Falls Creek / Woollamia Deferred Rural Residential Areas

Strategic Environmental Constraints Report




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CONTENTS

Figures:

Tables:

1 AIMS

To identify opportunities and constraints to the future development of the study areas for a higher subdivision density than is currently allowable under existing controls via analysis of existing desktop information and field survey data.

1.1 Objective

Constraints are mapped to indicate the level of further investigation and assessment which would be required to facilitate a rezoning outcome of additional rural residential subdivision.

2 GENERAL DESCRIPTION OF THE STUDY AREAS

The study areas are situated approximately 12 kilometres from the Nowra urban area and 5 kilometres west of Huskisson. They are indicated in red on Figure 1 below.

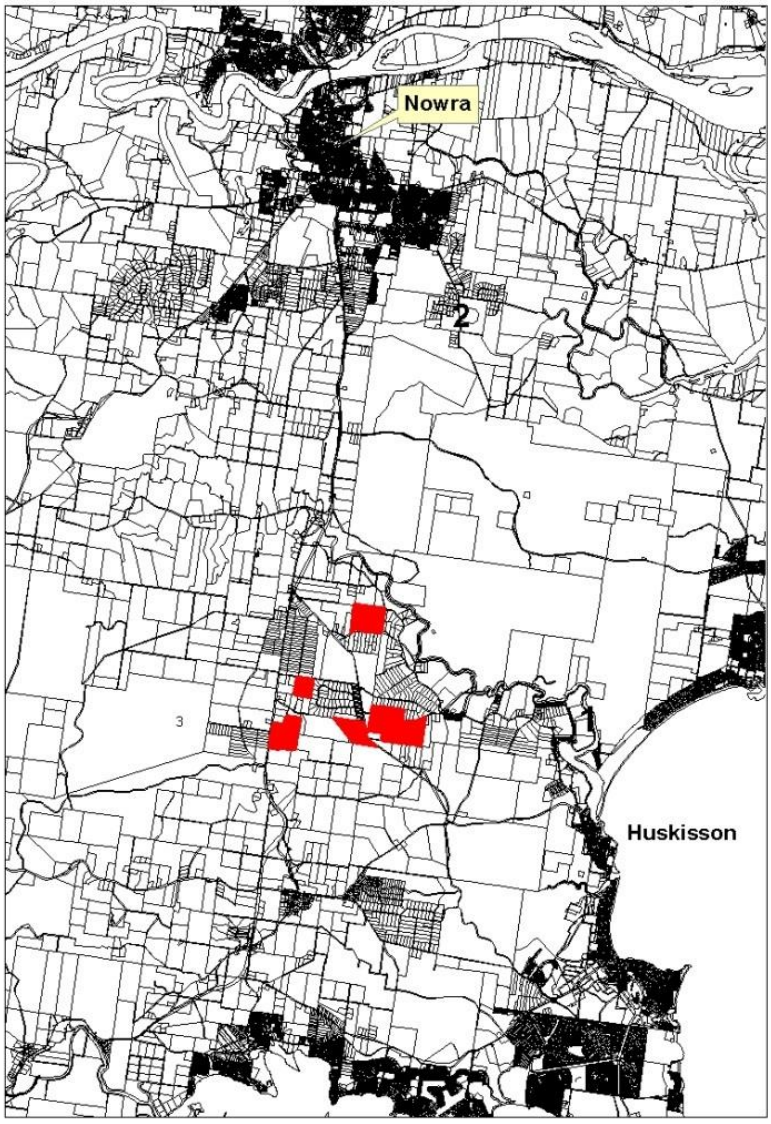


Figure 1 - Location of the study area

The study areas have been divided into 5 study areas as indicated in Figure 2, below and comprise:

1. Nineteen lots (approximately 100 Ha) along Seasongood Road (Area 1)
2. Eight Lots (approximately 50 Ha) on Woollamia Road (Area 2)
3. Seven lots (approximately 50 ha) on Barron and Pepper Roads bordering the Princes Highway (Area 3)
4. One block (approximately 20 hectare) on Mortimer Road (Area 4)
5. Two lots (approximately 35 Ha) on Jervis Bay Road (off Gorindah Road) (Area 5)

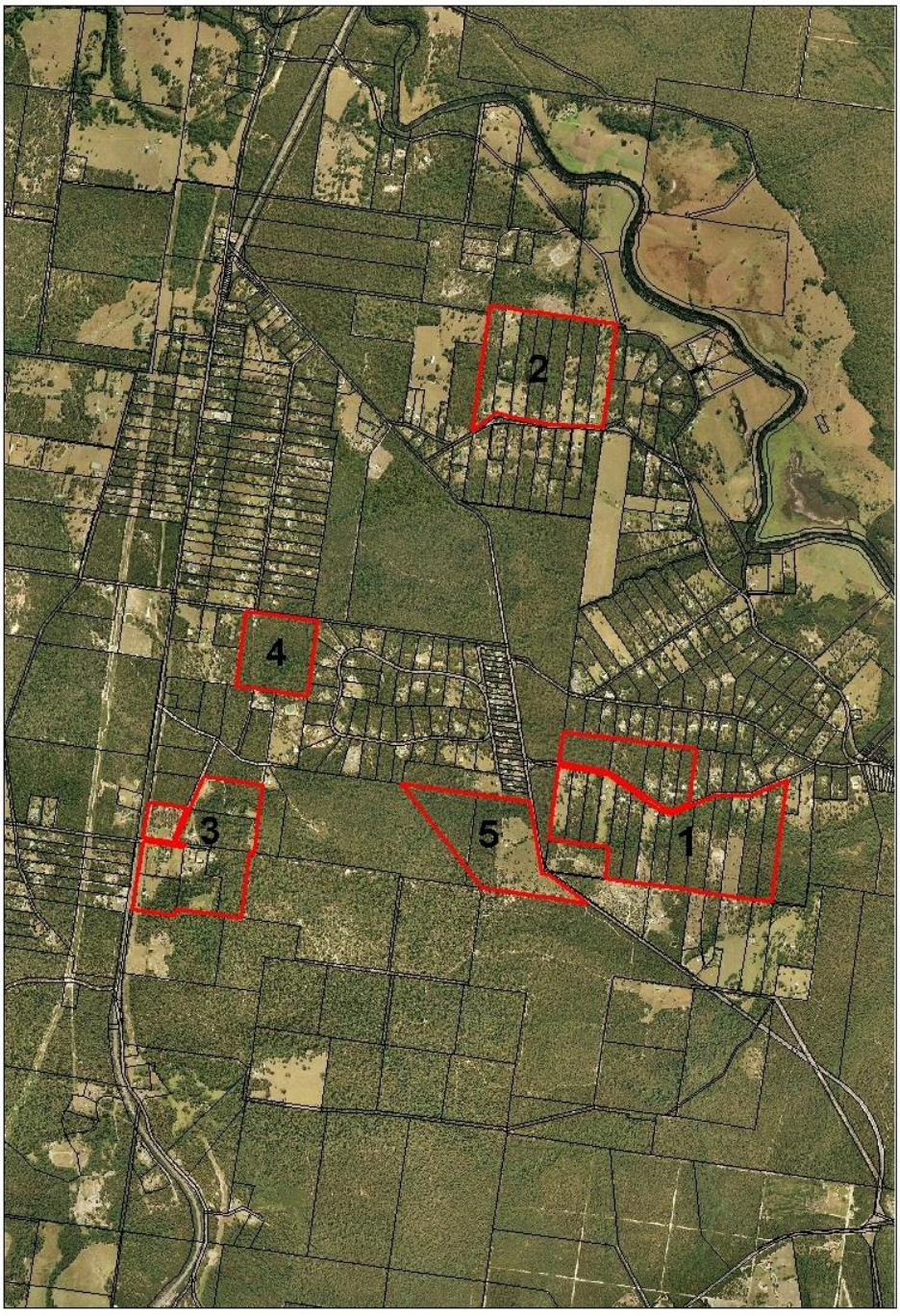


Figure 2 – StudyAreas

3 METHODOLOGY – information gathered from field survey

Desktop review of Council's existing environmental data (SCC GIS Database) and to describe the environments of the study area lands and determine the likely ecological opportunities and constraints associated with each of the sites.

The components of the assessment are described below.

3.1 Desktop review

Search of the BioNet Atlas of NSW Wildlife and review of Council's environmental data (SCC GIS Database) was undertaken to identify known records of threatened species within 5km of the study area. This information can be used to predict likelihood of occurrence if suitable habitats are detected via field surveys.

3.2 Field survey and site assessment:

Site visits were carried out during January and early February 2014. No specialised or nocturnal surveys were undertaken. Photographs and GPS data were taken across survey locations.

The surveys involved walked transects across the lands to record the following information:

- General flora and fauna observations
- Vegetation descriptions(including dominant canopy, shrub and ground cover species and structural composition)
- Vegetation condition assessment
- Topography
- Soil type
- Presence of threatened flora or fauna habitats such as hollow-bearing trees, nests, hollow logs, aquatic habitats)
- Indirect evidence of fauna species (e.g. diggings, scratches, feed scars, burrows, nests)
- Extent of riparian systems.

Examples of the detailed survey data sheets are provided as Appendix 1.

3.2.1 Vegetation Mapping

Previous vegetation mapping for the sites was reviewed and included the mapping prepared by Mills *et al* (1996). These maps were ground-verified during the surveys and further details on the dominant species within each community recorded.

3.2.2 Endangered Ecological Communities

The field site assessment included a search for endangered ecological communities (EEC) listed under the NSW TSC Act and Federal EPBC Act. Where a vegetation community contained a range of the key species from an EEC and had the correct structural composition it was mapped as '*likely EEC'*. This signals that vegetation plots and comparison against the Scientific Committees Determination would be required in this area. Other key characteristics such as elevation, soil type and hydrological requirements listed in the determination for the EEC were also considered prior to flagging the vegetation.

3.2.3 Additional considerations

Light Detection and Ranging (LiDAR) elevation mapping was used to determine the slope of land within the study areas. LiDAR is a remote sensing technology that measures distance by illuminating a target with a laser and analysing the reflected light.

Where the slope of land was over 10 degrees it was considered to present a potential constraint from a bushfire protection and access perspective and is mapped as a 'high' constraint. Performance criteria for property access roads (Planning for Bushfire Protection 2006) state that the cross-fall must not exceed 10 degrees. Further to this, maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.

In addition, Asset Protection Zones cannot be established on slopes of greater than 18 degrees (PBP 2006).

3.3 Conservation Value Assessment

Survey data sheets (Appendix 1) were used to calculate a condition scoring for each site via the methodology described in section 0 below.

Constraint maps were prepared using *ArcMap10.2©GIS* using the results of the condition scoring and significant habitat and data features recorded via GPS in the field survey.

The location of watercourses were verified by ground-truthing. This was cross-checked using the *LiDAR* elevation modelling. Buffers to watercourses were determined using the current Guidelines for "Strategic Assessments of Riparian Corridors Methodology" developed by the former Department of Natural Resources in conjunction with the former NSW Planning & Infrastructure (as per South Coast Regional Planning Strategy, NSW Planning, 2010). Buffers to other significant habitat features, such as Hollow bearing trees, were set at 20 metres in consideration that this distance may need to be increased or decreased once a targeted species specific survey is undertaken to confirm the significance of the tree for hollow dependant fauna. Twenty metres is considered to be the minimum distance to negate impact on this significant habitat resource. This considers impacts within the drip line of the tree and root system which may cause trauma.

