habitat the council must consider the next step.

Step 3 - Where the land is core Koala habitat, the council is prohibited from granting consent unless a plan of management, addressing the matters referred to in the SEPP, covering that land has been prepared.

Under SEPP 44, proponents must consider the impact of their proposals on koalas and koala habitat (as defined in the SEPP), and in certain circumstances, prepare individual koala plans of management for their land. Koala records exist in the local and will be undertaken as part of surveys.

1.1.4 Native Vegetation Act 2003

The Department of Environment, Climate Change and Water (DECCW) is charged with promoting compliance with native vegetation legislation to achieve better environmental outcomes in accordance with the performance target for native vegetation management in the NSW Government's State Plan - A New Direction for NSW. A key component of native vegetation management is compliance with the Native Vegetation Act 2003 and DECCW's role in its regulation.

DECCW is responsible for implementing a credible compliance and enforcement framework for native vegetation to ensure that landholders who comply with the law are not disadvantaged. This compliance and enforcement framework is 'risk-based' and provides DECCW with a cost-effective approach to monitoring compliance, enabling investigation of the highest priority regulatory risks and proactive response to changing or emerging risks.

The act applies to rural residential land in that, any native vegetation at any stratum which regrows after 1990 does not require approval for clearing under the Act.

2.0 Preliminary habitat assessment and data searches

Prior to undertaking targeted surveys of the study area a preliminary assessment was completed, this being based on desktop studies involving a review of aerial photography of the study area, review of the Atlas of NSW Wildlife (DEC 2009) within the local area (10 kilometre radius) and other existing data from various sources.

The likely occurrence of significant species and ecological communities within the study area was assessed by comparing the known habitat requirements of species recorded within the local area with habitats present within the study area. The databases and other sources that were searched include:

- the NSW National Parks and Wildlife Service *Wildlife Atlas* database for threatened species and ecological communities;
- the NSW Fisheries database for threatened and protected aquatic species and ecological communities;
- the National Herbarium of NSW *Plant Net* database for threatened and other significant species;
- the National Department of Environment and Heritage database for Ramsar sites and important wetlands;
- the Australian Museum, NSW Department of Environment and Conservation and the NSW Department of Primary Industries *BioNet* map and database collections for threatened and other significant species;
- The Commonwealth Department of Environment and Heritage database for nationally listed threatened species and 'Important Wetlands';

2.1 Local Significant Species, Populations and Communities

2.1.1 Threatened Species

Threatened[1] species are listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act), the NSW *Fisheries Management Act 1994* (FM Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Atlas of NSW Wildlife administered by the Department of Environment and Conservation (DEC) was searched for threatened flora and fauna within a 10km radius of the subject site to determine which threatened species have been recorded in the local area. This search was conducted on 24 October 2009 and the results are shown below in **Table 1**. This information was utilised to design surveys to target threatened species that have potential habitat within and adjacent to the subject site.

[1] Threatened species and ecological communities are divided into three sub-categories: presumed extinct, endangered and vulnerable.

Table 1: Wildlife Atlas Search for threatened species within 10km of the proposal area.

Scientific Name	Common Name	Legal Status*	
		TSC Act	EPBC Act
Freshwater Wetlands on Coastal Floodplains	Freshwater Wetlands	EEC	
Lower Hunter Spotted Gum-Ironbark Forest in the Sydney Basin Bioregion	Lower Hunter Spotted Gum-Ironbark Forest	EEC	
River-flat Eucalypt Forest on Coastal Floodplains	River-flat Eucalypt Forest on Coastal Floodplains	EEC	
Swamp Oak Floodplain Forest	Swamp Oak Floodplain Forest	EEC	
Swamp Sclerophyll Forest on Coastal Floodplain	Swamp Sclerophyll Forest	EEC	
Rutidosis heterogama	Heath Wrinklewort	V	
Tetratheca juncea	Black-eyed Susan	V	
Callistemon linearifolius	Netted Bottle Brush	V	
Eucalyptus glaucina	Slaty Red Gum	V	
Eucalyptus parramattensis subsp. decadens		V	
Persicaria elatior	Tall Knotweed	V	
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	
Rulingia prostrata	Dwarf Kerrawang	E1	
Rutidosis heterogama	Heath Wrinklewort	V	
Litoria aurea	Green and Golden Bell Frog	E1	
Hamirostra melanosternon	Black-breasted Buzzard	V	
Lophoictinia isura	Square-tailed Kite	V	
Pandion haliaetus	Osprey	V	
Oxyura australis	Blue-billed Duck	V	
Stictonetta naevosa	Freckled Duck	V	
Anseranas semipalmata	Magpie Goose	V	
Botaurus poiciloptilus	Australasian Bittern	V	
Callocephalon fimbriatum	Gang-gang Cockatoo	V	
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	
Ephippiorhynchus asiaticus	Black-necked Stork	E1	
Ptilinopus superbus	Superb Fruit-Dove	V	
Irediparra gallinacea	Comb-crested Jacana	V	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	
Xanthomyza phrygia	Regent Honeyeater	E1	
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	
Pterodroma leucoptera leucoptera	Gould's Petrel	E1	
Lathamus discolor	Swift Parrot	E1	
Neophema pulchella	Turquoise Parrot	V	
Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	E1	
Ninox connivens	Barking Owl	V	
Ninox strenua	Powerful Owl	V	
Tyto capensis	Grass Owl	V	
Tyto novaehollandiae	Masked Owl	V	
Tyto tenebricosa	Sooty Owl	V	
Dasyurus maculatus	Spotted-tailed Quoll	V	
Phascogale tapoatafa	Brush-tailed Phascogale	V	
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	
Mormopterus norfolkensis	Eastern Freetail-bat	V	
Petaurus norfolcensis	Squirrel Glider	V	
Phascolarctos cinereus	Koala	V	
Pteropus poliocephalus	Grey-headed Flying-fox	V	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
Miniopterus australis	Little Bentwing-bat	V	
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	
Myotis adversus	Large-footed Myotis	V	
Scoteanax rueppellii	Greater Broad-nosed Bat	V	
Vespadelus troughtoni	Eastern Cave Bat	V	

Note:
V = Vulnerable, E = Endangered, EEC = Endangered Ecological Community, M = Migratory

A review of the EPBC Protected Matters report (**Table 2**) conducted for the subject site (24 October 2009) and internationally significant treaties on migratory birds (CAMBA, JAMBA, and Bonn Convention) identified many significant threatened species as being known to the local area.

Table 2: EPBC Protected Matters search results (10km radius of proposal area).

Common Name	Scientific Name	Legal Status*	Type of Presence
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EEC)		CE	Community may occur within area
Leafless Tongue-orchid	*Cryptostylis hunteriana*	V	Species or species habitat may occur within area
Slaty Red Gum	*Eucalyptus glaucina*	V	Species or species habitat likely to occur within area
Earp's Gum, Earp's Dirty Gum	*Eucalyptus parramattensis subsp. decadens*	V	Species or species habitat likely to occur within area
	Grevillea parviflora subsp. parviflora	V	Species or species habitat likely to occur within area
Dwarf Kerrawang	*Rulingia prostrata*	E	Species or species habitat likely to occur within area
	Tetratheca juncea	V	Species or species habitat likely to occur within area
Swift Parrot	*Lathamus discolor*	E	Species or species habitat may occur within area
Australian Painted Snipe	*Rostratula australis*	V, M	Species or species habitat may occur within area
Regent Honeyeater	*Xanthomyza phrygia*	E, M	Species or species habitat likely to occur within area
Green and Golden Bell Frog	*Litoria aurea*	V	Species or species habitat likely to occur within area
Stuttering Frog, Southern Barred Frog (in Victoria)	*Mixophyes balbus*	V	Species or species habitat likely to occur within area
Southern Barred Frog, Giant Barred Frog	*Mixophyes iteratus*	E	Species or species habitat likely to occur within area
Large-eared Pied Bat, Large Pied Bat	*Chalinolobus dwyeri*	V	Species or species habitat may occur within area
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	*Dasyurus maculatus maculatus (SE mainland population)*	E	Species or species habitat may occur within area
Brush-tailed Rock-wallaby	*Petrogale penicillata*	V	Species or species habitat may occur within area
Long-nosed Potoroo (SE mainland)	*Potorous tridactylus tridactylus*	V	Species or species habitat may occur within area
Hastings River Mouse	*Pseudomys oralis*	E	Species or species habitat likely to occur within area
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	Species or species habitat likely to occur within area
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	M	Species or species habitat likely to occur within area
White-throated Needletail	*Hirundapus caudacutus*	M	Species or species habitat may occur within area
Rainbow Bee-eater	*Merops ornatus*	M	Species or species habitat may occur within area
Black-faced Monarch	*Monarcha melanopsis*	M	Breeding may occur within area
Satin Flycatcher	*Myiagra cyanoleuca*	M	Breeding likely to occur within area
Rufous Fantail	*Rhipidura rufifrons*	M	Breeding may occur within area
Great Egret, White Egret	*Ardea alba*	M	Species or species habitat may occur within area
Cattle Egret	*Ardea ibis*	M	Breeding likely to occur within area
Ruddy Turnstone	*Arenaria interpres*	M	Species or species habitat likely to occur within area
Curlew Sandpiper	*Calidris ferruginea*	M	Species or species habitat likely to occur within area
Lesser Sand Plover, Mongolian Plover	*Charadrius mongolus*	M	Species or species habitat likely to occur within area
Latham's Snipe, Japanese Snipe	*Gallinago hardwickii*	M	Species or species habitat may occur within area
Broad-billed Sandpiper	*Limicola falcinellus*	M	Species or species habitat likely to occur within area

Common Name	Scientific Name	Legal Status*	Type of Presence
Bar-tailed Godwit	*Limosa lapponica*	M	Species or species habitat likely to occur within area
Black-tailed Godwit	*Limosa limosa*	M	Species or species habitat likely to occur within area
Eastern Curlew	*Numenius madagascariensis*	M	Species or species habitat likely to occur within area
Whimbrel	*Numenius phaeopus*	M	Species or species habitat likely to occur within area
Pacific Golden Plover	*Pluvialis fulva*	M	Species or species habitat likely to occur within area
Common Greenshank, Greenshank	*Tringa nebularia*	M	Species or species habitat likely to occur within area
Marsh Sandpiper, Little Greenshank	*Tringa stagnatilis*	M	Species or species habitat likely to occur within area
Terek Sandpiper	*Xenus cinereus*	M	Species or species habitat likely to occur within area

Note:
CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory; CAMBA = China Australia Migratory Bird Agreement (1988); JAMBA = Japan Australia Migratory Bird Agreement (1981); CMS = International Convention on Migratory Birds (Bonn Convention). NOTE: species listed under CAMBA and JAMBA are also considered to be migratory under CMS.

The NSW National Parks and Wildlife Service's *Wildlife Atlas* database indicates that Heath Wrinklewort, Slaty Red Gum, Small-flower Grevillea and Dwarf Kerrawang has been recorded within the local area. No other threatened flora species have been recorded within the vicinity of the subject site.

No threatened aquatic fish species have been recorded from streams in the local area and Four Mile Creek area although no detailed investigations have been conducted. A search of Fisheries database records (BioNet 2006) in the Newcastle areas identified the presence of the significant fish species Purple Spotted Gudgeon as being recently recorded in the Lower Hunter

The NSW National Parks and Wildlife Service's *Wildlife Atlas* database indicates that Powerful Owl, Eastern Bent-wing Bat, Little Bent-wing Bat, Grey-Crowned Babbler, Speckled warbler, Brush-tailed phascogale and Squirrel Glider, have been recorded in forested habitats close to the vicinity of the study area.

However, for all of these species, given the narrow impact area by the proposed activity it is unlikely to increase the level of disturbance faced by these species or greatly reduce the likelihood of these species remaining in this area.

2.2 Rare Species

In addition to statutory listings under State and Commonwealth legislation, a published list of rare or threatened Australian plants (ROTAP) was prepared by Briggs and Leigh (1995). A spatial search of (*PlantNET*, 2005) identified 9 ROTAP species as occurring in the Cessnock (**Table 3**).

Table 3: Rare plants in the local area

Family	Scientific Name	Common Name
Asteraceae	*Rutidosis heterogama*	Heath Wrinklewort
Elaeocarpaceae	*Tetratheca juncea*	Black-eyed Susan
Myrtaceae	*Callistemon linearifolius*	Narrow-leaved Bottlebrush
Polygonaceae	*Muehlenbeckia costata*	Scrambling Lignum
Proteaceae	*Grevillea montana*	Mountain Grevillea
Scrophulariaceae	*Euphrasia arguta*	
Sterculiaceae	*Rulingia prostrata*	Dwarf Kerrawang
Zamiaceae	*Macrozamia flexuosa*	
Zannichelliaceae	*Zannichellia palustris*	

In addition to these rare species a list of regionally and locally significant flora species is maintained by Cessnock City Council which has been prepared from a State of the Environment Report 2002-2003. This list does not mean these species are threatened or require consideration under legislative requirements but instead provide an account of species which are rarely recorded in the Cessnock LGA.

2.3 Threatened Communities

In addition to listing threatened species, the TSC Act, FM Act and EPBC Act list ecological communities considered to be threatened. Although none of the communities presently listed under the FM Act and EPBC Act occur in the vicinity of the study area, six communities listed as endangered under the TSC Act do occur in the vicinity of the study area. These are shown in **Table 4**.

Table 4: Endangered Ecological communities known to occur in the vicinity of the study area.

Endangered Ecological Communities	Relevance to the activity area and surrounding vegetation
Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions TSC Act (EEC)	Wetland recorded in the local area includes this community, however this is well removed from the proposal area. This community does not require any further consideration..
Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions TSC Act (EEC)	This forest occurs on lowland, floodplains and lower slopes on moderate fertile soils. It is dominated by *Eucalyptus tereticornis* (Forest Red Gum) and *E. punctata* (Grey Gum). Other frequently occurring canopy species are *Angophora costata*, *Corymbia maculata*, *E. crebra* and *E. moluccana*.. This vegetation community was not recorded in the study area during surveys and does not require further assessment.
Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion TSC Act (EEC)	This community is dominated by Spotted Gum *Corymbia maculata* and Broad-leaved Ironbark *Eucalyptus fibrosa*, while Grey Gum *E. punctata* and Grey Ironbark *E. crebra* occur occasionally. Spotted gum Ironbark associations are known to the study area to the west and east of the activity area, however these are largely distinguishable from LHSGIBF by the co-dominance of *Corymbia maculata* ,E.umbra and E. siderophloia. The floristic associations for LHSGIBF where not recorded in the activity area and this community does not require any further assessment.
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions TSC Act (EEC)	This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present

Endangered Ecological Communities	Relevance to the activity area and surrounding vegetation
	as subordinate species. This community was recorded in the study area. The activity will not remove or modify any of this vegetation, however it will be assessed as a precautionary measure.
Sydney Freshwater Wetlands in the Sydney Basin Bioregion TSC Act (EEC)	Largely restricted to freshwater swamps in swales and depressions on sand dunes and low nutrient sandplains such as those of the Warriewood and Tuggerah soil landscapes. The study area is part of the Sydney-Newcastle Coastal Alluvial Plains. This community is often a complex of vegetation types. These also vary considerably due to fluctuating water levels and seasonal conditions. Characteristic species include sedges and aquatic plants such as *Baumea* species, *Eleocharis sphacelata*, *Gahnia* species, *Ludwigia peploides* ssp. *montevidensis* and *Persicaria* species. Areas of open water may occur where drainage conditions have been altered and there may also be patches of emergent trees and shrubs. This community was recorded in the study area directly north of the activity area. The activity will remove up to $50m^2$ of this vegetation and as such further assessment is required.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC) EPBC (CE)	Prefers relatively fertile soils on the western slopes and tablelands of NSW where rainfall is between 400 and 800 millimetres at an altitude of approximately 170 to 1200 metres (NPWS, 2004).
Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions.	Woodland community that occurs on Permian sediments in the Hunter Valley. Typically low to mid-high woodland dominated by Narrow-leaved Ironbark (Eucalyptus crebra), Kurrajong (Brachychiton populneus subsp. populneus) and Grey Box (E. moluccana). Extends from Singleton Military Area west to Denman and Wybong and north to Castle Rock and Muswellbrook, mainly south of New England Highway (Peake 2006).
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions.	Woodland community that occurs on Permian sediments in the Hunter Valley. Typically and open forest to woodland dominated by Eucalyptus crebra (Narrow-leaved Ironbark), Spotted Gum (Corymbia maculata) and Grey Box (E. moluccana). Occurs throughout central and eastern Upper Hunter Valley largely north of the New England Highway (Peake 2006).Central Hunter Ironbark-Spotted Gum-Grey Box Forest. This community, the Central Hunter Ironbark-Spotted Gum-Grey Box Forest has recently (May 2009) been given preliminary determination by the NSW Scientific Committee as an Endangered Ecological Community under Part 3 of Schedule 1 of the TSC Act. Central Hunter Ironbark-Spotted Gum-Grey Box Forest was once extensive across the central lowlands of the upper Hunter Valley (defined as Singleton, Muswellbrook, Scone, Murrurundi and Merriwa LGAs) with most remnants on ridges and crests on rolling hills. Ravensworth State Forest and Belford National Park are prominent examples of the Central Hunter Spotted Gum-Ironbark-Grey Box Forest (NPWS 2000b). This community has been identified as a regionally significant vegetation community within the Lower Hunter and Central Coast Region (LHCC 2003) and Hunter Remnant Vegetation Project (Peake 2006). The Hunter Remnant Vegetation Project has described the Central Hunter Ironbark-Spotted Gum-Grey Box Forest as regionally significant as the extant community is approximately 18 306 ha from a modelled range of 46 753 ha. That is, approximately 61% has been cleared (Peake 2006). Further, it is poorly conserved with only approximately 293 ha conserved in Belford National

Endangered Ecological Communities	Relevance to the activity area and surrounding vegetation
	Park (Peake 2006).

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Habitats of the Study Area

3.1 Terrestrial Habitats in the Study Area

The proposed area includes approximately 8.5 hectares of cleared and regenerating remnant vegetation creek line and riparian habitat (See Figure 2). The main terrestrial features within the proposed site include cleared and maintained grassland, Spotted Gum Iron Bark Forest, Disturbed Pasture, and She oak riparian habitats. Three small tree hollows were recorded within the survey area. Understorey vegetation was largely limited to grasses and forbs with the occasional shrub and mid-story plant. Ground debris was almost absent from Lot 4 but more abundant in Lot 31-33. Broadly specking, given the lack of survey on Lot 4, this lot is more diverse, with greater coverage and structural diversity than Lot 31-33.

3.2 Aquatic Habitats in the Study Area

The main aquatic habitat features within the study area are the Creek line extending throughout the site. This area supports interrupted riparian bands of Swamp Oak (*Casuarina glauca*), as well as patches of freshwater wetlands.

3.3 Habitat for Significant Flora Species

The preferred habitat for significant flora species of the sub-regional area is compared to the habitats within the study area in Table 5.

Table 5: Distribution and key habitat requirements for threatened flora species of the local area.

