niche
Environment and Heritage

NOONGAH STREET BARGO
ECOLOGICAL CONSTRAINTS ASSESSMENT

April 2012

DOCUMENT CONTROL

Business Unit	Niche Environment and Heritage, Central Coast/Hunter		
Project No.	1220		
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	Name	Signed	Date
Supervising Manager(s)	Matthew Richardson		27 April 2012

Person managing this document	Person(s) writing this document
	Luke Baker

External Review	Name
	Phil Purnell Purnell Property Group

Document Status	Date
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Prepared for:	Organisation
	Precise Planning

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EXECUTIVE SUMMARY

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Precise Planning to prepare an ecological constraints assessment for a rural property located at 45 Noongah Street Bargo, NSW. The purpose of the assessment is to help inform planning and development options by identifying ecological constraints and opportunities within the property.

The Study Area consists of an approximate 17.38 hectares rural residential Lot comprising a house, sheds, bushland and cleared paddocks. Hornes Creek runs south to north through the centre of the property and a smaller tributary is located to south-east corner of the property. Retained native vegetation within the Study Area is primarily along the riparian zone of Hornes Creek and scattered along the boundary edges.

Sections of the Study Area had been previously mapped as part of the South East NSW (SCIVI) mapping project.

A rapid field survey was conducted on the 17th of April 2012 to validate the vegetation mapping and conduct a habitat-based threatened species survey.

In summary, the current survey identified discrepancies in the existing vegetation mapping. The boundaries of the vegetation polygons in the SCIVI mapping project needed to be extended to include vegetation previously not mapped within the property boundary.

Four vegetation communities were recorded within the Study Area including two Endangered Ecological Communities (EEC):

- Cumberland Shale Sandstone Transition Forest is equivalent to Shale Sandstone Transition Forest (SSTF), which is listed as an EEC under the *NSW Threatened Species and Conservation Act* 1995 (TSC Act) and *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act);
- Southern Highlands Shale Woodland (SHSW) is equivalent to Southern Highland Shale Woodlands in the Sydney Basin Bioregion which is listed as an EEC under the TSC Act.

Five threatened flora species have been given a moderate likelihood of occurrence rating within the property. These are: *Grevillea parviflora* subsp. *parviflora, Persoonia bargoensis, Persoonia hirsuta, Persoonia glaucescens,* and *Epacris purpurascens var. purpurascens*. Habitat for these species is along the riparian vegetation of Hornes Creek, or along the patches of vegetation to the west and south-west of the Study Area boundary.

Twenty threatened fauna species have been given a moderate to high likelihood of occurrence rating within the Study Area. These include:

- Birds: Bush Stone-curlew, Gang-gang Cockatoo, Glossy Black Cockatoo, Brown Treecreeper (Eastern sub species), Varied Sittella, Little Lorikeet, Hooded Robin, Black-chinned Honeyeater, Turquoise Parrot, Barking Owl, Powerful Owl, Scarlet Robin, Diamond Firetail and Regent Honeyeater.

- Amphibians: Giant Burrowing Frog, Green and Golden Bell Frog and Littlejohn's Tree Frog.
- Mammals: Eastern False Pipistrelle, Eastern Freetail-bat and Koala.

No threatened flora or fauna species were detected during the current survey.

High ecological constraints identified during the study are those that contain ecological values where development should be avoided, where possible. High constraints include the following:

- EECs such as vegetation mapped as SSTF and SHSW;
- Hornes Creek and the vegetation along it;
- Hornes Creek tributary.

Depending on the level of impact to High ecological constraints, the impact assessment process under the TSC Act and EPBC Act may require:

- Targeted threatened fauna and flora surveys following Office of Environment and Heritage (OEH) threatened species survey guidelines, particularly for amphibians should development impact on Hornes Creek;
- Depending on the results from the impact assessment a Species Impact Statement (SIS) and/or a Referral;
- An appropriate offset using the BioBanking Methodology;
- Consultation with OEH, Wollondilly Council and Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).

Low ecological constraints are those that have minimal ecological values. Areas include: paddocks, cleared areas around the existing sheds, houses and driveway. Utilising areas of Low ecological constraints will likely minimise the need for an SIS and/or Referral, offsetting and comprehensive consultation with determining authorities.

In total, High constraints occupy approximately 33% of the property, compared to approximately 66% of Low constraints.

1 INTRODUCTION

1.1 Background

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Precise Planning to prepare an ecological constraint assessment of 45 Noongah Street Bargo, NSW (Lot 22 DP 619150).

The purpose of this assessment is to aid planning and development options of the property, by identifying ecological constraints and opportunities.

1.2 Definitions and Abbreviations

CSSTF – Cumberland Shale Sandstone Transition Forest

EEC – Endangered Ecological Community

EP&A Act – NSW *Environmental Planning and Assessment Act 1979*

EPBC Act – Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

HSGF – Hinterland Sandstone Gully Forest

LBMWF – Lower Blue Mountains Wet Forest

OEH – NSW Office of Environment and Heritage (previously DECCW)

SEWPaC – Commonwealth Department of Sustainability, Environment, Water, Population and Communities (previously DEWHA)

SHSW – Southern Highland Shale Woodland

TSC Act – NSW *Threatened Species Conservation Act 1995*

1.3 Description of Study Area

The Study Area consists of Lot 22 DP 619150, located at 45 Noongah Street within the suburb of Bargo.

The Study Area is approximately 17.38 hectares, and includes a house, sheds, bushland and cleared paddocks. The Study Area is primarily flat.

Hornes Creek runs south to north through the centre of the property behind the existing house. Hornes Creek eventually flows into the Bargo River, approximately 3.8 kilometres to the north-west of the Study Area. Water was flowing in the creek at the time of the field survey. Riparian vegetation along Hornes Creek within the Study Area provides a wildlife corridor connecting bushland to the south and north of the property.

A small tributary of Hornes Creek is also located to the south-east corner of the property, and flows north-west into Hornes Creek. The tributary begins at Tylers Road near the Bargo Sports ground. Much of the riparian vegetation along this tributary has been removed.

Bushland occurs to the immediate south and west of the property. The bushland is part of an extensive vegetation corridor adjoining to the Bargo River (approximately 2 kilometres to the west) and the Bargo Conservation Area and Sydney Catchment Special Areas (approximately 4.3 kilometres to the south-west).

1.4 Objectives of this Assessment

The specific objectives of this assessment are to:

- Validate the existing vegetation mapping;
- Conduct a habitat based threatened species survey;
- Provide an assessment of the ecological value of the property;
- Provide a map showing constraint zones;
- Advise on impact assessment requirements and offsets should the site be subject to development.

2 METHODS

2.1 Review of Background Materials

A review of the South East NSW (SCIVI) mapping project (Tozer et al. 2010) was conducted for this assessment.

Threatened species with potential to occur within the Study Area were examined through searches of the following databases:

- NSW National Parks and Wildlife Service (NPWS) Atlas of NSW Wildlife; and
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) Protected Matters Search Tool.

2.2 Field Survey

A brief terrestrial ecology field survey was conducted on the 17th of April 2012.

The field survey involved a habitat-based threatened species assessment, and confirmation of the existing vegetation mapping. The condition of the vegetation was also assessed.