3.3.1 Scoring for the conservation value assessment

A list of attributes considered important to assessing the overall conservation value of an area was compiled and scores were attributed to reflect the value of vegetation and habitat features. This enabled the likelihood of potential habitat for threatened species and other environmental constraints to be estimated.

The following table outlines the criteria and values used to assign condition and level of environment value for each area. A ranking process which was developed by Alison Hunt (*Hunt et.al* 2010) for other Strategic Constraints Analysis work conducted for Council has been utilised for this assessment to ensure consistency in the approach (Appendix A). Areas which score as 'high' and 'moderate – high' will generally have a low weed count, mature intact vegetation community and various habitat features suitable for threatened species. These areas will be more difficult to develop due to the natural values on site and will require a more intense level of further study. These rankings are further explained below. Areas of 'high' constraint are generally not going to be appropriate for further development and are likely to enact a range of legislative triggers potentially requiring detailed and costly investigations and making ultimate development difficult. In some cases slope is also a determining factor in whether or not an area has been attributed a 'high' level of constraint. This is discussed further under the sections on slope analysis. The characteristics of each level of constraint are summarised below.

Characteristics of Mapped Constraints

High

This is the highest level of constraint which has the least opportunity for further development. Factors resulting in this level of constraint being attributed may include:

- Periodic inundation
- Presence of an Endangered Ecological Community
- A water course
- Hollow bearing trees
- Threatened species habitat verified on the site
- High value native vegetation (all strata present, mix of habitat components present)
- Potential for a range of threatened species to rely on habitats present
- Steep slopes (re: Planning for Bushfire Protection 2006).

Moderate – High

This is a moderately to highly constrained site with native vegetation present that is observed to be in poorer condition than the previous category (e.g. absence of hollow bearing trees). There is evidence of past disturbance that has modified the vegetation layers or structure (e.g. less hollow bearing trees or strata not as rich). These areas may still provide valuable habitat resources as they may contain a water course, display canopy connectivity and in some cases good ground cover. Potential for EEC or orchids to occur as well as a range of hollow dependant fauna, ground dwelling threatened mammals and birds.

Moderate

A lesser constrained site with some potential for development opportunity. Sites with this ranking present the following factors of constraint:

- Canopy connectivity present
- Understory is disturbed or removed
- Potential for orchids to occur
- Mid and ground strata would regenerate if left
- Generally low weed count.

Moderate – Low

- A lesser constrained site with greater potential for development opportunity. Sites with this ranking present the following factors of constraint:
- Highly disturbed or predominantly cleared
- Some mature native vegetation may be remaining
- Grazed with signs of weed invasion and exotic species
- No obvious habitat features present.

Low

- This site has the least constraints to further development. The site possesses the following:
- Highly disturbed or predominantly cleared
- High weed invasion or exotic grass count
- Grazed or slashed regularly
- No canopy connectivity
- No obvious habitat features.

4 RESULTS

4.1 Vegetation description for the study area

The remnant native vegetation in the study area is generally characteristic of vegetation found in the broader Jervis Bay Region (as described by Mills and Jakeman 2010). Across all sites the vegetation can be categorised into three main types. These are broadly described below to save repetition in the area specific results.

Open Forest

The canopy vegetation comprises a mix of tall eucalypt species. Turpentines (*Syncarpia glomulifera*) and red bloodwoods (*Corymbia Gummifera*) are dominant across the site and are associated with Blackbutts (*Eucalyptus pilularis*), Spotted gums (*Corymbia maculata*), White stringy bark (*Eucalyptus globoidea*) and patches of Hard-leafed Scribbly Gums (*Eucalyptus sclerophylla*). Rough-barked Apple (*Angophora floribunda*), Grey Ironbark (Eucalyptus paniculata), Southern Blue Gum (*Eucalyptus saligna*) and the hybrid Blue Gum Bangalay species *Eucalyptus saligna botryoides* were also noted. Generally in areas where spotted gums are present in abundant numbers the scribbly gums faded out and became absent. The common linkage species was the Turpentines which persisted across the entire area.

The midstory is dominated by mixed shrubs and sedges including Common Hop Bush (*Dodonaea triquetra*), Mountain Devil (Lambertia Formosa), Hairpin banksia (*Banksia Spinulosa*), Needle bush (*Hakea Sericea*). In some areas there is a mid-canopy of Black She-oak (A*llocasuarina littoralis)* and the understorey and groundcover are characterised by Lemon-scented Tea-tree, Golden Wattle, Kangaroo Grass, Germander Raspwort and Bracken. There are distinct patches on some properties where the Black She-oak represents a monoculture.

Open Heath

These areas are dominated by White Kunzea (*Kunzea ambigua*), Paperbark Tea-tree (*Leptospermum trinervium*), Mountain Devil (Lambertia Formosa), Hairpin banksia (*Banksia Spinulosa*), Needle bush (*Hakea Sericea*), Small leaved white beard (*leucopogon microphyllus*), Drumsticks (*Isopogon amemonifolius*) and Sydney Golden Wattle (*Acacia longifolia*) species. Throughout these areas there were large stands of *Allocasuarina Littoralis* and a range of native grasses. In some places it took the form of a dense casuarina forest with little ground cover. Eucalypts were sparse in the true heath areas, leaving a very open canopy.

Riparian vegetation

Riparian vegetation within lots was dominated by Melaleucas: Swamp Paperbark (*Melaleuca ericifolia*), Snow-in-Summer (*Melaleuca linariifolia*), and Prickly-leaved Paperbark (*melaleuca styphelioides*), with Swamp Mahogany (*Eucalyptus Robusta*), Red Mahogany (*Eucalyptus resinifera*), in the canopy. Gahnia grass dominated the understorey. No *Melaleuca Biconvexa* was recorded.

Some riparian sections had representations of what is likely to be classified as Swamp Schlerophyll Floodplain Forest (EEC), however, this would need to be determined using a plot analysis against the scientific committees determination.

In most cases, the vegetated areas were very low in weeds. It was mainly the areas which were being grazed that had a range of exotic species.

4.2 Summary of findings

Figure 3 summaries the strategic findings from across the entire study area. It illustrates the values attributed to each lot as a result of the conservation scoring. It does not intend to dictate 'absolute constraints' but rather provide an indication of the level of further investigation and assessment which would be required to facilitate a rezoning outcome. The remainder of this report works through each study area in turn and explains the attributes behind these findings.

Figure 3 - Summary of findings

4.3 Seasongood Road (Area 1)

The subject area comprises nineteen lots and approximately 100 Ha. There are water courses which run through a number of the blocks on both sides of the road. There are also dams on several of the properties, one of which has records of Green and Golden Bell Frogs (Endangered NSW TSC Act, Vulnerable EPBC Act). Some of the blocks north of the road have portions that are very low lying and subject to periodic inundation.

Figure 4 - Seasongood Road Study Area (Area 1)

4.3.1 Threatened Species Database Search results

4.3.1.1 Fauna

A search of the NSW Atlas and Council's threatened species records indicate that there are nineteen threatened animals and four threatened plants known to occur within 5 kilometres of the study area. These are listed below with reference to whether suitable habitat was found in the study area.

Table 1 - Threatened or migratory fauna species previously recorded within the locality or with the potential to occur across the study area

Scientific Name	Common Name	Conservation Rating	Habitat Present within Study Areas
Petaurus australis	Yellow-bellied Glider	Vulnerable (EPBC and TSC Act)	Recorded on Lot 113 DP 15266 and lots backing Fairfax Road.
Callocephalon fimbriatum	Gang-Gang Cockatoo	Vulnerable (TSC)	Recorded on Lot 113 DP 15266.
Litoria aurea	Green and Golden Bell Frog	Vulnerable (EPBC and TSC Act)	Recorded on Lot 112A DP 15266.
Calyptorhynchus lathami	Glossy Black Cockatoo	Vulnerable (TSC)	Suitable habitat occurs across the study area. This species was also recorded feeding within the study area.
Pteropus poliocephalus	Grey-headed Flying fox	Vulnerable (EPBC and TSC Act)	Sighting on Seasongood Road.
Glossopsitta pusilla	Little Lorikeet	Vulnerable (TSC)	Known to occur within 500 metres of the study area. Suitable habitat exists with the study area.
Tyto novaehollandiae	Masked Owl	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable (TSC) Endangered (EPBC)	Known to occur within 1km of the site. Suitable habitat within the study area.
Lophoictinia isura	Square-tailed Kite	Vulnerable (TSC)	Previously recorded within 2 km of the study area.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Ninox strenua	Powerful Owl	Vulnerable (TSC)	This species breeds and hunts in open or closed sclerophyll forest or woodlands. Scattered hollow bearing trees and potential roost sites do exist. Appropriate habitat for prey.
Cercartetus nanus	Eastern Pygmy Possum	Vulnerable	Known to occur within 2 km. There was suitable habitat identified for this species.
Dasyornis brachypterus	Eastern Bristlebird	Endangered	Would only occur in heath areas. This species has been translocated into the local area.
Tyto tenebricosa	Sooty Owl	Vulnerable (TSC)	Suitable foraging and breeding habitat within the study area.
Pandion cristatus	Eastern Osprey	Vulnerable (TSC)	Roost site intersection of Huskisson and Woollamia Roads.
Neophema pulchella	Turquoise Parrot	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.

Of these species, Glossy Black Cockatoos were sighted during field surveys and numerous feed trees were also located. It is also noted that several owners mentioned that they have observed Grey-headed Flying-foxes, Gang Gang Cockatoos and Green and Golden Bell Frogs on their properties at various times.

4.3.1.2 Flora

A number of threatened plants have been recorded within 2km's of the study area. These are listed below with reference to whether suitable habitat was found in the study area.

Table 2 - Known Threatened Flora

Scientific Name	Common Name	Conservation Rating	Habitat Present within study areas
Syzygium paniculatum	Magenta Lilly Pilly	Endangered (TSC) Vulnerable (EPBC)	Detected locally on 80 and 80A Woollamia Road.
Melaleuca Biconvexa	Biconvex paperbark	Vulnerable (EPBC and TSC Act)	Not found on site but known to occur locally.
Rhizanthella slateri	Eastern Australian Underground Orchid	Vulnerable (TSC) 3kc (ROTAP)	Previously detected on 2 Seasongood Road. Suitable habitat occurs across the study area.
Pterostylis ventricosa		Critically Endangered (TSC)	Known within 5 km of site. Potential to occur in study area.

4.3.1.3 Endangered Ecological Communities

Four EECs have been recorded locally:

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains
- Coastal Saltmarsh.

Only Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest on Coastal Floodplains are likely to occur within the study area.

4.3.2 Field survey and Site Assessment

4.3.2.1 Vegetation Description

This study area varies from grazed paddocks to very good quality native vegetation. The vegetation types were consistent with the three vegetation communities described in 4.1.

4.3.2.2 Habitat Assessment

Habitat observations are detailed in the table below. These are also reflected in the Conservation Value Assessment. The types of species that would be depending on these resources are also listed.

