
Prepared by Strategic Planning Unit
Eurobodalla Shire Council 2006

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# 1 Introduction

This environmental site analysis is an initial desktop analysis of sensitive urban lands in the Eurobodalla Shire as identified by the Draft South Coast Regional Strategy 2006. These lands comprise 5 separate locations across the shire that are currently under pressure for development. From north to south the locations are:

1. Long Beach urban expansion area;
2. Malua Bay urban expansion area;
3. Rosedale urban expansion area;
4. Moruya Heads urban expansion area; and
5. South Narooma Urban expansion area.

The land is zoned under the Eurobodalla Rural Local Environmental Plan (LEP) 1987 as Urban Expansion 10. This document will explore the suitability of any development over these lands by utilising a Geographic Information System (GIS) and various environmental map overlays.

# 2 Methodology

## 2.1 Digital mapping layers

The following digital mapping layers are utilised for the desktop analysis:

| | |
|---|---|
| Acid Sulphate Soils | SEPP 14 wetlands |
| Bushfire hazard | Soil regolith stability |
| Eurobodalla Rural LEP 1987 | Fauna habitat linkages |
| DNR Riparian Corridor Management Objectives & Natural drainage | Vulnerable vegetation ecosystems |
| Slope | 1% Floodline and extreme flooding |
| | Absolute Constraints |

Results will be obtained by utilising existing mapping as an overlay to determine any constraints to development occurring on or near sensitive urban lands. Due to the broad scale of some of the mapping layers, further field investigation may be required to firmly establish accuracy. The analysis will be done starting in the north of the shire and working south.

### 2.1.1 Acid Sulphate Soils

The term acid sulphate soils refers to soils that contain iron sulphides which, when exposed to oxygen due to disturbance, generates sulphuric acid that can have a detrimental affect on natural ecosystems. Acid sulphate soils are formed by natural processes and usually occur in low-lying parts of coastal floodplains, rivers and creeks.

The former Department of Infrastructure Planning and Natural Resources (DIPNR) undertook mapping along the NSW Coastline to create a digital mapping layer showing the probability for the occurrence of these soils.

### 2.1.2 Bushfire Hazard

Bushfire hazard mapping was prepared in conjunction with NSW National Parks & Wildlife, (now DEC), as part of the Eurobodalla Coastal Environment Capacity Planning Project (ECECP). The digital mapping layer was compiled by modelling the occurrence of a number of environmental criteria to establish a bushfire hazard rating.

There is scope to minimise the impact of bushfire hazard with the introduction of Asset Protection Zones (APZ) for bushfire protection. The APZ acts as a buffer zone between the development and

the hazard. The documents *Planning for Bush Fire Protection* and *Building in Bush Fire Prone Areas* are used to determine appropriate APZs. It is noted that overzealous application of APZs is causing vegetation removal and consequent soil erosion that is compromising the largely undeveloped qualities favoured by residents and visitors to the Eurobodalla Nature Coast.

### 2.1.3 Eurobodalla Rural LEP 1987

The lands identified as being Urban Expansion 10 are zoned under Council's primary rural planning instrument.

The objectives of this zone are:
(a) to identify areas within which urban development may be accommodated;
(b) to ensure that consideration is given by the Council to -
- the impact of urban development on the physical environment;
- the social and economic impact of urban development;
- the range and pattern of land uses appropriate to the land;
- the limits of urban development within the urban expansion zone in view of the fact that urban development will not necessarily proceed over all of the land within this zone; and
- the extent, range and capacity of services to be provided to the land and the economic, social and environmental cost of providing those services;

(c) to ensure that adequate services and community facilities are provided with development especially but not exclusively within residential areas within this zone;
(d) to ensure that no development is permitted within this zone which would, in the view of Council, jeopardise the future use of any of the land within this zone for urban purposes; and
(e) to ensure that sensitive environmental features, including wetlands, archaeological sites and areas of high scenic or scientific value, are identified and permanently conserved.

### 2.1.4 DNR Riparian Corridor Management Objectives

The Department of Natural Resources (DNR) undertook mapping of selected rivers and creeks to determine management options for conservation of native vegetation to ensure bank stability and good water quality is maintained. Riparian Corridor Management Objectives provide initiatives for the protection and/or restoration of individual watercourses and their vegetated buffer zones, according to their relative importance and future function within a catchment.

1. **Category 1 – *Environmental corridor***. The overarching objective is to provide biodiversity linkages by maintaining connectivity for the movement of aquatic and terrestrial species along the riparian corridor and between key destinations (eg between bottom and top of catchment, between wetlands and large nodes of vegetation, etc.). This Category is coloured red when mapped, and builds upon Category 2 and 3.

2. **Category 2 – *Terrestrial and aquatic habitat.*** The overarching objective is to provide basic habitat and preserve or emulate as much as possible a naturally functioning stream (not necessarily linking key destinations). While accepting the width of the riparian corridor will not fully satisfy the requirements of a Category 1 – Environmental Corridor, the width must still be sufficient to provide long term robust habitat and refuge for native fauna. This Category is coloured green when mapped and builds upon Category 3.

3. **Category 3 – *Bank stability and water quality.*** As implied, the overarching objectives are to prevent accelerated rates of soil erosion and to enhance water quality. This Category may have limited habitat value but contributes to the overall basic health of a catchment. While an open watercourse emulating some natural stream function is the preferred option, it is recognised, for example, that the practicality and economics of developing urban land may make this difficult. It is this Category of watercourse where it may be possible to negotiate trade-offs. This Category is coloured blue when mapped.

### 2.1.5 Slope

Hill slope greater than 25% (approx 14.3 degrees) is considered a constraint to development. The greater the slope the more likely that, when disturbed, fine grained sediment will be carried down slope to receiving waters with effects on water quality, habitat and biota. The greater the slope the more clearing is required for bushfire protection thus there is greater chance of erosion and runoff. Transportation of sediments will be minimal providing the correct procedures for sediment control are put in place during any works. Mapping is derived from 10m contour data.

### 2.1.6 SEPP14 Wetlands

State Environmental Planning Policy (SEPP) 14 identifies coastal wetlands protected by legislation. Wetlands are sensitive ecosystems, with high biodiversity, habitat and water catchment values. Wetlands themselves are restricted from development, although impacts such as pollution and sediment runoff in wetland buffers can lead to negative impacts on wetlands and adjoining waterways. The SEPP 14 wetlands include mangrove and saltmarsh communities. Saltmarsh was listed as an Endangered Ecological Community (EEC) in 2004 under the Threatened Species Conservation Act.

### 2.1.7 Soil Regolith Stability

Based on mapping of soil landscapes by DLWC, this layer evaluates soil characteristics in terms of erodibility and sediment delivery potential. Areas classed as unstable are unsuitable for development. Coarse grain sediment is relatively easy to retain on site. Fine-grained sediment is likely to be a problem on steep slopes near creek lines.

### 2.1.8 Fauna Habitat Linkages

This layer is made up of Aggregate Core Habitat as described in the report *Fauna Key Habitats and Habitat Linkages of Eurobodalla Local Government Area* (NPWS, 2000), combined with Fauna Habitat Linkages as identified in the report *Assessment of Fauna Key Habitat Linkages and Considerations for Management* (Gaia Research, 2001). The aim of habitat linkages is to retain connections or corridors across the landscape. This layer does not include all fauna habitat rather those areas identified as key habitat linkages through predictive modelling. It does not represent a comprehensive capturing of fauna habitat values on private coastal lowlands within the Shire but is the best available information until ground-truthing and mapping of Endangered Ecological Communities and other high conservation value areas is complete.

### 2.1.9 Soil Wetness & Natural Drainage Lines

Soil wetness or hydrology constraint is based on mapping of areas that are unsuitable for septic absorption trenches due to soil water retention of greater than 80% in an average rainfall year (when this data is available). The constraint is also based on natural drainage lines such as creek lines and gullies, and includes a 20 metre riparian buffer over all natural drainage lines. The constraint aims to minimise impacts of erosion, sediment, nutrient and bacterial loads in receiving waters and thus minimise effects on water quality, habitat quality and biota. Mapping is based on 1:25,000 topographic maps.