2.3 Likelihood of Occurrence Assessment for Threatened Species

A list of threatened species within the Locality (10 kilometre radius of the Study Area) was determined from database searches (NPWS Atlas of NSW Wildlife and SEWPAC Protected Matters Search Tool) (Section 3). The list of threatened species previously recorded within the Locality is then subjected to further consideration in light of the habitat types and condition recorded during the field survey. This further consideration narrows the database list to only those species which are considered likely to occur within the Study Area of who may be reliant on the resources and habitat features within the Study Area for at least part of its life cycle.

One of five categories for 'likelihood of occurrence' (Table 1) were assigned to each of the threatened species which may potentially occur within the Study Area after consideration of a number of criteria such as known records, presence or absence of important habitat features on the subject site, results of the field surveys and professional judgement. This process was completed on an individual species basis.

Table 1: Likelihood of Threatened Species Occurrence – Assessment Criteria

Likelihood rating	Threatened Flora/EEC Criteria	Threatened and Migratory Fauna Criteria
Known	The species was observed within the Study Area	The species was observed within the Study Area
High	It is likely that a species/EEC inhabits or utilises habitat within the Study Area	It is likely that a species inhabits or utilises habitat within the Study Area

Likelihood rating	Threatened Flora/EEC Criteria	Threatened and Migratory Fauna Criteria
Moderate	Potential habitat for a species/EEC occurs on the site. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the Study Area	Potential habitat for a species occurs on the site and the species may occasionally utilise that habitat. Species unlikely to be wholly dependent on the habitat present within the Study Area
Low	It is unlikely that the species/EEC inhabits the Study Area	It is unlikely that the species inhabits the Study Area. If present at the site the species would likely be a transient visitor. The site contains only very common habitat for this species which the species would not rely on for its ongoing local existence.
None	The habitat within the Study Area is unsuitable for the species/EEC	The habitat within the Study Area is unsuitable for the species

2.4 Habitat Condition Assessment

The three criteria used to define habitat condition are described as follows:

Good: The site is likely to contain vegetation with good structure, and contain a high number of indigenous species. Logs and litter layer are intact and undisturbed. Hollow bearing trees likely to be present, and nesting, feeding and roosting resources available. High richness and diversity of native fauna are likely to be present.

Moderate: The site is likely to contain a moderate number of indigenous species. Ground logs and litter moderately intact and undisturbed. There is a moderate availability of nesting, feeding and roosting habitat available. A moderate richness and diversity of native fauna is likely to be present.

Poor: The site is likely to contain a low number of indigenous species with poor community structure. Litter and log layer disturbed or modified. Low level of breeding, nesting and feeding resources available. Low richness and diversity of native fauna likely to be present.

2.5 Vegetation Condition Assessment

The three criteria used to define vegetation condition are described as follows:

Good: containing a high number of indigenous species; no weeds present or weed invasion restricted to edges and track margins; plant community contains original layers of vegetation; vegetation layers (ground, shrub, canopy etc.) are intact;

Moderate: containing a moderate number of indigenous species; moderate level of weed invasion; weeds occurring in isolated patches or scattered throughout; one or more of original layers of vegetation are modified; vegetation layers (ground, shrub, canopy etc.) are largely intact; and,

Poor: containing a low number of indigenous species; high level of weed invasion; weeds occurring in dense patches or scattered throughout; one or more of the original layers of vegetation are highly modified; one or more original vegetation layers (ground, shrub, canopy etc.) are modified or missing.

2.6 Limitations

The current survey involved a rapid assessment of the Study Area to validate existing vegetation mapping, search for threatened plant species, and determine the presence of potential habitat for threatened fauna. No fauna trapping was undertaken as it was not required for the project.

The day of the field survey was raining and therefore many fauna species were not active.

Some plant species are cryptic and can only be detected when flowering at certain times of the year and many fauna are difficult to detect without using specialised techniques. However, habitat assessments are an efficient method of assessing the likelihood of occurrence for threatened species as they do not require individual species to be surveyed for; only their habitat need be present on a site. Habitat assessments can be considered to be a more conservative method of assessment as a species is assumed to be present if its habitat is present.

3 RESULTS

3.1 Existing Vegetation Mapping

Three vegetation communities have been mapped occurring within the property as part of the South East NSW (SCIVI) mapping project (Tozer et al. 2010) (Figure 3, Table 2).

Descriptions for each of the vegetation communities along with adjacent communities are listed below. Two of the mapped vegetation communities are listed as an Endangered Ecological Communities (EEC):

- Cumberland Shale Sandstone Transition Forest (CSSTF) is equivalent to Shale Sandstone Transition Forest, which is listed as an EEC under the *NSW Threatened Species and Conservation Act* 1995 and *Environment Protection and Biodiversity Conservation Act* 1999;
- Southern Highlands Shale Woodland (SHSW) is equivalent to Southern Highland Shale Woodlands in the Sydney Basin Bioregion and listed as an EEC under the TSC Act.

Table 2: Previous Vegetation Mapping of Study Area

Vegetation Types	Approximate Area (ha)
Cumberland Shale Sandstone Transition Forest (CSSTF)	0.16
Southern Highlands Shale Woodland (SHSW)	0.53
Hinterland Sandstone Gully Forest (HSGF)	1.59
Not mapped	15.10
TOTAL	17.38

Table 3: Vegetation Community Descriptions.

Vegetation Community	Description[1]	Conservation Status[2]
South East NSW (SCIVI) mapping project (Tozer et al. 2006)		
Cumberland Shale Sandstone Transition Forest	Described by Tozer et al. (2010) as a eucalypt forest or woodland with a mixed understorey of sclerophyll shrubs and grasses. Dominant canopy species: *Eucalyptus crebra, Eucalyptus fibrosa, Allocasuarina littoralis* and *Eucalyptus punctata*. Dominant shrubs: *Persoonia linearis, Bursaria spinosa, Ozothamnus diosmifolius* and *Hibbertia aspera*. Groundcover: *Lepidosperma laterale, Cheilanthes sieberi, Aristida vagans, Pratia purpurascens, Microlaena stipoides, Entolasia stricta, Lomandra multiflora, Themeda australis, Panicum simile, Echinopogon caespitosus, Pomax umbellata, Dichondra spp., Billardiera scandens* and *Opercularia diphylla.* This plant community is equivalent to Shale Sandstone Transition Forest, an Endangered Ecological Community listed under both the TSC and EPBC Acts.	NSW: Endangered Commonwealth: Endangered
Southern Highlands Shale Woodland	A eucalypt open forest or woodland with a sparse shrub stratum and a dense groundcover dominated by grasses and herbs. Canopy: *Eucalyptus cypellocarpa, E. radiata, E. quadrangulata, E. globoidea*. Dominant shrubs: *Leucopogon lanceolatus, Ozothamnus diosmifolius, Persoonia linearis.* Groundcover*: Hardenbergia violacea, Lomandra longifolia, L. multiflora, Microlaena stipoides var. stipoides, Austrostipa rudis ssp nervosa, Dichondra spp., Gonocarpus tetragynus, Pteridium esculentum,* and *Opercularia diphylla.*	NSW: Endangered Commonwealth: Not listed

[1] Unless otherwise stated, information for the vegetation community descriptions have been taken from NPWS 2002, Tozer et al. 2010, or the NSW Department of Environment Climate Change and Water – threatened species website: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx

[2] NSW – *Threatened Species Conservation Act* 1995. Commonwealth – *Environment Protection and Biodiversity Conservation Act* 1999.