Habitat Type/ Resource present	Location	Species dependant on resource
Hollow-bearing trees	Figure 4 shows the numerous hollow-bearing trees in the study area. They occurred in all vegetation types. They ranged in size from very large to very small.	• Arboreal mammals • Microchiropteran bats • Hollow-dependent bird Species
Fallen timber	Scattered throughout much of the study area. There was a significant amount of suitable debris to provide habitat for reptiles.	• Small mammals • Reptiles • Insects
Black She-oak	Numerous feed trees occur across the site. There are dense stands of *Allocasuarina littoralis* providing a significant feeding resource.	Glossy Black-cockatoo
Leaf litter	Across most of the site which has not been cleared. Usually coupled with fallen timber.	Reptiles
Heathy understorey	Areas within the Scribbly Gum – Red Bloodwood - Grey Gum woodlands.	• Small mammals • Some birds (e.g. bristlebird)
Creek lines	Several waterways occur in this study area. Most properties have a creekline running through them or bordering their property.	• Frogs • Birds accessing winter-flowering Eucalypts
Sap Feed Trees	Numerous sap feed trees were sighted. Further assessment would be required to determine which gliders are using these features.	Gliders

Table 3 - Fauna Habitat

4.3.2.3 Hollow-bearing Trees

Hollow-bearing trees (HBT) are an important resource for many hollow-dependent species and the distribution of HBT across an area will largely determine the distribution of such species. Only visible hollows were recorded. A total of **290** hollow-bearing trees were recorded across the study area (Figure 5).

It is likely that the study area supports more hollows than recorded during this study as not all hollows would have been visible from below the tree. The size of the hollows ranged from very large to very small. They were suitable for a wide range of hollow-dependent arboreal mammals, microchiropteran bats and woodland birds.

Glossy black-cockatoos and Gang Gangs have been noticed inspecting hollows on the site (personal communication with owners).

Figure 5 - Hollow-bearing trees recorded within the Seasongood Road Study Area

4.3.2.4 Slope Assessment

Figure 6 illustrates that the slope in this study area is gradual and not considered to be a general constraint to development.

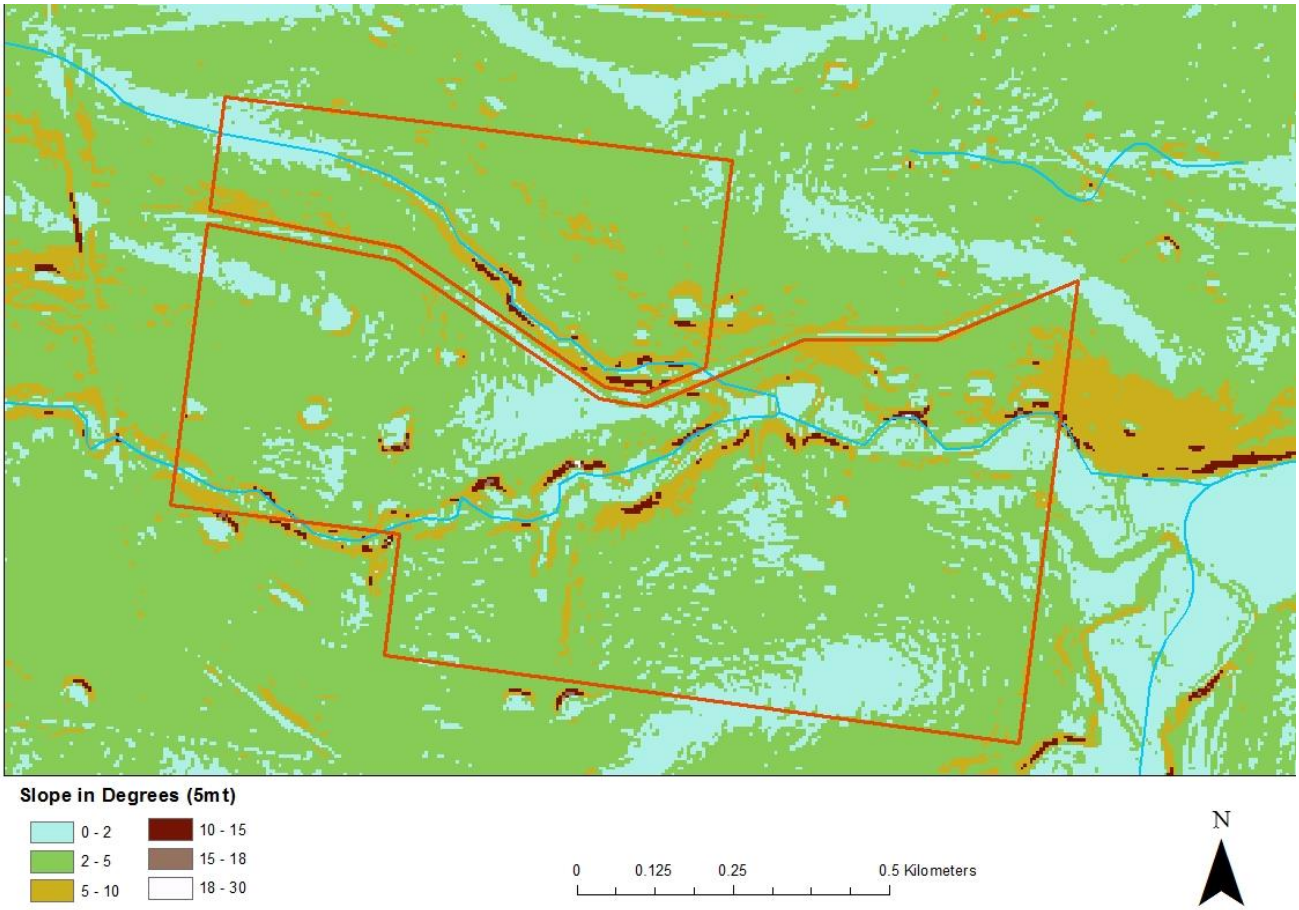


Figure 6 - Slope Analysis – Seasongood Road

4.3.3 Conservation Value Assessment Results

Figure 7 represents the values attributed to each lot as a result of the conservation scoring (refer 0 p5). It does not dictate 'absolute constraints' but rather provides an indication of the level of further investigation and assessment which would be required to facilitate a rezoning outcome. It provides a visual indicator of how easy or difficult it will be to justify and realise development within the study area.

The majority of blocks have homes already facing onto Seasongood Road. The back of the blocks vary from very dense forest with patches of heathland to cleared pasture land. A creek line runs through all of the properties, although has little effect on number 3, 5, 7 or 9 as it is at the very back boundary line. Figure 7 illustrates the area where the two creeks join. This area could be periodically subject to high water flows. There is evidence of the creeks forming a localised floodplain of up to 100 metres in some areas. A similar pooling effect was also noted on the northern side of the road in lots 2-8.

A uniform 30 metres from the centre line of each creek is considered an area of high constraint – regardless of whether the area has been cleared. The South Coast Regional Strategy requires that this area be managed for its conservation value in order to protect water quality within the wider catchment. This is a relevant consideration in this circumstance given the significance of the Jervis Bay catchment within which all the study areas sit.

Vegetation on each lot was inspected (except where owners specifically declined, as was the case for 15 Seasongood Rd). A Conservation Assessment Score was calculated for each lot which informed the environmental constraints map for the site (Figure 7).

Figure 7 - Seasongood Road Environmental Opportunities / Constraints Map

4.3.4 Seasongood Road - Conclusions

The study area contains a range of significant environmental features which would need to be further investigated to determine their importance in the landscape. Some areas have been modified by human occupation and are less constrained for this reason. A brief summary of opportunities and constraints is provided below.

Slope was generally not an issue in this study area, the main constraint is the presence of water courses and high quality threatened species habitat.

Development opportunity exists within the areas depicted on Figure 7 as low-moderate constraints. Any areas which have been identified on Figure 7 as a moderate –high constraint will require a significant further environmental assessment in the form of targeted flora and fauna assessment and/or flood/water quality assessment.

Consistent with the South Coast Regional Strategy, riparian vegetation is a priority for retention and is unlikely to yield any development opportunity. For this reason, an area of 30 metres from all water courses has been applied as a 'high' constraint, regardless of land disturbance or vegetation type. This incorporates a 20 metre core riparian zone and a 10 metre buffer from disturbance.

Table 4 - Constraints and Opportunities (refer Figure 7)

Area	**Opportunities**	**Constraints**
Lot 1,3,5,7,9,11 and 13	Development potential exists outside riparian areas in the areas mapped as low – moderate constraints. Generally this is only at the front of the lots where existing land use practices have substantially modified the natural environment.	The area south of the creek contains moderate-high quality remnant native vegetation and potential Threatened Species habitat. Moderate – High quality areas will require further flora and fauna investigation. While Lot 13 has low constraints at the rear beyond the creek, given that it is surrounded by neighbouring high value vegetation it has a higher regeneration capacity and will be difficult to develop in isolation.
Lot 15,17 &19	Limited	High value threatened species habitat. Flooding issues.
Lot 21-23	These lots are largely cleared.	Sensitive creek line areas where pockets are likely to meet the criteria for Swamp Sclerophyll Forest EEC There are obvious flooding issues especially on Lot 21.

Lots 25 and 27	Limited	High value threatened species habitat.
Lots 2-10	Limited	High value threatened species habitat. Some flood liable land present.
Lot 16	Limited	High value threatened species habitat at the back of the property. Creek at front of property.
Lot 18	Existing grazing has resulted in low environmental value on this property.	
Lot 20	Limited	Hollow bearing trees. Creek at the front of the property.

4.4 Woollamia Road (Area 2)

4.4.1 Threatened Species Database Search results – Woollamia Road

4.4.1.1 Fauna

A number of Threatened animals and birds have been recorded within 5km's of the study area. These are listed below with reference to whether suitable habitat was found in the study areas.

Table 5 - Threatened or migratory fauna species previously recorded within the locality or with the potential to occur across the study area

Scientific Name	Common Name	Conservation Rating	Habitat Present within study areas
Tyto novaehollandiae	Masked Owl	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Callocephalon fimbriatum	Gang-Gang Cockatoo	Vulnerable (TSC)	Recorded within 2km of the study area.
Petaurus australis	Yellow-bellied Glider	Vulnerable (EPBC and TSC Act)	Recorded within 2km of the study area, obvious glider incisions were found in the study area.

Litoria aurea	Green and Golden Bell Frog	Vulnerable (EPBC and TSC Act)	Recorded within 2km of the study area.
Calyptorhynchus lathami	Glossy Black Cockatoo	Vulnerable (TSC)	Recorded within 500metres of study area.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Hieraaetus morphnoides	Little Eagle	Vulnerable (TSC)	Suitable foraging habitat within study area.
Lophoictinia isura	Square-tailed Kite	Vulnerable (TSC)	Previously recorded on Lot 113 within the study area.
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable (TSC) Endangered (EPBC)	Known to occur within 1km of the site. Suitable habitat within the study area.
Ninox strenua	Powerful Owl	Vulnerable (TSC)	This species breeds and hunts in open or closed sclerophyll forest or woodlands. Scattered hollow bearing trees and potential roost sites do exist. Appropriate habitat for prey.
Petaurus australis	Yellow-bellied Glider	Vulnerable (EPBC and TSC Act)	Sap feeding trees found in study area
Pteropus poliocephalus	Grey-headed Flying fox	Vulnerable (EPBC and TSC Act)	Known to occur locally, suitable habitat within study area.
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable (TSC)	Suitable foraging habitat within the study area

4.4.1.2 Flora

A number of threatened plants have been recorded within 5km's of the study areas. These are listed below with reference to whether suitable habitat was found in the study area.