### 2.1.10 Vegetation Ecosystems

Vegetation mapping was done across the shire as part of the Eurobodalla Coastal Environmental Capacity Planning Project and to assist the Comprehensive Regional Assessment (CRA). A digital mapping layer was produced identifying ecosystems, dominant species and threats, using various criteria and air photo interpretation. The reports *Terrestrial Ecosystems of the Eurobodalla Local Government Area* (NPWS, 2000) and *Vulnerable Ecosystems of the Eurobodalla Shire* (EcoGIS, 2001) are available to view on Council's website.

Vulnerable vegetation identifies those native vegetation ecosystems that are most at risk due to past and present threats such as land clearing. Category 1 vulnerable ecosystems are classed as an absolute constraint and include the six ecosystems under most pressure. They are:

1. No. 24 - Coastal Swamp Oak - Swamp Melaleuca Wet Heath Swamp Forest
2. No. 25 - South Coast Swamp Oak Forest Complex
3. No. 27 - Coastal Swamp Oak - Bangalay Swamp Forest
4. No. 189 - Coastal Alluvial Valley Floor Wetlands
5. No. 54 - Coastal Forest Red Gum Shrub / Grass Forest
6. No. 51 - Araluen Yellow Box - Maidens Blue Gum Acacia Herb - Grass Dry Forest

The first five of these ecosystems are listed as Endangered Ecological Communities under the NSW Threatened Species Conservation Act 1995. This listing affords these communities a level of legal protection.

### 2.1.11 1% Floodline and extreme flooding

Where available this information will be utilised to look at flood levels posing any constraint to development. This information is based on flood modelling produced by consultants to determine freeboard and building heights in areas that are prone to flooding.

### 2.1.12 Absolute Constraints

As part of the Eurobodalla Coastal Environmental Capacity Planning Project, Council, in conjunction with state government departments including DEC, Department of Agriculture and the Department of Lands (formerly LPI), gathered computer-based mapping data. This data is used to determine areas in the shire that are considered suitable for development and those considered to be constrained. Lands identified as having "Absolute Constraint" are considered non-development areas.

Absolute constraints to development occur where slopes are greater than 25%, SEPP 14 wetlands are present, vulnerable vegetation/EECs exist, bushfire hazard is extreme, soil wetness is greater 80%, riparian corridors, or there is a high probability of acid sulphate soils.

### 2.1.13 Development capability

An estimate of potential residential lot yield is given for each urban expansion compartment. The estimate is based upon the remaining area of land considered suitable for development having removed absolutely constrained land and a further 25% for services. This remaining area of developable land is then divided by the average lot size of the surrounding locality. Lot yields may differ in this analysis to those provided in Council's Residential Land Monitor as thinking evolves about the preservation of settlement character (implementing directions and principles of the draft Eurobodalla Urban Settlement Strategy). It is felt that, where suitable for development, these urban expansion areas should be developed in the same manner as the immediate neighbouring area, for example, as 2ec Residential – Environmental Constraints with a lot size of 1500 square metres if the adjoining land is zoned 2ec.

# 3 Analysis – Long Beach

## 3.1 Locality


Figure 1 Location of the Long Beach sensitive urban land

## 3.2 Acid sulphate soils

Figure 2 shows the probability of acid sulphate soils occurring on or around the site. The mapping shows low probability of these soils in the area, which mainly occur over the wetlands either side of the urban expansion 10 boundary These areas do not pose a problem to development if left undisturbed.