Common Name *Scientific Name*	Distribution in NSW	Legal Status		Preferred habitat	Vegetation unit likely to occur in (See Figure 2):			
		TSC	EPBC		1	2	3	4
Slaty Red Gum *Eucalyptus glaucina*	Locally frequent but very sporadic, in grassy woodland on deep, moderately fertile and well-watered soil; near Casino and from Taree to Broke.			Tall medium sized tree up to 30m growing in grassy woodland and dry eucalypt forest. The bark is smooth and mottled white to slaty grey. The juvenile leaves are oval in shape and blue-green with a whitish bloom, and the buds and fruit are similarly coloured. The flowers are white and are produced between August and December. Grows on deep, moderately fertile and well-watered soils.	✓	✓	×	×
Parramatta Red Gum *Eucalyptus parramattensis* subsp. *decadens*	There are two separate meta-populations of *E. parramattensis* subsp. *decadens*, one at Kurri Kurri and Mulbring. Large aggregations also occur at Tomalpin and Tomago Sandbeds.			Is typically found on deep, low-nutrient sands, often subject to periodic inundation or where water tables are relatively high. Associated with dry sclerophyll woodlands with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant.	×	×	×	×
Black-eyed Susan *Tetratheca juncea*	Coast between Wyee and Bulahdelah			Typically eucalypt woodland or forest on conglomerate ridges but also recorded on sands and some volcanic ridges. Tetratheca juncea is often found in association with Red Bloodwood (*Corymbia gummifera*) dominated vegetation communities, within which Smooth-barked Apple (*Angophora costata*) or Scribbly Gum (*Eucalyptus haemastoma*) are co-dominant, with a dense understorey of herbs, forbs, grass trees and grasses (Landenberger, 2003).	×	×	×	×
Tiny Wattle *Acacia bynoeana*	Occurs south of Dora Creek-Morisset area to Berrima and the Illawarra region, and west to the Blue Mountains.			Grows mainly in heath and dry sclerophyll forest in sandy soils. The substrate in which it grows is typically sand to sandy clay, often with ironstone gravels and is usually very infertile and well-drained. The species seems to prefer open, and sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds (from grading) and recently burnt open patches. Associated overstorey species include; *Corymbia gummifera, Eucalyptus haemastoma, E. parramattensis, E. sclerophylla, Banksia serrata* and *Angophora bakeri*. Shrubs often associated with the species include *B. spinulosa, B. serrata, A. oxycedrus, A. myrtifolia and Kunzea spp.* (Winning 1992; James 1997).	×	×	×	×
Small-flower Grevillea *Grevillea parviflora* subsp. *parviflora*	Sporadically distributed throughout the Sydney Basin with the main occurrence centred around Picton, Appin and Bargo (and possibly further south to the Moss Vale area). Separate populations are also known further north from Putty to Wyong and			Occurs on sandy clay loam soils, often with lateritic ironstone gravels. Soils are mostly derived from Tertiary sands or alluvium. Found on crests, upper slopes or flat plains in both low-lying areas between 30-65m asl as well as on higher topography between 200-300m asl. Prefers open habitat conditions with the largest populations in open woodland and along exposed roadside areas. Competition and shading from dense growth of Tick Bush (Kunzea ambigua) appears to limit it's spread at several sites. (NPWS, 2002).	✓	✓	×	×

Common Name *Scientific Name*	Distribution in NSW	Legal Status		Preferred habitat	Vegetation unit likely to occur in (See Figure 2):			
		TSC	EPBC		1	2	3	4
	Lake Macquarie on the Central Coast and Cessnock and Kurri Kurri in the Lower Hunter.							
Heath Wrinklewort *Rutidosis heterogama*	Scattered coastal locations between Wyong and Evans Head, and on the New England Tablelands from Torrington and Ashford south to Wandsworth south-west of Glen Innes.			Occurs in dry sclerophyll forest and woodland, as well as heath and on san dunes and is often associated with disturbed areas. It does not appear to favour a particular soil type and occurs at a range of altitudes. Observed growing within open woodland (*E. haemastoma*, *A. costata*, and *E. capitellata*) in Wyong Shire.	✓	✓	×	×
Narrow-leafed Bottlebrush *Callistemon linearifolius*	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Further north it has been recorded from Yengo National Park.			Grows in dry sclerophyll forest on the coast and adjacent ranges.	✓	✓	×	×
Mountain Grevillea *Grevillea montana*	Occurs in the southern part of the Hunter Valley from Denman to Kurri Kurri.	V		Grows in open forest in sandy soils over mixed sedimentary substrates.	✓	✓	×	×
Scrambling Lignum *Muehlenbeckia costata*	Scattered distribution from Queensland to the Blue Mountains in NSW. Records on the New England Tablelands and North West Slopes include Bald Rock north of Tenterfield, Warra and Butterleaf National Parks near Glen Innes and Mt Kaputar.	V		Grows in coarse sandy soils and peat in heath, mallee and open eucalypt woodland on granite or acid volcanic outcrops at higher altitudes.	×	×	×	×
Dwarf Kerrawang *Rulingia prostrata*	Dwarf Kerrawang occurs on the Southern Tablelands and on the North Coast at the Tomago sandbeds north of Newcastle.	V		Occurs on sandy, sometimes peaty soils in a wide variety of habitats. AT Tomago it is known to occur in a Scribbly Gum (*Eucalyptus haemostoma*)/ Swamp Mahogany (*E. robusta*) Ecotonal Forest.	×	×	×	×

Common Name *Scientific Name*	Distribution in NSW	Legal Status		Preferred habitat	Vegetation unit likely to occur in (See Figure 2):			
		TSC	EPBC		1	2	3	4
Macrozamia flexuosa	Occurs from Bulahdelah to Lake Macquarie.	V		Scattered in sclerophyll forests on siliceous soils.	✓	✓	×	×
Zannichellia palustris	*Zannichellia palustris* has a cosmopolitan distribution, but in Australia is known only from the Murray River estuary in South Australia and the lower Hunter region in NSW. It is considered to be indigenous in NSW and is recognised as rare nationally (NSW Scientific Committee 1998)	E		This is an annual species that evidently requires a bare substrate in winter for germination, which is provided either by seasonal drying of the wetland or by deposition of a new sediment layer (Winning 1992; Greenwood 2001). It grows in shallow open water.	×	×	×	×
Tall Knotweed *Persicaria elatior*	In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland.	V	V	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	×	×	×	×
Leafless Tongue-orchid Cryptostylis hunteriana	Known from Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park, Ben Boyd National Park.	V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	✓	✓	×	×
Freshwater Wetlands on Coastal Floodplains	Known from along the majority of the NSW coast. However, it is distinct from Sydney Freshwater Wetlands which are associated with sandplains in the Sydney Basin bioregion.	EEC		Associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains.	×	×	×	×
Lower Hunter Spotted Gum-	Restricted to a range of approximately 65 km by 35	EEC		This community is dominated by Spotted Gum *Corymbia maculata* and Broad-leaved Ironbark *Eucalyptus fibrosa*, while Grey Gum *E. punctata* and Grey Ironbark *E. crebra* occur occasionally. A number of other	✓	×	×	×

Common Name *Scientific Name*	Distribution in NSW	Legal Status		Preferred habitat	Vegetation unit likely to occur in (See Figure 2):			
		TSC	EPBC		1	2	3	4
Ironbark Forest	km centred on the Cessnock - Beresfield area in the Central and Lower Hunter Valley. Within this range, the community was once widespread.			eucalypt species occur at low frequency, but may be locally common in the community. One of these species, *E. canaliculata*, intergrades extensively in the area with *E. punctata*.				
River-flat Eucalypt Forest on Coastal Floodplains	Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury,	EEC		As the name suggests, this EEC is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis (forest red gum)*, *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broad-leaved apple). *Eucalyptus baueriana* (blue box), *E. botryoides* (bangalay) and *E. elata* (river peppermint) may be common south from Sydney, *E. ovata* (swamp gum) occurs on the far south coast, *E. saligna* (Sydney blue gum) and *E. grandis* (flooded gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain.	×	×	×	×
Swamp Oak Floodplain Forest	Known from parts of the Local Government Areas of Tweed, Port Stephens, Maitland, Newcastle, Cessnock, Lake Macquarie, Wyong, Gosford,	EEC		This community is found on the coastal floodplains of NSW. It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford.	×	×	×	×
Swamp Sclerophyll Forest on Coastal Floodplain	This community is known from parts of the Local Government Areas of Great Lakes and Port Stephens, Lake Macquarie, Wyong, Gosford,	EEC		This swamp community has an open to dense tree layer of eucalypts and paperbarks although some remnants now only have scattered trees as a result of partial clearing. The trees may exceed 25 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality where the tree stratum is low and dense. The most widespread and abundant dominant trees include *Eucalyptus robusta* (swamp mahogany), *Melaleuca quinquenervia* (paperbark) and, south from Sydney, *Eucalyptus botryoides* (bangalay) and *Eucalyptus longifolia* (woollybut).	×	×	×	×
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EEC)	Box-Gum Woodland is found from the Queensland border in the north, to the Victorian border in the south. It occurs in the tablelands and western slopes of NSW.	ECC	CECC	White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation) , in which the most obvious species are one or more of the following: White Box *Eucalyptus albens*, Yellow Box *E. melliodora* and Blakely's Red Gum *E. blakelyi*.	×	×	×	×
Central Hunter Ironbark-Spotted Gum-	Occurs throughout central and eastern Upper Hunter Valley largely north of the	ECC (Preli minar		Woodland community that occurs on Permian sediments in the Hunter Valley. Typically and open forest to woodland dominated by Eucalyptus crebra (Narrow-leaved Ironbark), Spotted Gum (Corymbia maculata) and Grey Box (E. moluccana). This community, the Central Hunter Ironbark-Spotted Gum-Grey Box Forest has	✓	×	×	×

Common Name *Scientific Name*	Distribution in NSW	Legal Status		Preferred habitat	Vegetation unit likely to occur in (See Figure 2):			
		TSC	EPBC		1	2	3	4
Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions.	New England Highway (Peake 2006)..	y listing)		recently (May 2009) been given preliminary determination by the NSW Scientific Committee as an Endangered Ecological Community under Part 3 of Schedule 1 of the TSC Act.				
Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions.	Extends from Singleton Military Area west to Denman and Wybong and north to Castle Rock and Muswellbrook, mainly south of New England Highway (Peake 2006).	ECC (Preliminary listing)		Woodland community that occurs on Permian sediments in the Hunter Valley. Typically low to mid-high woodland dominated by Narrow-leaved Ironbark (Eucalyptus crebra), Kurrajong (Brachychiton populneus subsp. populneus) and Grey Box (E. moluccana).	×	×	×	×

3.4 Fauna Habitats

The species identified in the preliminary assessment are compared to the habitats found in the study area and the proposal area. Those species identified to have habitat present in the proposal area (e.g. eucalypt forest) or could be impacted by secondary impacts (e.g. down stream pollution, or indirect edge effects) will form the basis of further assessment and mitigation, See **Table 7**.

3.4.1 Koala habitat

Forested vegetation of the study area provides koala habitat. Although their distribution in the local area is poor and very few records exist (NPWS) Our initial surveys of vegetation communities (as shown above) in the study area supports the poor records.

Table 7: Distribution and key habitat requirements for threatened fauna species of the local area.

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
Green and Golden Bell Frog *Litoria aurea*	E	V	The distribution ranges through the coastal lowland areas of eastern NSW from approximately 50 km south of the NSW Queensland border and extending south into northeast Victoria. Within the Lake Macquarie LGA the species has been recorded at Jewells Swamp, Gateshead, Redhead and Belmont and was known, during the 1970s, to occur on stream floodplain wetlands between Wyee and Morisset (DEC, 2005).	A study by Pyke and White (1996) suggested that the habitat requirements for Green and Golden Bell frogs include the following features. Grassy areas close to water bodies and other vegetation should be a woodland or lower in maximum height. The substrate of the pond should be sand or rock, with waterbodies being still, shallow, ephemeral and unpolluted. The shape of waterbody should be shallow at one end (10-15cm) and deep at the other (0.5-1m). The waterbodies should be unshaded and free of predatory fish such as G*ambusia*, with aquatic plants present (e.g. Typha) with a range of possible diurnal shelter sites available including vegetation and rocks.	×	×	×	×
Magpie Goose *Anseranas semipalmata*	E	V	The Magpie Goose occurs in coastal areas of northern Australia. But they travel throughout Australia during the dry season. Formerly bred along the Murrumbidgee & Lachlan Rivers. Some introductions in the southern areas but still remains a rare vagrant in NSW.	The Magpie Goose (Pied Goose) is restricted to terrestrial wetlands, predominantly in monsoonal regions, with the presence of surface water and food being the principal determinants of the species' distribution. Documented habitat includes extensive wetlands especially with dense rushes; sedges; black-soil food plains (both wet & dry); wet grasslands, (Seventy, V.N. (ed), 1995). Also utilises wet grasslands and floodplains and, during the dry season, dry floodplains.	×	×	×	×
Blue-billed Duck *Oxyura australis*	E		Breeding occurs in the Murray-DarlingBasin and has been recorded from WillandraCreek, other tributary creeks of the Lachlan River, Narran Lake and in Lignum swamps of the Paroo (Pizzey 1991). Within the species range, new areas of suitable habitat are readily colonised following floods (Frith1982).	The species favours deep, permanent, well vegetated freshwater swamps, especially those with beds of Cumbungi Typha species (Frith 1982). Daylight hours are spent alone in small, concealed bays within vegetation or communally in large exposed rafts far from shore (Smith et al. 1995).	×	×	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
Freckled Duck *Stictonetta naevosa*	E	V	Endemic to SE & SW Aust. occurring as a vagrant elsewhere eg. coastal areas in drought	The Freckled Duck is found in lentic freshwaters. Waterbodies of various salinity are used usually with dense swamps of lignum, cane grass or paperbark (Klippel, 1992). Typically in extensive dense perm. cumbungi & lignum swamps: also large open lakes & their shores or those areas inundated by floodwaters, (Seventy, V.N. (ed), 1990) .	×	×	×	×
Australasian Bittern *Botaurus poiciloptilus*	V		In NSW, the species has been observed along the coast as well as in wetlands of the Murrumbidgee and Lachlan Rivers and is frequently recorded in the Murray-Darling Basin (Marchant & Higgins 1990; NPWS 1999).	Inhabits terrestrial and estuarine wetlands, generally where there is permanent water. The species prefers wetlands with dense vegetation, including sedges, rushes and reeds. (Marchant & Higgins 1990; Garnett 1992).	×	×	×	×
Painted Snipe *Rostratula benghalensis australis*	E		In NSW, this species has been recorded at the Paroo wetlands, Lake Cowal, Macquarie Marshes and Hexham Swamp, although is most common in the Murray-Darling basin (Smith 1991; Garnett 1992; NPWS 1999).	Inhabits inland and coastal shallow freshwater wetlands (Smith 1991). The species occurs in both ephemeral and permanent wetlands, particularly where there is a cover of vegetation, including grasses, Lignum and Samphire (Smith 1991). Individuals have also been known to use artificial habitats, such as sewage ponds, dams and waterlogged grassland (Marchant & Higgins 1993).The Painted Snipe nests on the ground amongst tall vegetation, such as grass tussocks or reeds. Nests are often located on small islands (Marchant & Higgins 1993). The nest consists of a scrape in the ground, lined with grass and leaves (Pringle 1987).	×	×	×	×
Black-necked Stork *Ephippiorhynchus asiaticus*	E		Coastal areas north of Newcastle	The Black-necked Stork inhabits wetlands, such as floodplains, large shallow swamps, pools, mangroves and deeper permanent bodies of water. Mainly forages over open fresh waters; or extensive sheets of shallow water over grassland or sedgeland; shallow swamps with short emergent vegetation and abundant aquatic flora; and permanent billabongs and pools on floodplains (Marchant and Higgins 1990). Also use freshwater meadows, wet heathland, seepage from springs, semi-permanent swamps with tall emergent vegetation (eg. *Eleocharis, Typha*) *Melaleuca* swamps, watercourses and reservoirs (Marchant and Higgins 1990). Builds a large, bulky stick platform often within a large tree offering a commanding view of the surrounding area but occasionally on low shrubs or on ground; usually but not always in wetlands (Frith 1976; Marchant and Higgins 1990).	×	×	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
Comb-crested Jacana *Irediparra gallinacean*	E		Occurs from coastal & subcoastal N & E Australia, W to Kimberleys & SE to Hawkesbury River, NSW where it is irregularly observed. On deeper permanent still freshwater swamps ponds billabongs is moderately abundant (Schodde, R. & Tidemann, S.C. , 1990) Occasionally recorded well inland Mudgee: Mt Isa & Bermagui (Marchant, S. and Higgins, P.J. (Editors), 1993).	Inhabits freshwater wetlands, lagoons, swamps, lakes, rivers & reservoirs (deep or shallow water) generally with abundant floating aquatic vegetation: often flat-leaved plants such as water lillies. Sometimes on grass & weeds & on mud or sand banks (Marchant, S. and Higgins, P.J. (Editors), 1993). Breeds in swamps, lagoons, large dams, reservoirs, lakes; on floating or emergent vegetation usually water-lily *Nymphaea* (Marchant, S. and Higgins, P.J. (Editors), 1993).	×	×	×	×
Pied Oystercatcher *Haematopus longirostris*	V		The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is thinly scattered along the entire coast.	Pied Oystercatchers are often located on intertidal flats of inlets and bays, open beaches and sandbanks. Foraging amongst the exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. Nest in shallow scrapes on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas.	×	×	×	×
Little Tern *Sterna albifrons*	E		The Little tern is found across the Indo-pacific region. Northern and eastern coastal areas of Australia from Derby (WA) to the Bass Strait and South Australia (Kippell, 1992). The species is restricted to the coast fringe of NSW.	Breeds in NSW on sandy islands and beaches. Documented habitat includes coastal waters, bays, shallow inlets and salt or brackish lakes (Kippell, 1992). Breeding occurs on undisturbed, un-vegetated sites near estuaries & adjacent to freshwater lakes, islands & coral cays (Garnett, S., 1992a).	×	×	×	×
Black-breasted Buzzard *Hamirostra melanosternon*	V		Recorded mainly in western and north-western NSW with only a few records in coastal areas of NSW.	Mainly located in arid and semi-arid regions where they often located within tree-lined water courses, billabongs and ephemeral lakes (Marchant & Higgins 1993), In higher rainfall areas they can be located in grasslands and open woodlands preying mostly upon rabbits and small to medium sized birds (Marchant & Higgins 1993). Nests in tall trees over watercourses.	✓	✓	×	×
Square-tailed Kite *Lophoictinia isura*	V		Endemic to Australia being widespread but sparsely distributed throughout the mainland. In NSW scattered records occur throughout the state indicating the Square-tailed Kite is	Ridge and gully forests dominated by woollybutt (*Eucalyptus longifolia*), spotted gum (*Corymbia maculata*) and peppermints (*E.elata* & *E.smithii*) (Marchant and Higgins 1993). During breeding season female roosts on nest at night while male roosts in nearby live tree (Marchant and Higgins 1993).	✓	✓	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
			a regular resident on the north, north-east along the Barwon, Culgoa, Darling and Murray Rivers and in the Paroo (NPWS 1999c).					
Osprey *Pandion haliaetus*	V		Coast and inland rivers. Is distributed around almost the entire coastline, sometimes inland on rivers and lakes (Debus, 1998).	Is often located in coastal areas, especially along lagoons, rivers, and watercourses where it perches in prominent locations overlooking foraging areas. Ospreys forage mainly for fish, but occasionally take crustaceans, reptiles, small mammals, or birds (Debus, 1998).	×	×	×	×
Swift Parrot *Lathamus discolor*	E		Throughout NSW. In the southeast mainly between March & November.	Swift Parrots live in eucalypt forests and woodlands, particularly box-ironbark forests, and feed primarily on nectar (Higgins, 1999) but also eat fruit and insects. Show a preference for sites of high soil fertility, where large trees have high nectar production, such as along drainage lines or in isolated rural or urban remnants (Emison et al., 1987, Tzaros, 1996, 1997). On the coast they are known to feed on swamp mahogany, spotted gum and red bloodwood. Breeding in Tasmania before migrating to the mainland every autumn to winter.	✓	✓	×	×
Turquoise parrot *Neophema pulchella*	V		The Turquoise Parrot occurs from the eastern coast and ranges from Nambour (Qld) to Canberra. Also areas of the upper Murray valley (Klippel, 1992). In NSW the species principally the western slopes & hills. Also occurs NE NSW. Documented from Richmond, Clarence & Hunter valleys, (Gilmore, A & Parnaby, H., 1994). E NSW-SE Qld & along upper reaches Murray R.	Lives on the edges of eucalypt woodland where it has access to grassy areas, particularly in sheltered valleys amongst rocky hills (Klippel, 1992). Occur in woodlands & dry sclerophyll forests (Gilmore, A & Parnaby, H., 1994).	✓	✓	×	×
Glossy Black-Cockatoo *Calyptorhynchus lathami*	V		Coastal regions to tablelands Qld and NSW.	Woodland and open forests on low nutrient soils with a middle stratum with abundant Allocasuarina spp which they are dependent upon for food. Breed in either dead or alive hollow within woodlands or remnant woodlands. They roost in the canopy of leafy eucalypts less than one (1) kilometre from the feed site and within thirty (30) metres of the nesting tree (HANZAB, 1999).	✓	✓	×	×
Barking Owl *Ninox connivens*	V		Widely scattered throughout NSW.	Often located within dry sclerophyll forests and woodlands containing large trees suitable for breeding and roosting within all regions.Breed in large hollows often located near watercourses or wetlands. Forage opportunistically throughout the forest and edges preying upon terrestrial, arboreal or aerial prey, with the most favoured prey species being Sugar Gliders.	✓	✓	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
Powerful Owl *Ninox strenua*	V		Coast and ranges. Distribution Limits - N-Border Ranges National Park. S-Eden.	Wet or dry sclerophyll forest with mature trees. Roost and breeding trees usually in densely vegetated gullies. Require a large home range (800-1000 ha). Powerful Owl is the largest of Australia's owls (Debus & Chafer 1994). It feeds on larger arboreal mammals, megabats, and other fauna captured in trees. It forages mostly in open forests and typically roosts in tall trees in moist gullies. It nests in a very large hollow, typically in large tree in a moist gully. Pairs maintain and hunt throughout a home range that may be up to 1000 ha. (Garnett 1992, Fleay 1944).	✓	✓	✓	×
Masked Owl *Tyto novaehollandiae*	V		Coast and ranges. In NSW they are recorded in most regions but occur predominantly east of the Great Divide from Murwillumbah to Ben Boyd National Park in the south (Higgins, 1999).	Inhabit a diverse range of dry eucalypt forest and woodland, especially adjacent to grassland or clearings. Require a large home range (1000 ha). Key roosting and nesting habitat must contain tall or dense mature trees with suitable hollows. Favoured nesting hollows are near-vertical spouts or large hollows in trunks of large eucalypts (Higgins, 1999). Forage mainly upon terrestrial prey in adjoining open habitat, occasionally preying upon arboreal or scansorial mammals (Higgins, 1999).	✓	✓	✓	✓
Wompoo Fruit-dove *Ptilinopus magnificus*	V		Australia has three discrete populations along the east coast: from central eastern New South Wales to central eastern Queensland; north-eastern Queensland; and northern Cape York Peninsula. It is more common and abundant in northern parts of its range (Australian Museum, 2003).	Mainly occurs in large undisturbed patches of tall tropical or subtropical rainforest but occasionally occur in patches of monsoon forest, closed galley forest, wet sclerophyll forest, tall open forest, open woodland or vine-thickets near rainforest (Higgins and Davies 1996). They generally forage in dense canopy of large rainforest trees and, occasionally, in lower strata; occasionally forage in nearby open forest, woodland or deciduous vine-thickets (Higgins and Davies 1996). Little is known about the movements of the species however it is thought the birds do not travel large distances, but move around in small, localised areas in search of fruit-bearing trees. They breed in the middle strata of dense rainforest building a frail, flat or slightly concave nest consisting of a few thin sticks or twigs, intermingled and lined with vine tendrils (Higgins and Davies 1996).	×	×	×	×
Black-chinned Honeyeater *Melthripus gularis*	V		Rarely recorded east of the Great Dividing range mainly between Richmond and Grafton, although recorded in a few scattered sites around the Hunter and Central Coast regions (Higgins, Peter & Steele 2001).	Mainly forage in the upper levels of open eucalypt forests or woodlands dominated by box or ironbark species. They are sometimes recorded as occurring in riparian associations dominated by paperbarks, eucalypts and acacia's with open country nearby. They forage amongst the canopy on nectar and invertebrates. Nest is concealed in the crowns of trees and breed year-round.	✓	✓	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
Regent Honeyeater *Xanthomyza phrygia*	E		Within NSW they have scattered records but occur mainly in the north-west plains west of the Great Divide. Occasional records in the Hunter and Central Coast regions (Higgins et al, 2001).	Forest and woodlands dominated by winter-flowering eucalypts like ironbark and box species. Found especially in moist fertile sites along creeks, river valleys and lower slopes of foothills (Higgins et al, 2001). Forage in canopy among foliage and flowers foraging on nectar and invertebrates.	✓	✓	✓	×
Brown Treecreeper *Climacteris picumnus*	V		Mainly found in forests and woodlands of inland plains and inland slopes of the Great Divide (HANZAB, 2001). They occur mostly in eucalypt dominated woodlands with a variety of stringy and rough-barked species with an open understorey with a sparse shrub layer. Brown Treecreepers are sedentary and occupy their territory year round. Within their territory they are conspicuous and noisy, foraging on the ground.	The subject site contains potentially suitable habitat throughout the Spotted Gum Ironbark open forest in the north and eastern sides, which contained a variety of stringy and rough-barked species. The proposal area contains no suitable habitat, as the area is disturbed and lacks an understorey. No Brown Treecreeper's were observed throughout the survey period.	✓	✓	×	✓
Grey-crowned Babbler *Pomatostomus temporalis temporalis*	V		The Grey-crowned Babbler is found throughout large parts of northern Australia and in south-eastern Australia. In NSW, the eastern sub-species occur on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Hay. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands.	Grey-crowned Babbler generally inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Within the Hunter Valley they often occur in Spotted Gum Ironbark forests which have a relatively open understorey with a sparse shrub layer. In the Hunter Valley they have also been found to utilise regenerating Eucalypt forest and edges of forest on lower Permian slopes, road verges and linear plantings (King 2004). The species is known to have a poor ability to recolonise habitats (Traill and Duncan 2000). They live in family groups and forage on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses. Build and maintain several conspicuous, dome-shaped stick nests about the size of a football.	✓	✓	✓	✓
Spotted-tail Quoll *Dasyurus maculatus*	E		Mainly located in rainforest, forest, woodlands and coastal heath on tablelands and coastal hills where disturbance is low. This Dasyurid	There is suitable habitat present on the subject site; however their presence within the proposal area would be unexpected given the highly modified and disturbed nature of the site.	✓	✓	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
			is the largest on the Australian mainland. This carnivorous species forages on the ground and in trees where it takes birds, small mammals and wallabies (Mansergh 1984, Green and Scarborough 1990).					
Yellow-bellied Glider *Petaurus australis*	V		Patchily distributed along the east coast.	Located in tall mature forests in high rainfall areas. Forages mainly in tall open sclerophyll forests on eucalypt sap and nectar, honeydew, manna and invertebrates. Den in leaf-lined tree hollows.	✓	✓	×	×
Squirrel Glider *Petaurus norfolcensis*	V		Patchily distributed along ranges, western slopes, and the coast north of Sydney.	Eucalypt forest or woodland with mature or mixed-age trees, with a variety of species. The presence of winter-flowering species appears to be important.	✓	✓	×	×
Brush-tailed Phascogale *Phascogale tapoatafa*	V		The distribution of Brush-tailed Phascogale within NSW has a patchy distribution around the coast of Australia up to 1500m (Soderquist, 1995). In NSW it is more frequently found in forest on the Great Dividing Range in the north-east and south-east of the State. There are also a few records from central NSW. Maxwell *et al* (1996) reported that the within NSW they are most commonly recorded from Taree to Port Macquarie as well as some parts of the Hunter Valley. The distribution of Phascogale populations is correlated to the richness and abundance of arthropods which Recher et al. (1996) which are positively related to soil and foliar nutrient levels.	Brush-tailed Phascogale are agile climbers which forage arboreally in dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. They are often found at low densities as they have large home ranges, male home ranges are up to 100ha (Soderquist 1995) in continuous habitat and overlap with female intrasexually exclusive home ranges (30-60 ha). They are a hollow dwelling species which require large numbers of hollows(>30) within their home range (DSE, 1997). They show a preference (Rhind 2004) for utilising dead or senescent trees with suitable hollows, 25-40mm wide, lined with leaves and pungent faeces (DSE, 1997). They forage arboreally on trunks for large invertebrates including insects, spiders and centipedes (Triall & Coates 1993; Soderquist 1995; Scarff et al. 1998).	✓	✓	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
Koala *Phascolarctos cinereus*	V		Patchily distributed throughout coast, ranges and western slopes, but concentrated on north coast.	Eucalypt forest and woodland on higher nutrient soils. Although the Koala feeds on a range of tree species, a small number of eucalypt species provide its staple diet.	✓	×	×	×
Grey-headed Flying-fox *Pteropus poliocephalus*	V		North to south coast	Their natural diet consists of fruits from rainforest trees, and nectar from nectiferous trees, such as Swamp Mahogany. Roost and breed in large 'camps' that are most often located in rainforests or other dense-canopied forests.	✓	✓	×	×
Little Bentwing-bat *Miniopterus australis*	V		Coast north of the Central Coast	Little Bent-wing Bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel 100s km from feeding home ranges to breeding sites. (Law 1996, Wilson P. 1982)	✓	✓	✓	✓
Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis*	V		Coast and ranges	Forages above dry and moist forest, and can be found on edges of urban areas. Roost in caves, in old mines, in tunnels, under bridges, or in similar structures. Specific maternity caves are used by females during summer to give birth.	✓	✓	✓	✓
Eastern Freetail-bat *Mormopterus norfolkensis*	V		*Mormopterus norfolkensis* is thought to be 'uncommon' and distributed east of the Great Dividing range to the coastline, and ranging in latitude from Picton (New South Wales) in the south, as far north as south-east Queensland (DEH, 1999). Most recent records come from north-eastern New South Wales (Parnaby 1992, Gilmore and Parnaby 1994 cited in DEH 1999).	*Mormopterus norfolkensis* is a tree-dwelling (Allison & Hoye, 1995) insectivorous bat which is often located in dry eucalypt forest and coastal woodlands, although individuals have also been captured within riparian zones, wet sclerophyll and rainforest (Allison & Hoye, 1995). They forage above the canopy or in unobstructed corridors in open areas (Strahan, 1995) on either winged or wingless ants (Allison, 1989). Roost together in small colonies in hollows or under loose bark (Australian Museum, 2004).	✓	✓	✓	×
Eastern False Pipistrelle *Falsistrellus tasmaniensis*	V		The bat occurs along the entire east coast of Australia, into southern Queensland, southern Victoria and inhabits all of Tasmania	*Falsistrellus tasmaniensis* is an insectivorous bat which is often located in wet temperate forests with tall trees with a dense canopy and sub-canopy, foraging on beetles (Herr, 1998). Their preferred roost habitat is a mature forest with a low density of trees, with a high frequency of old mature trees with a large dbh (>100cm). The trees utilised are often older smooth-barks with large hollows with a large crown canopy (Herr, 1998). Radio tracking analysis of revealed a variable home range of between 6 ha and 336 ha, and a high roost fidelity to a group of trees rather than single trees (Herr, 1998).	✓	✓	✓	✓