Table 6 - Known Threatened Flora

Scientific Name	Common Name	Conservation Rating	Habitat Present within study areas
Syzygium paniculatum	Magenta Lilly Pilly	SVCi	Detected on 80 and 80AWoollamia Road.
Melaleuca Biconvexa	Biconvexa Paperbark	Vulnerable (EPBC and TSC Act)	Not detected but potential to occur.
Typhonium eliosurum		3RC- (ROTAP)	Known record within 2km.
Eucalyptus langleyi	Albatross Mallee	2V	Known record within 2km.

4.4.1.3 Endangered Ecological Communities

Four EECs have been recorded locally:

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains
- Coastal Saltmarsh.

Only Swamp Sclerophyll Forest on Coastal Floodplains is likely to occur within the study area.

4.4.2 Field survey and Site Assessment

4.4.2.1 Vegetation description

This study area varies from grazed paddocks to very good quality native vegetation. The vegetation types were consistent with the three vegetation communities described in 4.1. Soils across the site vary from sandy loam to pale clay typical of the Jervis Bay area.

It was noted that there was variation among areas of riparian vegetation. This was linked to soil type. In some areas there was a wet forest community characteristic of sandy, well drained soils. These areas had more rainforest species in the understory (e.g. ferns, cheese trees, calacomas). In other places the riparian vegetation comprised predominantly swamp sclerophyll species dominated by melaleucas and gahnia – characteristic of poorer soils where water is more likely to pool for longer durations. Some riparian areas had representations of what is likely to be Swamp Schlerophyll Floodplain Forest (EEC), however, this would need to be determined using a plot analysis against the scientific committees determination.

4.4.2.2 Habitat Assessment

Habitat observations are detailed in the table below. These are also reflected in the Conservation Value Assessment.

Table 7 - Fauna Habitat

Habitat Resource	Location	Species Dependant on Resource
Hollow-bearing trees	Figure 8 shows the numerous hollow-bearing trees in the study area. They occurred in all vegetation types. They ranged in size from very large to very small.	• Arboreal mammals • Microchiropteran bats • Hollow-dependent bird • Species

Fallen timber	Scattered throughout much of the study area. There was a significant amount of suitable debris to provide habitat for reptiles.	• Small mammals • Reptiles • Insects
Black She-oak	Numerous feed trees occur across the site. There are dense stands of *Allocasuarina littoralis* providing a good feeding resource.	Glossy Black-cockatoo
Leaf litter	Across most of the site which has not been cleared. Usually coupled with fallen timber.	Reptiles
Heathy understorey	Areas within the Scribbly Gum – Red Bloodwood - Grey Gum woodlands.	• Small mammals • Some birds
Creek lines	Several waterways occur in this study area. Most properties have a creekline running through them or bordering their property.	• Frogs • Birds accessing winter-flowering Eucalypts
Sap Feed Trees	Numerous sap feed trees found on site.	• Gliders

4.4.2.3 Hollow-bearing Trees

Hollow-bearing trees (HBT) are an important resource for many hollow-dependent species and the distribution of HBT across an area will largely determine the distribution of such species. Only visible hollows were recorded. A total of 125 hollow-bearing trees were recorded across the study area (Figure 8).

It is likely that the study area supports more hollows than recorded during this study as not all hollows would have been visible from below the tree. The size of the hollows ranged from very large to very small hollows.

Figure 8 - Hollow-bearing trees recorded within the Woollamia Road Study area

4.4.2.4 Slope Assessment

Figure 9 illustrates that the slope in this study area is generally gradual and is not considered to be a problematic constraint for development.

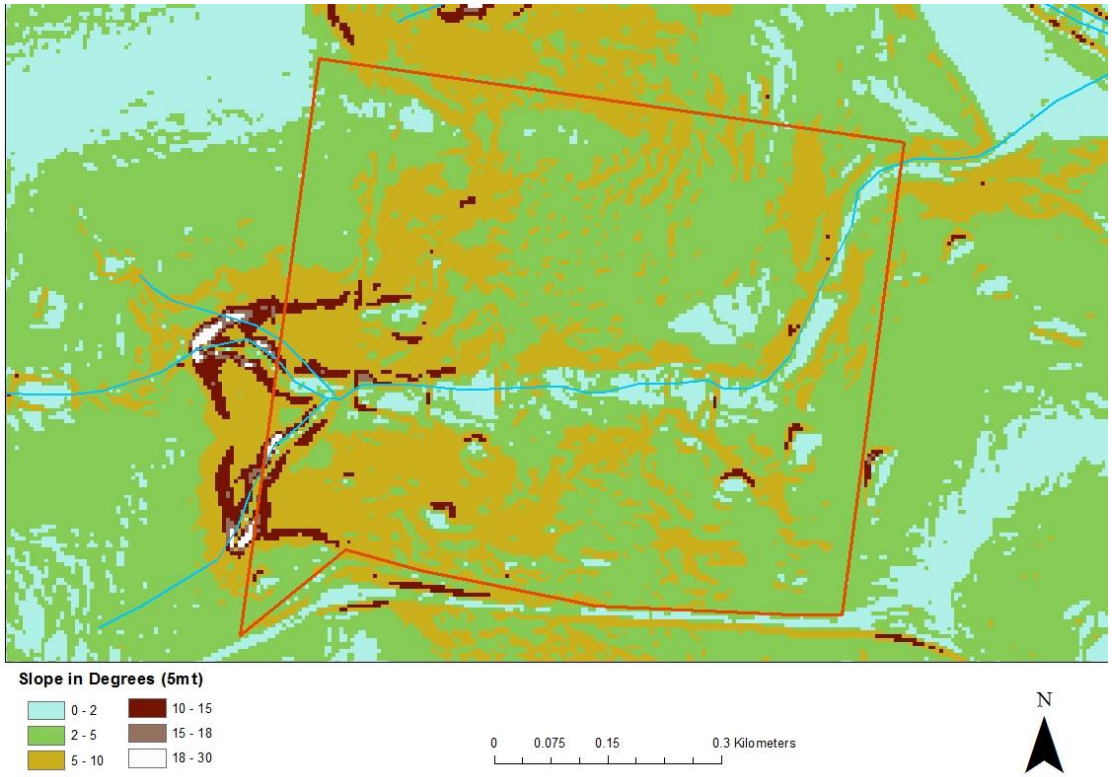


Figure 9 - Slope Analysis within the Woollamia Road Study Area

4.4.3 Conservation Value Assessment Results – Woollamia Road

Figure 10 represents the values attributed to each lot as a result of the conservation scoring (refer 0 p5). It does not dictate 'absolute constraints' but rather provides an indication of the level of further investigation and assessment which would be required to facilitate any rezoning outcome. It provides a visual indicator of how easy or difficult it will be to realise development within the study area.

Vegetation on each lot was inspected. A Conservation Assessment Score was calculated for each lot which informed the environmental constraints map for the site.

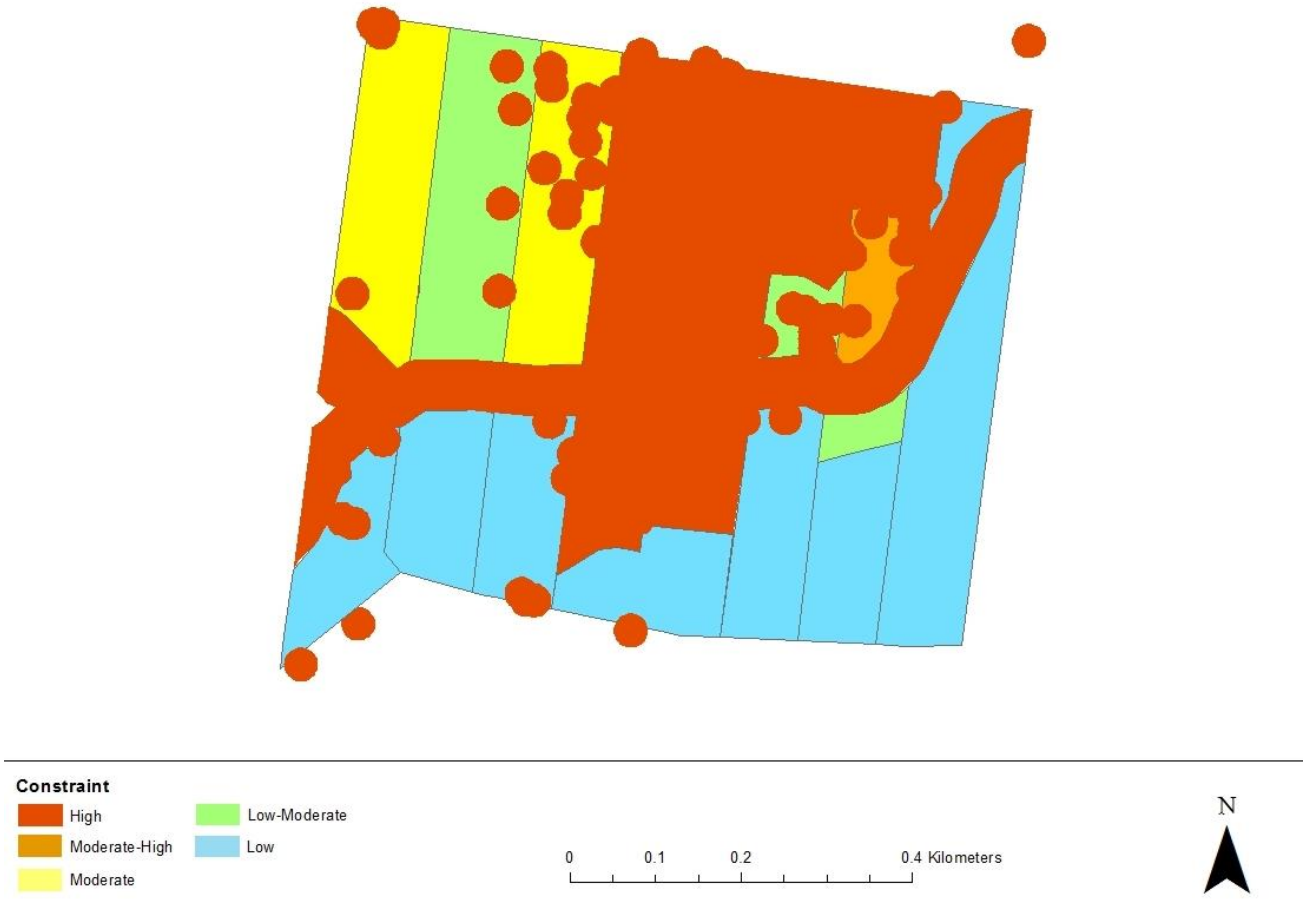


Figure 10 - Woollamia Road Environmental Constraints Map

4.4.4 Woollamia Road - Conclusions

The study area contains a range of significant environmental features which would need to be further investigated to determine their importance in the landscape.

Some areas have been modified by human occupation and are less constrained for this reason. A brief summary of opportunities and Constraints is provided in Table 8.

Development opportunity exists within the areas depicted on Figure 10 as low-moderate constraints. Any areas which have been identified on Figure 7 10 as a moderate-high constraint will require further environmental assessment in the form of targeted flora and fauna assessment and/or flood/water quality assessment.

Consistent with the South Coast Regional Strategy, riparian vegetation is a priority for retention and is unsuitable for future development. For this reason, an area within 30 metres of all water courses has been identified as a 'high' constraint, regardless of land disturbance or vegetation type. This incorporates a 20 metre core riparian zone and a 10 metre buffer from disturbance.