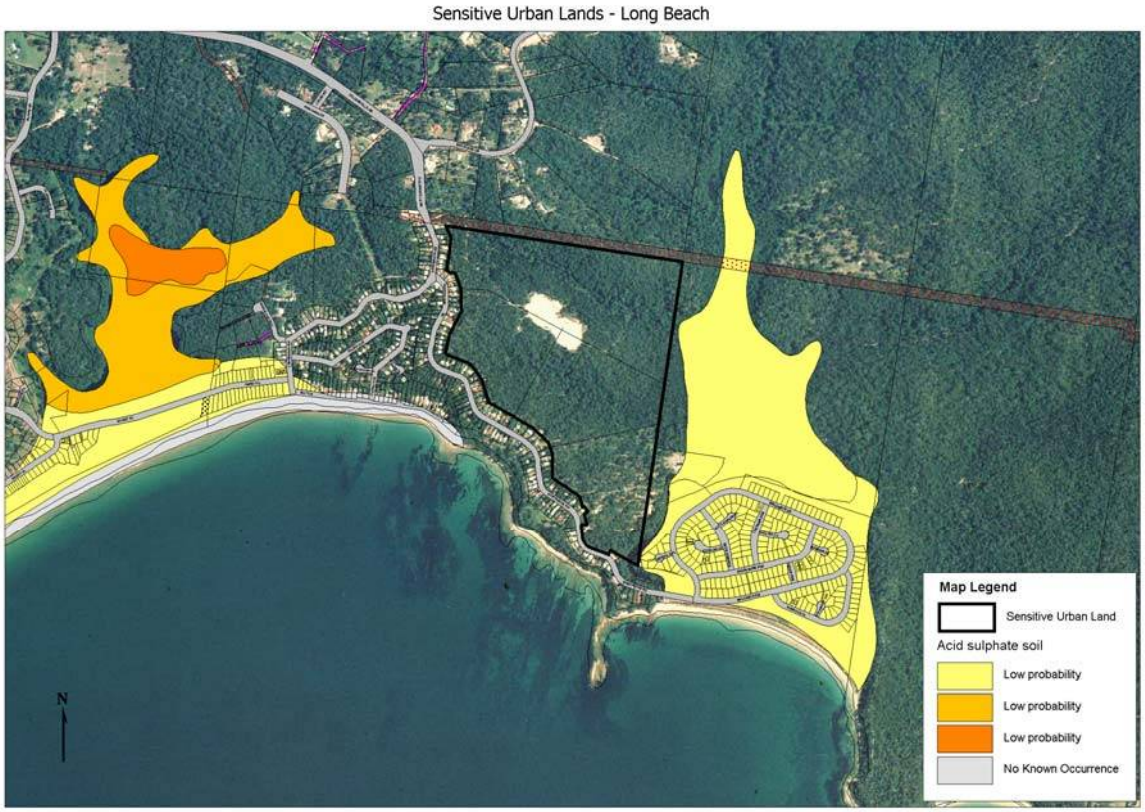



Figure 2 Probability of acid sulphate soils

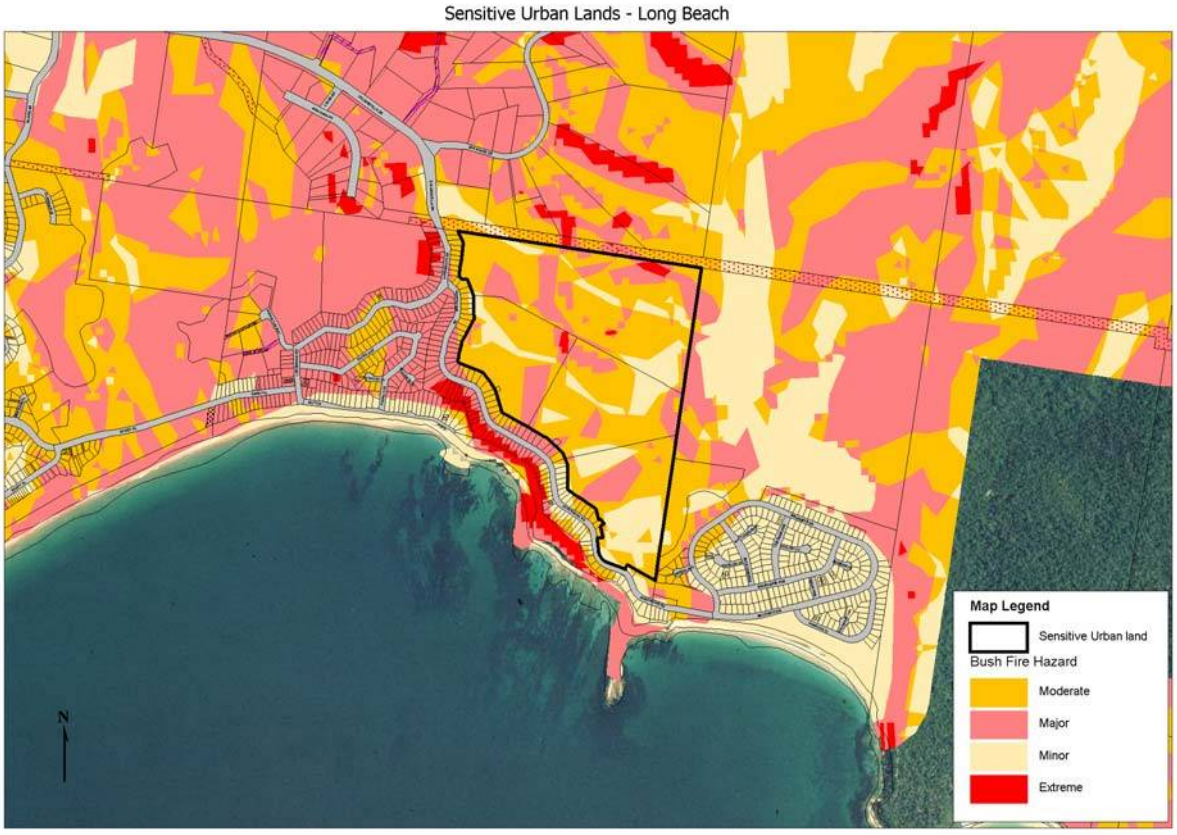



Figure 3 Bush fire hazard map

### 3.3 Bushfire Hazard

Figure 3 shows the bush fire hazard for the Long Beach sensitive urban land. The map illustrates that the majority of the site is classified as moderate bush fire hazard, with some small pockets of extreme and major hazard. These hazards are due to the area being heavily vegetated with large fuel loads and steeper slopes. Care should be taken to avoid the clearing of steep slopes as this may lead to severe erosion problems.

### 3.4 Eurobodalla Rural LEP 1987

The land is zoned as Urban Expansion 10 under the Eurobodalla Rural LEP 1987 (see 2.1.3 for objectives of zone). The area backs onto the urban zone of 2g – residential and is surrounded by 1a – rural (environmental constraints & agricultural) zone with 7a - protected wetlands to the east and the zone 1c – rural smallholdings to the north.

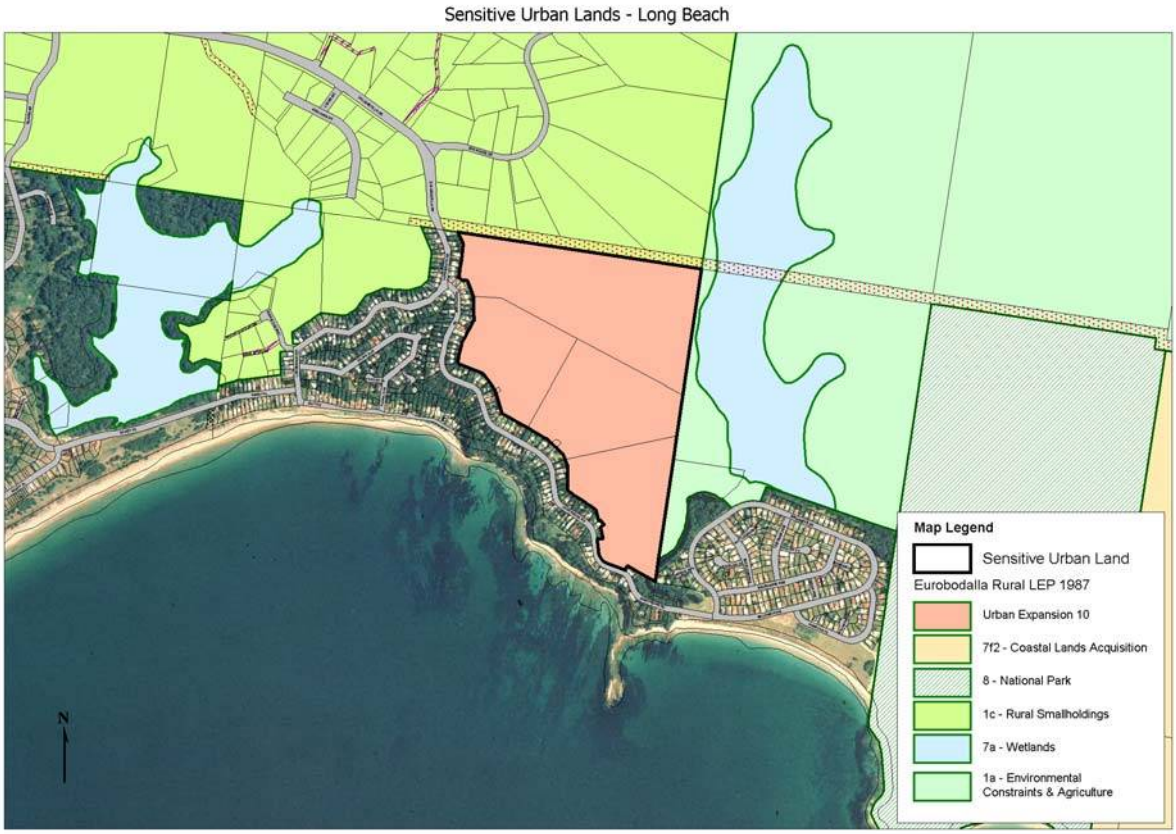



Figure 4 Eurobodalla Rural LEP 1987 Zones

### 3.5 DNR Riparian Management Objectives and Natural Drainage Lines

Figure 5 shows the creeks and gullies across the site are classed as category 1 – Environmental Corridor and category 2 – Terrestrial and Aquatic Habitat. The native vegetation buffers for these categories are 40m from the top of bank for category 1 and 20m from the top of bank category 2.

The natural drainage lines across the site flow into a protected wetland to the east and must be protected from erosion, sedimentation and disturbance from any earth works to avoid the degradation of stream or creek bank that could have a negative impact on the wetland ecosystems.