Common Name *Scientific Name*			Distribution in NSW	Preferred habitat	Habitat onsite			
					1	2	3	4
Greater Broad-nosed Bat *Scoteanax rueppellii*	V		Predominantly coastal (altitudes under 500 metres) and less than 100km inland (Hoye & Richards, 1995)	The Greater Broad-nosed bats are found in a variety of habitats ranging from woodlands, to moist and dry eucalypt forest and rainforest (Hoye & Richards, 1995). They prefer open habitats in which they can fly straight and direct and are known to utilise artificial openings in forests, with their favoured habitats being river and creek corridors (Hoye & Richards, 1995). Individuals have been recorded roosting in tree hollows, cracks and fissures in the trunk and boughs of stags, and under exfoliating bark. A recent study on the north coast of NSW by Campbell (2001) found roost habitat occurred in a Melaleuca swamp woodland habitat (Wallum) in areas of low relief.	✓	✓	✓	✓
Large-footed Myotis *Myotis adversus*	V		Myotis adversus is known to be distributed along the east coast of Australia, along the top of Queensland, the Northern Territory and north-western Australia. Sites of inhabitance are usually far between, and as such it is regarded as sparse in Australia (State Forests of NSW, 1995).	Large-footed Myotis live in caves, tunnels, under bridges and in trees in eastern and northern Australia. They are about 5 cm long with a grey-brown back and grey belly. They have very large feet to help them catch insects from the water and narrow wings to help them fly fast. Large-footed Myotis hunt for food at night. They fly over creeks and rake their clawed hind feet through the water to catch fish and insects. Lives in harems, usually with 8 females for every male (Dwyer, 1970a).	×	×	×	×
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*	V		Distributed over much of Australia except for south-western Australia.	Little is known about this species' life cycle except that it roosts in hollows in old trees and sometimes in the abandoned nests of sugar gliders. They usually form small colonies of up to 30. Single young births have been recorded from December to March. They forage on flying insects, including beetles eating prey as they fly. They fly quickly and are not good at twisting and turning when chasing their prey. However they also feed on insects living in open forests and open grasslands.	✓	✓	✓	✓
Black-necked Stork *Ephippiorhynchus asiaticus*	E		The species is widespread across coastal northern and eastern Australia, becoming increasingly uncommon further south into NSW, and rarely south of Sydney. Some birds may move long distances and can be recorded well outside their normal range.	Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries. Feeds in shallow, still water on a variety of prey including fish, frogs, eels, turtles, crabs and snakes. Breeds in late summer in the north, and early summer further south.	×	×	×	×
Sooty Owl *Tyto tenebricosa*	V		Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. There is no seasonal variation in its	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (Pseudocheirus peregrinus) or Sugar Glider (Petaurus breviceps).	✓	✓	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
			distribution.	Nests in very large tree-hollows.				
Eastern Cave Bat *Vespadelus troughtoni*	V		The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT.	A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.	✓	✓	×	×
Australian Painted Snipe *Rostratula benghalensis*	E		In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin.	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally occurs from September to December. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	×	×	×	×
Stuttering Frog, Southern Barred Frog (in Victoria) *Mixophyes balbus*	E	V	Stuttering Barred Frogs occur along the east coast of Australia from southern Queensland to the north-eastern Victoria. The species has suffered a marked decline in distribution and abundance, particularly in south-east NSW. It is the only *Mixophyes* species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney.	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. Feed on insects and smaller frogs. Breed in streams during summer after heavy rain. Eggs are laid on rock shelves or shallow riffles in small, flowing streams.	×	×	×	×
Southern Barred Frog, Giant Barred Frog *Mixophyes iteratus*	E	E	Coast and ranges from south-eastern Queensland to the Hawkesbury River in NSW. North-eastern NSW, particularly the Coffs Harbour-Dorrigo area, is now	Giant Barred Frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer. Females lay eggs onto moist creek banks or rocks above water level, from where tadpoles drop into the water when hatched.	×	×	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
			a stronghold.					
Large-eared Pied Bat, Large Pied Bat *Chalinolobus dwyeri*	V	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes.	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. The relatively short, broad wing combined with the low weight per unit area of wing indicates manoeuvrable flight. This species probably forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months.	✓	✓	×	×
Tiger Quoll (southeastern mainland population) *Dasyurus maculatus maculatus (SE mainland population)*	V	E	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now 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. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites. Mostly nocturnal, although will hunt during the day; spends most of the time on the ground, although also an excellent climber and may raid possum and glider dens and prey on roosting birds. Use 'latrine sites', often on flat rocks among boulder fields and rocky cliff-faces; these may be visited by a number of individuals; latrine sites can be recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals.	✓	✓	×	×
Brush-tailed Rock-wallaby *Petrogale penicillata*	E	V	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However the distribution of the species across its original range has declined significantly in the west and south and has become more	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Live in family groups of 2 – 5 adults and usually one or two juvenile and sub-adult individuals.	×	×	×	×

Common Name ***Scientific Name***			**Distribution in NSW**	**Preferred habitat**	**Habitat onsite**			
					1	**2**	**3**	**4**
			fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit.					
Long-nosed Potoroo (SE mainland) *Potorous tridactylus tridactylus*	V	V	he Long-nosed Potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. There are geographically isolated populations in western Victoria. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm.	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. Often digs small holes in the ground in a similar way to bandicoots. Mainly nocturnal, hiding by day in dense vegetation - however, during the winter months animals may forage during daylight hours. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha. Breeding peaks typically occur in late winter to early summer and a single young is born per litter. Adults are capable of two reproductive bouts per annum.	×	×	×	×
Hastings River Mouse *Pseudomys oralis*	E	E	patchy distribution along the east side of the Northern Tablelands and great escarpment of north-east NSW, usually but not always at elevations between 500 m and 1100 m. Also recorded in south-east Queensland.	A variety of dry open forest types with dense, low ground cover and a diverse mixture of ferns, grass, sedges and herbs. Access to seepage zones, creeks and gullies is important, as is permanent shelter such as rocky outcrops. Nests may be in either gully areas or ridges and slopes. They eat seeds, leaves, insects and fungi.	×	×	×	×
White-bellied Sea-Eagle *Haliaeetus leucogaster*			Auatralia wide, in castal and inland river systems, lakes and wetlands.	Hunts for fish and turtles in wetland, lake and river systems.	✓	✓	×	×

Methods

4.1 Methodology adopted for Flora

Fieldwork investigating the study area was undertaken on the 24 October 2009. The flora was sampled through five (5) 20x20 metre flora vegetation community quadrates and a 1 kilometre walking transect. Data collected included:

- Species,
- Diameter Breast Height;
- Height
- Relative Cover;
- Habitat; and
- Hollows.

The aim of the flora vegetation community quadrates throughout the subject site was to locate threatened flora species, and/or their potential habitat to identify areas that are potentially constrained, and develop an understanding of the surrounding vegetation communities. Potential habitat for threatened fauna species were also recorded in these areas.

The detailed searches along the proposal area specifically targeted threatened flora and fauna species, fauna habitat attributes and endangered ecological communities. Vegetation structure and floristic data were recorded to develop map unit descriptions detailing flora associations along the proposal area.

4.2 Methodology adopted for Fauna

The review of the general fauna assemblage of the study area was conducted through scoping of fauna records and the correlation of habitat requirements of significant species with the vegetation units contained in the study area. The vegetation units were then examined based on their habitat characteristics in order to determine which of the significant species would be likely to occur or inhabit those vegetation units, based on their habitat requirements.

The general fauna investigation conducted for the preparation of this report had the objective of:

- Identifying the fauna assemblage of the study area through local fauna records and determining which significant species may occur based on habitat suitability assessment;
- Determining the habitat qualities of the study area through field investigations to identify habitat features such as tree hollows, terrestrial habitat and foraging resources; and

- Locating important habitat within the study area which may be utilised by significant species, such as large hollows, creek lines and wetlands.

Following the initial investigation of the study area, fieldwork for fauna was carried out over four nights including:

- Walking transect (1km);
- Anabat Survey (All night) at two (4) stations within study area;
- Spotlighting by two (2) staff for two (4) nights for one and a half hours identifying Gliders, Possums, Owls and Koalas;
- Owl calls playback using digital amplification calls; and
- Koala pellet surveys of all trees within proposed area (approximately 35 trees)
- 10 x 2 four night trap stations.

4.3 Survey Limitations

Owing to the nature of the process flora and fauna surveys were undertaken over a one week period during July 2009. Seasonal influences are likely to have resulted in cryptic species being missed and as a result, have recorded a snap shot of the species which utilise the study area, which may only represent a proportion of the total number. To overcome the survey limitations, the flora and fauna assessments conducted within this report, assume that if suitable habitat for significant species recorded in the local area occurs then it is likely that this species will be present.

Results

5.1 Flora

5.1.1 Threatened Plants

No threatened flora species were recorded in the study area during the surveys for this assessment.

5.1.2 Vegetation Communities

The vegetation communities within the study area comprise 3 communities. Map unit 1 has affinities with the Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions. (Preliminary Determination). A full list of the flora species observed during field surveys is provided in Appendix 1. A full description of communities is presented below.

Unit 1	**Central Hunter Spotted gum Ironbark/disturbed forest**
EEC:	Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions. (Preliminary Determination)
Mapped Area:	7.02ha
Dominant Species:	*Corymbia maculata, Eucalyptus crebra, Eucalyptus tereticornis*
General Description:	
An woodland community formed by clearing of the original native forest and ongoing grazing to maintain a understorey of native grasses, such as *Aristida ramosa, Austrostipa verticillata* and *Eriochloa pseudoacrotricha*, introduced grasses, such as *Paspalum dilatatum*, and native and introduced herbs. Includes scattered *Acacia falcata*, *Allocasuarina luehmannii, Daviesia ulicifolia subsp. Ulicifolia.*	
Unit 2	**Central Hunter Riparian Forest**
EEC:	n/a
Mapped Area, Option 1:	1.73ha
Dominant Species:	*Casuarina gluaca, Angophora floribunda*
General Description:	
Vegetation along the creek dominated by riparian trees *Casuarina gluaca and Angophora floribunda. Understorey of grasses, such as cynodon dactylon, Pennisetum clandestinum*, *Cymbopogon refractus*, *Carex appressa*, *Hypochoeris radicata*, *Plantago lanceolata.*	
Unit 3	**Pasture**
EEC:	n/a
Mapped Area:	12.7 ha
Dominant Species:	various mostly introduced grasses and herbs
General Description:	
Pasture on poor quality soil dominated by introduced grasses and herbs, such as as *cynodon dactylon, Pennisetum clandestinum*, *Cymbopogon refractus*, *Carex appressa*, *Hypochoeris radicata*, *Plantago lanceolata.*	

5.1.3 Threatened Communities

Map unit 1 is likely a remnant of the Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions. (Preliminary Determination) although not yet an endangered ecological community it is considered here to have high conservation significance.

5.2 Fauna

In total 47 species where recorded within the proposed area (Appendix 2), these comprised of:

- 33 bird species, 4 of these migratory bird species;
- 4 amphibian;
- 3 marsupials; and
- 7 flying mammal species.

5.2.1 Fauna Habitat Analysis

Based on the habitat analysis (**Table 9**) and availability of habitat resources within the study area 38 fauna species were identified as having potential habitat on the site.

5.2.2 Habitat Importance

The proposal area provides 8.75ha of habitat for significant species recorded in the study area. The habitat provides a range of habitat qualities (See Figure 2) for the local threatened species (See Table 5.9).

Table 9: Significant Species which could potentially utilise the proposal area.

Common Name Scientific Name	Habitat Value			Impact likely if not mitigated	7 Part Test
	Core	Supplementary	Marginal		
Slaty Red Gum *Eucalyptus glaucina*			✓	no	no
Parramatta Red Gum *Eucalyptus parramattensis* subsp. *decadens*			✓	No	No
Black-eyed Susan *Tetratheca juncea*			✓	No	No
Tiny Wattle *Acacia bynoeana*			✓	No	No
Small-flower Grevillea *Grevillea parviflora* subsp. *parviflora*			✓	No	No
Heath Wrinklewort *Rutidosis heterogama*		✓		No	No
Narrow-leafed Bottlebrush *Callistemon linearifolius*			✓	No	No
Mountain Grevillea *Grevillea montana*		✓		No	No
Macrozamia flexuosa			✓	No	No
Lower Hunter Spotted Gum-Ironbark Forest		✓		No	No

Common Name Scientific Name	Habitat Value			Impact likely if not mitigated	7 Part Test
	Core	Supplementary	Marginal		
River-flat Eucalypt Forest on Coastal Floodplains			✓	No	No
Leafless Tongue-orchid Cryptostylis hunteriana			✓	No	No
Black-breasted Buzzard *Hamirostra melanosternon*			✓	No	No
Square-tailed Kite *Lophoictinia isura*			✓	No	No
Swift Parrot *Lathamus discolor*			✓	No	No
Turquoise parrot *Neophema pulchella*			✓	No	No
Glossy Black-Cockatoo *Calyptorhynchus lathami*		✓		No	No
Barking Owl *Ninox connivens*			✓	No	No
Powerful Owl *Ninox strenua*			✓	No	No
Masked Owl *Tyto novaehollandiae*			✓	No	No
Black-chinned Honeyeater *Melthripus gularis*			✓	No	No
Regent Honeyeater *Xanthomyza phrygia*			✓	No	No
Brown Treecreeper *Climacteris picumnus*			✓	No	No
Grey-crowned Babbler *Pomatostomus temporalis temporalis*	Y			yes	yes
Spotted-tail Quoll *Dasyurus maculatus*			✓	No	No
Yellow-bellied Glider *Petaurus australis*			✓	No	No
Squirrel Glider *Petaurus norfolcensis*		✓		yes	yes
Brush-tailed Phascogale *Phascogale tapoatafa*			✓	No	No
Koala *Phascolarctos cinereus*			✓	No	No
Grey-headed Flying-fox *Pteropus poliocephalus*		✓		yes	yes
Little Bentwing-bat *Miniopterus australis*		✓		No	No
Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis*		✓		yes	yes
Eastern Freetail-bat *Mormopterus norfolkensis*		✓		No	No
Eastern False Pipistrelle *Falsistrellus tasmaniensis*			✓	No	No
Greater Broad-nosed Bat *Scoteanax rueppellii*			✓	No	No
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris*			✓	No	No
Sooty Owl *Tyto tenebricosa*			✓	No	No
Eastern Cave Bat *Vespadelus troughtoni*			✓	No	No

7-part test assessments of the following species is presented in Appendix 3. Significant impacts can be avoided on these species with the adoption of the recommendations presented in the conclusion:

- Grey-crowned Babbler *Pomatostomus temporalis temporalis*
- *Speckled warbler Sericornis sagittatus*
- Squirrel Glider *Petaurus norfolcensis*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis*

8.2 EPBC Act

The Commonwealth *Environment Protection & Biodiversity Conservation Act, 1999* (EPBC Act) provides for the need for the approval of the Commonwealth Environment Minister for all actions that will or are likely to have a significant impact on a matter of national environmental significance. Matters of national environmental significance are:

- World Heritage properties,
- National heritage places (from 1 January 2004)
- Ramsar wetlands of international importance,
- listed threatened species and communities,
- migratory species protected under international agreements,
- nuclear actions, and
- The Commonwealth marine environment.