Vegetation Community	Description[1]	Conservation Status[2]
Sydney Hinterland Transition Woodland	Described by Tozer et al. (2010) as a eucalypt woodland with an open understorey of sclerophyll shrubs, sedges, forbs and grasses. Dominant trees: *Corymbia gummifera, Eucalyptus punctata, Angophora costata* and *Syncarpia glomulifera*. Shrubs: *Phyllanthus hirtellus, Persoonia linearis, Leptospermum trinervium, Acacia ulicifolia, Persoonia levis, Acacia linifolia, Banksia spinulosa* and *Pimelea linifolia.* Groundcover: *Entolasia stricta, Lomandra obliqua, Pomax umbellata, Themeda australis, Lomandra multiflora, Lepidosperma laterale, Dianella revoluta, Austrostipa pubescens* and *Goodenia hederacea*. This vegetation shares similar characteristic and diagnostic species with Shale Sandstone Transition Forest. Vegetation assessed during the survey consisted of species that resembled that of SHTW.	NSW: Not listed Commonwealth: Not listed
Lower Blue Mountains Wet Forest	A tall eucalypt forest with a moist open understorey of shrubs, climbers and ferns. This unit is widely distributed in the sheltered sandstone slopes and gullies of the Greater Blue Mountains, with localised occurrences in tributaries of the Hawkesbury River north of Sydney and the upper Georges River. Dominant trees: *Syncarpia glomulifera, Angophora costata, Acacia elata, Eucalyptus deanei,* and *Allocasuarina torulosa.* Shrubs: *Elaeocarpus reticulatus, Leucopogon lanceolatus, Persoonia linearis.* Groundcover: *Lomandra longifolia, Calochlaena dubia, Blechnum cartilagineum, Dianella caerulea, Pteridium esculentum, Viola hederacea, Lepidosperma laterale*.	NSW: Not listed Commonwealth: Not listed
Unclassified	Vegetation not previously mapped	NSW: - Commonwealth: -

3.2 Vegetation Mapping Validation

Based on the current survey, discrepancies in the existing vegetation mapping were found. Boundaries of the vegetation polygons in the Tozer et al. (2010) needed to be extended to included vegetation previously not mapped within the property boundary. Vegetation communities identified in Table 3 were observed as intergrades occurring within the Study Area.

The results of the current vegetation survey are illustrated in Figure 3b.

Approximate vegetation area calculations have been provided in Table 4.

Two EECS were recorded within the property.

Table 4. Current Vegetation Mapping of the Study Area

Vegetation Types	Approximate Area (ha)
Cumberland Shale Sandstone Transition Forest (CSSTF)	2.51
Southern Highlands Shale Woodland (SHSW) intergrade with Hinterland Sandstone Gully Forest (HSGF)	2.16
Hinterland Sandstone Gully Forest (HSGF) intergrade with Lower Blue Mountains Wet Forest (LBMWF)	0.93
Cleared	11.78
TOTAL	17.38

Vegetation along Hornes Creek consisted of intergrades of SHSW with HSGF to the north, and HSGF with LBMF to the south. The abundance of *Eucalyptus piperita* along the creekline marked the change in community from SHSW to HSGF.

The condition of vegetation along Hornes Creek ranged from Low to Moderate depending on historic clearing and the abundance of weed species such as *Ligustrum sinense, Ageratina adenophora, Setaria gracilis,* and *Sida rhombifolia*.

The north and north-west boundary included scattered *Eucalyptus punctata* and *Eucalyptus racemosa* with *Eucalyptus fibrosa* present towards the south-west corner. The shrub layer along the boundary was predominantly cleared, with the occasional *Allocasuarina littoralis,* and *Acacia parramattensis*. It is likely that these areas are aligned to SSTF.

The open paddocks and areas immediately around the driveway and house had been subject to prior clearing and/or agriculture. As such, vegetation consisted predominantly of exotic pasture grasses and contained no regeneration of native trees.

3.3 Threatened Flora Species

A total of seventeen threatened flora have previously been recorded or have potential habitat within a 10 km radius of the Study Area (Figure 4 and Table 6).

Table 5 identifying the habitat requirements for each of the species listed, has been provided in the Appendix.

Based on the likelihood of occurrence, five species have been given a moderate likelihood of occurrence rating within the property. These species include: *Grevillea parviflora subsp. parviflora, Persoonia bargoensis, Persoonia hirsuta, Persoonia glaucescens,* and *Epacris purpurascens var. purpurascens*.

Habitat for these species is along the riparian vegetation of Hornes Creek, or along the patches of vegetation to the west and south-west of the Study Area boundary.

Despite the potential for these species to be present within the Study Area, the species are relatively conspicuous and were not recorded during the current survey.

3.4 Threatened Fauna Species

A total of thirty-nine threatened fauna species have previously been recorded or have potential habitat within a 10 km radius of the Study Area (Table 7 and Figure 5). Table 7, identifying the habitat requirements for each of the species listed, has been provided in the Appendix.

Based on an assessment of the likelihood of occurrence, twenty species have been given a moderate to high likelihood of occurrence rating within the Study Area. These species include:

- Birds: Bush Stone-curlew, Gang-gang Cockatoo, Glossy Black Cockatoo, Brown Treecreeper (Eastern sub species), Varied Sittella, Little Lorikeet, Hooded Robin, Black-chinned Honeyeater, Turquoise Parrot, Barking Owl, Powerful Owl, Scarlet Robin, Diamond Firetail and Regent Honeyeater.
- Amphibians: Giant Burrowing Frog, Green and Golden Bell Frog and Littlejohn's Tree Frog.
- Mammals: Eastern False Pipistrelle, Eastern Freetail-bat and Koala

It should be noted that many of these species, in particular the bird species, may use the Study Area for foraging only.

No threatened fauna species were detected during the current survey.

3.5 Habitat Features

Fauna habitat types have been classified into several general categories depending on the vegetation type and general features present. Habitat in the Study Area can be classified as either:

- Scattered woodland;
- Riparian vegetation;
- Cleared land;
- Microhabitat features.

Scattered Woodland

Scattered woodland occurs mainly along the boundaries of the property and adjoins adjacent bushland on neighbouring properties.

For the most part, the shrub layer has previously been cleared, leaving scattered native eucalypts and a combination of native and exotic grasses as ground cover. As a result, native fauna are more likely to utilise the neighbouring bushland to the west for habitat, but still may use the Study Area for foraging.

Native fauna that would typically use the woodland habitat include:

- Forest-dependent fauna, such as arboreal and semi-arboreal mammals, birds and reptiles.
- Mobile forest-dependent birds such as parrots, honeyeaters, and cuckoos.
- Diurnal and nocturnal birds that would use the woodland for foraging.

Creeklines and Riparian Vegetation

Hornes Creek and a small tributary of Hornes Creek occur in the Study Area. Riparian vegetation exists along Hornes Creek, however the smaller tributary to the east of the Study Area has been previously cleared.

Both creeks were flowing at the time of the survey.

Native fauna are more likely to utilise Hornes Creek rather than the smaller tributary in the Study Area, due to the occurrence of riparian vegetation.

Native fauna utilising riparian vegetation include:

- Resident fauna such as arboreal and semi-arboreal mammals, birds and reptiles;
- Semi-aquatic fauna that shelter, forage or breed in areas associated with water, such as frogs and turtles; and,
- Diurnal birds.