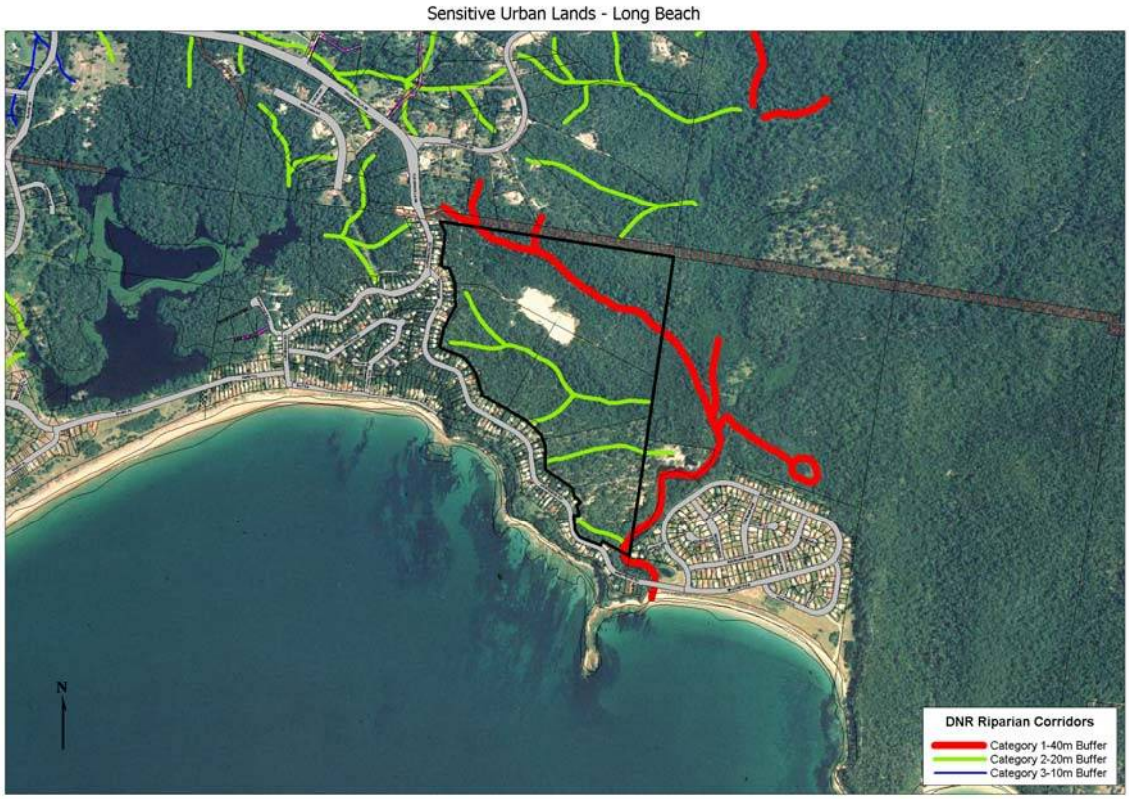



Figure 5 DNR Riparian Corridor Management Objectives

## 3.6 Slope

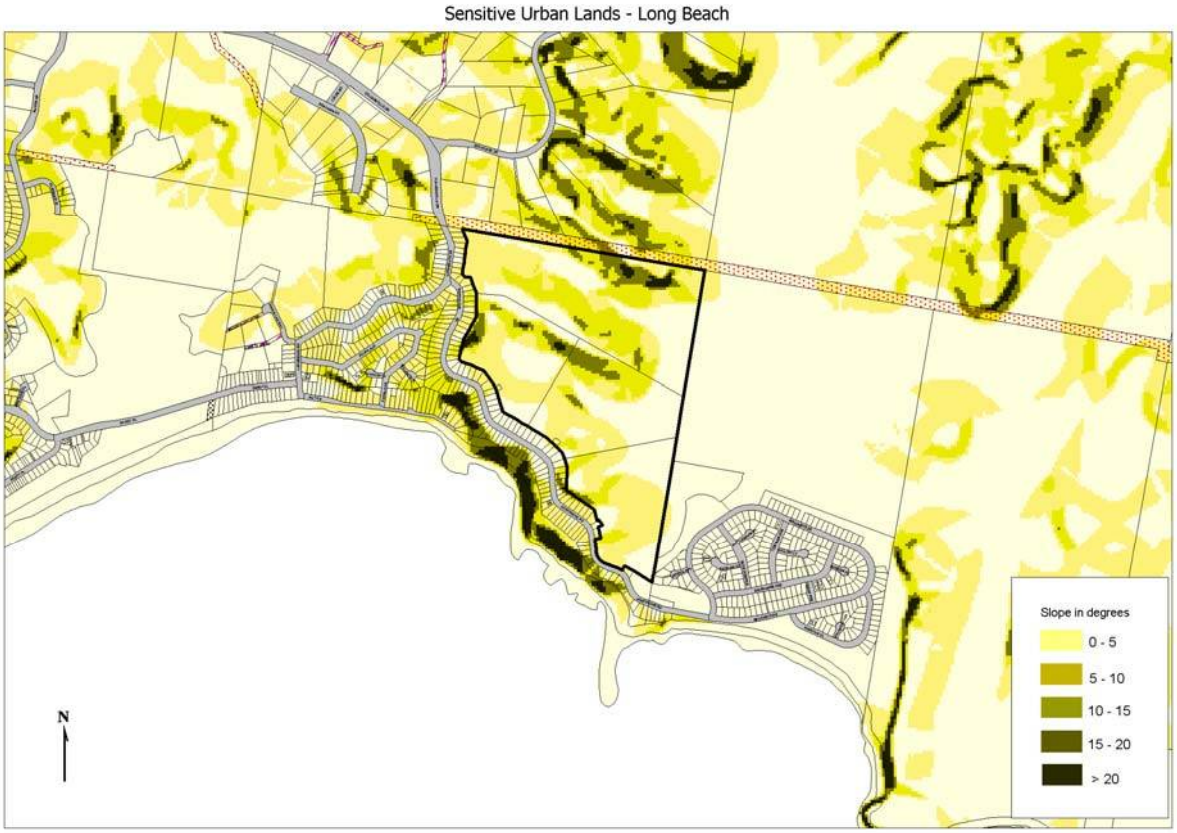



Figure 6 Long Beach Slope map

Figure 6 shows the slope map for the Long Beach sensitive urban land. The site is undulating with depressions where the natural drainage lines occur. There are steep slopes on the site in the 10 – 20 degree range and these are considered non development areas due to the possibility of erosion from the clearing of vegetation.

### 3.7 SEPP 14 Wetlands

State Environmental Planning Policy 14 places planning and development controls under the Environmental Planning and Assessment Act 1979 over wetlands identified as having significant environmental values. These wetlands require development consent for clearing, draining, filling, or levee construction. Correct procedures for sediment fencing and other mitigation works should be followed to minimise any runoff into these wetlands.

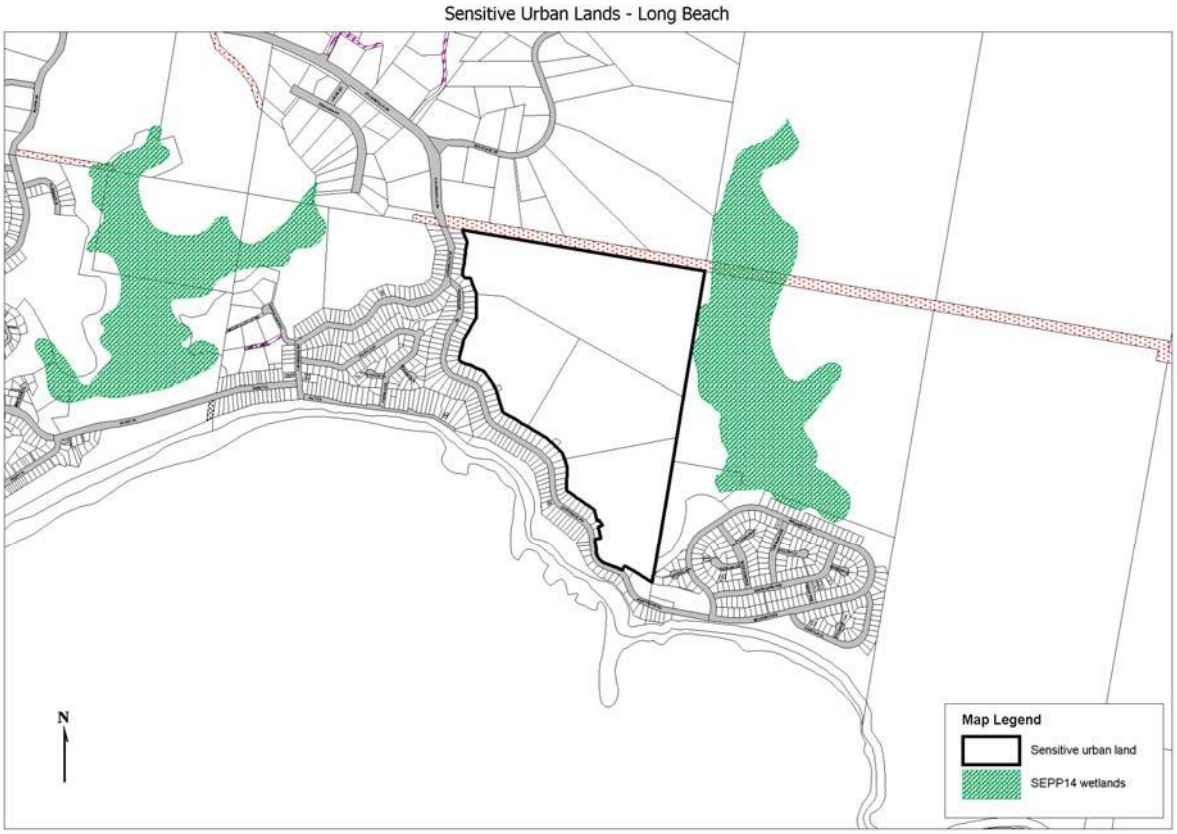



Figure 7 SEPP14 Wetlands

### 3.8 Soil Regolith Stability

Soil regolith is mapped as being stable in this area of Long Beach and for the sensitive urban lands. The soil type is considered to have low erosion potential but care should be taken to avoid any sediment transportation during works with sediment fencing (no map has been included).

### 3.9 Fauna Habitat Linkages

Aggregate core habitat displays those areas of the shire that are likely to support the highest diversity of native animal species. Figure 8 shows that part of the Long Beach sensitive urban land is identified as being of high value habitat. It is important to create and maintain a link between areas of high value habitat for future biodiversity and so native animals can move between these areas to feed and reproduce.

The precautionary approach to development in the shire would be to exclude development in areas of moderate or highest core habitat. If development is to be pursued in highest core habitat areas,

then the development proposal should provide a Species Impact Statement (SIS) as part of an application to determine the likely impact of a particular development on local native species.