8.2.5 Is a referral required under the EPBC Act?

Assessment under the EPBC Act found that the proposal was unlikely to have an impact on any NES, specifically increased risk of death for migratory species, as such the proposal does not require referral to the Commonwealth Minister for the Environment.

8.3 SEPP 44 – Koala Habitat Protection

Step 1: Determination of whether land contains "potential Koala habitat".

The remnant forest communities located within the study area included Forest gum a known koala feed tree. Pellet surveys (15 trees) failed to locate any koala pellets.

These trees did not constitute 15% of the remnant forest communities and provide approximately 4 hectare of relatively poor quality habitat for Koala. Therefore, the study area is considered to provide potential Koala Habitat under SEPP 44.

Step 2: Where "potential Koala habitat" occurs Council must determine if it is core habitat.

Approximately 4 hectares of relatively poor quality habitat Potential Koala Habitat occurs within the study area for Koala. However, despite pellet surveys for signs of Koala habitation, Koala scats were not recorded (Figure 5). Further to this, no scratch marks which could be confidently attributed to Koala were observed. Wildlife Atlas records (DEC 2005) indicate that 3 Koala records (Wildlife Atlas 2005; Bionet 2006) occur in the local area, however these were scattered old recordings and know population is known.

Lack of Koala activity within the study area may be due to its relative isolation from other areas of Koala habitat.

9.0 Conclusion

Surveys conducted on site recorded one threatened species, Grey-crowned Babbler. One troop (4 birds) was recorded onsite along with five other troops in the local area (See Figure 2). Habitat was also found for 7 other threatened species and one community had affinities with the Central Hunter Spotted gum Ironbark Grey box

forest (ECC preliminary determination) and, as such has a moderate level of conservation significance.

Surveys of vegetation communities using quantitative measures was limited by access to the entire study area, nonetheless, Lot 4 is considered floristically and structurally more diverse than Lot 275.

The 7-part tests conducted on these species at risk, concluded that the proposal would not have a significant impact, that is, given the implementation of the following recommendations:

- That regional planning (Figure 3) incorporate the guidelines for regional species movements;
- The areas shown in Figure 4 should become reserved and rehabilitated to form "reserves" as part of the structure plan for the site;
- A best-practice erosion and sediment control plan would be developed;
- Appropriate stormwater and nutrient control systems would be incorporated into the proposal designed to reduce the effects of runoff and ensure water flowing off the proposal area is of a suitable quality;
- The construction site would be managed to ensure that there is no accidental incursions into areas which are not subject to the proposal; and,
- Any landscaping associated with the proposal would comprise of endemic native plants.

APPENDIX 1 – Flora Species List

Classification/ Scientific name	Recent synonyms[1]	Common Name	
DIVISION TRACHEOPHYTA		Vascular Plants	
Subdivision Pteridophytina		Seedless Vascular Plants	
CLASS FILICOPSIDA		Ferns	
Order Polypodiales			
Order Pteridales			
ADIANTACEAE			
Adiantum aethiopicum		Maidenhair Fern	
Order Dennstaedtiales			
DENNSTAEDTIACEAE			
Calochlaena dubia	*Culcita dubia*	False Bracken	
Pteridium esculentum		Bracken	
THELYPTERIDACEAE			
Christella hispidula			
Subdivision Spermatophytina		Seed Plants	
CLASS MAGNOLIOPSIDA		Flowering Plants	
SUBCLASS MAGNOLIIDAE		Dicotyledons	
Order Laurales			
LAURACEAE			
Cassytha glabella		Devils Twine	
Cinnamomum camphora		Camphor Laurel	i
Order Ranunculales			
MENISPERMACEAE			
Stephania japonica		Snake Vine	
RANUNCULACEAE			
Clematis aristata		Toothed Clematis	
Order Polygonales			
POLYGONACEAE			
Persicaria decipiens	*Polygonum decipiens*	Slender Knotweed	
Order Dilleniales			
DILLENIACEAE			
Hibbertia scandens		Climbing Guinea-flower	
Order Malvales			
MALVACEAE			
Sida rhombifolia		Paddys Lucerene	i
Order Thymeleales			
THYMELEACEAE			
Pimelea linifolia subsp. *linifolia*		Slender Rice Flower	
Order Euphorbiales			
EUPHORBIACEAE			
Breynia oblongifolia		Breynia	
Poranthera microphylla		Small Poranthera	
VIOLACEAE			
Viola hederacea		Ivy-leaf Violet	
Order Theales			
DROSERACEAE			
Drosera peltata		Rosette Sundew	
Order Ebenales			

Order Primulales			
Order Casuarinales			
CASUARINACEAE			
Casuarina glauca		Swamp Oak	
ROSACEAE			
Rubus fruticosus agg.		Blackberry	i
Rubus parviflorus		Small-leaf Bramble	
Order Myrtales			
MYRTACEAE			
EUCALYPTS			
Corymbia maculatta		Spotted gum	
Eucalyptus Fibrosa		Broad-leaved Ironbark	n
Eucalyptus siderophloia		Northern Grey Ironbark	
Eucalyptus tereticornis		Forest Red Gum	
OTHER MYRTACEAE			
Callistemon salignus		Willow Bottlebrush	
Leptospermum polygalifolium subsp. *cismontanum*	*Leptospermum falvescens*	Yellow Tea-tree	
Melaleuca decora		White Feather Honey-myrtle	
Melaleuca linariifolia		Snow-in-Summer	
Melaleuca nodosa		Ball Honey-myrtle	
Syncarpia glomulifera		Turpentine	
Order Haloragales			
HALORAGACEAE			
Gonocarpus micranthus subsp. *micranthus*	*Haloragis micrantha*	Creeping Raspwort	
Order Fabales			
FABACEAE			
CAESALPINIOIDEAE			
Senna septemtrionalis	*Senna x floribunda, Cassia floribunda*	Cassia	i
FABOIDEAE			
Daviesia ulicifolia		Gorse Bitter-pea	
Glycine microphylla		Glycine	
Glycine clandestina agg.		Twining Glycine	
Hardenbergia violacea		Purple Twining-pea	
Indigofera australis		Native Indigo	
Kennedia rubicunda		Dusky Coral Pea	
Platylobium formosum subsp. *formosum*		Handsome Flat-pea	
Pultanaea villosa		Wallaby Tails	
Trifolium repens		White Clover	i
MIMOSOIDEAE			
Acacia irrorata subsp. *irrorata*		Rough Green Wattle	
Acacia longifolia		Sydney Golden Wattle	
Acacia myrtifolia		Myrtle Wattle	
Order Geraniales			
OXALIDACEAE			
Oxalis exilis		Yellow Oxalis	
GERANIACEAE			
Geranium solanderi var. *solanderi*		Native Cranesbill	
Order Santalales			
SANTALACEAE			
Exocarpos cupressiformis		Cherry Ballart	
Order Pittosporales			
PITTOSPORACEAE			
Billardiera scandens		Apple-berry	
Citriobatus pauciflorus		Orange Thorn	
Pittosporum revolutum		Yellow Pittosporum	
Order Araliales			

ARALIACEAE			
Polyscias sambucifolia		Elderberry Panax	
APIACEAE			
Centella asiatica		Swamp Pennywort	
Foeniculum vulgare		Fennell	i
Hydrocotyle laxiflora		Stinking Pennywort	
Order Campanulales			
LOBELIACEAE			
Pratia purpurescens		White Root	
Order Asterales			
ASTERACEAE			
Ageratina adenophora	*Eupatorium adenophorum*	Crofton Weed	i
Aster subulatus		Wild Aster	i
Bidens pilosa		Cobblers Peg	i
Cirsium vulgare		Scotch Thistle	i
Conyza canadiensis		Canadian Fleabane	i
Hypochoeris radicata		Flatweed	i
Lagenifera stipitata		Bottle-daisy	
Ozothamnus diosmifolius	*Helichrysum diosmifolia*	Tall Paperdaisy	
Senecio madagascariensis		Fireweed	i
Sigesbeckia orientalis		Indian Weed	
Sonchus oleraceus		Common Sow-thistle	i
Vernonia cinerea var. *cinerea*	*Cyanthillium cinereum*	Vernonia	
SOLANACEAE			
Solanum mauritianum		Wild Tobacco	i
Solanum nigrum		Black Nightshade	i
Solanum prinophyllum		Forest Nightshade	
CONVOLVULACEAE			
Dichondra repens		Kidney Weed	
Ipomoea cairica		Coastal Morning Glory	i
Polymeria calycina		Woodland Bindweed	
Order Ericales			
EPACRIDACEAE			
Leucopogon juniperinus		Juniper Beard-heath	
Trochocarpa elliptica	*Trochocarpa laurina*	Tree Heath	
Order Cornales			
STYLIDIACEAE			
Stylidium debile		Frail Trigger Plant	
Order Goodeniales			
GOODENIACEAE			
Dampieria stricta		Blue Dampieria	
Goodenia ovata		Ovate Goodenia	
Goodenia paniculata		Panicled Goodenia	
Order Gentianales			
RUBIACEAE			
Galium propinquum		Maori Bedstraw	i
Morinda jasminoides		Morinda	
Pomax umbellata		Pomax	
APOCYNACEAE			
Parsonsia straminea		Common Silkpod	
ASCLEPIDACEAE			
Marsdenia rostrata		Common Milk Vine	
Order Scrophulariales			
ACANTHACEAE			
Brunoniella australis		Blue Trumpet	
Pseuderanthemum variable		Pastel Flower	
Order Lamiales			

VERBENACEAE			
Lantana camara		Lantana	i
Verbena bonariensis		Purple Top	i
Verbena rigidus		Creeping Verbena	i
LAMIACEAE			
Ajuga australis		Austral Bugle	
SUBCLASS LILIIDAE		Monocotyledons	
Order Dioscoreales			
DIOSCOREACEAE			
Dioscorea transversa		Native Yam	
SMILACACEAE			
Smilax glyciphylla		Sweet Sarsparilla	
LUZURIAGACEAE			
Eustrephus latifolius		Wombat Berry	
Order Liliales			
ASTELIACEAE			
Cordyline stricta		Narrow-leaf palm-lily	
LOMANDRACEAE			
Lomandra confertifolia subsp. *rubiginosa*		Slender Mat-rush	
Lomandra filiformis subsp. *coriacea*		Wattle Mat-rush	
Lomandra longifolia subsp. *longifolia*		Spiny Mat-rush	
Lomandra multiflora subsp. *multiflora*		Many-flowered Mat-rush	
PHORMIACEAE			
Dianella caerulea var. producta		Stemmed Blue Flax Lily	
ANTHERICACEAE			
Arthropodium milleflorum		Vanilla Lily	
Order Orchidales			
ORCHIDACEAE			
Acianthus fornicatus		Pixie Caps	
Caladenia catanata		Pink Fingers	
Pterostylis nutans		Nodding Greenhood	
Order Commelinales			
COMMELINACEAE			
Commelina cyanea		Scurvy Weed	
Order Juncales			
JUNCACEAE			
Juncus usitatus		Common Rush	
Order Poales			
POACEAE			
Lachnagrostis filiformis	*Agrostis avenacea*	Blown Grass	
Andropogon virginicus		Whisky Grass	i
Aristida vagans		Three-awned Spear Grass	
Axonopus affinis		Carpet Grass	i
Chloris gayana		Rhodes Grass	i
Cymbopogon refractus		Barbed Wire Grass	
Cynodon dactylon		Common Couch	
Digitaria parviflora		Small-flower Finger Grass	
Echinochloa crus-galli		Barnyard Grass	i
Echinopogon caespitosus		Hedgehog Grass	
Entolasia marginata	*Panicum marginatum*	Margined Panic	
Entolasia stricta		Wiry Panic	
Eragrostis brownii		Brown's Lovegrass	
Hyparrhenia hirta		Coolatai Grass	i
Imperata cylindrica		Blady Grass	
Ischaemum australe var. australe		Ischaemum	
Microlaena stipoides var. *stipoides*		Weeping Grass	
Oplismenus aemulus		Broad-leaf Beard-grass	

Oplismenus imbecillis		Narrow-leaf Beard-grass	
Panicum maximum var. *maximum*		Guinea Grass	i
Panicum simlie		Two-colour panic	
Paspalum dilatatum		Paspalum	i
Paspalum distichum		Water Couch	
Paspalum urvillei		Vasey Grass	i
Paspalum vaginatum		Salt-water Couch	
Phragmites australis		Common Reed	
Setaria gracilis		Slender Pigeon Grass	i
Setaria italica		Foxtail Millet	i
Sporobolus creber	*Sporobolus indicus* var. *creber*	Slender Rats Tail Grass	

ABBREVIATIONS:
i = introduced (i.e. not indigenous to Australia)
n = native Australian species not considered to be indigenous to the site
c = cultivated (i.e. planted on the site)
t = threatened (TSC Act and/or EPBC Act)
spp. = several species of the one genus (sometimes occurring as a hybrid swarm)
sp. = unidentified species[3]
sp. aff. = unidentified species with characteristics similar to the indicated species or genus[3]
? = unconfirmed species[3]
var. = variety
subsp. = subspecies
cv. = cultivar (i.e. a anthropogenic form of the species)
p = recorded in the proposal area or subject site
s = recorded in the study area
l = recorded in the local areas
agg. = an aggregate of several yet to be defined species
NOTES:
1. Recent 'synonyms' include misapplied names.
2. A sample flora assemblage obtained from a short term survey, such as the present one, cannot be considered to be comprehensive, but rather indicative of the actual flora assemblage. It can take many years of flora surveys to record all of the plant species occurring within any area, especially species that are only apparent in some seasons.
3. Not all species can be accurately identified in a 'snapshot' survey due to absence of flowering or fruiting material, etc.
SCIENTIFIC NAMES & AUTHORITIES:
Scientific names are those used in the *Flora of New South Wales* as maintained by the Royal Botanic Gardens (http://.plantnet.rbgsyd.gov.au)
For sake of simplicity, scientific names in this list do not include authorities. These can be found in the *Flora of NSW*.

APPENDIX 2 – Fauna species recorded

Class	Family	Scientific name	Common name
CLASS AMPHIBIA			Amphibians
Order Salientia			Frogs
	MYOBATRACHIDAE		
		Crinia signifera	Common Eastern Froglet
		Limnodynastes peronii	Brown Striped Frog
		Limnodynastes tasmaniensis	Spotted Grass Frog
	HYLIDAE		
CLASS AMPHIBIA			Amphibians
		Litoria dentata	Bleating Tree Frog
		Litoria fallax	Eastern Dwarf Tree Frog
		Litoria peronii	Peron's Tree Frog
CLASS REPTILIA			Reptiles
Order Squamata			Lizards & Snakes
Suborder Sauria			Lizards
	SCINCIDAE		
		Cryptoblepharus virgatus	Fence Skink
CLASS AVES			Birds
Order Anseriformes			Ducks, Geese & Swans
	ANATIDAE		
		Anas superciliosa	Black Duck
Order Ciconiiformes			Herons, Bitterns, Ibis, Spoonbills & Storks
	ARDEIDAE		
		Ardea novaehollandiae	White-faced Heron
		Ardeola ibis	Cattle Egret
		THRESKIORNITHIDAE	
Order Falconiformes			Falcons, Hawks & Eagles
	FALCONIDAE		
		Falco cenchroides	Australian Kestrel
Order Columbiformes			Pigeons
	COLUMBIDAE		
		Ocyphaps lophotes	Crested Pigeon
		Streptopelia chinensis	Spotted Turtle-Dove
Order Psittaciformes			Cockatoos & Parrots
	CACATUIDAE		
		Cacatua galerita	Sulphur-crested Cockatoo
		Cacatua roseicapilla	Galah
	PSITTACIDAE		

Class	Family	Scientific name	Common name
		Platycercus elegans	Crimson Rosella
		Platycercus eximius	Eastern Rosella
		Trichoglossus haematodus	Rainbow Lorikeet
CLASS AMPHIBIA			Amphibians
Order Salientia			Frogs
	MYOBATRACHIDAE		
		Crinia signifera	Common Eastern Froglet
		Limnodynastes peronii	Brown Striped Frog
		Limnodynastes tasmaniensis	Spotted Grass Frog
	HYLIDAE		
CLASS AMPHIBIA			Amphibians
		Litoria dentata	Bleating Tree Frog
		Litoria fallax	Eastern Dwarf Tree Frog
		Litoria peronii	Peron's Tree Frog
CLASS REPTILIA			Reptiles
Order Squamata			Lizards & Snakes
Suborder Sauria			Lizards
	SCINCIDAE		
		Cryptoblepharus virgatus	Fence Skink
CLASS AVES			Birds
Order Anseriformes			Ducks, Geese & Swans
	ANATIDAE		
		Anas superciliosa	Black Duck
Order Ciconiiformes			Herons, Bitterns, Ibis, Spoonbills & Storks
	ARDEIDAE		
		Ardea novaehollandiae	White-faced Heron
		Ardeola ibis	Cattle Egret
		THRESKIORNITHIDAE	
Order Falconiformes			Falcons, Hawks & Eagles
	FALCONIDAE		
		Falco cenchroides	Australian Kestrel
Order Columbiformes			Pigeons
	COLUMBIDAE		
		Ocyphaps lophotes	Crested Pigeon
		Streptopelia chinensis	Spotted Turtle-Dove
Order Psittaciformes			Cockatoos & Parrots
	CACATUIDAE		
		Cacatua galerita	Sulphur-crested Cockatoo
		Cacatua roseicapilla	Galah
	PSITTACIDAE		

Class	Family	Scientific name	Common name
		Platycercus elegans	Crimson Rosella
		Platycercus eximius	Eastern Rosella
		Trichoglossus haematodus	Rainbow Lorikeet
Order Coraciiformes			Kingfishers, Bee-eaters & Dollarbird
	ALCEDINIDAE		
		Dacelo novaeguineae	Laughing Kookaburra
Order Passeriformes			Songbirds or Perching Birds
	MALURIDAE		
		Malurus cyaneus	Superb Fairy-wren
	PARDALOTIDAE		
		Acanthiza chrysorrhoa	Yellow-rumped Thornbill
		Acanthiza pusilla	Brown Thornbill
		Acanthiza reguloides	Buff-rumped Thornbill
		Pardalotus punctatus	Spotted Pardalote
	MELIPHAGIDAE		
		Manorina melanocephala	Noisy Miner
		Meliphaga lewinii	Lewin's Honeyeater
	DICRURIDAE		
		Grallina cyanoleuca	Australian Magpie-lark
		Rhipidura fuliginosa	Grey Fantail
		Rhipidura leucophrys	Willie Wagtail
	CAMPEPHAGIDAE		
	ARTAMIDAE		
		Cracticus nigrogularis	Pied Butcherbird
		Gymnorhina tibicen	Australian Magpie
		Strepera graculina	Pied Currawong
	CORVIDAE		
		Corvus coronoides	Australian Raven
	HIRUNDINIDAE		
		Hirundo ariel	Fairy Martin
	ZOSTEROPIDAE		
		Zosterops lateralis	Silvereye
		Acridotheres tristis	Common Mynah
	POTOROIDAE		
		Aepyprymnus rufescens	Rufous Bettong
		Potorous tridactylus	Long-nosed Potoroo
	MACROPODIDAE		
		Macropus giganteus	Eastern Grey Kangaroo
SUBCLASS EUTHERIA			Placental Mammals
Order Chiroptera			Bats
	PTEROPODIDAE		
		Pteropus poliocephalus	Grey-headed Flying Fox
	MOLOSSIDAE		
		Nyctinomus australis	White-striped Freetail-bat
	VESPERTILIONIDAE		
		Chalinolobus gouldii	Gould's Wattled Bat
		Vespadelus pumilus	Eastern Forest Bat
		Vespadelus vulturnus	Little Forest Bat
Order Rodentia			Rodents

Class	Family	Scientific name	Common name
	MURIDAE		
		Rattus fuscipes	Bush Rat
Order Lagomorpha			Rabbit, etc.
	LEPORIDAE		
		Lepus capensis	Brown Hare
		Oryctolagus cuniculus	European Rabbit
Order Carnivora			Carnivores
	CANIDAE		
		Vulpes vulpes	Red Fox
	FELIDAE		
		Felis catus	Domestic Cat
Order Perissodactyla			Horses, etc.
	EQUIDAE		
		Equus caballus	Horse
Order Artiodactyla			Pig, Sheep, Cattle, etc.
	SUIDAE		
	BOVIDAE		
		Bos taurus	European Cattle

APPENDIX 3 –Section 5A Assessment

- Grey-crowned Babbler *Pomatostomus temporalis temporalis*
- Squirrel Glider *Petaurus norfolcensis*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis*

7.1.4. Grey-crowned Babbler 7 Part test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

Surveys in the local area identified three sub-populations of Grey-crowned Babbler. One troop was recorded utilising the degraded riparian woodland associated with the Creek corridor. Local records for the species are extensive with over 200 sightings on the Atlas database for the LGA (See Figure 1). In unpublished research collected by the author, we found that Grey-crowned Babbler was one of the most common woodland birds in the lower hunter in moderately fertile woodland and modified forest communities. Grey-crowned Babbler is often recorded in yards of semi-rural lots and golf courses on good soils in the Hunter.