Lots 155, 155A and 157 have the highest potential for further development if they collaboratively move forward to provide coordinated bushfire access and creek crossing options. Individually, the lots have a much lower probability of success.

Table 8 - Constraints and Opportunities (refer Figure 10)

Area	Opportunities	Constraints
Lot 155 DP 15266	This property has been underscrubbed and as a result has a lower habitat value than other blocks in this study area.	Two creek lines intersect on this property.
Lot 155A DP15266	This block is largely cleared with only the riparian area still vegetated.	Creek line runs through the property.
Lot 157 DP 15266	Limited	Creek line runs through the block
Lot 157A DP15266	Cleared area at the front of the block is already developed.	High density of HBT across ¾ of the site. Creekline and high value threatened species habitat present. Detailed surveys required.
Lot 158 DP 15266	Cleared area at the front of the block is already developed.	High density of HBT across ¾ of the site. High value threatened species habitat. Detailed surveys required. Creekline runs through the block.
Lot 158A DP15266	Two thirds of the block has been cleared and could offer some development potential.	Numerous Yellow-bellied glider sap feed trees in the middle of the block and hollow bearing trees across the back half. Detailed surveys required. Creekline runs through the block.
Lot 159 DP 15266	Limited	Numerous hollow bearing trees at the back of the block. Good threatened species habitat – would require detailed surveys.
Lot 159A DP15266	Highly modified landscape with low habitat value. Could be further developed with minimal studies necessary.	Creek line runs through the property and access would have to be managed.

4.5 Pepper and Barron Roads (Area 3)

4.5.1 Threatened Species Database Search results

4.5.1.1 Fauna

A number of Threatened animals and birds have been recorded within 5kms of the Pepper and Barron Roads study areas. These are listed below with reference to whether suitable habitat was found.

Table 9 - Threatened or migratory fauna species previously recorded within the locality or with the potential to occur across the study area

Scientific Name	Common Name	Conservation Rating	Habitat Present within study area
Tyto novaehollandiae	Masked Owl	Vulnerable (TSC and EPBC Act)	Scattered hollow bearing trees and potential roost sites exist. Appropriate habitat for prey.
Petaurus australis	Yellow-bellied Glider	Vulnerable (EPBC and TSC Act)	Good connectivity to surrounding vegetation with feeding resources present on site (including sap feed trees).

Calyptorhynchus lathami	Glossy Black Cockatoo	Vulnerable (TSC)	*Allocasuarina littoralis* present on site as a feeding resource. Yellow Tailed Black Cockatoos were seen feeding.
Glossopsitta pusilla	Little Lorikeet	Vulnerable (TSC)	Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.
Ninox strenua	Powerful Owl	Vulnerable (TSC)	This species breeds and hunts in open or closed sclerophyll forest or woodlands. Scattered hollow bearing trees and potential roost sites do exist. Appropriate habitat for prey.
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable (TSC) Endangered (EPBC)	Suitable habitat within the study area
Callocephalon fimbriatum	Gang-Gang Cockatoo	Vulnerable (TSC)	Suitable habitat on site for foraging and breeding.
Cercartetus nanus	Eastern Pygmy Possum	Vulnerable	Marginal habitat, unlikely to occur.
Dasyornis brachypterus	Eastern Bristlebird	Endangered	Unlikely to be found in the study area.
Pteropus poliocephalus	Grey-headed Flying fox	Vulnerable (EPBC and TSC Act)	Suitable habitat within the study area for foraging.
Tyto tenebricosa	Sooty Owl	Vulnerable (TSC)	Suitable foraging and breeding habitat within the study area.
Lophoictinia isura	Square-tailed Kite	Vulnerable (TSC)	Suitable habitat within the study area for foraging.
Neophema pulchella	Turquoise Parrot	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.

4.5.1.2 Flora

A number of threatened plants have been recorded within 5km's of the study area. These are listed below with reference to whether suitable habitat was found.

Table 10 - Known Threatened Flora

Scientific Name	Common Name	Conservation Rating	Habitat Present within study area
Grevillea macleayana	Jervis Bay Grevillea	3RC- (ROTAP)	Grows in low open woodland or shrubland, sandy soils. Suitable habitat on site.
Meleleuca biconvexa	Biconvexa Paperbark	Vulnerable	Species was not found on site during random survey, however could occur in drainage line.
Pterostylis ventricosa		Critically Endangered (TSC)	Potential to occur in this study area.

4.5.1.3 Endangered Ecological Communities

Three EECs have been recorded locally:

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains

Only Swamp Sclerophyll Forest on Coastal Floodplains is likely to occur within this study area. This community has potential to occur in the low lying areas dominated by paperbarks and associated swamp species. These areas are generally unsuitable for development.

4.5.2 Field survey and Site Assessment

4.5.2.1 Vegetation description

This study area varies from grazed paddocks to very good quality native vegetation. The vegetation communities found in this study area are characteristic of those described in 4.1. A steep and characteristically rocky slope runs through many of the properties and leads down into a wet sclerophyll forest at the base of the slope. In the case of lot 722 this vegetation can be described as a rainforest formation. This was the only example of rainforest vegetation that was located in any of the study areas.

4.5.2.2 Habitat Assessment

Habitat observations are detailed in the table below. These are reflected in the Conservation Value Assessment.

Table 11 - Fauna Habitat

Habitat Type/ Resource present	Location	Species
Hollow-bearing trees	Figure 11 shows the hollow-bearing trees in the study area. This area showed signs of previous logging.	• Arboreal mammals • Microchiropteran bats • Hollow-dependent bird • species
Fallen timber	Scattered throughout much of the study area. There was a significant amount of suitable debris to provide habitat for reptiles.	Small mammals Reptiles Insects
Black She-oak	Numerous feed trees occur across the site. There are dense stands of Allocasuarina littoralis providing a good feeding resource.	Glossy Black-cockatoo
Leaf litter	Across most of the site which has not been cleared. Usually coupled with fallen timber.	Reptiles
Creek lines	Several waterways occur in this study area. Most properties have a creek line running through them or bordering their property.	Frogs Birds accessing winter-flowering Eucalypts
Sap Feed Trees	Five sap feed trees were located within the study area. There are likely to be more. Whether these are used by Yellow-bellied gliders or other gliders would need to be the subject of further assessment.	Gliders

4.5.2.3 Hollow-bearing Trees

Hollow-bearing trees (HBT) are an important resource for many hollow-dependent species and the distribution of HBT across an area will largely determine the distribution of such species. Figure 11 shows the number of hollow bearing trees (19) and sap feed trees (5) recorded on site. Compared to other sites, there was not a high density of either habitat resource. However, several property owners declined the offer to inspect their property (25B Pepper Road and D1289 Princes Hwy) so this has affected the results in this case. There was also evidence of previous clearing which may explain the scarcity of hollow bearing trees.

Figure 11 - Hollow bearing trees and Sap feed trees recorded on site

4.5.2.4 Slope Assessment

Figure 12 shows the elevation challenges which occur on this site. It depicts the steep drop away that occurs behind the current dwellings. In reality this will cause a number of issues for any future development within the study area. This issue is further discussed in the opportunities and constraints section.

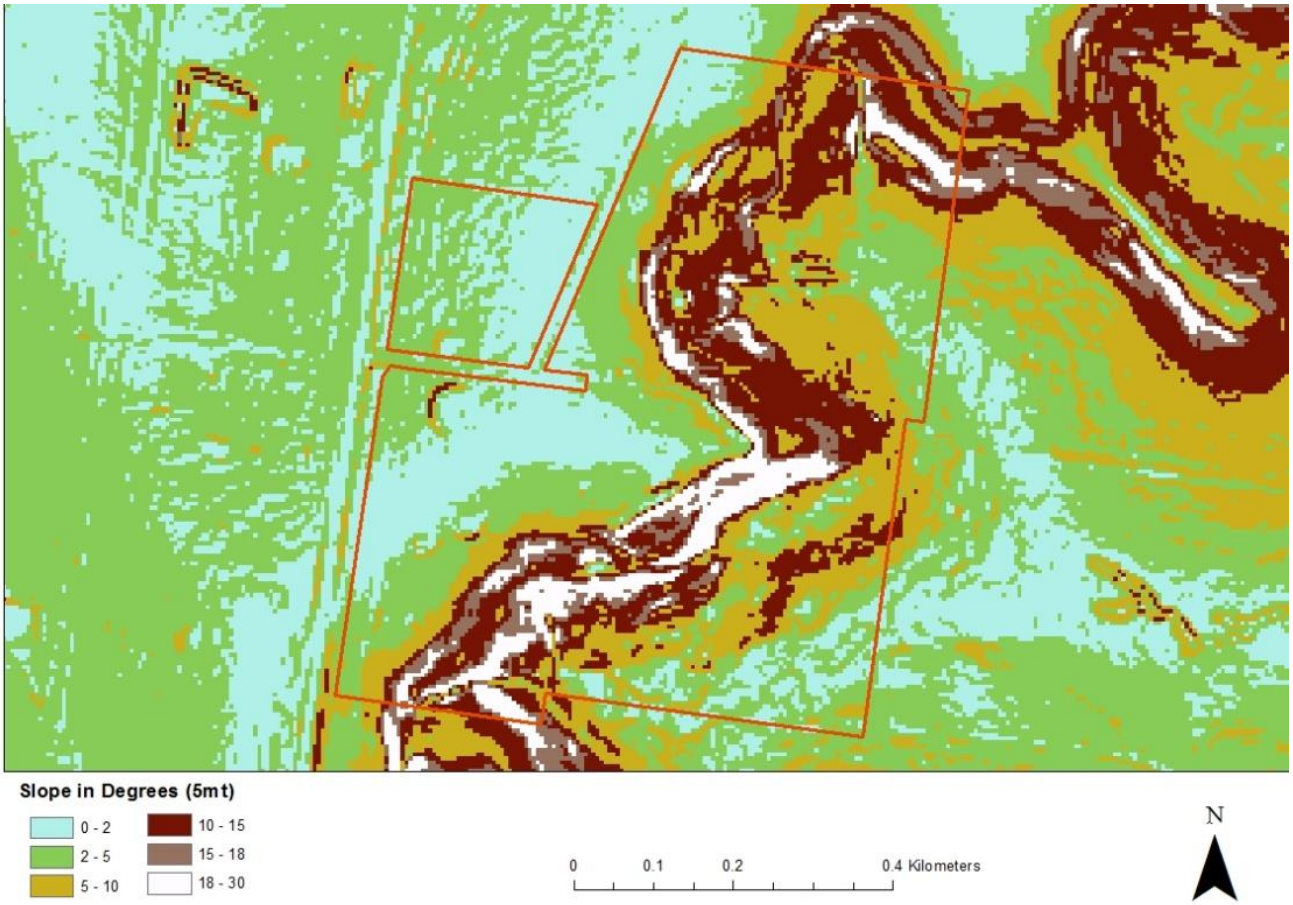


Figure 12 - Pepper and Barron Roads Slope Analysis

4.5.3 Conservation Value Assessment Results – Barron and Pepper Roads

Figure 13 represents the values attributed to each lot as a result of the conservation and slope assessment process. It does not dictate 'absolute constraints' but rather provide an indication of the level of further investigation and assessment which would be required to facilitate a rezoning outcome. In this case, the slope of the land is considered to be the most significant constraint to further development in this area.