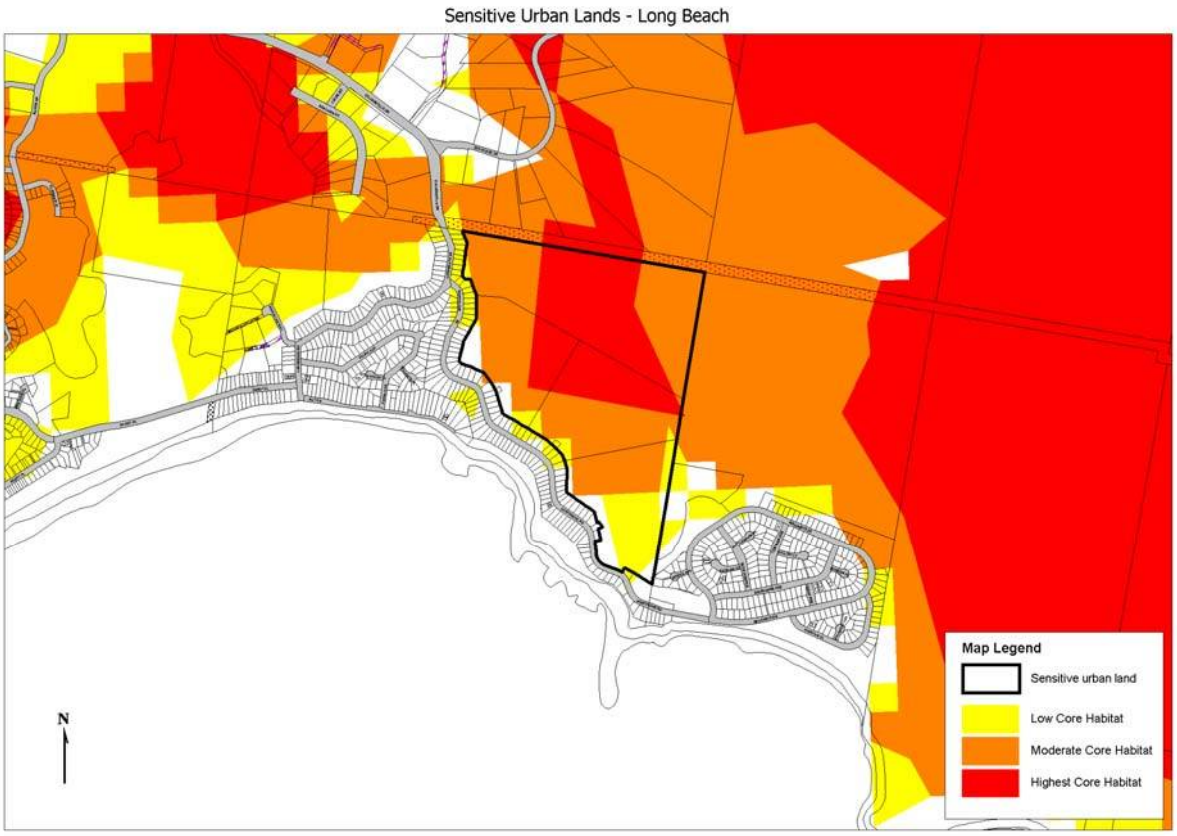



Figure 8 Core fauna habitat

### 3.10 Vegetation Ecosystems

Figure 9 shows the vegetation mapping for Long Beach. The area is well vegetated with the majority of the site being covered by a composite of veg unit 9 and 21 with the dominant species being:

- Corymbia maculata (spotted gum);
- Eucalyptus pilularis (blackbutt); and
- Macrozamia communis (Burrawang).

There are two vulnerable vegetation types in the surrounding area which are directly associated with the wetlands. These are:

- South Coast Swamp Oak Complex with the dominant species being:
  - Casuarina glauca (Swamp Oak),
  - Acacia sophorae (Coastal Wattle),
  - Avicennia marina (River Mangrove), and
- Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest with the dominant species being:
  - Casuarina glauca (Swamp Oak),
  - Melalueca ericifolia (Swamp Paperbark).

Any subdivision plan should show the proposed building envelopes and be accompanied by a landscape plan showing native habitat trees that are to be retained. Being recognised as such a

diverse area for fauna habitat, it is crucial to the biodiversity of the region to retain as much vegetation as possible.

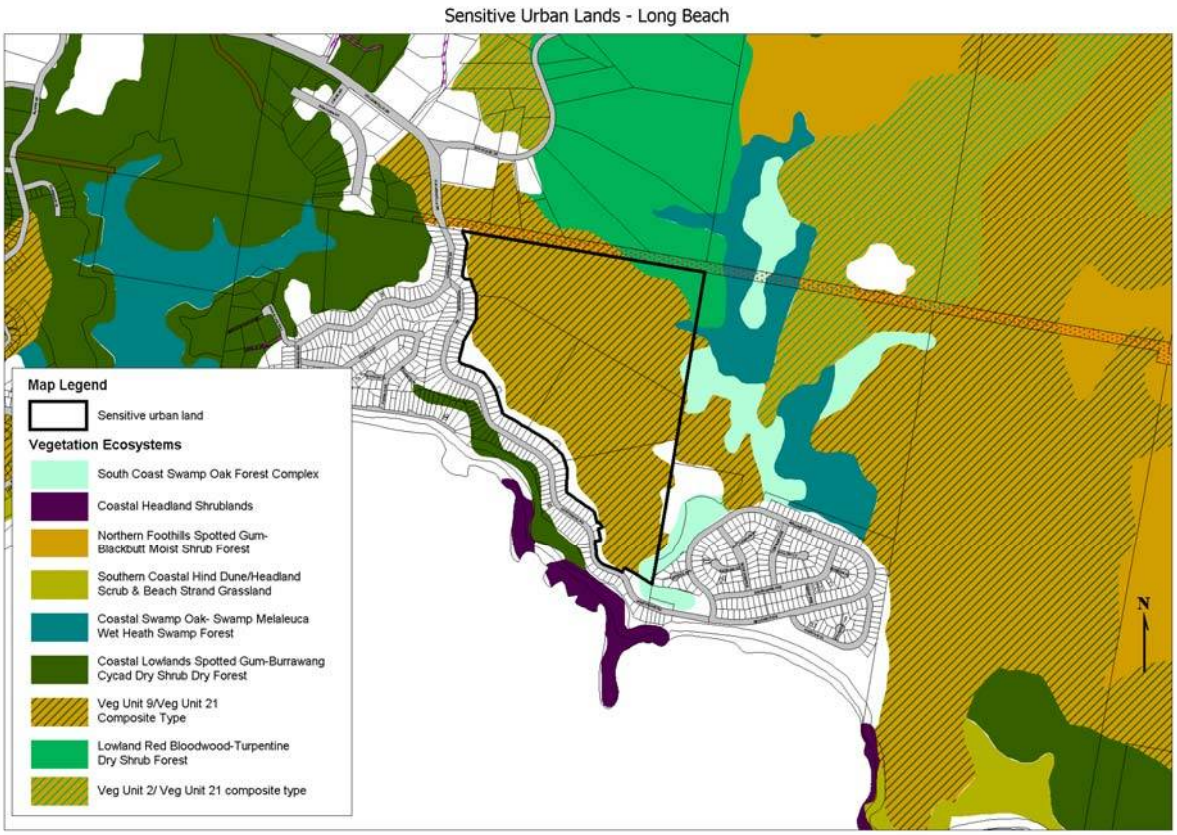



Figure 9 Vegetation ecosystems for the Long Beach sensitive urban land

### 3.11 Flooding

There are no flooding issues associated with the Long Beach sensitive urban land due to the elevation and slopes on the land.

### 3.12 Absolute Constraints

This area of Long Beach is subject to various absolute development constraints. Figure 10 shows the constraint mapping for the site. The main constraint over the sensitive urban land is the natural drainage lines and associated soil wetness in these gullies that flow into the protected wetland. The soil wetness constraint refers to the soil structure and the ability of the soil to drain, or retain moisture. This is mainly a concern for the onsite treatment of septic as it will runoff the surface into wetlands, rivers or creeks and does not get absorbed into the ground.

There is a slope constraint where the slope is greater than 15 degrees. This becomes a problem for development as clearing vegetation for bush fire protection can lead to greater erosion or runoff problems.