There is a strong population in the local area that is connected and viable. In total surveys conducted on site and in the local area recorded over 30 individuals. Given the tendency of the species to relocate in close proximity to previous breeding sites and to expand their home ranges at different times of the year, individuals would be expected to use the proposal area. Nonetheless, the activity will only involve the removal of a small area of habitat, which will be mitigated with the regeneration of the grassland areas with woodland and forest on moderately fertile soils. We consider that this removal **will not** reduce the viability of *Grey-crowned Babbler* in the local area, to a degree that could put the local population at risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to *Grey-crowned Babbler*.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to *Grey-crowned Babbler*.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential habitat from the activity area.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will not contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

It is currently difficult to quantify the importance of the habitat, however the species is often recorded in the local area in similar habitats. Given that the proposal will remove only a small area of the potential marginal habitat, it is predicted that this would not constitute a loss of significant habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for the *Grey-crowned Babbler*.

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

At this point in time no recovery plan has been prepared for this species by DECCW.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DECCW have identified that the following threatening processes are acting upon this species:

- Clearing of woodland remnants.
- Heavy grazing and removal of coarse, woody debris within woodland remnants.
- Nest predation by species such as ravens and butcherbirds may be an issue in some regions where populations are small and fragmented

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

6.25 Spotted-tailed Quoll *Dasyurus maculatus* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

The Spotted-tailed Quoll is about the size of a domestic cat and has a rich-rust to dark-brown fur above, with irregular white spots on the back and tail, and a pale belly. The spotted tail

distinguishes it from all other Australian mammals The average weight of an adult male is about 3500 grams and an adult female about 2000 grams.

They usually den in rock shelters, small caves, hollow logs or tree hollows. They utilise numerous dens within their home range which is estimated to be between 800ha and 20km² (NPWS 1999). They often utilise 'latrine sites', which are located on flat rocks among boulder fields and rocky cliff-faces. These may be visited by a number of individuals and recognised by the accumulation of the sometimes characteristic 'twisty-shaped' faeces deposited by animals.

Spotted-tailed quoll are solitary and primarily nocturnal foraging across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, especially along vegetated creeklines. They consume a wide variety of prey, including gliders, possums, small wallabies, rats, birds, bandicoots, rabbits, insects; as well as carrion and domestic fowl. They are predominantly terrestrial foragers but are excellent climbers and may raid possum and glider dens.

Spotted-tailed quolls breed between April and July with average litter size being 5. Spotted-tailed quoll have extremely large home ranges with females occupying home ranges of up to about 750 hectares and males up to 3500 hectares. Given the large home ranges required for this species little high quality habitat for this species occurs in the Hunter Valley given the large amount of habitat fragmentation from agricultural and viticulture activities in the local area. Large tracts of vegetation are confined to the Broken Back Ranges, Werakata National Park and Yengo National Parks where records for this species are much more abundant.

Only marginal foraging and roosting resources exist on the subject site and although not recorded, it is acknowledged that this species is difficult to record and the potential habitat is good quality. Nonetheless, there is no evidence of a local population in the area and the loss this area of potential habitat is unlikely to disrupt the life cycle of the local population to the extent that its viability would be reduced or placed at risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to Spotted-tailed Quoll.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to Spotted-tailed Quoll.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential foraging and roosting habitat from the subject site.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

It is currently difficult to quantify the importance of the habitat, however potential foraging and nesting habitat indicates that the site provides good quality potential habitat. The proposal involves the removal of the majority of this habitat, and given this loss, it is predicted that this could constitute a loss of potential habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for Spotted-tailed Quoll.

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

At this point in time no recovery plan has been prepared for this species by DEC. DEC (2006) have identified that the following actions need to be followed in order to recover this species:

- Consult with DEC if Spotted-tailed Quolls are raiding poultry, rather than taking direct action.
- Undertake cat and fox control using poison-baiting techniques least likely to affect quolls.
- Consult with DEC if any poison baiting is to be conducted in and immediately adjacent to areas where Spotted-tailed Quolls are known or likely to occur.
- Retain and protect large, forested areas with hollow logs and rocky outcrops, particularly areas with thick understorey or dense vegetation along drainage lines

In addition DEC (2006) have identified 33 priority actions for this species which can be observed at the DEC website.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DEC have identified that the following threatening processes are acting upon this species:

- Loss, fragmentation and degradation of habitat.
- Accidental poisoning during wild dog and fox control programs. Deliberate poisoning, shooting and trapping may also be an issue.
- Competition with introduced predators such as cats and foxes.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

6.27 Squirrel Glider *Petaurus norfolcensis* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

Squirrel gliders live in small family groups containing adults and juveniles within exclusive territories. Their home-ranges depending upon the surrounding habitat quality (Goldingay & Sharpe 2006) but has been estimated using radio-telemetry in northern NSW to be approximately 8.8 hectares (Sharpe 1996). The flowering intensity of resources has a strong influence on group structure, breeding success and changes in the reproductive strategies and behavior adopted by female gliders (Goldingay & Sharpe 2006)

Within these territories many den trees are used and communal denning is common. Squirrel Gliders den in a bowl-shaped leaf-lined hollow. Dispersing individual males need to establish their own territory in order acquire access to many females, alternatively males can become satellite males and mate with females from other parts of other family groups.

Dry sclerophyll forests are particularly important to Squirrel Gliders in coastal NSW as they provide floristically diverse resources (Quin *et al* 2004). Squirrel Gliders are often found in habitats where there is abundance of key winter and spring flowering resources and exudates (nectar, gum or sap), especially understorey species such as Banksia, Acacia and Xanthorrhoea species (Smith & Murray 205). Squirrel Gliders are present in areas lacking these key requirements but in low densities, with Sugar Gliders more frequently captured (Smith & Murray 2006). Squirrel gliders were also found to forage on arthropods in earl autumn (Sharpe 2004).

Squirrel Glider **was not** recorded within the site. Given the loss of only a small area of potential foraging habitat and roosting habitat the proposal **will not** reduce the viability of Squirrel Glider in the local area, and disrupt the life cycle such that, the local population is placed at a risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to Squirrel Glider.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to Squirrel Glider.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential foraging and roosting habitat from the subject site.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The habitat proposed for removal would likely be used by the local population during seasonal home ranging. The potential foraging and nesting habitat indicates that the area to be removed provides good quality potential habitat. The proposal involves the removal of the majority of this habitat, and given this loss, it is predicted that this could constitute a loss of significant habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for Squirrel Glider.

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

At this point in time no recovery plan has bee prepared for this species by DEC. DEC (2006) have identified that the following actions need to be followed in order to recover this species:

- Retain food resources, particularly sap-feeding trees and understorey feed species such as Acacias and banksias.
- Retain den trees and recruitment trees (future hollow-bearing trees).
- Replace top one or two strands of barbed wire on fences with regular wire in and adjacent to habitat.
- Retain and protect areas of habitat, particularly mature or old growth forest containing hollow-bearing trees and sap-feeding trees.
- In urban and rural areas retain and rehabilitate habitat to maintain or increase the total area of habitat available, reduce edge effects, minimise foraging distances and increase the types of resources available.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DEC have identified that the following threatening processes are acting upon this species:

- Loss and fragmentation of habitat.
- Loss of hollow-bearing trees.
- Loss of flowering understorey and midstorey shrubs in forests.
- Individuals can get caught in barbed wire fences while gliding.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

6.28 Brush-tailed Phascogale *Phascogale tapoatafa tapoatafa* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is more frequently found in forest on the Great Dividing Range in the north-east and south-east of the State. There are also a few records from central NSW. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. The Brush-tailed Phascogale is a agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. It feeds mostly on arthropods but will also eat other invertebrates, nectar and sometimes small vertebrates. Females have exclusive territories of approximately 20 - 60 ha, while males have overlapping territories of up to 100 ha. Nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span. Mating occurs May - July; males die soon after the mating season whereas females can live for up to three years but generally only produce one litter.

Brush-tailed Phascogale **was not** recorded within the subject site, and given the trapping undertaken would be expected to be recorded. Given the absence of the species and the marginal foraging and roosting habitat the proposal **will not** reduce the viability of Brush-

tailed Phascogale in the local area, and disrupt the life cycle such that the local population is placed at a risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to the Brush-tailed Phascogale.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to the Brush-tailed Phascogale.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential foraging and roosting habitat from the subject site.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The habitat proposed for removal is currently not used by the local population. The potential foraging and nesting habitat indicates that the area to be removed provides marginal quality habitat. The proposal involves the removal of a small area of this habitat, and given this loss, it is predicted that this would not constitute a loss of important habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for the Brush-tailed Phascogale.

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

At this point in time no recovery plan has bee prepared for this species by DEC. DEC (2006) have identified that the following actions need to be followed in order to recover this species:

- Undertake fox and feral cat control.
- Provide nest boxes in areas where tree-hollows have been removed.
- Retain and protect habitat, particularly mature or oldgrowth forest containing hollow-bearing trees.
- Retain nest trees and recruitment trees (future hollow-bearing trees).

In addition DEC (2006) have developed 5 priority actions which can be viewed at the DEC website.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DEC have identified that the following threatening processes are acting upon this species:

- Loss and fragmentation of habitat.
- Loss of hollow-bearing trees.
- Predation by foxes and cats.
- Competition for nesting hollows with the introduced honeybee.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

6.5 Koala *Phascolarctos cinereus* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

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 coasts with some populations in the western region. It was historically abundant on the south coast of NSW, but now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands.

The Koala inhabit eucalypt woodlands and forests, were they feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, they feed and move mostly at night. Koala generally spend most of their time in trees, but will descend and traverse open ground to

move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary, but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery. Females breed at two years of age and produce one young per year.

Koala **was not** recorded within the subject site, and given the scat surveys undertaken it would not be expected to be recorded. Given the absence of the species and the supplementary habitat proposed for removal the proposal **will not** reduce the viability of Koala in the local area, or disrupt the life cycle such that the local population is placed at a risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to the Koala.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to the Koala.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential foraging and roosting habitat from the subject site.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

The habitat proposed for removal could potentially be used by the local population during seasonal home ranging by rouge males. The potential foraging habitat in the area to be removed does support known Koala feed trees. The proposal involves the removal of the a small area of supplementary koala habitat that does not currently support a local population.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for the Koala.

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

There is a draft recovery plan prepared for this species by DEC (2003). Specific objectives of the plan, include:

- ***Objective 1:*** *To conserve koalas in their existing habitat.*
- ***Objective 2:*** *To rehabilitate and restore koala habitat and populations.*
- ***Objective 3:*** *To develop a better understanding of the conservation biology of koalas.*
- ***Objective 4:*** *To ensure that the community has access to factual information about the distribution, conservation and management of koalas at a national, state and local scale.*
- ***Objective 5:*** *To manage captive, sick or injured koalas and orphaned wild koalas to ensure consistent and high standards of care.*
- ***Objective 6:*** *To manage over-browsing to prevent both koala starvation and ecosystem damage in discrete patches of habitat. As discussed in Section 9.2.10 overbrowsing is not considered to be a potential issue in NSW in the foreseeable future. Therefore, this recovery plan does not include actions associated with this objective of the NKCS.*
- ***Objective 7:*** *To co-ordinate the implementation of the Koala Recovery Plan across NSW.*

DEC (2006) have also identified that the following actions that need to be followed in order to recover this species:

- Undertake feral predator control.
- Apply low intensity, mosaic pattern fuel reduction burns in or adjacent to Koala habitat.
- Retain suitable habitat, especially areas dominated by preferred feed-tree species.
- Protect populations close to urban areas from attacks by domestic dogs.
- Identify road-kill blackspots and erect warning signs, reduce speed limits or provide safe crossing points to reduce Koala fatalities.
- Revegetate with suitable feed tree species and develop habitat corridors between populations.

In addition DEC (2006) have developed 32 priority actions which can be viewed at the DEC website.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DEC have identified that the following threatening processes are acting upon this species:

- Loss, modification and fragmentation of habitat.
- Predation by feral and domestic dogs.
- Intense fires that scorch or kill the tree canopy.
- Road-kills.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

7.1.7. Grey-headed Flying-fox *Pteropus poliocephalus* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

The Grey-headed Flying Fox occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps (Churchill 1998; Hall and Richards 2000; NPWS 2009). Urban gardens and cultivated fruit crops also provide habitat for this species. The main threats to the survival of this species are on-going habitat clearance particularly along the northern NSW coast. Un-regulated culling may also pose a threat to this species (DECCW 2009).

Roost sites (camps) can occur within rainforest patches, *Melaleuca* stands, mangroves, riparian woodland or modified vegetation in urban areas (NPWS 2009). Within the sub-regional area two Grey-headed Flying-fox camps occur at Blackbutt Reserve, Newcastle and at Singleton. The protection of camp sites is a major factor in the successful management of this species as it has been shown to have a high fidelity for such sites. For example, some camps in NSW have been used for over a century (Eby 2000b cited in NPWS 2001).

No camp sites were identified on the subject site and no Grey-headed Flying-foxes were observed during the survey period. Reproductive age is reached between 2-3 years with only one offspring (generally) produced each year (Martin *et al.* 1996). They return annually to traditional camps to give birth and rear young (Lunney and Moon 1997; Augee and Ford 1999 cited NPWS 2004).

Grey-headed Flying Foxes forage in the nectar and pollen of native trees, in particular *Eucalyptus*, *Melaleuca* and *Banksia* (Eby 2000a cited in NPWS 2001), and fruits of rainforest trees and vines.

Foraging movements are related to food availability, with movements of hundreds of kilometres being recorded (NPWS 2001). However, opportunistic foraging generally occurs at distances < 30 km from camps (occasionally < 60–70 km when food resources are inconsistent) per night (Augee and Ford 1999; Tidemann, *et al.* 1999 cited NPWS 2004).

Between May and June the Grey-headed Flying Fox occurs in northern NSW and Queensland feeding on winter-flowering trees such as Swamp Mahogany (*Eucalyptus robusta*), Forest

Red Gum (*E. tereticornis*) and Paperbark (*Melaleuca quinquenervia*) (Eby *et al.* 1999; P. Birt and L. Hall pers. comm. cited NPWS 2004).

A small area of marginal foraging habitat was recorded within the subject site. Given the small area of limited habitat potential of the site, the removal of these resources **will not** reduce the viability of Grey-headed Flying-fox in the local area, to a degree that could put the local population at risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

Not applicable for this species.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to Grey-headed Flying-fox.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to Grey-headed Flying-fox.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential marginal habitat from the subject site.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will not contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

It is currently difficult to quantify the importance of the habitat, however the foraging records made nightly during these surveys, indicates that the species utilizes the site occasionally. Given the small scale of removal it is predicted that this would not constitute a loss of significant habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for Grey-headed Flying-fox.

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

At this point in time no recovery plan has bee prepared for this species by DECCW. DECCW (2006) have identified that the following actions need to be followed in order to recover this species:

- Protect roost sites, particularly avoid disturbance September through November.
- Identify and protect key foraging areas.
- Manage and enforce licensed shooting.
- Investigate and promote alternative non-lethal crop protection mechanisms.
- Identify powerline blackspots and implement measures to reduce deaths.

In addition DECCW (2006) have developed 29 priority actions which can be viewed at the DECCW website.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DECCW have identified that the following threatening processes are acting upon this species:

- Loss of foraging habitat.
- Disturbance of roosting sites.
- Unregulated shooting.
- Electrocution on powerlines.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

6.16 Little Bentwing-bat *Miniopterus australis* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

Little Bentwing-bats are small chocolate brown insectivorous bats with long thick fur over the crown and neck (DEC 2006) and a body length of about 45 mm (DEC 2006). They are essentially a coastal species foraging amongst well timbered forest canopies in a broad range of habitats including rainforests, wet and dry sclerophyll forest, and *Melaleuca* swamps (Strahan 1995; Churchill 1998).

Little Bent-wing Bats prefer foraging for beneath well timbered canopies, flying rapidly with considerable manoeuvrability between the shrub and canopy layers in search of crane flies, ant, moths, and wasps (Churchill 1998).

Miniopterus australis roost in large numbers in caves and also within man made structures such as bridge culverts, drains and buildings (DEH 2004; Hoye and Spence 2004).

Both male and female *Miniopterus australis* undertake a regional migration in spring. Females migrate large distances (Strahan 1995) to reach certain caves where they form maternity colonies. The areas surrounding maternity colonies are resource rich in order to support the higher energetic requirements of females during pregnancy and lactation (Kunz et al. 1995; Kurta et al. 1989; Speakman and Racey 1987). Males however undertake a smaller migration into areas with lower resource availability as they have lower energetic demands. As a result of migratory habits of this species, defining a local population is nearly impossible

As bats spend over half their lives within their roosting environment (Kunz, 1982) the protection and management of both shelter roosts and maternity roosts is important to the conservation of cave-dwelling species. However little is known about *Miniopterus australis* within its roosting environment except that they are dependent upon specific nursery sites to rear their young (Strahan 1995). The southern-most breeding population of *Miniopterus australis* is within the Macleay River watershed (Strahan 1995).

No potential roosting habitat was recorded within the study, however suitable foraging habitat for the species was recorded on the site, and a small area of this will be removed as part of the proposal. This removal **will not** reduce the viability of *Minopterus australis* in the local area, to a degree that could put the local population at risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

iii. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to *Miniopterus australis*.

iv. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to *Miniopterus australis*.

(d) in relation to the habitat of a threatened species, population, or ecological community:

iv. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of 38 hectares of potential marginal habitat from the subject site.

v. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

vi. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

It is currently difficult to quantify the importance of the habitat, however the foraging records made nightly during these surveys, indicates that the species utilizes the site on a regular basis. Given that the proposal will remove the majority of the potential marginal habitat on the site, it is predicted that this would constitute a small loss of occupied habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for the Little Bent-wing Bat.

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

At this point in time no recovery plan has been prepared for this species by DEC. DEC (2006) have identified that the following actions need to be followed in order to recover this species:

- Retain stands of native vegetation.
- Reduce use of pesticides.
- Protect known roosting and nursery sites and surrounding forest.
- Check with DEC before undertaking recreational caving activities.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DEC have identified that the following threatening processes are acting upon this species:

- Disturbance of colonies, especially in nursery or hibernating caves may be catastrophic.
- Destruction of caves that provide seasonal or potential roosting sites.
- Changes to habitat, especially surrounding maternity caves.

- Use of pesticides.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

6.17 Eastern Bentwing-bat *Miniopterus schreibersii oceanensis* 7-Part Test

(a) in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction

The Eastern Bentwing-bat has chocolate to reddish-brown fur on its back and slightly lighter coloured fur on its belly. It has a short snout and a high 'domed' head with short round ears.

The Eastern Bentwing-bat exhibits a biomodal activity pattern where they leave the cave around sunset to feed and return to the roost between 2400 – 0100 to digest before leaving again after an hour to forage until dawn (Codd *et al.* 1999). Hoye (2000) estimated whilst they are highly mobile they generally forage within a radius of 20km from their roost site in a night. Eastern Bentwing-bats are often found in well-timbered valleys where it forages above the canopy on small insects and moths (Strahan 1995).

The primary roosting habitat for the Eastern Bentwing-bat is caves but is also known to utilise man-made structures such as old mines, bridges, stormwater drains, and buildings etc (Strahan 1995). Eastern Bentwing-bats migrate annually to a maternity cave each spring and summer to birth and rear young (DEC 2006).

Maternity caves have very specific temperature and humidity regimes (DEC 2006). Juvenile Bent-wing bats disperse from maternity caves between February and March (Dwyer 1995) and once young become independent females leave the colony. Given the breeding patterns of this species, the proposal is unlikely to have a significant impact on breeding.

Throughout the rest of the year Eastern Bentwing-bats are widely dispersed, usually with a few colonies within a single large watershed (Strahan 1995). Dispersal between roosts and maternity caves is triggered by changing seasonal needs and local climatic conditions. As a result of migratory habits of this species, defining a local population is nearly impossible. Breeding or roosting colonies can number from 100 to 150,000 individuals.

Females migrate large distances (Strahan 1995) to reach certain caves where they form maternity colonies. The areas surrounding maternity colonies are resource rich in order to support the higher energetic requirements of females during pregnancy and lactation (Kunz et al. 1995; Kurta et al. 1989; Speakman and Racey 1987).

Males however undertake a smaller migration into areas with lower resource availability as they have lower energetic demands. As a result of migratory habits of this species, defining a local population is nearly impossible.

A study by Codd *et al.* (1999) reported that within their cave-dwelling environment Eastern Bentwing-bats spend an average of 62% of its time at rest (not moving), 16% grooming(scratching, licking, preening) and 22% of the time active (head raised, alert, stretching).

No potential roosting habitat was recorded within the study, however suitable foraging habitat for the species was recorded on the site, and the majority of this will be retained as part of the

proposal. This removal **will not** reduce the viability of Eastern Bentwing-bat in the local area, to a degree that could put the local population at risk of extinction.

(b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

This factor applies a similar test as in factor (a) to endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be removed or modified as a result of the action.

Not applicable to Eastern Bentwing-bats.

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

Not applicable to Eastern Bentwing-bats.

(d) in relation to the habitat of a threatened species, population, or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

The proposed action **would** result in the loss of approximately 2 hectares of potential marginal habitat from the subject site.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The proposal will contribute to the cumulative loss of habitat and the increased fragmentation or isolation of habitat.

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.

It is currently difficult to quantify the importance of the habitat, however the foraging records made nightly during these surveys, indicates that the species utilizes the site on a regular basis. Given that the proposal will remove the majority of the potential marginal habitat on the site, it is predicted that this would constitute a loss of occupied habitat.

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

The proposal would not have any adverse effect on critical habitat. There is a capacity for critical habitats to be gazetted under the Threatened Species Conservation Act 1995. No such habitats have yet been gazetted for the Eastern Bent-wing Bat.

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

At this point in time no recovery plan has been prepared for this species by DEC. DEC (2006) have identified that the following actions need to be followed in order to recover this species:

- Control foxes and feral cats around roosting sites, particularly maternity caves.
- Retain native vegetation around roost sites, particularly within 300 m of maternity caves.
- Minimise the use of pesticides in foraging areas.
- Protect roosting sites from damage or disturbance.