Figure 13 - Pepper and Barron Roads Environmental Constraints Map

4.5.4 Pepper and Barron Roads - Conclusions

Table 12 - Constraints and Opportunities (refer Figure 13)

Area	Opportunities	Constraints
Lot 162 DP 755965	This lot is bordered by the Princes Hwy and Pepper Road. It is cleared with remaining paddock trees. Some of these trees have hollows but overall the property scored Low-Moderate. There are no slope issues on this land	Scattered hollow bearing trees and potential yellow bellied glider feed trees.
Lot 161 DP 755965	This lot is bordered by the Princes Hwy and Pepper Road. It is predominantly cleared. It scored 'Low' and has good potential for further development. There are no slope issues on this land.	No obvious constraints.
Lot 160 DP755965	This lot is bordered by the Princes Highway.	There is a steep drop off behind the house (see slope analysis map). Owner agrees – likely to be no further development potential.
Lot 721 DP 633867	The front of this lot has been cleared and developed.	The back half of the lot drops away and is generally unsuited to further intensification.
Lot 722 DP 633867	The front of this lot has been cleared and developed.	There is a steep drop off behind the house. This leads down to a wet sclerophyll complex with pockets of rainforest. Generally unsuited to further intensification.
Lot 171 DP755965	There is limited development potential abutting Barron road before the slope exceeds 20 degrees.	There is a steep drop off behind the house. There are several creeks running through the property.
Lot 170 DP755965	There is limited development potential abutting Barron road before the slope becomes steep.	There is a steep drop off behind the house leading down to a shanty nestled next to a riparian corridor. Access is an issue.

4.6 Mortimer Road (Area 4)

4.6.1 Threatened Species Database Search results

4.6.1.1 Fauna

A number of Threatened animals and birds have been recorded within 5kms of the study area. These are listed below with reference to whether suitable habitat was found.

Table 13 - Threatened or migratory fauna species previously recorded within the locality or with the potential to occur across the study area

Scientific Name	Common Name	Conservation Rating	Habitat Present within study area
Petaurus australis	Yellow-bellied Glider	Vulnerable (EPBC and TSC Act)	Good connectivity to surrounding vegetation with feeding resources present on site (including sap feed trees).
Calyptorhynchus lathami	Glossy Black Cockatoo	Vulnerable (TSC)	*Allocasuarina littoralis* was present on site as a feeding resource. Yellow Tailed Black Cockatoos were seen feeding.

Glossopsitta pusilla	Little Lorikeet	Vulnerable (TSC)	Forages primarily in the canopy of open *Eucalyptus* forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used.
Ninox strenua	Powerful Owl	Vulnerable (TSC)	This species breeds and hunts in open or closed sclerophyll forest or woodlands. Very few hollow bearing trees on site for any breeding potential. Appropriate habitat for prey.
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable (TSC) Endangered (EPBC)	Suitable habitat within the study area.
Callocephalon fimbriatum	Gang-Gang Cockatoo	Vulnerable (TSC)	Suitable habitat on site for foraging. Very few hollow bearing trees on site for any breeding potential.
Cercartetus nanus	Eastern Pygmy Possum	Vulnerable	Marginal habitat, unlikely to occur.
Pteropus poliocephalus	Grey-headed Flying fox	Vulnerable (EPBC and TSC Act)	Suitable habitat within the study area for foraging.
Tyto tenebricosa	Sooty Owl	Vulnerable (TSC)	Suitable foraging and breeding habitat within the study area. Lack of hollow bearing trees on site for any breeding potential.
Lophoictinia isura	Square-tailed Kite	Vulnerable (TSC)	Suitable habitat within the study area for foraging.
Neophema pulchella	Turquoise Parrot	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.

4.6.1.2 Flora

A number of threatened plants have been recorded within 5kms of the study area. These are listed below with reference to whether suitable habitat was found.

Table 14 - Known Threatened Flora

Scientific Name	Common Name	Conservation Rating	Habitat Present within study area
Syzygium paniculatum	Magenta Lilly Pilly	3VCi - ROTAP	Potential to occur.
Meleleuca biconvexa	Biconvexa Paperbark	Vulnerable (TSC and EPBC Act)	Species was not found on site during random survey, however could occur in drainage line.
Eucalyptus langleyi		Vulnerable (TSC and EPBC)	Unlikely to occur.

4.6.1.3 Endangered Ecological Communities

Four EECs have been recorded locally:

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains
- Coastal Saltmarsh.

Only Swamp Sclerophyll Forest on Coastal Floodplains is likely to occur within the study area.

4.6.2 Field Survey and Site Assessment

4.6.2.1 Vegetation Description

This study area is variable in its conservation value. The site has evidence of logging and there are very few hollow bearing trees remaining. There is a steep decline (which is cliff-like in some places) which leads down to a swampy valley area comprising elements of sclerophyll forest. In the valley the vegetation changes from woodland forest to a wet swamp sclerophyll complex.

4.6.2.2 Habitat Assessment

Habitat observations are detailed in the table below. These are also reflected in the Conservation Value Assessment Scoring.

Table 15 - Fauna Habitat

Habitat Type/ Resource present	Location	Species
Hollow-bearing trees	Very few hollow bearing trees were found on this site.	• Arboreal mammals • Microchiropteran bats • Hollow-dependent bird • Species
Fallen timber	Scattered throughout much of the study area. There was a significant amount of suitable debris to provide habitat for reptiles.	• Small mammals • Reptiles • Insects
Black She-oak	Some feed trees occur on the site.	Glossy Black-cockatoo
Leaf litter	Across most of the site which has not been cleared. Usually coupled with fallen timber.	Reptiles
Heathy understorey	Limited area of the site.	• Small mammals • Some birds

4.6.2.3 Hollow-bearing Trees

Figure 14 shows the number of hollow bearing trees (6) and sap feed trees (6) recorded on site. Compared to other sites, there was not a high density of either habitat resource. There was also evidence of previous clearing which may explain the scarcity of hollow bearing trees.

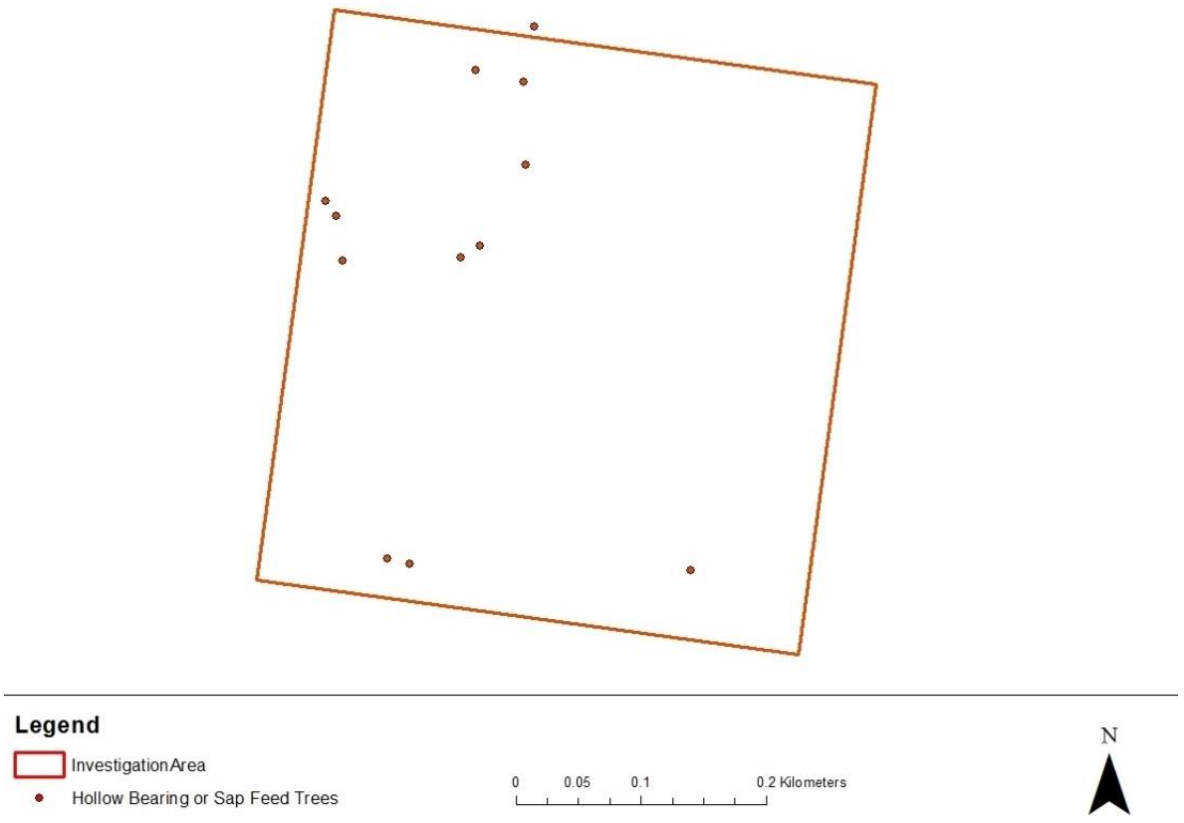


Figure 14 – Habitat Resources detected in the Mortimer Road Study Area

4.6.2.4 Slope Analysis

Figure 15 depicts the elevation of the land in this study area. It clearly demonstrates that the land has a gorge area running through the middle which will present challenges for future development.

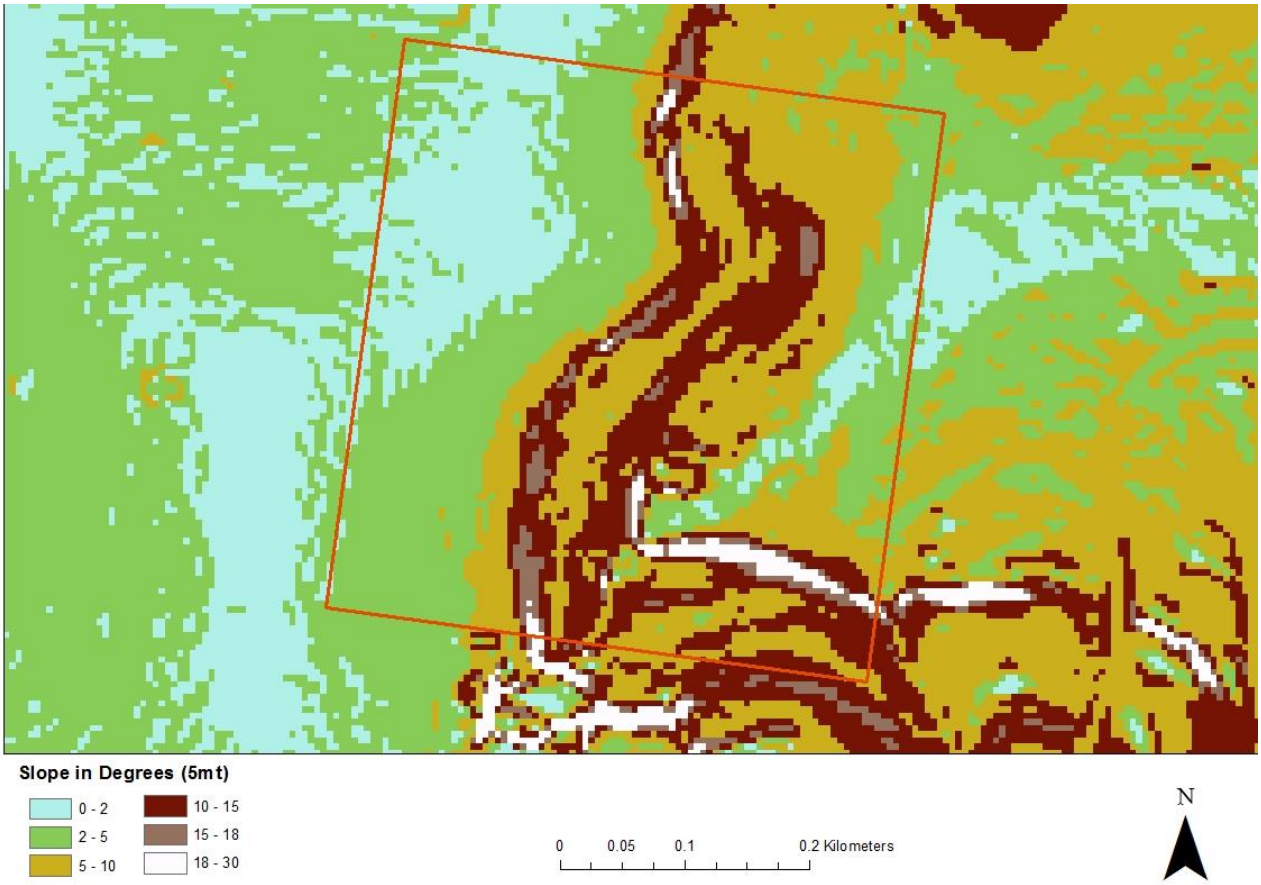


Figure 14 - Mortimer Road Slope Analysis

4.6.3 Conservation Value Assessment Results – Mortimer Road

Figure 7 represents the values attributed as a result of the conservation scoring and the slope analysis. It does not dictate 'absolute constraints' but rather provide a realistic indication of the level of further investigation and assessment which would be required to facilitate a rezoning outcome.