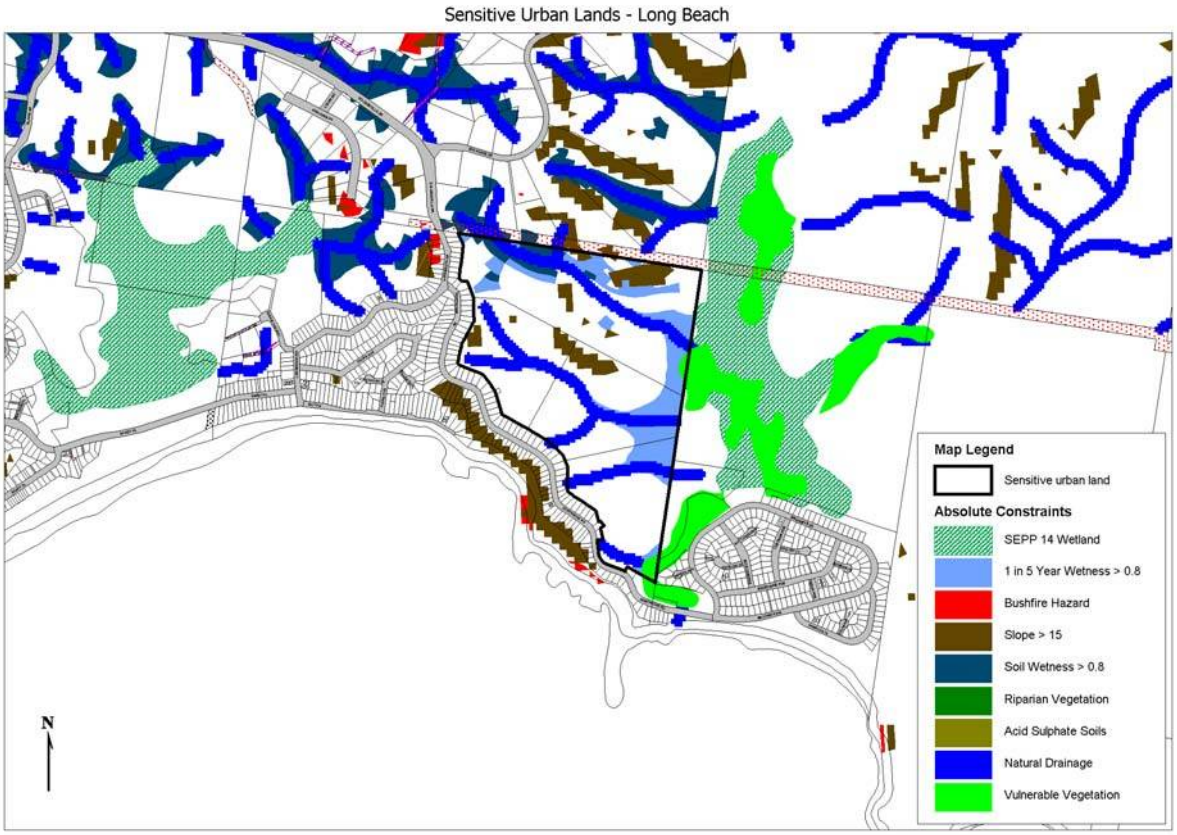



Figure 10 Absolute Constraints for Long Beach


Figure 11 Long Beach sensitive urban lands looking toward Batemans Bay

### 3.13 Visual Assessment for Long Beach Sensitive Urban Land

The south east facing slopes of the Long Beach urban expansion zone present an important vegetated backdrop to the Batemans Bay estuary and when viewed from the settlement of Batehaven. It is important to keep this visual amenity intact as it helps represent the nature coast. Figure 11 shows an aerial view of the Long Beach sensitive urban land looking across the Clyde River entrance to Batehaven.

### 3.14 Development Capability

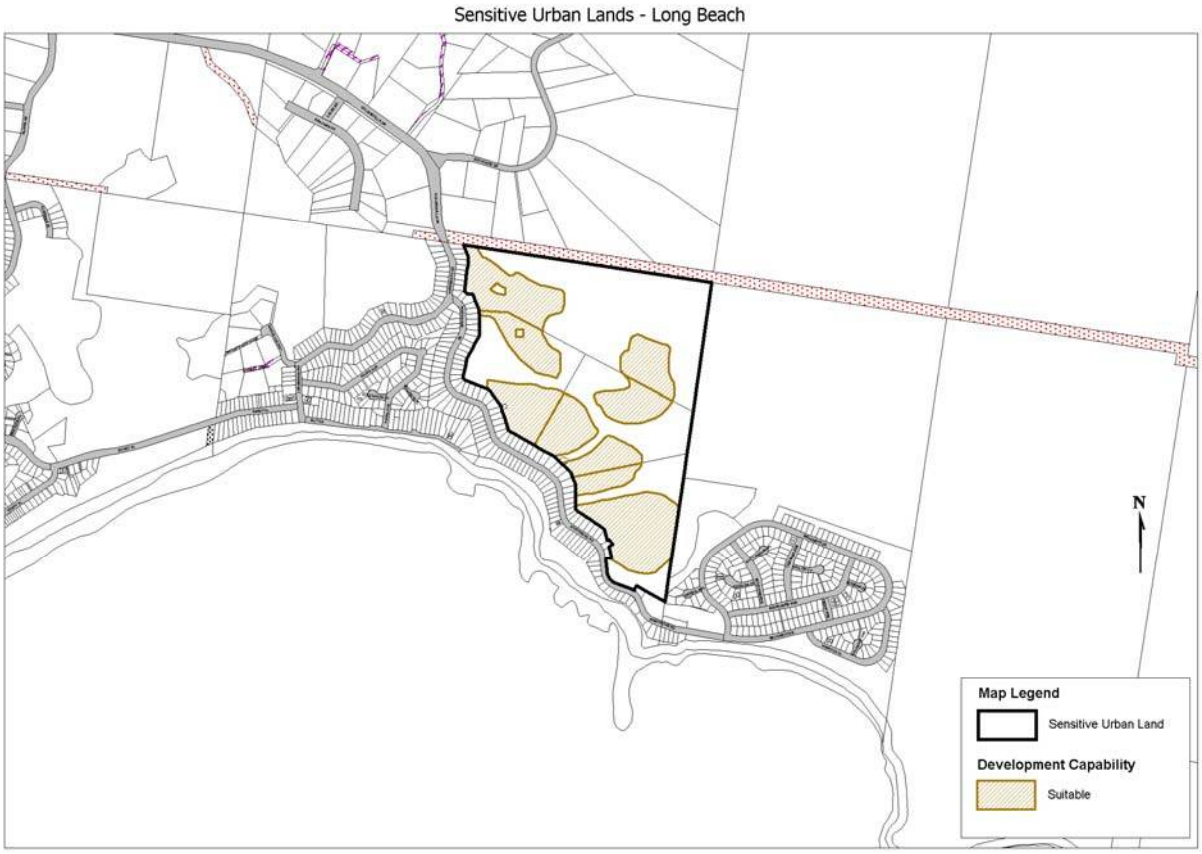



Figure 12 Development Capability for Long Beach sensitive urban land

Figure 12 shows the developable area for the Long Beach sensitive urban land. This suitable area is obtained by subtracting the absolute constraints from the total area of the land. From this we can get an approximate lot yield as shown below:

Total suitable area = Approx. 27 ha
Minus 25% for servicing (roads, easements etc) = Approx. 20.25 ha
Estimated Lot yield @ 700sqm (locality average) = Approx. 289 lots

# 4 Analysis – Malua Bay

## 4.1 Locality

Figure 13 shows the location of the Malua Bay sensitive urban land. It covers approximately 139 hectares of vegetated, undulating terrain to the west of Malua Bay urban area. The area has been subject to extensive urban development and is probably the fastest developing urban expansion area in the Eurobodalla Shire.