The proposal is not consistent with all the recovery objectives for this species. The proposal seeks to ameliorate any impact through the implementation of regeneration or restoration programs wherever suitable.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The NSW DEC have identified that the following threatening processes are acting upon this species:

- Damage to or disturbance of roosting caves, particularly during winter or breeding.
- Loss of foraging habitat.
- Application of pesticides in or adjacent to foraging areas.
- Predation by feral cats and foxes.

The proposed action constitutes a key threatening process, and it is considered to contribute to the increased impact of a threatening process.

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Preliminary Stormwater and Flooding Assessment

for

Proposed Re-zoning of Land for Residential Purposes
Lots 31-33 in DP 571275 Dalwood Road, Branxton

for

JW Planning Pty Ltd

February 2010
Revision A
Ref NL090139

Prepared By	SW	05.02.10
Checked By	AB	08.02.10

Executive Summary

This report details a preliminary stormwater and flooding assessment for a parcel of approximately 11ha of partially vegetated rural land situated in Branxton, NSW, herein referred to as the 'subject site'. This report has been prepared at the request of JW Planning Pty Ltd, to inform preliminary structure planning and rezoning investigation for the subject site.

The subject site is located on the northern side of Dalwood Road, Branxton, within the Singleton Shire Council Local Government Area (LGA). The land consists of three seperate parcels described as Lots 31-33 in DP 571275. The subject site is bound by Dalwood Road to the south, and by rural land to the east, north and west. Red House Creek is located to the south of the site, beyond Dalwood Road. Residentially developed land exists approximately 150m from the site.

The subject site is gently graded toward a flow path traversing the site. The flow path drains south to south east, conveying stormwater runoff toward Red House Creek via existing outlet structures crossing under Dalwood Road. The hydrologic and hydraulic investigations undertaken for this report indicate shallow flooding is likely to occur along the flow path in large rainfall events. For the 1 in 100 year Average Recurrence Interval (ARI) peak rainfall event, estimated flood widths were found to range from 7m to 56m wide along the flow path. Flood widths were found to be wider at the existing in-line dam located within the flow path and toward the southern boundary of the subject site immediately upstream of the existing outlet structures crossing under Dalwood Road.

Flood modelling undertaken for both the flow path within the subject site and for an additional flow path located adjacent to the site indicates the majority of the subject site will not be inundated during the 1 in 100 year ARI flood peak event. Egress routes away from flood affected areas are available, predominately to the west and north.

The flooding regime within the subject site is considered 'low hazard' to future residential development, based on hydraulic investigations undertaken for this report and the hazard category criteria outlined in the NSW Government's Floodplain Development Manual (2005).

The Department of Environment, Climate Change and Water (DECCW) typically require riparian buffer areas be established either side of flow paths, to preserve natural streamflow characteristics, native vegetation, and wildlife habitat. Buffer area widths for the flow path traversing the subject site are likely to be at least 10m wide.

Council's Singleton Development Control Plan (DCP) requires peak flow from proposed developments within the LGA to mimic peak flow from the pre-developed site, and outlines specific stormwater quality requirements. For the subject site, a number of stormwater management devices could be included at the individual allotment and/or ultimate development scale to achieve both aims. A water sensitive stormwater management strategy is considered suitable for this site, and could include devices such as rainwater tanks; small gravel trenches on individual lots; pervious paving; grassed swales with riffle zones; bio-retention swales; detention/retention trenches; off-line detention/retention basins; and wetlands.

Site scale calculations undertaken for this report suggest stormwater detention volumes in the order of 140m^3 / ha may be required to limit peak post-developed flow from the subject site to pre-developed peak flow. However, detailed calculations which consider a specific development layout should be undertaken once a masterplan has been prepared to determine ultimate allotment and site scale detention requirements.

The preliminary assessment of flooding and stormwater runoff regimes for the subject site presented in this report indicate large areas of the site to be suitable for future residential development, provided appropriate site specific stormwater and flood risk management strategies are designed and implemented.

Contents

1 Project Background

Northrop Consulting Engineers (Northrop) were engaged by JW Planning Pty Ltd (JWP) to undertake a preliminary stormwater and flooding assessment for approximately 11ha of land off Dalwood Road in Branxton, NSW. The land comprises Lots 31-33 in DP 571275, and is generally referred to in this report as the 'subject site'. This report presents the assessment undertaken by Northrop, and is intended to inform JWP's preliminary structure planning and rezoning investigations for the subject site.

In particular, this report discusses the potential for flooding within the subject site, and identifies possible strategies for minimising the impact future development may have on water quantity and quality within and downstream of the site. This report intends to discuss these issues at a broadscale level appropriate for a rezoning application, and does not attempt to provide detailed design solutions.

This report is heavily dependant upon the information and direction provided by JWP throughout the course of investigation. The recommendations of this report have been determined in consideration of Singleton Shire Council's (Council's) 'Singleton Development Control Plan – October 2009' (DCP), the NSW Government's 'Floodplain Development Manual – 2005' (FDM) and best practice water sensitive urban design principles.

2 Site Features & Constraints

The subject site is bounded by Dalwood Road to the south, and rural land to the east, north and west. Residential development is located to the south west of the site, approximately 150m away. The subject site currently has a rural residential zoning under the Singleton Local Environmental Plan (LEP), and is under investigation by JWP for potential re-zoning for low density residential development.

The subject site is predominantly cleared grazing land, with scattered pockets of vegetation. For the purposes of this report, it has been assumed that the existing vegetation will be maintained post-development of the subject site, in accordance with the usual requirements of Council's DCP. A small number of buildings are located in the southern area of the subject site; it is assumed these will be removed as part of future development of the site.

The site topography falls with an average 6% grade, toward a flow path traversing the subject site, identified on the 1:25000 topographic map of the area as a blue line. This flow path is a potential source of flooding within the subject site. A second blue line identified on the 1:25000 topographic map to the west of the subject site, is also a potential source of flooding for the subject site. The two flow paths each run in a south to south east direction, both crossing under Dalwood Road via formal culvert crossings towards Red House Creek. At the time of a site inspection undertaken in September 2009, both flow paths were observed to be degraded irregular channels, generally dry with some areas of ponded water. A water storage dam (in line) has been constructed on each of the flow paths, typical for rural land of this nature.

Figure 1 overleaf is an aerial image indicating the subject site locality and the approximate location of the two flow paths noted above. It provides an indication of the existing pockets of vegetation within the subject site.

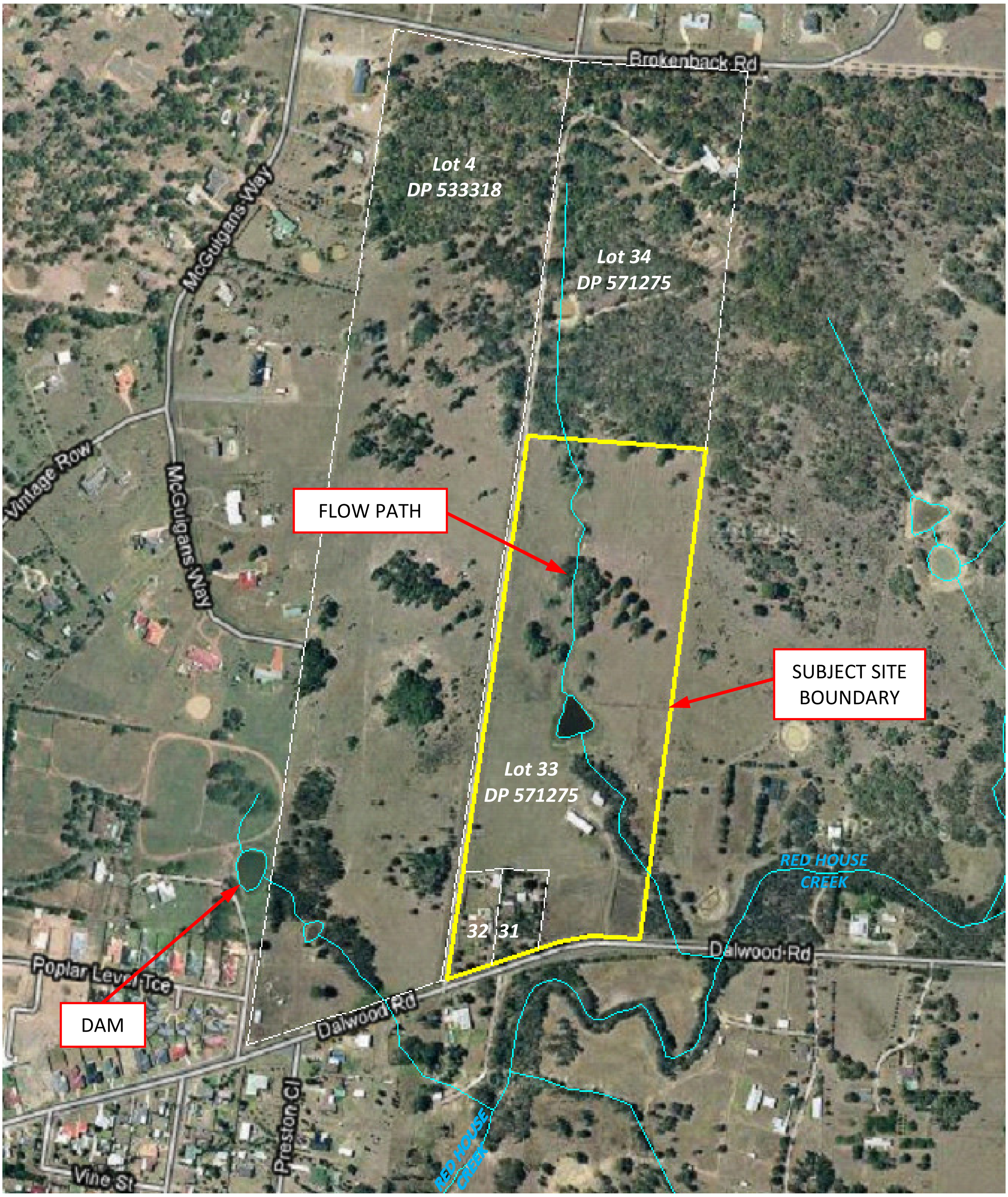

Figure 1 – Subject Site

Notes:

1. Flow path and creek lines are indicative only, approximated from the 1:25000 Topographic Map.

2. Boundary locations are indicative only.

3 Buffer Areas to Watercourses

Buffer areas are reserved corridors of land along either side of a watercourse (extending from the top of a watercourse bank), designated with the intent of retaining existing vegetation and environmental integrity of the watercourse, as well as allowing large flows to be safely conveyed. Appropriate buffer widths for significant watercourses are determined by the Department of Environment, Climate Change and Water (DECCW), in accordance with the 'Rivers and Foreshores Improvement Act 1948'.

Prescribed buffer area widths vary, depending on the size or significance of the watercourse, the existing environmental integrity of the watercourse and the potential for either improving or maintaining desirable environmental outcomes. Typical buffer area widths prescribed by the DECCW range from 10m – 60m.

As noted, the flow path traversing the subject site is identified on the 1:25000 topographic map of the area as a 'blue line', indicating it to be a potential perennial stream. Experience with similar top of catchment streams suggests this flow path would likely be classified by DECCW as a 1st order watercourse. DECCW generally advise that for first order watercourses, a buffer width of at least 10m each side may be required, and potentially even wider. Further consultation with DECCW will be required to confirm the order and significance of the flow path and the appropriate buffer width, once a concept structure plan for the development has been progressed.

As a general rule, buildings, roadways and other significant infrastructure are not permitted within buffer areas. However, soft items such as landscaping, seating, educational signs, footpaths and service infrastructure (including stormwater drainage) may be acceptable within buffer areas. Consultation with DECCW and Council will be required to ascertain acceptable options for integration of the riparian buffer area within the future development layout.

4 Flooding Assessment

4.1 Investigation Scope

Peak flow and the associated peak flood level for the 1 in 100 year Average Recurrence Interval (ARI) rainfall event were estimated for the two flow paths that were identified in Figure 1. Flow and flood level estimates were undertaken at a broadscale level, commensurate with the master planning / conceptual level of a rezoning investigation.

The NSW Government's Floodplain Development Manual (2005) requires access and egress from developed lands known to be affected by extreme flooding to be sufficient to enable timely evacuation, if needed. Evacuation routes have been investigated for the subject site.

The Probable Maximum Flood (PMF) level for the subject site has not been explored, as Council's DCP acknowledges that generally it is not physically or economically possible to provide complete protection against the PMF. Council's DCP provides guidance on flood risk management, and recommends Flood Planning Levels (FPL) for floor heights of new buildings.

4.2 Estimation of Peak 1 in 100 Year ARI Flow

For the purpose of modelling peak flow and flood levels, the two flow paths were labelled as 'Flow Path 1' and 'Flow Path 2'. Figure 2 overleaf indicates the approximate catchment extents for each flow path. Flow Path 1 flows from the north-western corner to the south-eastern corner of Lot 33, DP 571275, while Flow Path 2 is located in the south western corner of Lot 4, DP 533318.

Catchment areas for each flow path were estimated by hand measurement using the 1:25000 topographic map of the area.

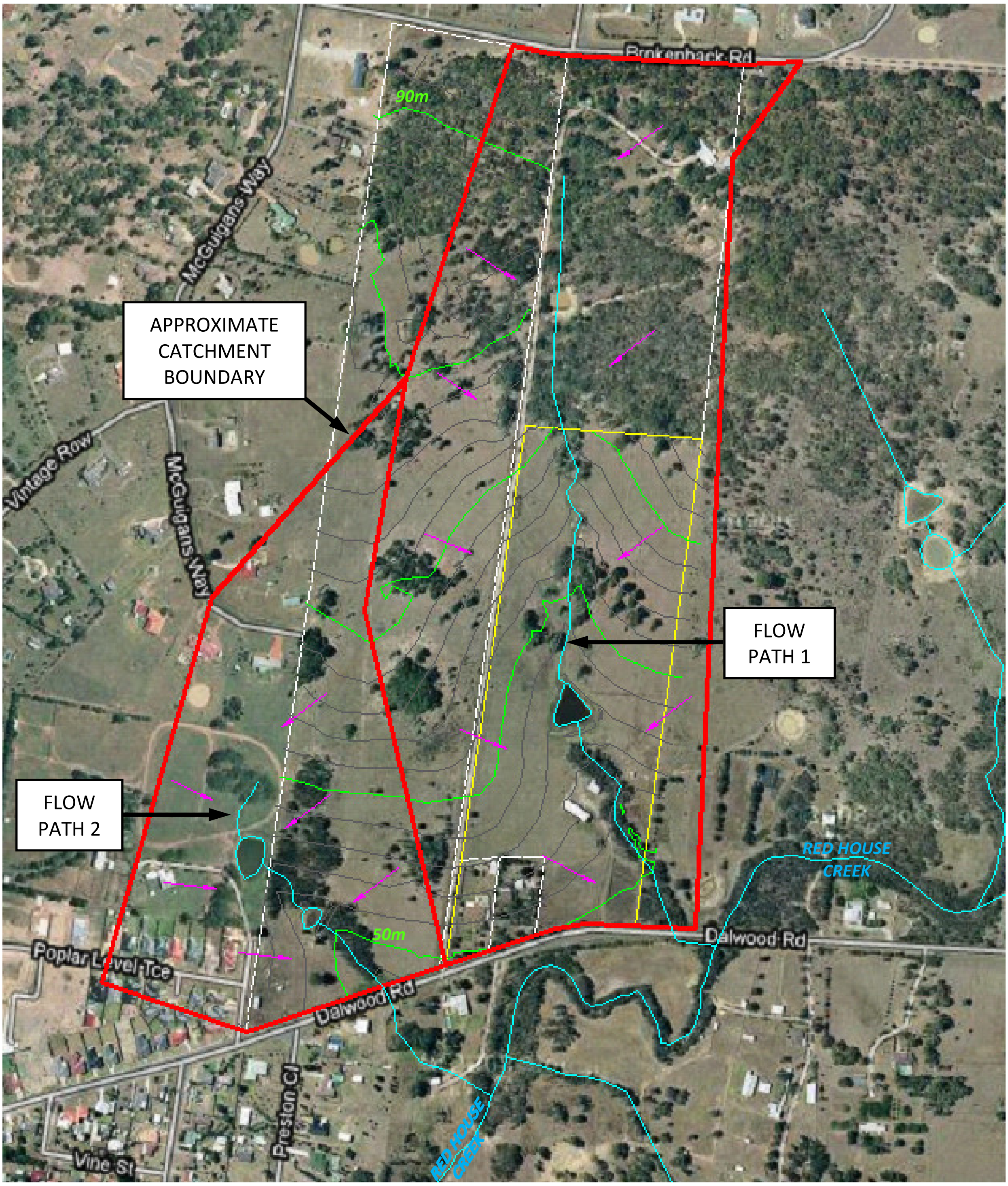

Figure 2 – Catchment Plan

Notes:

1. Flow paths and creek lines are indicative only, approximated from the 1:25000 Topographic Map.

2. Contours are indicative only, sourced and scaled from supplied survey data. Contour interval 2m.

The peak 1 in 100 year ARI flow for each flow path was estimated assuming a developed state for the subject site, and zero stormwater runoff mitigation measures within the catchments, to estimate 'worst case' likely flow. To calculate the peak flows some assumptions were required surrounding the potential developable area and likely impervious fraction of the subject site. It was assumed:

- Existing vegetated areas would remain vegetated (100% pervious);
- A 10m wide buffer zone each side of Flow Path 1 would likely be undevelopable (100% pervious);
- Areas available for future low density development within the subject site including roadways would be 40% impervious post-development.

No assumptions regarding future land use for land other than the subject site were made; portions of the catchments outside the subject site were modelled in their current state.

The runoff-routing software DRAINS was used to model the 1 in 100 year ARI peak flow for each of the flow paths. Table 1 contains a summary of the adopted catchment areas and characteristics for each flow path, and the calculated peak flows. Additonal detail is provided in Appendix A.

Table 1: Catchment Characteristics & Peak 100 Year Flows

Flow Path	**Flow Path 1**	**Flow Path 2**
Total Catchment Area	35ha	16ha
Impervious Area External to Subject Site	0ha	1.2ha
Potential Developable Area Within Subject Site *Assumed % Impervious*	10ha *40%*	0 *n/a*
Adopted Total % Impervious for Catchment	11%	8%
Calculated Peak 1 in 100 Year ARI Flow	6.4 m^3/sec	3.6 m^3/sec

4.3 Estimation of Peak 1 in 100 Year Flood Level

The 1D river analysis software HEC-RAS was used to determine the peak 1 in 100 year flood levels and flood widths within the two flow paths.

For input into the HEC-RAS model, cross-sections for each flow path were generated from the site detail survey provided by JWP. Due to the existing topography, the cross-sections typically resemble wide shallow depressions. 'Manning's n' values for each cross-section were adopted based on the in-situ conditions observed in September 2009 and the vegetation extents indicated on the site survey plan. The locations of modelled cross-sections are shown in Figure 3 overleaf. Peak flow for each flow path was input from the results of the DRAINS modelling, and conservatively assumed to be constant along each flow path.

A summary of the hydraulic output from the HEC-RAS modelling is given in Table 2 below; additional detail and pictorial output is included as Appendix B to this report.

Table 2: Estimated Peak 1 in 100 Year ARI Flood Levels and Widths

Flow Path	Cross-section	Peak Flood Level (m AHD)	Peak Flood Width (m)
Flow Path 1	1	50	8
Flow Path 1	2	52	14
Flow Path 1	3	56	**56**
Flow Path 1	4	58	7
Flow Path 1	5	66	8
Flow Path 2	1	48	7
Flow Path 2	2	49	13
Flow Path 2	3	52	**38**
Flow Path 2	4	52	8

Where the dams are located within the flow paths, estimated peak flood widths balloon out to 56m and 38m for Flow Path's 1 and 2 respectively. Future modification or removal of the existing dams may reduce flooding widths in these locations.

The estimated flood widths, with the exception of the area's surrounding the existing dams, are generally contained within the buffer area widths typically assigned to first order streams.

The calculated peak 1 in 100 year ARI flood extents within the flow paths are wide and shallow, as would be expected for the topography; the maximum flow depth within the modelled cross-sections was calculated as 0.5m and 0.6m for Flow Path 1 and 2 respectively.

The HEC-RAS modelling indicates the majority of the subject site will not be inundated by flooding from Flow Path 1 in the peak 1 in 100 year ARI rainfall event, and flooding from Flow Path 2 will not encroach the subject site. The estimated extent of flooding along each flow path is shown overleaf in Figure 3.

Passive recreational items, including play equipment, seating, walkways, cycle paths, picnic areas and sporting fields may be permissible within flood prone land, provided they do not worsen flood extents. Stormwater conveyance and quality management measures including swales, gravel filled trenches, bio-infiltration gardens, mini-ponds and mini- wetlands may also be permissible within flood prone land. Consultation with Council and DECCW during the detailed development of the structure plan and stormwater management strategy for the subject site will be required to ascertain if these opportunities are viable.

Any future formalisation, improvement or modification to the flow path or dam within the subject site (if permissble by DECCW and Council) will need to consider appropriate conveyance of peak flows, and ensure adequate volumetric storage capacity for flood events is maintained.