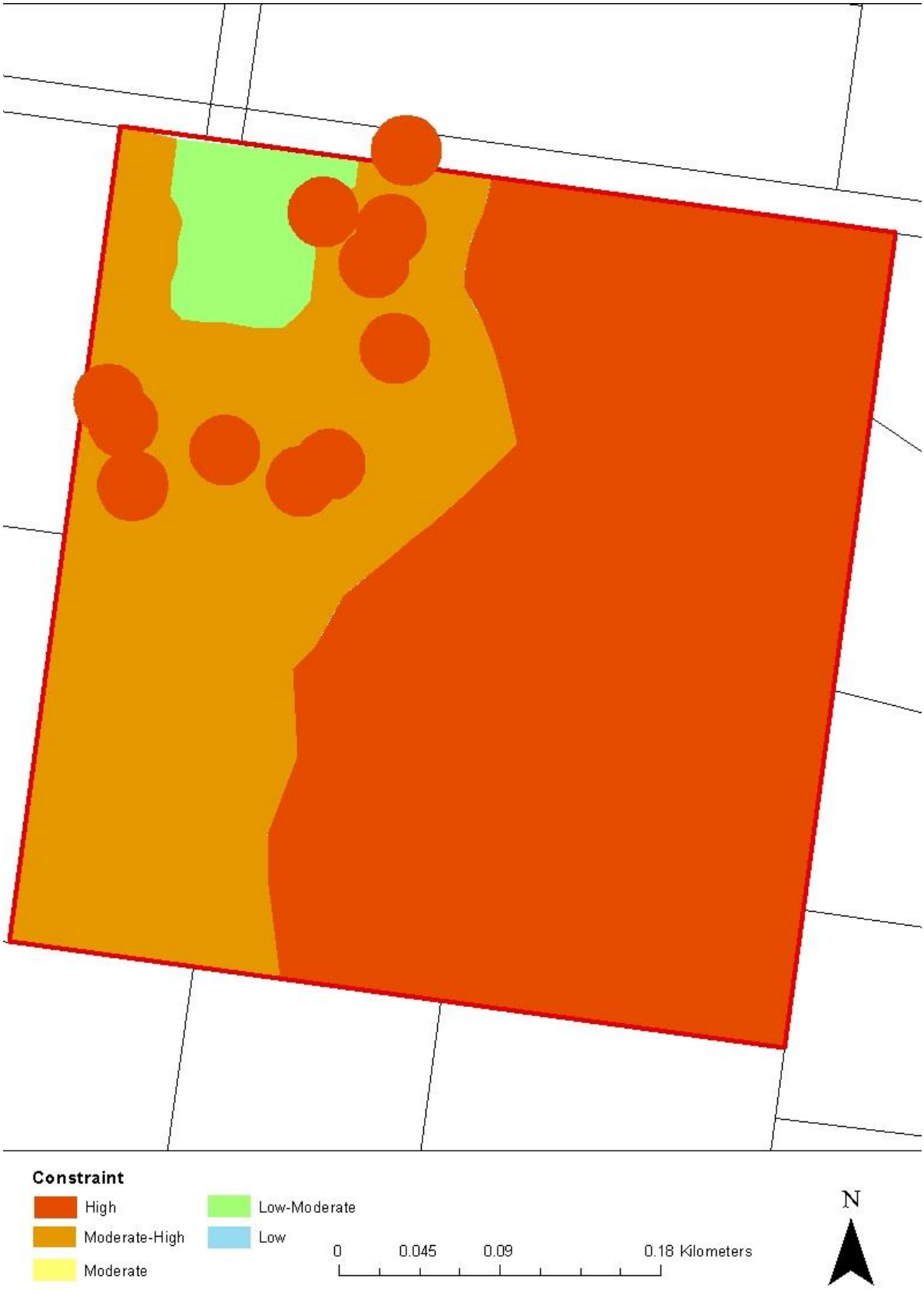


Figure 15 - Mortimer Road Environmental Opportunities/Constraints Map

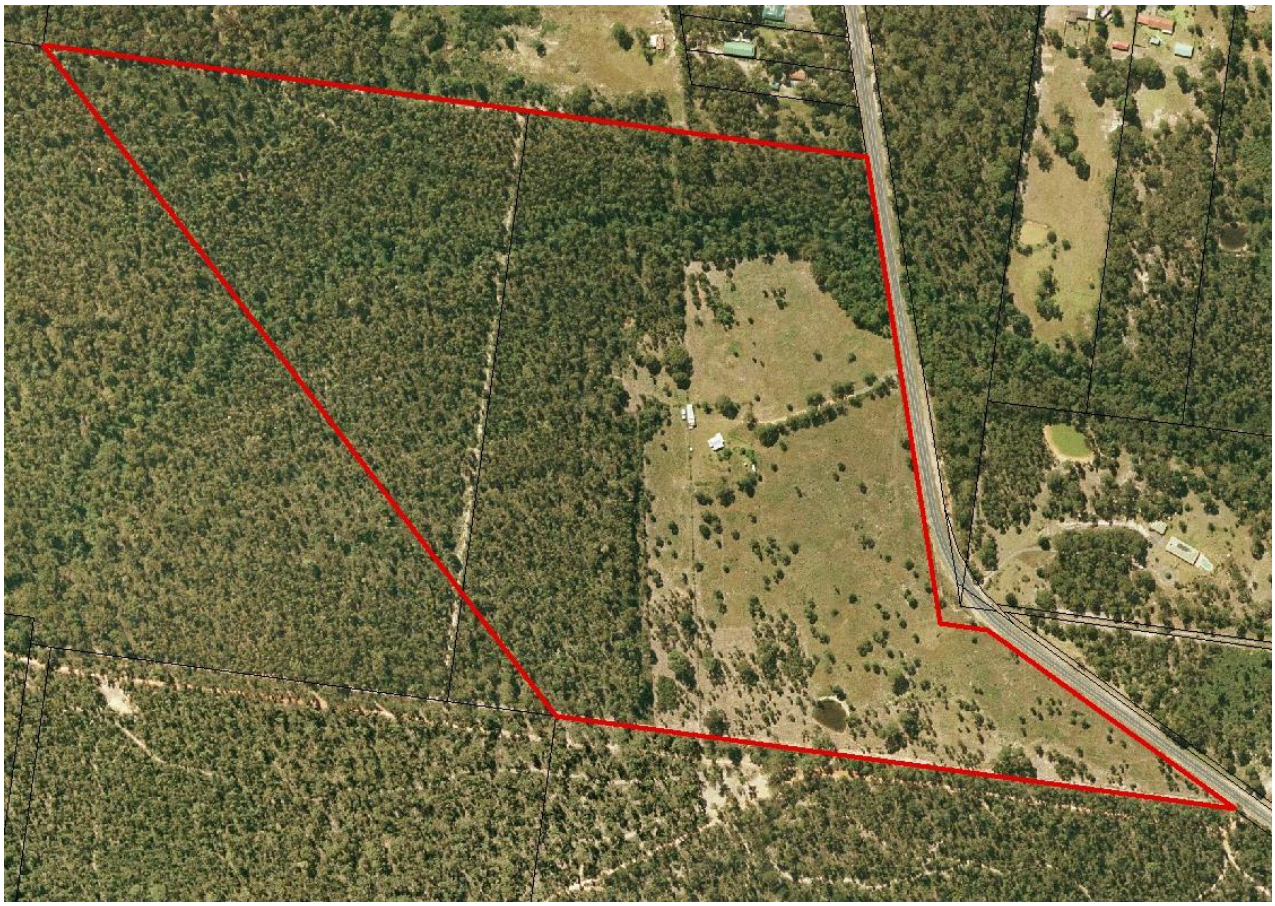
4.6.4 Mortimer Road - Conclusions

Table 16 – Opportunities and Constraints

Area	Opportunities	Constraints
Lot 4 DP 608099	There is further development potential surrounding the existing house and extending to the edge of the plateau. The area categorised as moderate is worthy of further analysis. If the threatened species issues turn out to be minimal then the area has few constraints.	Development beyond the edge of the plateau is not advisable. Not only will there be potential for flooding issues, the steep slope will be susceptible to erosion and access issues. It will also be difficult to meet the Bushfire Protection Requirements.

Note: This area was recently zoned R5 Large Lot Residential, with a minimum lot size of 2ha. As such it is unlikely that the landowner will wish to pursue further rezoning potential.

4.7 Two lots off Jervis Bay Road (Area 5)



4.7.1 Threatened Species Database Search results

4.7.1.1 Fauna

A number of Threatened animals and birds have been recorded within 5kms of the study area. These are listed below with reference to whether suitable habitat was found in the study area.

Table 17 - Threatened or migratory fauna species previously recorded within the locality or with the potential to occur across the study area

Scientific Name	Common Name	Conservation Rating	Habitat Present within study area
Tyto novaehollandiae	Masked Owl	Vulnerable (TSC and EPBC Act)	Hollow bearing trees and potential roost sites do exist. Appropriate habitat for prey.
Petaurus australis	Yellow-bellied Glider	Vulnerable (EPBC and TSC Act)	Good connectivity to surrounding vegetation with feeding resources present on site (including sap feed trees).
Calyptorhynchus lathami	Glossy Black Cockatoo	Vulnerable (TSC)	*Allocasuarina littoralis* was present on site as a feeding resource.
Ninox strenua	Powerful Owl	Vulnerable (TSC)	This species breeds and hunts in open or closed sclerophyll forest or woodlands. Appropriate sized hollow bearing trees and potential roost sites do exist. Appropriate habitat for prey.
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable (TSC) Endangered (EPBC)	Suitable habitat within the study area.
Callocephalon fimbriatum	Gang-Gang Cockatoo	Vulnerable (TSC)	Suitable habitat on site for foraging and breeding.
Cercartetus nanus	Eastern Pygmy Possum	Vulnerable	Potential to occur, suitable ground habitat.
Dasyornis brachypterus	Eastern Bristlebird	Endangered	Unlikely to be found in the study area.
Pteropus poliocephalus	Grey-headed Flying fox	Vulnerable (EPBC and TSC Act)	Suitable habitat within the study area for foraging.
Tyto tenebricosa	Sooty Owl	Vulnerable (TSC)	Suitable foraging and breeding habitat within the study area.
Lophoictinia isura	Square-tailed Kite	Vulnerable (TSC)	Suitable habitat within the study area for foraging and breeding.
Neophema pulchella	Turquoise Parrot	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable (TSC and EPBC Act)	Suitable habitat within the study area.
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Mormopterus norfolkensis	Eastern Freetail-Bat	Vulnerable (TSC)	Suitable foraging habitat within the study area.
Litoria aurea	Green and Golden Bell Frog	Vulnerable (EPBC and TSC Act)	Potential to occur in the riparian areas.