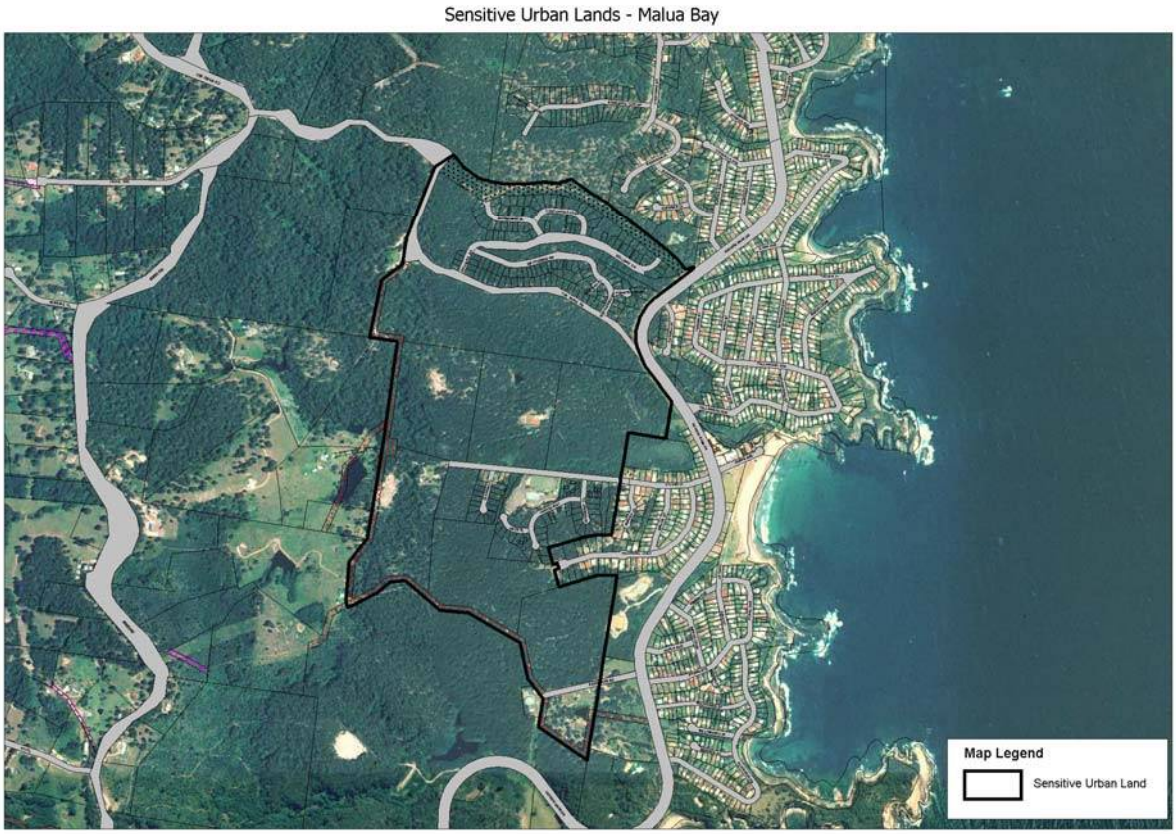



Figure 13 Malua Bay sensitive urban land

## 4.2 Acid Sulphate Soils

Figure 14 shows the probability of acid sulphate soils in the Malua Bay sensitive urban land area. From this mapping there appears to be no major concern for these soils. The gully to the east shows a low probability for the occurrence of acid sulphate soil where the gully meets a wet, backwater area. This will not pose a problem if it is left undisturbed.

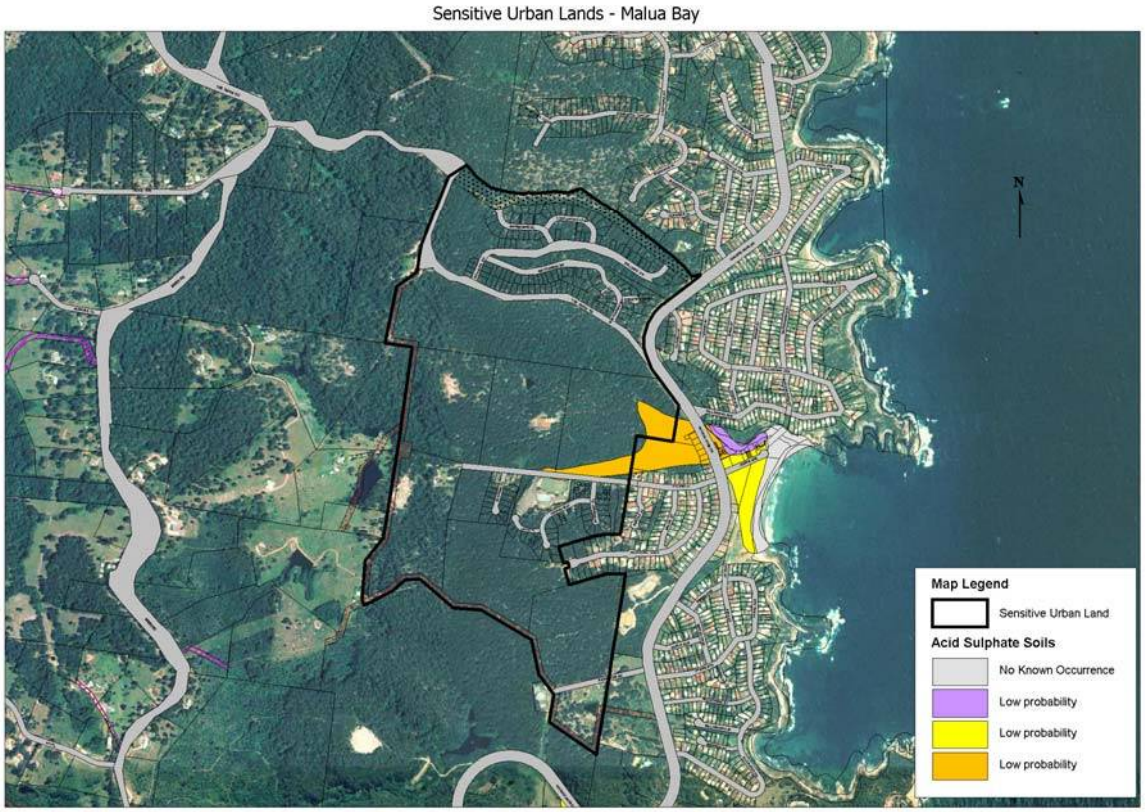



Figure 14 Acid sulphate soils Malua Bay

## 4.3 Bushfire Hazard

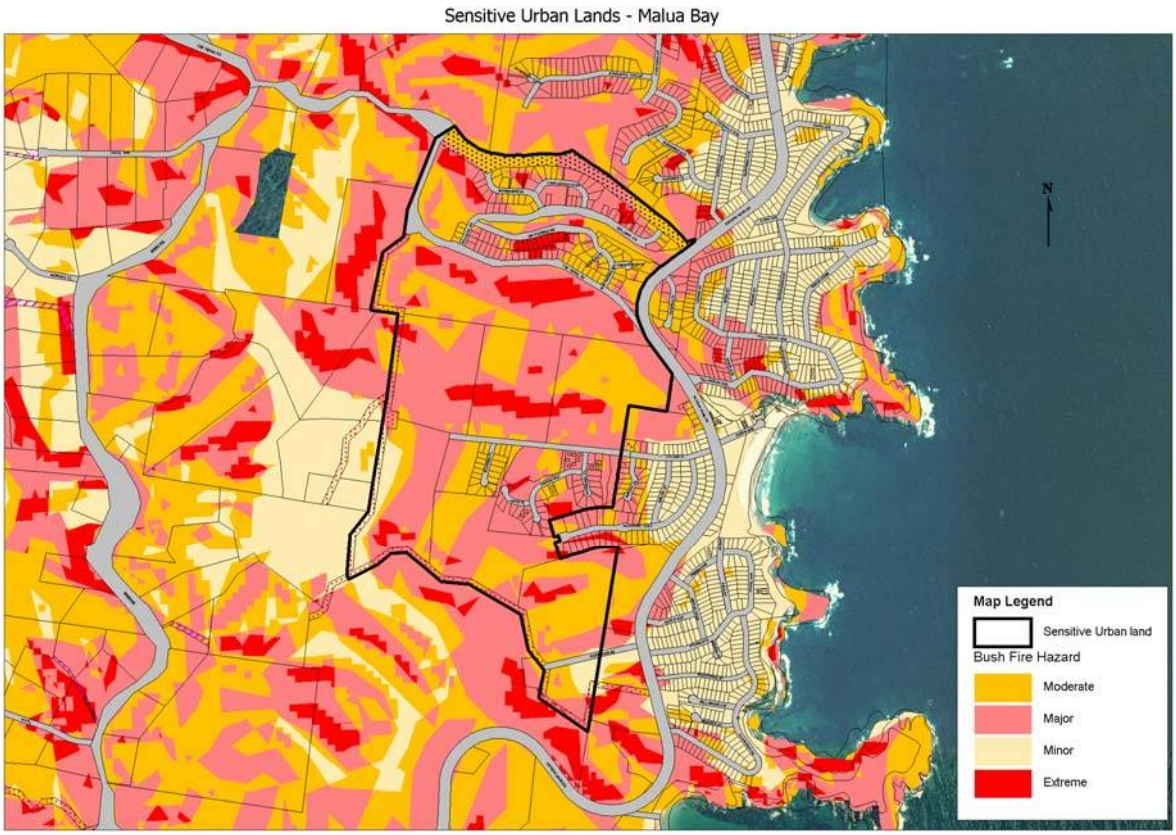



Figure 15 Bush fire hazard Malua Bay

Figure 15 shows bush fire hazard mapping for the Malua Bay sensitive urban land. There are extreme hazard areas around the site. Extreme hazards usually occur on steep, well-vegetated slopes where fuel levels are high.