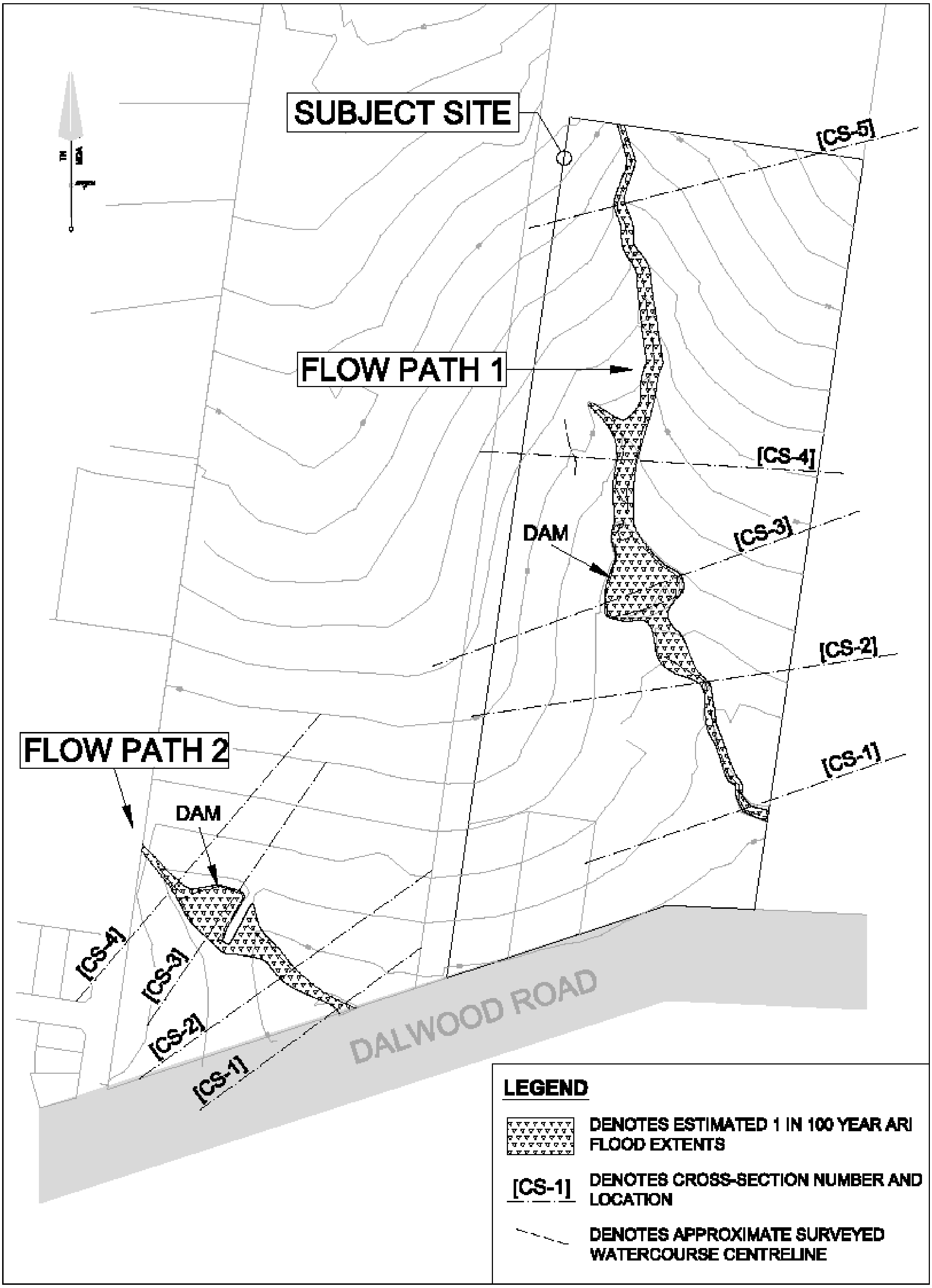

Figure 3 – Estimated Peak 1 in 100 year Flood Extents

4.4 Flood Hazard & Risk Management

The NSW Government's Floodplain Development Manual (FDM) provides guidance on assessing the hazard category of flood waters. Hydraulically, flow velocities above $2m^2$/sec and water depths greater than 2m are considered to present high hazard to people, animals, vehicles and structures. The average velocity for Flow Path 1 cross-sections was calculated to be $2.6m^2$/sec ($2.3m^2$/sec for Flow Path 2). Logically, there is a higher hydraulic hazard toward the centre of a flow path above the deeper channel section than at the shallow fringes of the flood extents. Factors other than channel geometry and flow hydraulics influence flood hazard categorisation. These include:

- Size of flood;
- Effective warning time;
- Flood readiness;
- Rate of rise of floodwaters;
- Duration of flooding;
- Evacuation problems;
- Effective flood access; and
- Type of development;
- Complexity of stream network.

The flood modelling undertaken for this report indicates flood waters within the subject site are likely to be concentrated along the flow path traversing the site, with the majority of the site unaffected by flooding. The existing topography provides for evacuation routes away from flood inundated areas.

Considering the flood modelling results and site topography, flood events within the subject site could be categorised as 'low' hazard, assuming risks are well managed through appropriate development layout planning, future residential development is undertaken outside of flooding extents, and access / egress routes from flood affected land are maintained. The FDM and Council's DCP provide further guidance on flood risk management.

5 Stormwater Management Infrastructure

Stormwater management for future development within the subject site should, where practical, comply with industry best practise principles for water sensitive urban design (WSUD) and sustainable water use in accordance with Council's DCP. The design and construction of stormwater infrastructure within the subject site should aim to generally adhere to the following guidelines:

- Stormwater management devices should be designed to ensure peak flows from developed areas mimic pre-developed peak flows as best as possible, to maintain natural flow regimes;

- Source control devices (grassed swales, infiltration/retention trenches, rainwater tanks, bio-retention swales, permeable paving etc) should be used to control water quality, instead of large traditional end of line controls;

- Stormwater management devices (both volume and quality) should be visually integrated into the subdivision and landscape context, and where possible form part of the open space amenity of the development;

- A holistic approach to management of stormwater generated from the developed site should be adopted, with allotment scale measures integrated into the wider subdivision context. This would involve the use of 'at source' stormwater collection and treatment devices on individual lots, which overflow during larger rainfall events into a trunk drainage system;

- The design of the trunk drainage system should be sensitive to maintaining or improving the condition of downstream watercourses, and in particular the existing flow path within the subject site;

- Dispersed release of stormwater runoff should be encouraged at both allotment and trunk drainage levels, to reduce the potential for scour and erosion at outlet points. Discharge of concentrated, high velocity, and high erosive potential flow should be avoided;

- Development structure planning should be integrated with the stormwater management design, and should consider existing site topography and features including the flow path and dam, and seek to make use of the opportunities these features present.

5.1 Stormwater Quantity

Development of the subject site and the ensuing introduction of impervious surfaces will increase peak flow from the site. It is Council's policy that new developments are required to manage stormwater, such that peak developed flow leaving the site does not exceed peak pre-developed flow, for all storm events and durations up to and including the 100 year ARI.

Stormwater runoff should be managed as much as possible at the allotment level. Where practical, this should be done through actively minimising impervious areas on allotments, and through the collection and reuse of roof water. Devices incorporated within individual allotments to mitigate developed flows could include:

- Rainwater tanks with reuse facilities;
- Small gravel trenches (to store and infiltrate runoff into the ground); and
- Pervious paving (to reduce impervious areas on lots).

Dependent on total impervious area and mains water availability, Singleton Shire Council may require 10-25kL rainwater tanks to be provided for each allotment, in addition to, or integrated with any detention measures. The NSW Government's BASIX assessment may also require additional stormwater measures for allotments.

Further to allotment scale measures, mitigation of flow from road and footpath surfaces at a subdivision scale will need to be considered. Techniques and devices designed to perform this function should, where possible, be incorporated as part of landscaped or open space areas within the subdivision. The detailed design of such structures will need to adequately consider both DECCW and Council requirements, as well as site flooding regimes. Devices to mitigate peak developed flow at the subdivision scale could include:

- Grassed swales with riffle zones;
- Bio-retention swales or gardens;
- Detention / retention / infiltration trenches;
- Detention / retention ponds;
- Pervious paving;
- Mini wet / dry basins or wetlands.

DECCW have a preference that detention or retention structures be constructed off-line, rather than in-line with watercourses. It is therefore considered unlikely that the existing dam within the flow path could be utilised as a detention / retention pond.

It should be noted that stormwater management principles based on dispersal or infiltration may be inappropriate in unfavourable soil conditions, or where development type or yield may be adversely affected. Soil conditions will need to be assessed on the subject site to determine appropriate stormwater management options.

To indicatively determine the stormwater detention required to limit peak developed flows to peak pre-developed flows for the subject site, preliminary broad scale volumetric calculations were undertaken by hand. The subject site was assumed to be 100% pervious in the pre-developed state, in accordance with Council's DCP. An area of 10 ha within the subject site was assumed to be developableand 40% impervious, as discussed in Section 4. Our calculations indicate a detention storage volume of at

least 140m^3/ha may be required to ensure peak developed flows from the subject site do not exceed peak pre-developed flows.

The detention volume noted above should not be assumed in any way to be the finite requirement for the subject site. Our calculations are broad site scale preliminary estimates, and have conservatively assumed allotment scale devices will not detain 100 year ARI flows. The appropriate use of stormwater devices at the allotment scale could result in a reduction to the detention volume required at the site scale. Detailed modelling will be required at the concept and final design stages to determine ultimate detention requirements.

5.2 Stormwater Quality

Water quality considerations should play a major part in the planning of future development within the subject site. Council's DCP requires new developments to be designed such that the development does not adversely affect downstream receiving waters. Future appropriate development of the site could provide an opportunity to enhance downstream water quality, ecology and overall amenity.

It is expected that stormwater runoff from current rural land use within the subject site would contain a higher amount of pollutants than a natural regime. Changing land use within the site to low density residential development may therefore not necessarily increase downstream pollutant loads. Still, it is expected that runoff from future residential development on the subject site will contain measurable amounts of pollutants, and some water quality treatment will be required. Litter, coarse sediments, fine particles, oils and greases, phosphorus and nitrogen are typical pollutants likely to be generated from a residential development.

In line with Council's DCP, the design of future stormwater management systems for the site should meet targets for pollutant removal in keeping with Table 4 overleaf.

Table 4: Pollutant Removal Targets

Target Pollutant Removal Efficiencies *	
Suspended Solids	Reduce average annual load by at least 80%
Total Phosphorus	Reduce average annual load by at least 45%
Total Nitrogen	Reduce average annual load by at least 45%
Litter	Litter greater than 50mm diameter retained for flows up to 50% of the 1 year ARI peak flow
Course Sediment	Sediment coarser than 0.125mm diameter retained for flows up to 50% of the 1 year ARI peak flow
Oil & Greases	No visible oils for flows up to 50% of the 1 year ARI peak flow in areas with concentrated hydrocarbon deposition

** Removal Rates shown are taken from the Singleton DCP*

Design of appropriate water quality treatment devices should be undertaken within the concept and detail design stages for future development of the subject site. Devices should, where possible, be based on the principle of 'at source' control. Source control devices could be integrated into landscaped areas of future development, and could include:

- First flush devices;
- Rainwater tanks;
- Grassed swales;
- Retention trenches;
- Infiltration trenches;
- Vegetated buffer strips;
- Bio-retention swales or gardens;
- Mini wetlands; and
- Mini wet/dry basins.

Where source control devices are not practical or do not provide adequate treatment, proprietary treatment devices may be required, but these should only be included as a last resort to supplement at source treatment.

The nature of site pollutants and the performance targets to be met will form key inputs into device selection. Establishment and on-going maintenance requirements are also important considerations in the selection of stormwater treatment devices.

Ideally, stormwater quality treatment devices should be designed to act as a treatment train within the subject site. In a treatment train, individual devices treat stormwater runoff for different pollutants and to different efficiencies, with the net result being adequate treatment of all pollutants. Indicatively, a treatment train could include the following processes:

- First flush devices to collect the first portion of runoff from roofs, thus removing the vast majority of sediment and nutrients from roof runoff;

- Rainwater tanks acting as sediment traps, treating the remaining roof water runoff for sediment, and nutrients attached to the sediment;

- Buffer strips located within footpaths, treating overland flow from allotments for coarse sediments, nutrients and litter and dispersing flows to reduce erosion potential; and

- Bio-filtration or standard roadside swales, treating runoff for fine sediments, nutrients and litter, as well as dispersing flows to minimise downstream erosion.

Figure 4 overleaf illustrates one option for how a water sensitive treatment train could be incorporated within future residential development of the subject site, compared to a traditional ‘pit and pipe’ approach to stormwater conveyance. It should be noted that the treatment train presented in Figure 4 is intended to be indicative only. Water quality treatment devices should be designed and validated by water quality modelling during the detailed design stage of development.

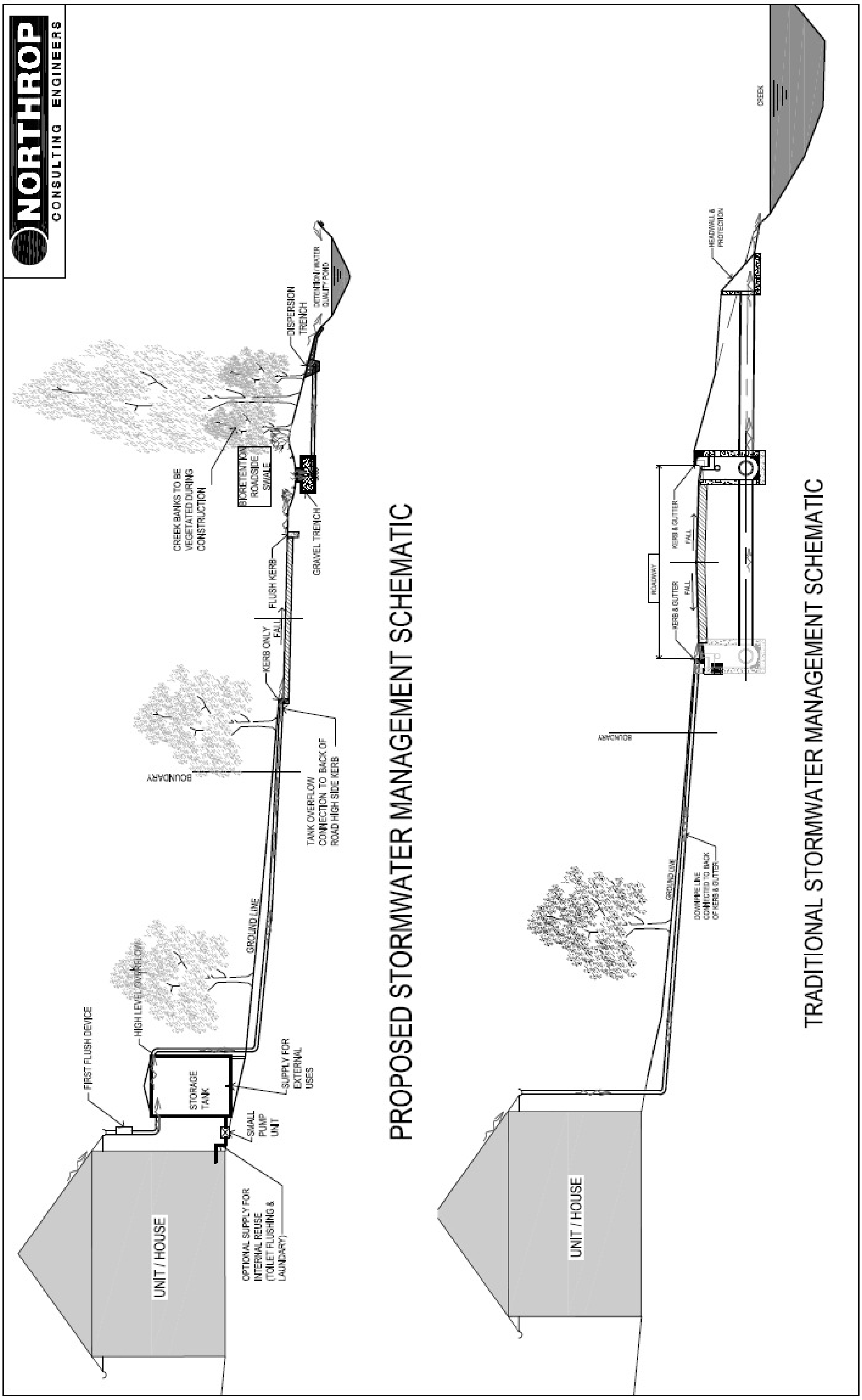

Figure 4 – Indicative treatment train

6 Recommendations

Development of the subject site for residential purposes will require the adoption of a number of initiatives to appropriately manage stormwater runoff and flooding, and to minimise the impact of the development on downstream watercourses. Design of stormwater management strategies should be integrated with development layout planning. The site topography, existing vegetation, flow path and dam, existing runoff regime and flooding characteristics should be considered during concept and detailed development planning for the site. Opportunities to utilise or modify the existing dam and flow path to reduce flooding extents and improve water quality should be explored, in consultation with the DECCW and Council.

The following initiatives are recommended for the subject site:

- Adoption of a holistic approach to site and allotment scale stormwater management to mitigate developed peak flow, based on water sensitive urban design principles of at source control;

- Use of appropriate at source and whole of site stormwater quality and quantity control devices within the development. These devices could include, where practical, grassed swales, bio-retention swales, small wet/dry basins, water harvesting tanks, dispersion and retention trenches;

- Ensuring habitable floor levels are set above peak 1 in 100 year ARI flood levels on site, to Council's requirements;

- Generally, residential development should not occur below the 100 year ARI flood line. However, opportunities for footpaths, cycleways, open space, seating, and sports fields may exist within areas subject to flooding and should be considered where appropriate, in consultation with Council and DECCW;

- Stormwater management for the development should comply with the requirements of Singleton Shire Council's DCP and industry best practice guidelines;

- Consultation with DECCW should be undertaken to ascertain the significance of the flow path traversing the subject site, and any specific requirements for buffer areas and / or remediation or rehabilitation works along the flow path.

Based on the preliminary investigations outlined in this report, and for the purposes of a rezoning assessment, it is apparent that management of stormwater and flooding can be provided for future development of this site in a safe, appropriate and practical manner. Obviously, further engineering assessment will be required in order to provide detailed design solutions for the site, which adequately cater for the desired development layout and fully respond to site topographical, hydraulic and geotechnical characteristics.

The hydraulic and hydrologic review of the subject site presented in this report identifies the subject site to be suitable for future residential development, provided appropriate stormwater and flood management strategies are implemented as recommended. Future appropriate development of the site presents the opportunity to significantly enhance downstream water quality, ecology and overall amenity. From a water management perspective, rezoning of the subject site as a residential precinct should therefore be supported.

7 References

- Floodplain Development Manual, NSW Government, 2005
- Singleton Development Control Plan, Singleton Shire Council, 2009
- Australian Rainfall and Runoff, Engineers Australia, 1987
- Australian Runoff Quality: a guide to water sensitive urban design, Engineers Media, 2006
- 1:25000 Topographic Map: Greta 9132-1S 2nd Edition, NSW Government, 2001
- Singleton Local Environment Plan, 1996

Appendix A – Flow Calculations – DRAINS

DRAINS Input

DRAINS Version 9

Table A1 - PIT / NODE DETAILS

Name	Type
N1	Node
N2	Node

Table A2 - SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)
Flow Path 1	N1	35	0	89	11	0	30	15
Flow Path 2	N2	16	0	92	8	0	19	10

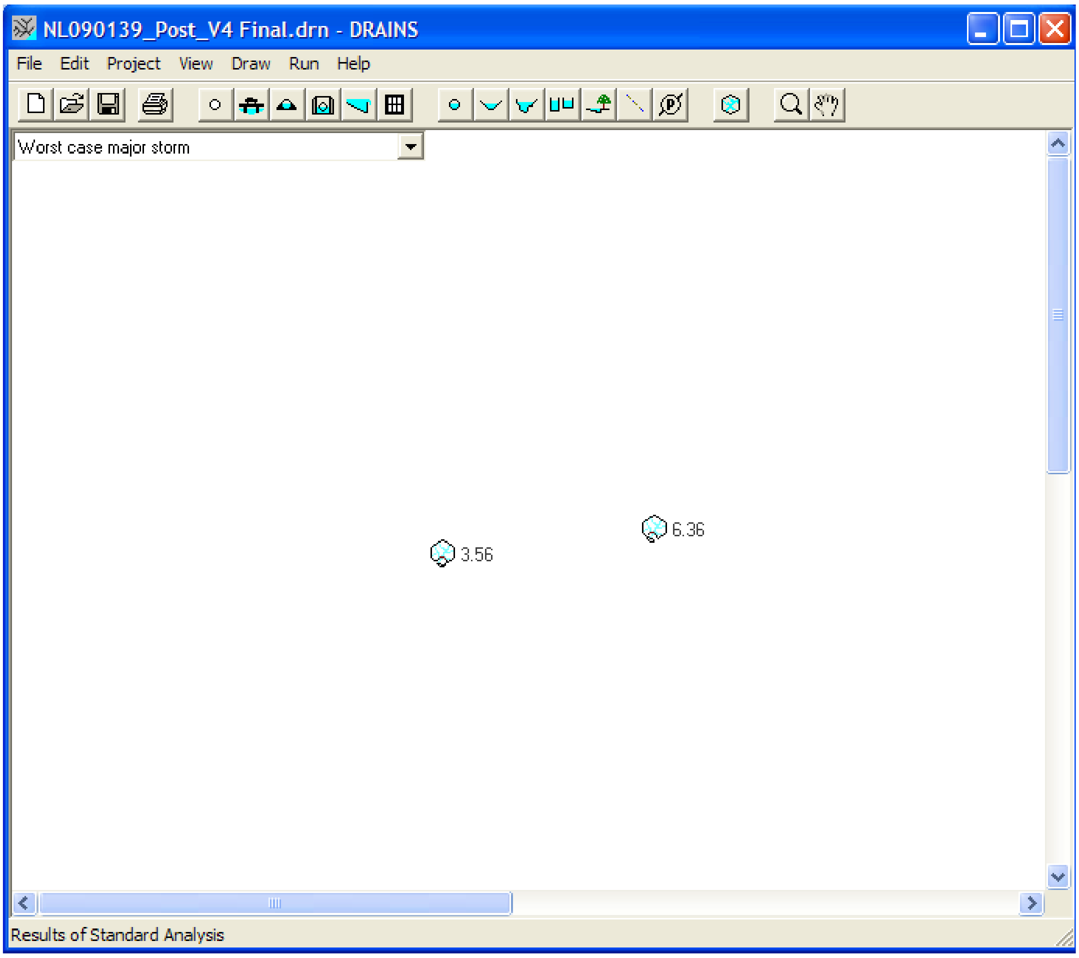

Figure A1 – DRAINS Screen Shot

DRAINS Output

DRAINS results prepared 15 January, 2010 from Version 2009.06

Table A3 - SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
Flow Path 1	6.356	0	6.356	0	30	15	AR&R 100 yr, 1 hour storm, average 56.2 mm/h, Zone 1
Flow Path 2	3.562	0	3.562	0	19	10	AR&R 100 yr, 1 hour storm, average 56.2 mm/h, Zone 1