Cleared habitat

Cleared habitat occurs in the open paddocks and areas around the dwellings and sheds. The cleared land within the Study Area provides little habitat value for fauna other than for common native and introduced avian species and introduced mammal species.

Micro habitat features

Other habitat features that are exist across the Study Area include micro habitat features such as:

- Hollow bearing trees;
- Mature trees;
- Woody debris;
- Leaf debris; and,

- Exfoliating bark.

3.6 Current Disturbances

The following disturbances were observed on within the Study Area:

- High abundance of weed species, in particular *Ligustrum sinense* along Hornes Creek and within the paddocks;
- Horses;
- Erosion along the banks of Hornes Creek.

4 CONSTRAINTS & OPPORTUNITIES

Constraints and opportunities have been identified in Figure 6. Figure 6 depicts zones of High, or Low/nil ecological constraint.

High ecological constraints are those that contain ecological values where development should be avoided, where possible. High constraints include the following:

- EECs such as vegetation mapped as SSTF and Southern Highlands Shale Woodland;
- Hornes Creek and the vegetation along it;
- Hornes Creek tributary.

An impact assessment would be required should the proposed development impact on any of these high constraints. Depending on the type and level of impact on the areas of high constraint, the assessment process may include the following:

- Impact assessments under the TSC Act and EPBC Act;
- Targeted threatened fauna and flora surveys following OEH threatened species survey guidelines, particularly for amphibians should development impact on Hornes Creek;
- Depending on the results from the impact assessment a Species Impact Statement (SIS) and/or a Referral may be required should any impacts be deemed as having a 'significant impact' to any vegetation community or threatened species;
- An appropriate offset using the BioBanking Methodology may be required should EECs or riparian vegetation be impacted;
- Consultation with OEH, Wollondilly Council and Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC).

Low ecological constraints are those that have minimal ecological value. Areas include: paddocks, cleared areas around the existing sheds, houses and driveway. Utilising areas of low ecological constraint will highly likely minimise the need for an SIS and/or Referral, offsetting and comprehensive consultation with determining authorities. It should be noted that depending on the type of development and location to Hornes Creek, a biodiversity management plan may be required given the EECs and Creeklines present on the property.

In summary, the percentage estimate of High constraints compared to that of Low/nil constraints is shown in Table 5.

Table 5. Percentage of High Constraints to Low Constraints in Study Area

Zone	Approximate Area (ha)	Percentage of Study Area
High	5.74	33%
Low/Nil	11.64	67%
TOTAL	17.38	100%

5 CONCLUSION

The current project has identified areas of ecological constraint, and conducted a rapid vegetation mapping validation and habitat based threatened flora and fauna searches.
In summary, the assessment concluded the following:

- Some discrepancies with the SCIVI (Tozer et al. 2010) vegetation mapping were observed;
- Two EECs were recorded within the Study Area;
- Vegetation across the Study Area was in Poor to Moderate condition, with the dominant weed consisting of *Ligustrum sinense*;
- Six threatened flora species have a moderate likelihood of occurrence within the Study Area. No threatened flora species were recorded during the current study;
- Twenty threatened fauna species have a moderate to high likelihood of occurrence rating within the Study Area. Most of the species have habitat in the riparian vegetation along Hornes Creek. Most of the threatened fauna species with potential habitat are likely to only use the Study Area for foraging, given the better condition vegetation within adjacent properties. No threatened fauna species were detected during the current survey.
- Disturbance was evident in the Study Area, and included: vegetation clearing, weeds, horses and erosion.
- High ecological constraints included: EECs, riparian vegetation, Hornes creek and its smaller tributary,

REFERENCES

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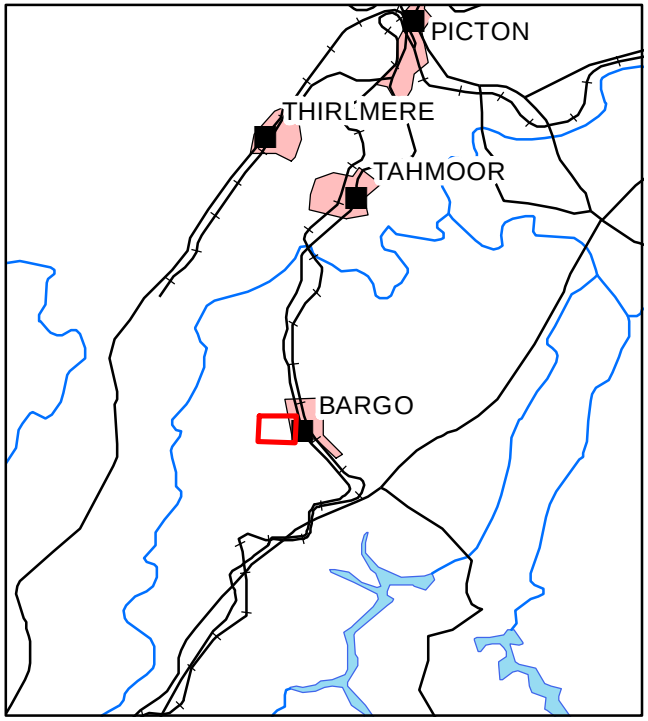
FIGURES