4.7.1.2 Flora

A number of threatened plants have been recorded within 5km's of the study area. These are listed below with reference to whether suitable habitat was found.

Table 18 - Known Threatened Flora

Scientific Name	Common Name	Conservation Rating	Habitat Present within study area
Melaleuca Biconvexa	Biconvexa Paperbark	Vulnerable (EPBC and TSC Act)	Potential to occur in riparian areas
Rhizanthella slateri	Eastern Australian Underground Orchid	Endangered (EPBC)	
Pterostylis ventricosa		Critically Endangered (TSC)	Potential to occur in this study area.
Syzgium paniculatum	Magenta Lily Pilly	Endangered (TSC), Vulnerable (EPBC)	

4.7.1.3 Endangered Ecological Communities

Three EECs have been recorded locally:

- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains

Only Swamp Sclerophyll Forest on Coastal Floodplains is likely to occur within the study area.

4.7.2 Field survey and Site Assessment

4.7.2.1 Vegetation description

This study area varies from grazed paddocks boardering Jervis Bay Road through to very good quality native vegetation. Numerous habitat features were observed on this site. A large portion of the study area is covered with a mature open forest community (as described in 4.1). The canopy of this community was dominated by Turpentines (*Syncarpia glomulifera*), Blackbutts (*Eucalyptus pilularis*), and red bloodwoods (*Corymbia gummifera*). It also has an intact mid and understorey with very low weed abundance. There are riparian areas on site which demonstrate characteristics consistent with the sclerophyll community described in 4.1. This site had limited heathland when compared to other study areas.

There are patches of this study area bordering the grazed land which are covered with dense black wattle. These areas are considered to have low ecological value.

4.7.2.2 Habitat Assessment

Habitat observations are detailed in the table below. These are also reflected in the Conservation Value Assessment. This site has hollow bearing trees of various sizes suitable for a range of animals and birds. There are glider incised feed trees and glossy black cockatoo feed trees. There was a dense mid story and also good quality riparian vegetation present.

Table 18 - Fauna Habitat

Habitat Type/ Resource present	Location	Species
Hollow-bearing trees	Evidence of previous logging. There were sparse hollow-bearing trees and dead stags in the study area. They ranged in size from very large to very small.	• Arboreal mammals • Microchiropteran bats • Hollow-dependent bird • Species
Fallen timber	Scattered throughout much of the study area. There was a significant amount of suitable debris to provide habitat for reptiles.	• Small mammals • Reptiles • Insects
Black She-oak	Numerous feed trees occur across the site. There *Allocasuarina littoralis* present providing a good feeding resource	Glossy Black-cockatoo
Leaf litter	Across most of the site which has not been cleared. Usually coupled with fallen timber. Diggings were also observed.	• Reptiles • orchids
Heathy understorey	Areas within the Scribbly Gum – Red Bloodwood - Grey Gum woodlands.	• Small mammals • Some birds
Sap Feed Trees	Numerous sap feed trees were observed on this site	• Gliders

4.7.2.3 Hollow-bearing Trees

Hollow-bearing trees (HBT) are an important resource for many hollow-dependent species and the distribution of HBT across an area will largely determine the distribution of such species. Some hollow bearing trees were detected on the vegetated portion of this study area. However, there were not in high abundance due to previous logging. They were not all mapped due to the inaccessibility of the site.

Given the combination of obvious habitat resources and evidence of use by various species it was determined that the area would require a significant level of flora and fauna assessment prior to any future proposal to intensify the usage of the site. This is reflected in Figure 18 of this report.

4.7.2.4 Slope Analysis

Figure 17 depicts the elevation of the land in this study area. It demonstrates a gentle slope down to a low lying riparian area near the northern boundary of the study area. Slope is not considered to be a problematic constraint for this land.

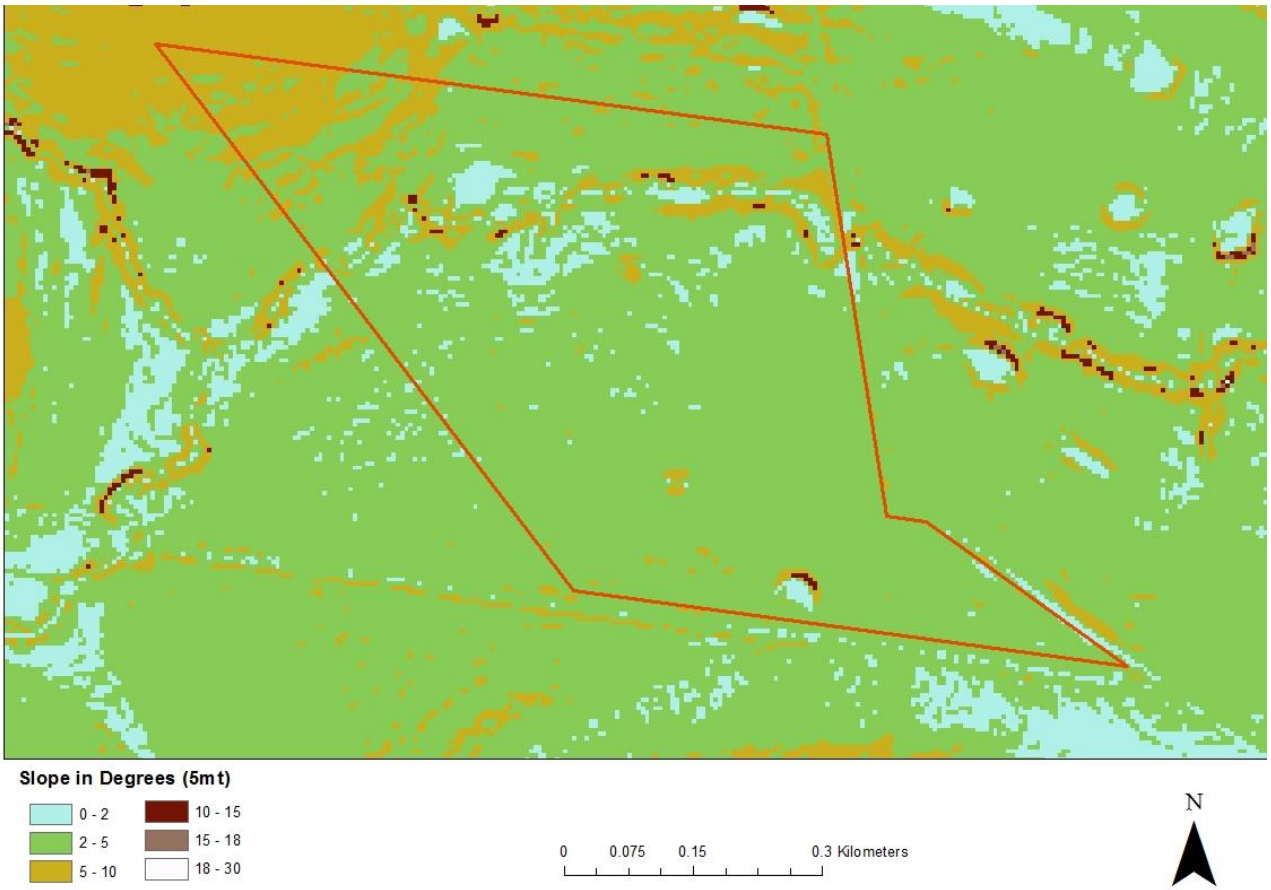


Figure 17 – Jervis Bay Road Slope Analysis

4.7.3 Conservation Value Assessment Results – Jervis Bay Road

Figure 7 on the following page represents the values attributed to each lot as a result of the conservation scoring. It does not dictate 'absolute constraints' but rather provide an indication of the level of further investigation and assessment which would be required to facilitate a rezoning outcome.

In the case of this site not all habitat features were recorded. The bush was extremely dense and intact. A random meander with the owners yielded evidence of an abundance of habitat features (sap feed trees, hollow bearing trees, hollow logs, small mammal tunnels, and Glossy Black Cockatoo feed trees).

Figure 18 - Jervis Bay Road Environmental Constraints Map

4.7.4 Conclusions - Two lots off Jervis Bay Road

Table 20 - Constraints and Opportunities

Area	Opportunities	Constraints
Lot 3 DP 846470	This lot has been cleared and grazed. There is evidence of weed invasion and patches of dense black wattle considered to be of low ecological value.	Low
Lot 2 DP 846470	Limited	A significant flora and fauna investigation would be required to facilitate any development of this site. It has high conservation value for a range of threatened fauna.

5 LIMITATIONS

Given the timeframe provided for development of this report, it is based on a strategic habitat constraint assessment. While random meanders for summer flowering orchids were undertaken, there are species that could not be surveyed at this time (e.g. *Pterostylis Ventricosa*) and the survey effort is not adequate to determine a definitive presence or absence even for the summer flowering species.

Given the limitations associated with all surveys, these studies instead aimed to provide an overall assessment of the ecological values of the site with particular emphasis on threatened species. For those species of conservation significance that were not detected but with the potential to occur, an assessment of the likelihood of occurrence was based on the presence of suitable habitat.

This report gives an indication of the level of study which would be required with regard to environmental factors should owners wish to continue with rezoning investigations.

Appendix A

Scoring

High Environmental Constraint	≥ 25
Moderate – High Constraint	21– 25
Moderate	16 – 20
Low - Moderate	11 – 15
Low constraint	< 10

Attribute	Value for each
WEEDS	
Low weed invasion (> 5%)	4
Moderate weed invasion (6-25%	3
High Weed invasion (65 -75%)	2
Extreme	1
STRATA	
All strata present	3
Two strata present	2
One stratum present	1
AGE	
Mature Veg	4
Regrowth with scattered mature trees	3
Regrowth no mature trees	2
Regeneration juveniles	1
CONNECTIVITY	
Connected to adjoining extensive bushland	4
Minor fragmentation but otherwise connected to extensive bush	3
Part of a narrow riparian corridor	2
Isolated	1
CONSERVATION SIGNIFICANCE	
EPBC Act/TSC Act	4
Regionally Significant	3
Locally significant	2
OTHER	
Fauna Habitat	1
Hollow bearing tree	1
Fallen timber	1
Ground dwelling mammal habitat	1
Winter flowering eucalypts	1
Reptile habitat	1
Amphibian habitat (creeks, streams or dams)	1
GBC foraging resources	1
THREATENED SPECIES	
Known threatened species habitat	2
Provides potential habitat for threatened flora	1
TOTAL	