Table A4 - Outflow Volumes for Total Catchment (8.26 impervious + 58.7 pervious = 67.0 total ha)

Storm	Total Rainfall cu.m	Total Runoff cu.m (Runoff %)	Impervious Runoff cu.m (Runoff %)	Pervious Runoff cu.m (Runoff %)
AR&R 100 year, 5 minutes storm, average 203 mm/h, Zone 1	8627.5	3841.36 (44.5%)	0.00 (0.0%)	3841.36 (49.5%)
AR&R 100 year, 10 minutes storm, average 152 mm/h, Zone 1	12920	7350.66 (56.9%)	0.00 (0.0%)	7350.66 (63.3%)
AR&R 100 year, 20 minutes storm, average 107 mm/h, Zone 1	18190	11543.10 (63.5%)	0.00 (0.0%)	11543.10 (70.6%)
AR&R 100 year, 30 minutes storm, average 85 mm/h, Zone 1	21675	13938.98 (64.3%)	0.00 (0.0%)	13938.98 (71.5%)
AR&R 100 year, 1 hour storm, average 56.2 mm/h, Zone 1	28662	18692.21 (65.2%)	0.00 (0.0%)	18692.21 (72.5%)
AR&R 100 year, 2 hours storm, average 36.7 mm/h, Zone 1	37434	24187.90 (64.6%)	0.00 (0.0%)	24187.90 (71.8%)
AR&R 100 year, 3 hours storm, average 28.6 mm/h, Zone 1	43758.01	28010.02 (64.0%)	0.00 (0.0%)	28010.02 (71.2%)
AR&R 100 year, 6 hours storm, average 18.6 mm/h, Zone 1	56916	34039.53 (59.8%)	0.00 (0.0%)	34039.53 (66.5%)
AR&R 100 year, 12 hours storm, average 12.2 mm/h, Zone 1	74664.01	40391.34 (54.1%)	0.00 (0.0%)	40391.34 (60.1%)
AR&R 100 year, 24 hours storm, average 7.97 mm/h, Zone 1	97552.79	41065.28 (42.1%)	0.00 (0.0%)	41065.28 (46.8%)

Table A5 - CONTINUITY CHECK for AR&R 100 year, 1 hour storm, average 56.2 mm/h, Zone 1

Node	Inflow (cu.m)	Outflow (cu.m)	Storage Change (cu.m)	Difference %
N1	12835.32	12835.32	0	0
N2	5856.89	5856.89	0	0

Appendix B – Flooding Calculations – HEC-RAS

Table B1 – Flow Path 1 Profile Output Table

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Vel Chnl (m/s)
Flow Path 1	5	100yr ARI	6.4	65.65	65.91	6.37
Flow Path 1	4	100yr ARI	6.4	57.2	57.7	1.69
Flow Path 1	3	100yr ARI	6.4	55.84	55.92	1.64
Flow Path 1	2	100yr ARI	6.4	52	52.38	5.12
Flow Path 1	1	100yr ARI	6.4	48.96	49.46	2.05

Reach	River Sta	Profile	Flow Area (m2)	Top Width (m)	Hydr Depth (m)	Sta W.S. Lft (m)	Sta W.S. Rgt (m)
Flow Path 1	5	100yr ARI	1	7.76	0.13	-5.55	2.22
Flow Path 1	4	100yr ARI	3.79	13.49	0.28	-0.65	12.84
Flow Path 1	3	100yr ARI	4.01	55.92	0.07	-26	29.92
Flow Path 1	2	100yr ARI	1.25	6.64	0.19	-1.93	4.71
Flow Path 1	1	100yr ARI	3.13	7.43	0.42	-7.08	0.35

Table B2 – Flow Path 2 Profile Output Table

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Vel Chnl (m/s)
Flow Path 2	4	100yr ARI	3.6	51.55	51.74	5.14
Flow Path 2	3	100yr ARI	3.6	51.38	51.47	1.52
Flow Path 2	2	100yr ARI	3.6	48.8	48.95	3.64
Flow Path 2	1	100yr ARI	3.6	47.24	47.82	1.71

Reach	River Sta	Profile	Flow Area (m2)	Top Width (m)	Hydr Depth (m)	Sta W.S. Lft (m)	Sta W.S. Rgt (m)
Flow Path 2	4	100yr ARI	0.7	7.48	0.09	-4.99	2.49
Flow Path 2	3	100yr ARI	2.42	38.3	0.06	-18.53	19.77
Flow Path 2	2	100yr ARI	0.99	13.11	0.08	-2.83	10.28
Flow Path 2	1	100yr ARI	2.1	7.25	0.29	-5.72	1.53

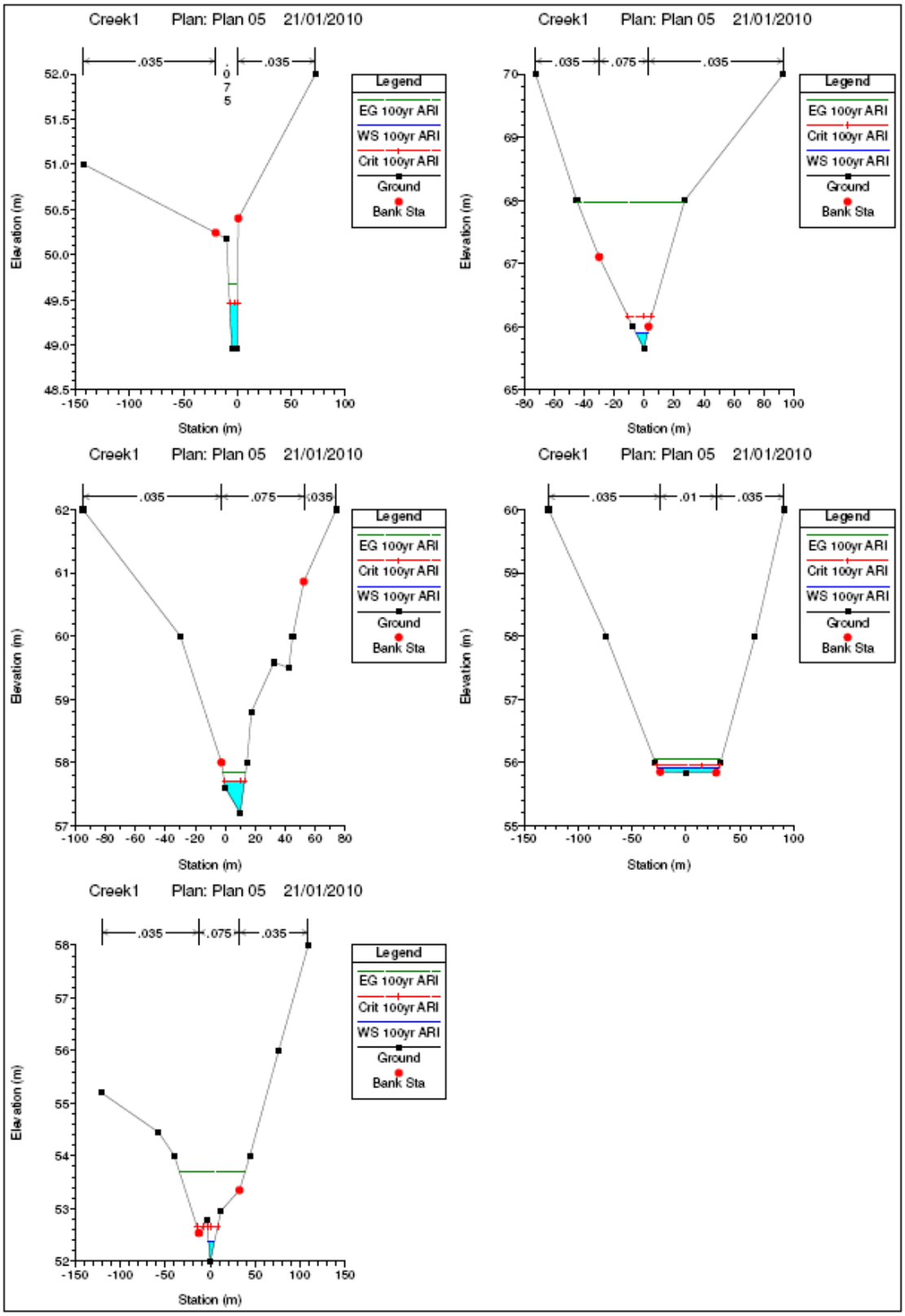

Figure B1 – HEC-RAS Cross-sections for Flow Path 1, 1 in 100 year peak flood

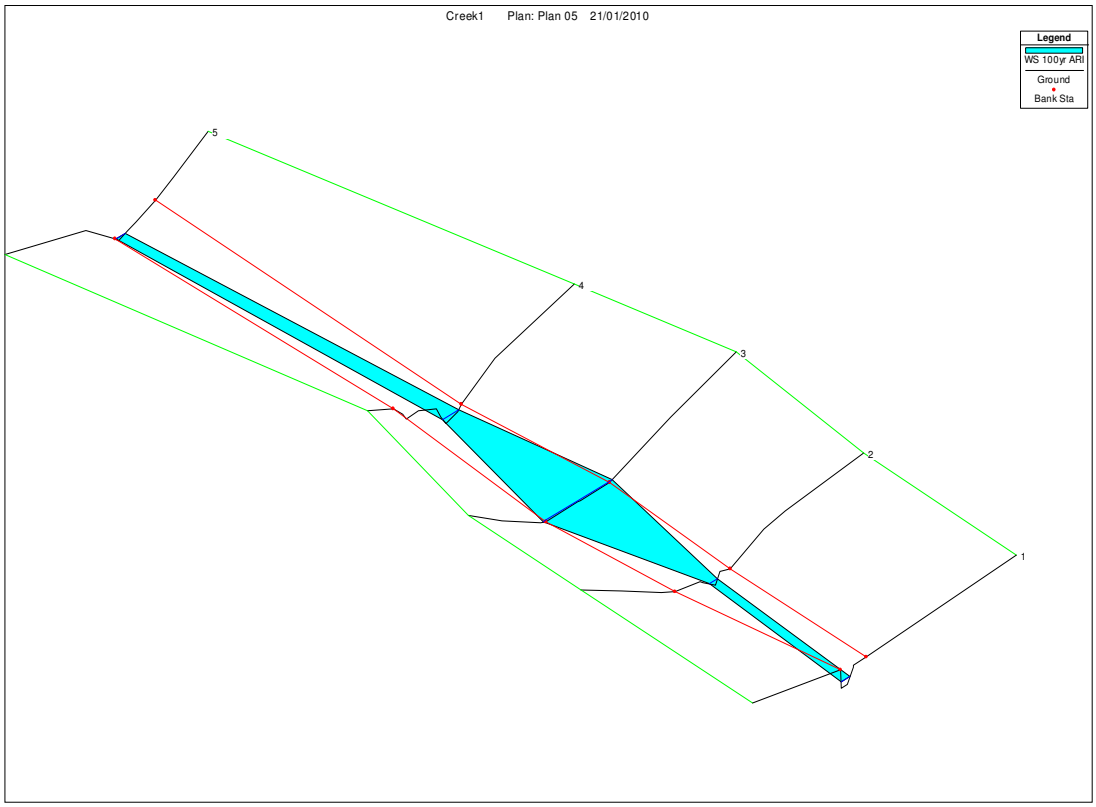

Figure B2 – HEC-RAS X-Y-Z Perspective Plot for Flow Path 1, 1 in 100 year peak flood

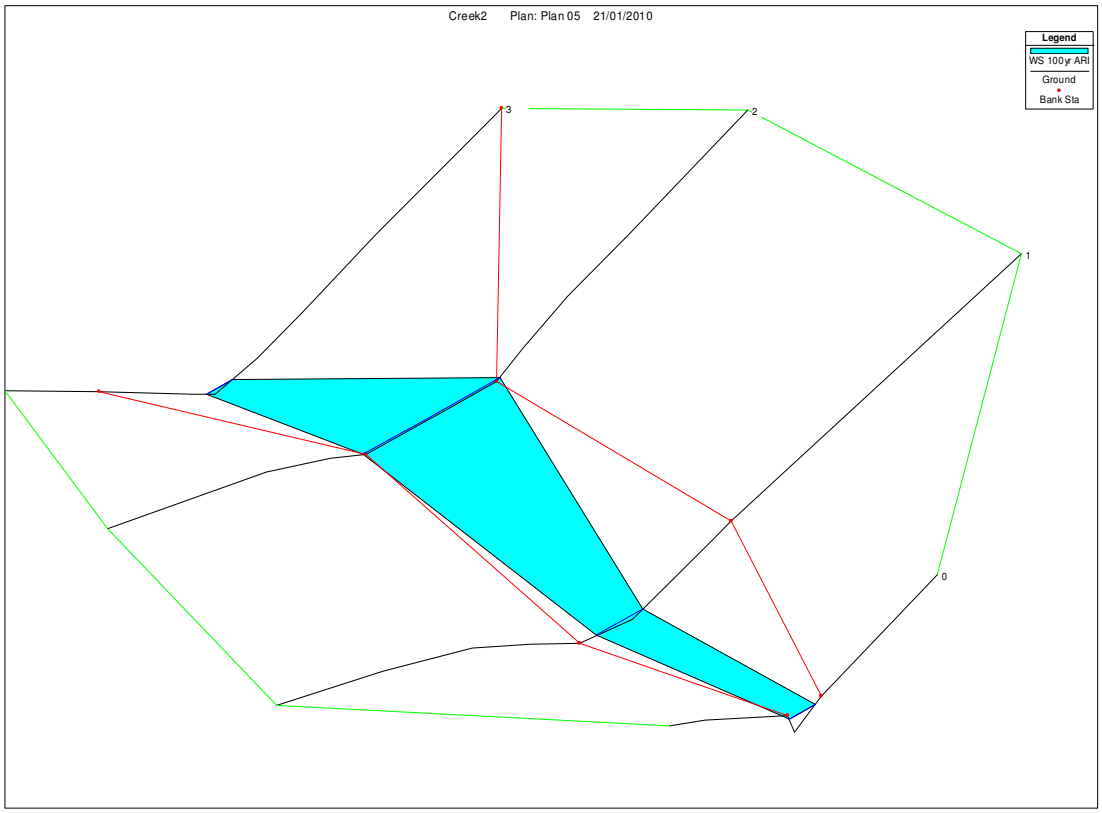

Figure B3 – HEC-RAS X-Y-Z Perspective Plot for Flow Path 2, 1 in 100 year peak flood

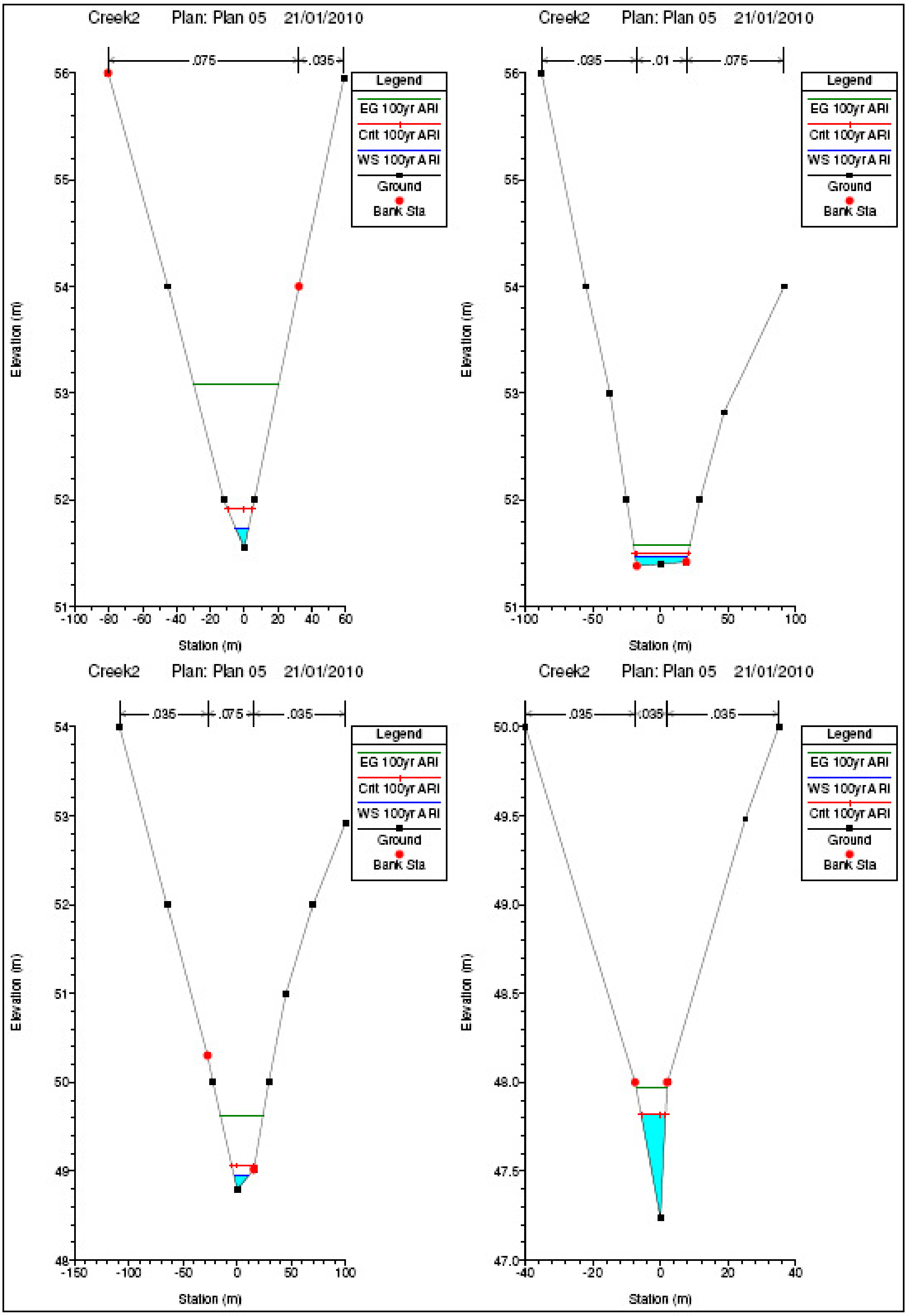

Figure B4 – HEC-RAS Cross-sections for Flow Path 2, 1 in 100 year peak flood

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Email: properties@jurds.com.au

Friday, 21 May 2010

Jason Wasiak
JW Planning
Email: jason@jwplanning.com.au

Dear Sir,

RE: SUPPLY & DEMAND FOR RESIDENTIAL LAND
BRANXTON – HUNTER VALLEY

I write in response to your request to provide an overview of market demand for land in the Branxton Region.

Our company is actively involved in the marketing and sale of land throughout the Hunter Region from Cessnock through to Singleton and Maitland. Over the last twenty years, I have personally experienced demand for land in the Branxton region increase from low to static and over the last four years to extremely strong.

The announcement of the F3 extension to Branxton combined with the explosion in the resource/coal sector has had the effect of highlighting Branxton as a hotspot for investment. The proposed commercial activity for the town centre is evidence of the potential for rapid population growth generated by a workforce shifting to this locality to service the nearby Coal Industry in the Upper Hunter, Branxton is a particularly attractive option for this shifting workforce in comparison to the Upper Hunter as it is easily commutable and yet still accessible to Newcastle / Lake Macquarie and the vineyards for leisure activity / schooling etc for mining families.

Our company receives more enquiry/demand for residential and rural/residential land in this area than any other in the Hunter Region. There is currently an undersupply for homes in Branxton which will be exacerbated when the F3 is completed in 4 years.

I would be surprised if a detailed study on likely population growth and employment demand did not identify Branxton as the major growth region in the Hunter.

Regards,

Alan Jurd
Principal

Hon Tony Kelly MLC
Minister for Planning
Minister for Infrastructure
Minister for Lands
Deputy Leader of the Government in the Legislative Council
Leader of the House in the Legislative Council

The Hon Kerry Hickey MP
Member for Cessnock
PO Box 242
CESSNOCK NSW 2325

10/14928

Dear Mr Hickey

I refer to your representations on behalf of Mr Raymond Lewis, Director of Jenlaw Pty Ltd, concerning a proposed rezoning at Dalwood Road, Branxton.

I am advised the Department of Planning has been discussing this proposed rezoning with Singleton Council. Singleton Council is the appropriate planning authority for this rezoning, as it is not a matter of State or Regional significance.

Singleton Council will need to ensure the proposal is consistent with the Singleton Landuse Strategy, prepared in 2008. This will involve the assessment of supply and demand for the locality, taking into consideration land already identified for development, and other rezoning proposals in the locality. If Council supports the proposal, the matter will be forwarded to the Department for a determination as to whether the proposal is to proceed. I am advised the Department is tracking the progress of this proposal.

Should Mr Lewis have any further enquiries about this matter, I have arranged for Ms Amy Blakely, of the Department of Planning, to assist. Ms Blakely can be contacted on telephone number 4904 2705.

Yours sincerely

17 AUG 2010

Tony Kelly MLC
Minister for Planning

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