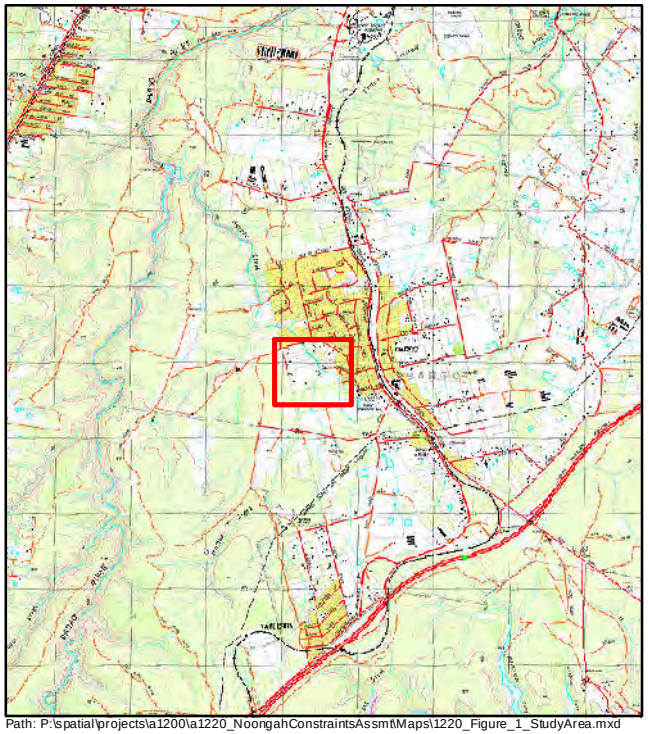


Figure 1: Location Map

1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 20/04/2012

Study Area

N
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Metres

0 250 500 750 1,000

niche Environment and Heritage

Horizontal Datum:
GDA 1994 MGA Zone 56

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Figure 2: Site Map

1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 20/04/2012

Subject Site

N
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Metres

0 100 200

niche Environment and Heritage

Horizontal Datum:
GDA 1994 MGA Zone 56

Imagery:
(c) 2010 Microsoft Corporation
and its data suppliers

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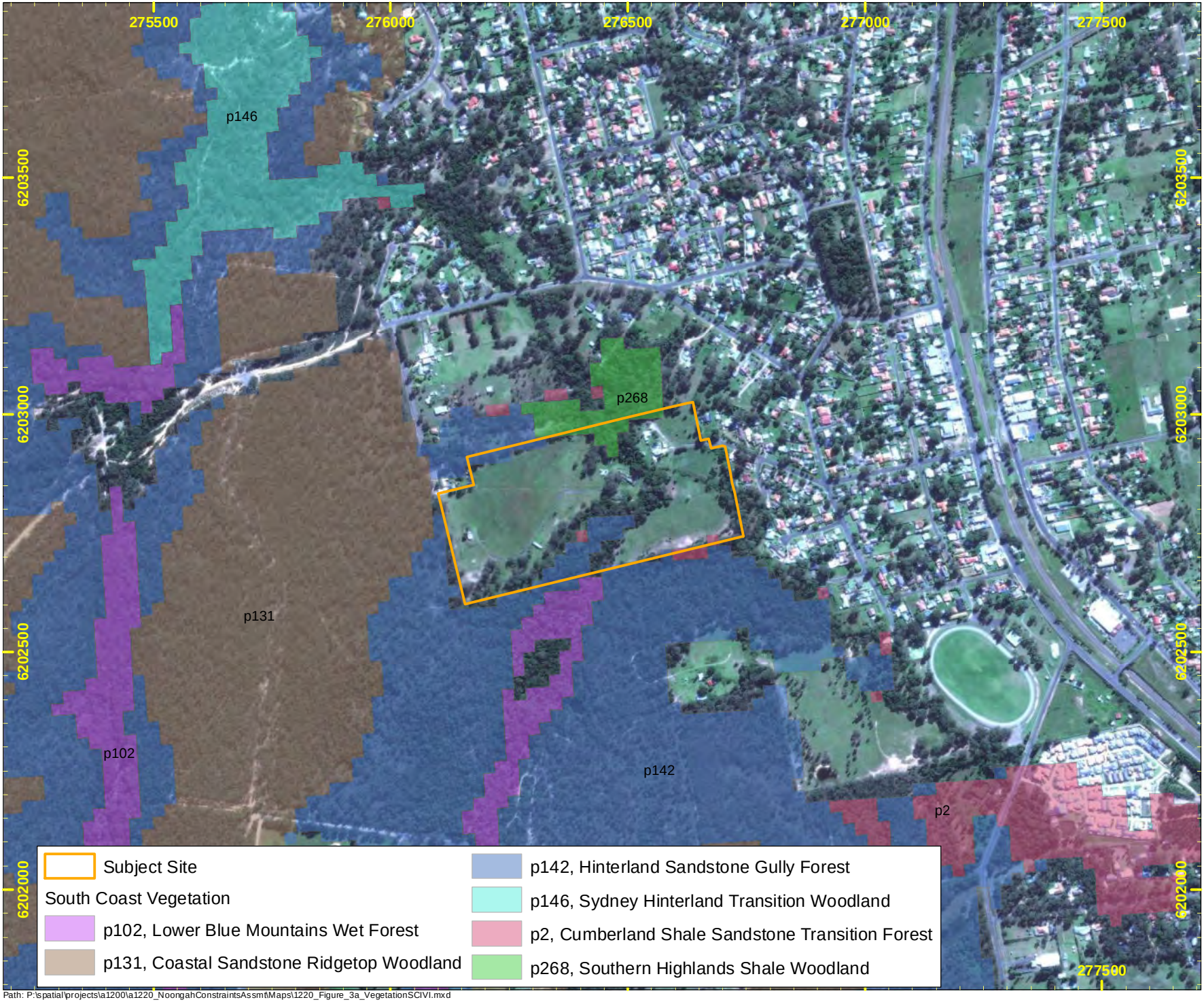

Figure 3a: Vegetation (SCIVI - published)

1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 20/04/2012

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Horizontal Datum:
GDA 1994 MGA Zone 56

Imagery:
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Figure 3b: Updated Vegetation Mapping

1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 26/04/2012

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Horizontal Datum:
GDA 1994 MGA Zone 56

Imagery:
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and its data suppliers

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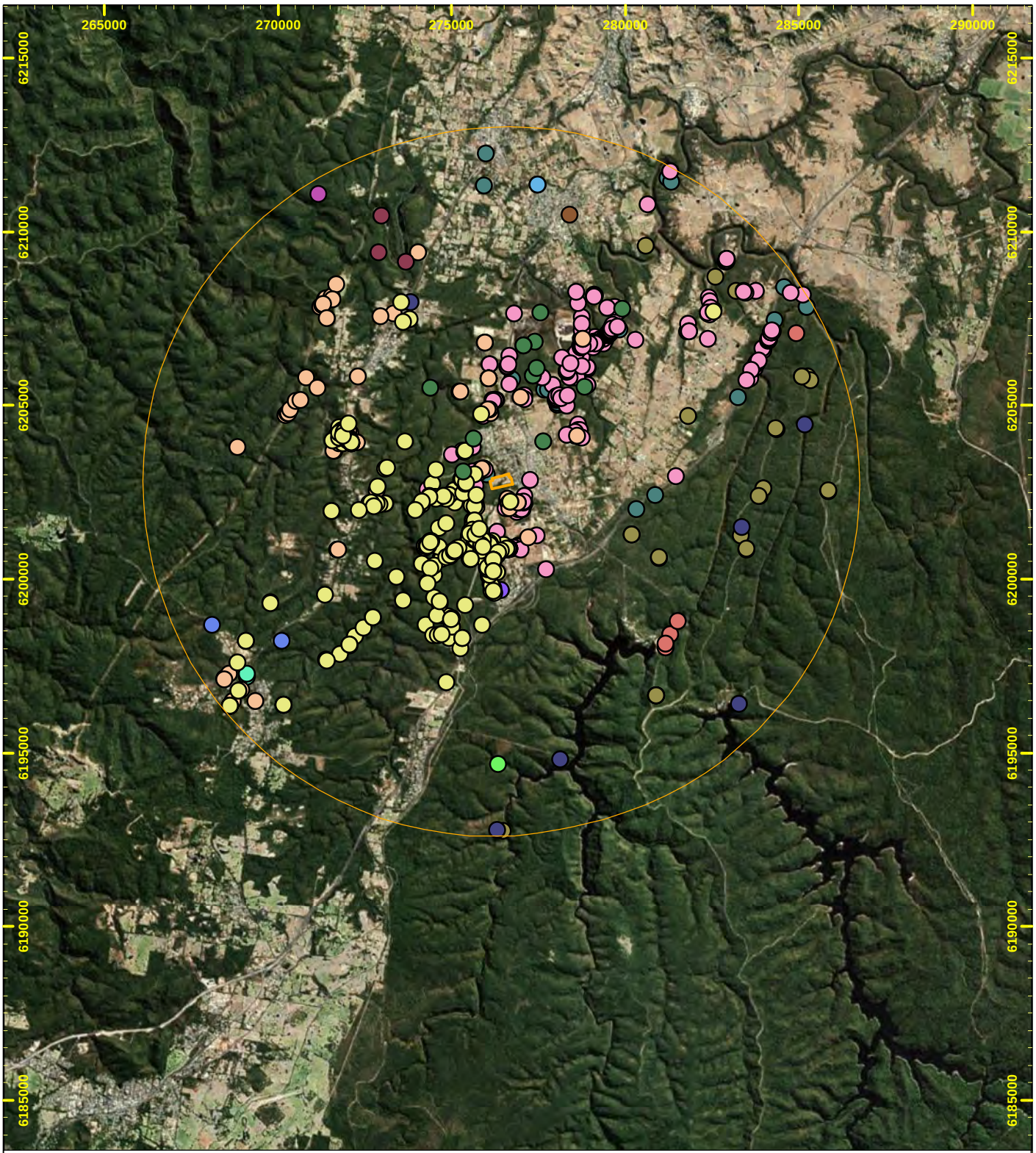

Figure 4: Threatened flora previously found within 10 km of the Subject Site
1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 20/04/2012

N
W
E
S

km
0 1 2 3 4 5

Imagery: (c) 2010 Microsoft and its data suppliers

Horizontal Datum: GDA 1994 MGA Zone 56

niche Environment and Heritage

Path: P:\spatial\projects\a1200\a1220_NoongahConstraintsAssmt\Maps\1220_Figure_4_ThreatFlora.mxd

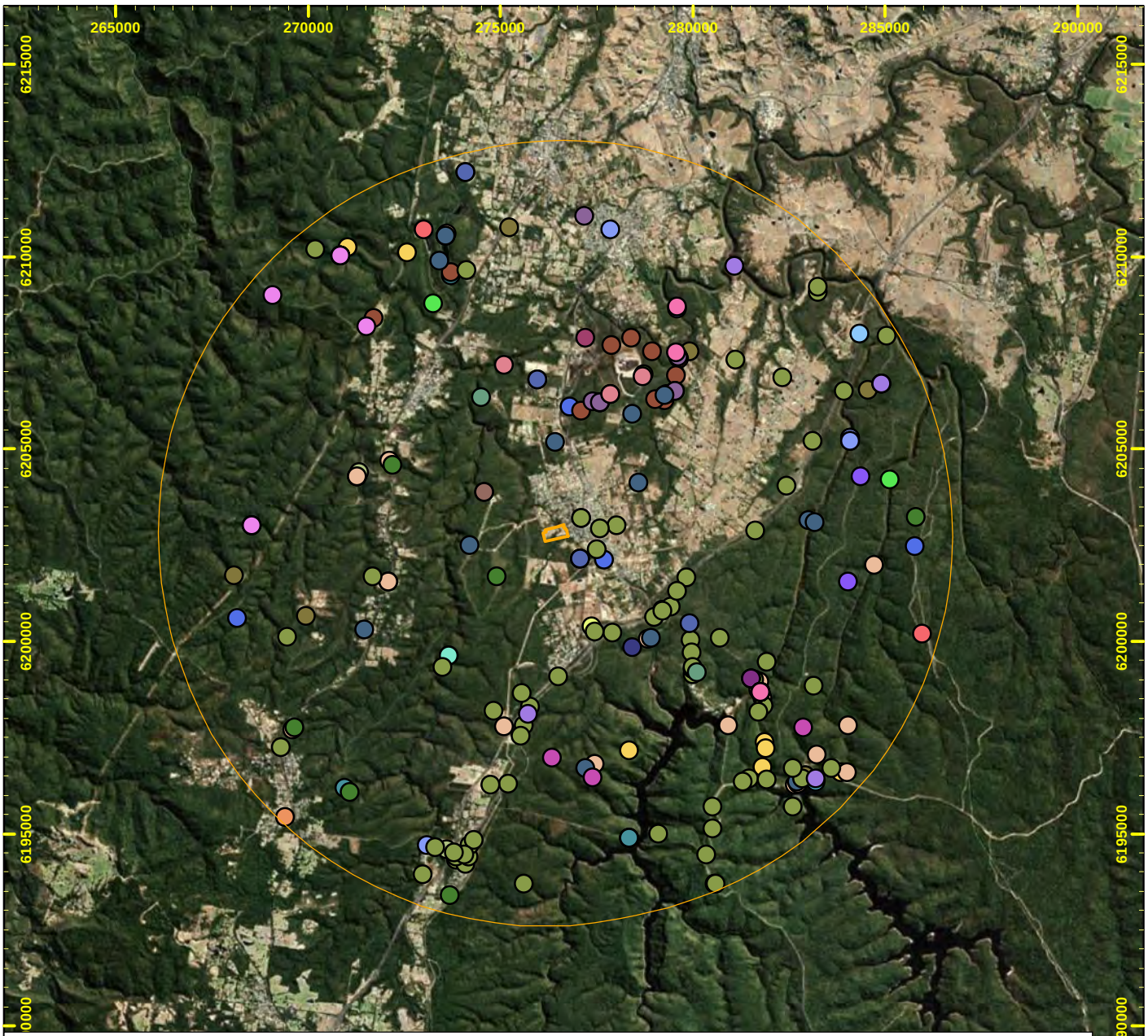

Figure 5: Threatened fauna previously found within 10 km of the Subject Site
1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 20/04/2012

N
W
E
S

km
0 1 2 3 4 5

Imagery: (c) 2010 Microsoft and its data suppliers

Horizontal Datum: GDA 1994 MGA Zone 56

niche Environment and Heritage

Path: P:\spatial\projects\a1200\a1220_NoongahConstraintsAssmt\Maps\1220_Figure_5_ThreatFauna.mxd

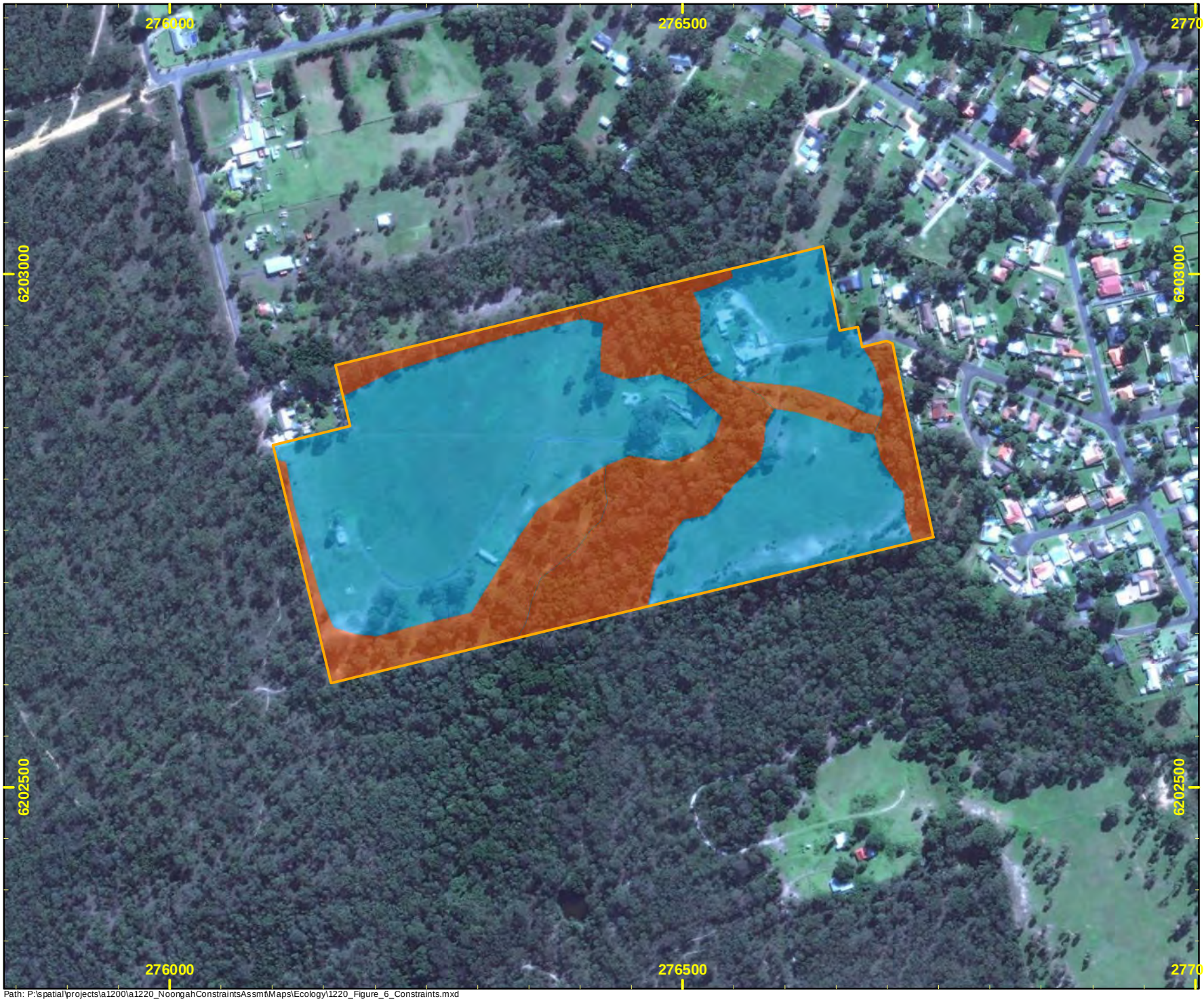

Figure 6: Constraints

1220 Noongah Street Constraints Assessment

Drawn by: RJ

Project Mgr: LB

Date: 26/04/2012

Subject Site

Vegetation Constraints

High

Low

N

W E

S

Metres

0 50 100 150 200

niche Environment and Heritage

Horizontal Datum:
GDA 1994 MGA Zone 56

Imagery:
(c) 2010 Microsoft Corporation
and its data suppliers

Path: P:\spatial\projects\a1200\a1220_NoongahConstraintsAssmt\Maps\Ecology\1220_Figure_6_Constraints.mxd

APPENDICIES

Appendix A: Threatened Flora Tables

Table 6. Threatened Flora Likelihood Table

Threatened Flora	Habitat Requirements[3]	Conservation Status	Likelihood of Occurrence
Acacia bynoeana Bynoe's Wattle	*A. bynoeana* occurs mainly in heath and dry sclerophyll forest (Morrison & Davies 1991). The substrate is typically sand and sandy clay, often with ironstone gravels and is usually very infertile and well-drained. The species seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds.	NSW: Vulnerable Commonwealth: Vulnerable	Low
Cynanchum elegans White-flowered Wax Plant	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar. ROTAP: 3ECi	NSW: Endangered Commonwealth: Endangered	Low
Darwinia peduncularis	Occurs as local disjunct populations in coastal NSW with a couple of isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone.	NSW: Vulnerable Commonwealth: Not listed	Low
Epacris purpurascens var. purpurascens	Found in a range of habitat types, most of which have a strong shale soil influence. Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Genoplesium baueri	Grows in sparse sclerophyll forest and moss gardens over sandstone. The species has been recorded from locations between Ulladulla and Port Stephens.	NSW: Vulnerable Commonwealth: Not listed	Low
Grevillea parviflora Small-flower Grevillea	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Often occurs in open, slightly disturbed sites such as along tracks. Sporadically distributed throughout the Sydney Basin with the main occurrence centred on Picton, Appin and Bargo (and possibly further south to the Moss Vale area).	NSW: Vulnerable Commonwealth: Vulnerable	Moderate

[3] Unless otherwise stated, information for the threatened species habitat requirements have been sourced from the NSW Department of Environment Climate Change and Water – threatened species website: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx

Threatened Flora	Habitat Requirements[3]	Conservation Status	Likelihood of Occurrence
Leucopogon exolasius Woronora Beard-heath	Grows in woodland on sandstone. Restricted to the Woronora and Grose Rivers and Stokes Creek, Royal National Park.	NSW: Vulnerable Commonwealth: Vulnerable	Low.
Melaleuca deanei Dean's Melaleuca	The species grows in heath on sandstone. Occurs in two distinct areas, in the Ku-ring-gai / Berowra and Holsworthy / Wedderburn areas respectively	NSW: Vulnerable Commonwealth: Vulnerable.	Low.
Persicaria elatior Tall Knotweed	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	NSW: Vulnerable Commonwealth: Vulnerable	Low.
Persoonia acerosa Needle Geebung	Occurs in dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils. Recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Mainly in the Katoomba, Wentworth Falls, Springwood area.	NSW: Vulnerable Commonwealth: Vulnerable	Low.
Persoonia bargoensis	The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravely soils.	NSW: Endangered Commonwealth: Vulnerable	Moderate
Persoonia glaucescens Mittagong Geebung	The Mittagong Geebung grows in woodland to dry sclerophyll forest on clayey and gravely laterite. The preferred topography is ridge-tops, plateaux and upper slopes. Aspect does not appear to be a significant factor.	NSW: Endangered Commonwealth: Vulnerable	Moderate.
Persoonia hirsuta Hairy Geebung	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	NSW: Endangered Commonwealth: Endangered	Moderate.
Persoonia nutans	NSW NPWS (1996) found that *P. nutans* grows in Castlereagh Scribbly Gum Woodlands and in Agnes Banks Woodland (classified by Benson 1992). More recent mapping of the vegetation of Western Sydney indicates that *P. nutans* also occurs on Shale/Gravel Transition Forest and Cooks River Castlereagh Ironbark Forest (NSW NPWS 2002).	NSW: Endangered Commonwealth: Endangered	Low.
Pomaderris brunnea Brown Pomaderris	The species has been found in association with *Eucalyptus amplifolia*, *Angophora floribunda, Acacia parramattensis, Bursaria spinosa* and *Kunzea ambigua*. Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England tablelands and in far eastern Gippsland in Victoria.	NSW: Vulnerable Commonwealth: Vulnerable	Low.

Threatened Flora	Habitat Requirements[3]	Conservation Status	Likelihood of Occurrence
Pterostylis saxicola Sydney Plains Greenhood	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	NSW: Endangered Commonwealth: Endangered	Low.
Rulingia prostrata	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: Snow Gum (*Eucalyptus pauciflora*) Woodland at Rose Lagoon; Blue leaved Stringybark (*E. agglomerata*) Open Forest at Tallong; and in Brittle Gum (*E. mannifera*) Low Open Woodland at Penrose; Scribbly Gum (*Eucalyptus haemastoma)/* Swamp Mahogany (*E. robusta*) Ecotonal Forest at Tomago.	NSW: Endangered Commonwealth: Endangered	Low.

Appendix B: Threatened Fauna Tables

Table 7. Threatened Fauna Likelihood Table

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
Birds			
Burhinus grallarius Bush Stone-curlew	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however, and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Callocephalon fimbriatum Gang-gang Cockatoo	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands and is often found in urban areas.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Calyptorhynchus lathami Glossy Black Cockatoo	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur.	NSW: Vulnerable Commonwealth: Endangered only in South Australia Population	Moderate
Climacteris picumnus victoriae Brown Treecreeper (Eastern sub species)	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range. Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. Usually not found in woodlands with a dense shrub layer. Fallen timber is an important habitat component for foraging. Also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Daphoenositta chrysoptera Varied Sittella	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked	NSW: Vulnerable Commonwealth: Vulnerable	Moderate

[4] Unless otherwise stated information for the threatened species habitat requirements have been taken from the NSW Department of Environment Climate Change and Water – threatened species website: http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
	species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years (ref: http://www.environment.nsw.gov.au/determinations/variedsittellapd.htm		
Glossopsitta pusilla Little Lorikeet	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Hieraaetus morphnoides Little Eagle	Occupies open eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	NSW: Vulnerable Commonwealth: Not listed	Low
Lathamus discolor Swift Parrot	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.	NSW: Endangered Commonwealth: Endangered	Low
Lophoictinia isura Square Tailed Kite	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	NSW: Vulnerable Commonwealth: Not listed	Low
Melanodryas cucullata cucullata Hooded Robin	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Melithreptus gularis gularis Black-chinned Honeyeater	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks and tea-trees.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Neophema pulchella Turquoise Parrot	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	NSW: Vulnerable Commonwealth: Not listed	High

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
Ninox connivens Barking Owl	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country (Pizzey, 1997).	NSW: Vulnerable Commonwealth: Not listed	Moderate
Ninox strenua Powerful Owl	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Balart *Exocarpus cupressiformis* and a number of eucalypt species.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Petroica boodang Scarlet Robin	The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is found up to 1000 metres in altitude. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Pyrrholaemus saggitatu Speckled Warbler	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	NSW: Vulnerable Commonwealth: Not listed	Low
Stagonopleura guttata Diamond Firetail	Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Sterna fuscata Sooty Tern	Flocks can be seen soaring, skimming and dipping but seldom plunging in off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk	NSW: Vulnerable Commonwealth:	Low

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
	Islands.	Not listed	
Tyto novaehollandiae Masked Owl	Pairs have a large home-range of 500 to 1000 hectares. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	NSW: Vulnerable Commonwealth: Not listed	Low
Tyto tenebricosa Sooty Owl	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*). Nests in very large tree-hollows.	NSW: Vulnerable Commonwealth: Not listed	Low
Xanthomyza phrygia Regent Honeyeater	A semi-nomadic species occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests (NPWS, 1999)(Pizzey, 1997).	NSW: Endangered Commonwealth: Endangered, Migratory	Moderate
Amphibians			
Heleioporus australiacus Giant Burrowing Frog	Breeding habitat of this species is generally soaks or pools within first or second order streams. They are also commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	NSW: Vulnerable Commonwealth: Vulnerable	Low - Moderate
Litoria aurea Green and Golden Bell Frog	Inhabits marshes, dams, ponds and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and have diurnal sheltering sites available.	NSW: Endangered Commonwealth: Vulnerable	Low - Moderate
Littlejohn's Tree Frog *Litoria littlejohni*	Occurs in wet and dry sclerophyll forests associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range (Barker et al, 1995). Uses a range of riparian habitats including rocky flowing streams, temporary and permanent dams and upland swamps Lemckert 2004). Forages both in the tree canopy and on the ground, and has been observed sheltering under rocks on high exposed ridges during summer. It is not known from coastal habitats.	NSW: Vulnerable Commonwealth: Vulnerable	Low - Moderate
Mixophyes balbus Stuttering Frog	This species is usually associated with mountain streams, wet mountain forests and rainforests (Barker et al, 1995). Individuals, particularly females, can move hundreds of metres from breeding sites to undertake foraging. Eggs are deposited in nests in shallow riffle zones within streams, either within sandy/gravel or leafy substrates (Anstis 2002)..	NSW: Endangered Commonwealth: Vulnerable	Low
Pseudophryne	Red-crowned Toadlets are quite a localised species that appear to be	NSW:	Low

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
australis Red-crowned Toadlet	largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges (sandstone crevices and rock piles) near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones.	Vulnerable Commonwealth: Not listed	
Reptiles			
Hoplocephalus bungaroides Broad-headed Snake	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. May move from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer, depending if temperatures become very high.	NSW: Endangered Commonwealth: Vulnerable	Low
Varanus rosenbergi Rosenberg's Goanna	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component.	NSW: Vulnerable Commonwealth: Not listed	Low
Invertebrates			
Meridolum corneovirens Cumberland Plain Land Snail	Lives in a very small area on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. Primarily inhabits Cumberland Plain Woodland. This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	NSW: Endangered Commonwealth: Not listed	Low
Mammals			
Bettongia penicillata penicillata Brush-tailed Bettong (south-east mainland)	The Brush-tailed Bettong (south-east mainland) was associated with grassland, heath and sclerophyll woodland (AMMSG 1996). Other accounts record the subspecies from open eucalypt forest with low woody scrub, tussock grass and occasional bare patches (Flannery 1990). The Brush-tailed Bettong (south-east mainland) was described as common in South Australia at the end of the nineteenth century and was gone by 1923. The subspecies has not been recorded in Australia since that time (AMMSG 1996).	NSW: Not listed Commonwealth: Extinct	Low
Cercartetus nanus Eastern Pygmy-possum	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest (Turner, 1995). Because of its small size it is able to utilise a range of hollow sizes including very small hollows (Gibbons, 1997). Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5 month period (Turner, 1990).	NSW: Vulnerable Commonwealth: Not listed	Low

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
Chalinolobus dwyer Large-eared Pied Bat	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.	NSW: Vulnerable Commonwealth: Vulnerable	Low
Dasyurus maculatus Spotted-tailed Quoll	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.	NSW: Vulnerable Commonwealth: Endangered	Low
Falsistrellus tasmaniensis Eastern False Pipistrelle	Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Miniopterus schreibersii oceanensis Eastern Bentwing-bat	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	NSW: Vulnerable Commonwealth: Not listed	Low
Mormopterus norfolkensis Eastern Freetail-bat	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures.	NSW: Vulnerable Commonwealth: Not listed	Moderate
Petaurus australis Yellow-bellied Glider	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	NSW: Vulnerable Commonwealth: Not listed	Low
Petaurus norfolcensis Squirrel Glider	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	NSW: Vulnerable Commonwealth: Not listed	Low
Petrogale penicillata Brush-tailed Rock-wallaby	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north.	NSW: Endangered Commonwealth: Vulnerable	None
Phascolarctos cinereus Koala	Inhabit eucalypt woodlands and forests.	NSW: Vulnerable Commonwealth: Not listed	Moderate

Threatened Fauna	Description[4]	Conservation Status	Likelihood of Occurrence
Pteropus poliocephalus Grey-headed Flying-fox	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost (Tidemann 1995) although some individuals may travel up to 70 km (Augee 1999).	NSW: Vulnerable Commonwealth: Vulnerable	Low
Scoteanax rueppellii Greater Broad-nosed Bat	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings.	NSW: Vulnerable Commonwealth: Not listed	Low