## 4.4 Eurobodalla Rural LEP 1987

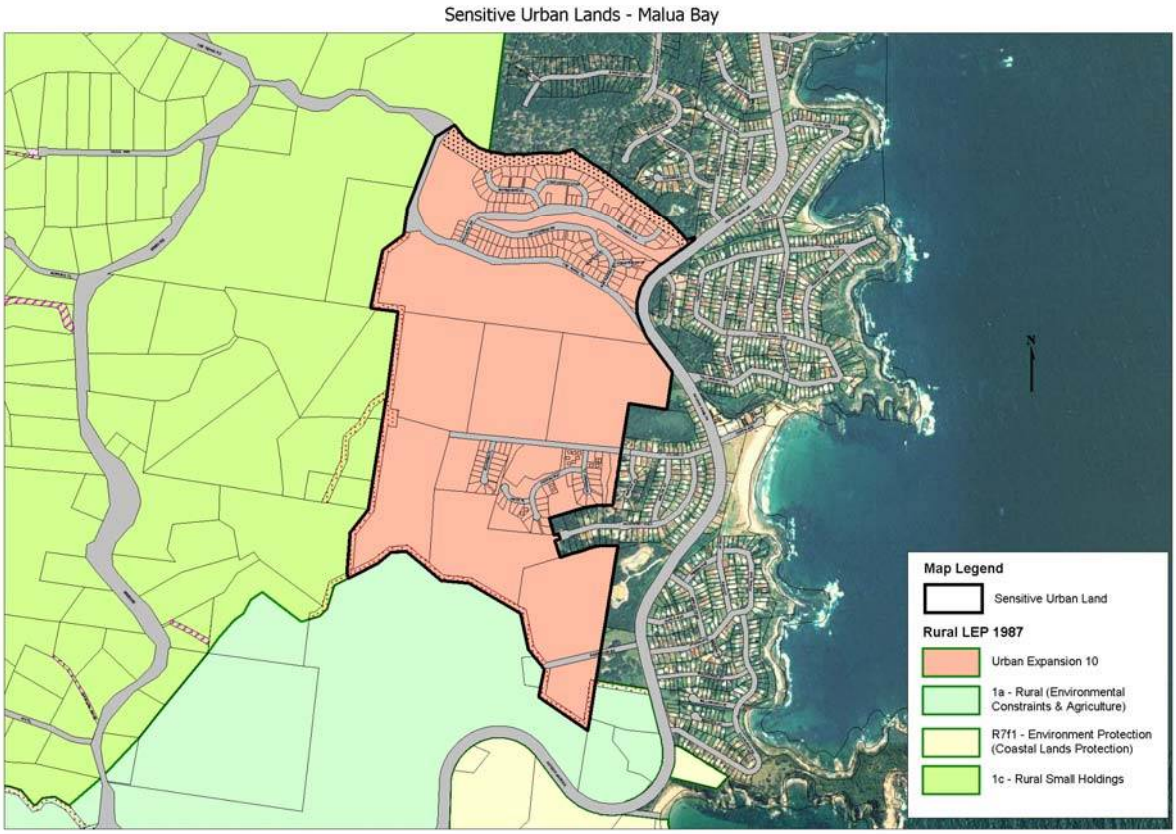



Figure 16 Eurobodalla Rural LEP 1897 Malua Bay sensitive urban land

The Malua Bay sensitive urban land is zoned Urban Expansion 10 under the Eurobodalla Rural LEP 1987 (see 2.1.3 for objectives of zone). There is a vast expanse of 1c – rural small holdings to the west of the land with 1a – rural (environmental constraints & agricultural to the south. The site has had extensive urban development to the north and central parts of the site.

## 4.5 DNR Riparian Corridor Management Objectives & Natural Drainage

Figure 17 shows the DNR riparian corridor mapping for the Malua Bay sensitive urban land. Creeks across the site have been identified as category 2 - Terrestrial and Aquatic Habitat. It is recommended that a 20m vegetated buffer from the top of bank be implemented and maintained to ensure creek bank stability.

In areas where there may have already been degradation of these riparian corridors, revegetation and maintenance of these areas is recommended to restore native vegetation along the bank.

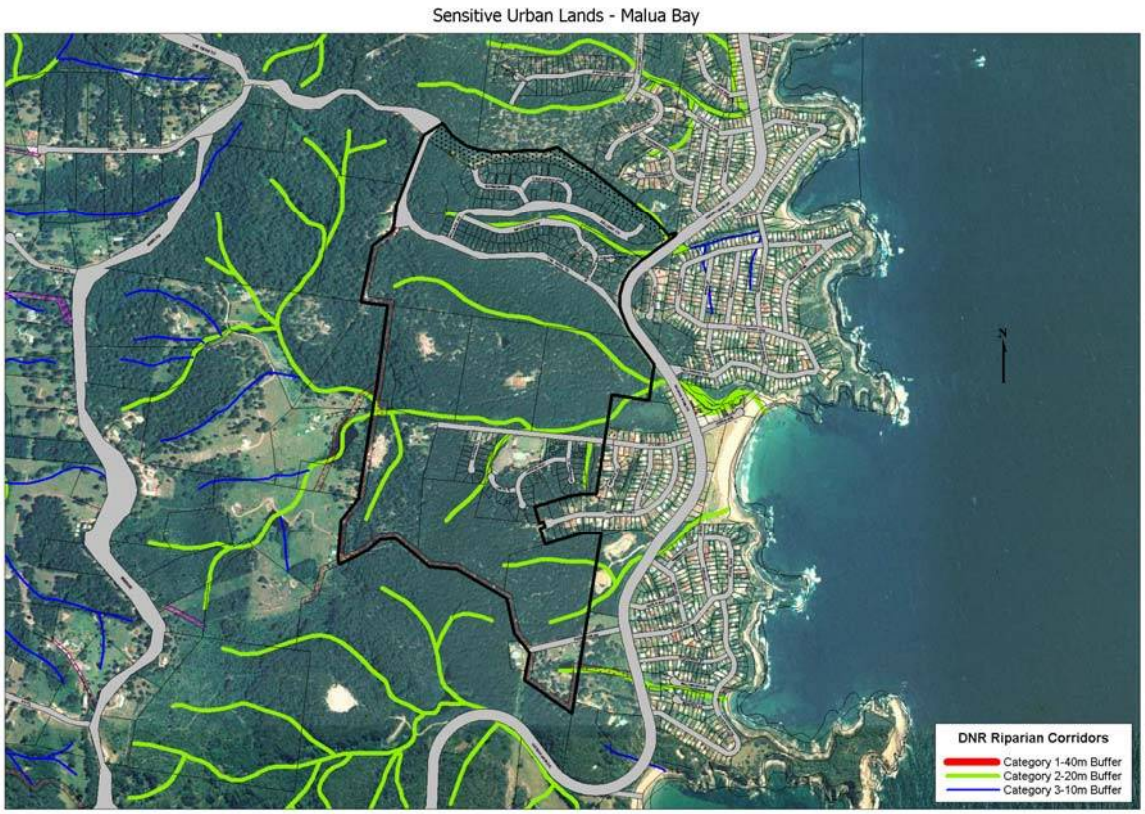



Figure 17 DNR Riparian Corridor Management Objectives

## 4.6 Slope

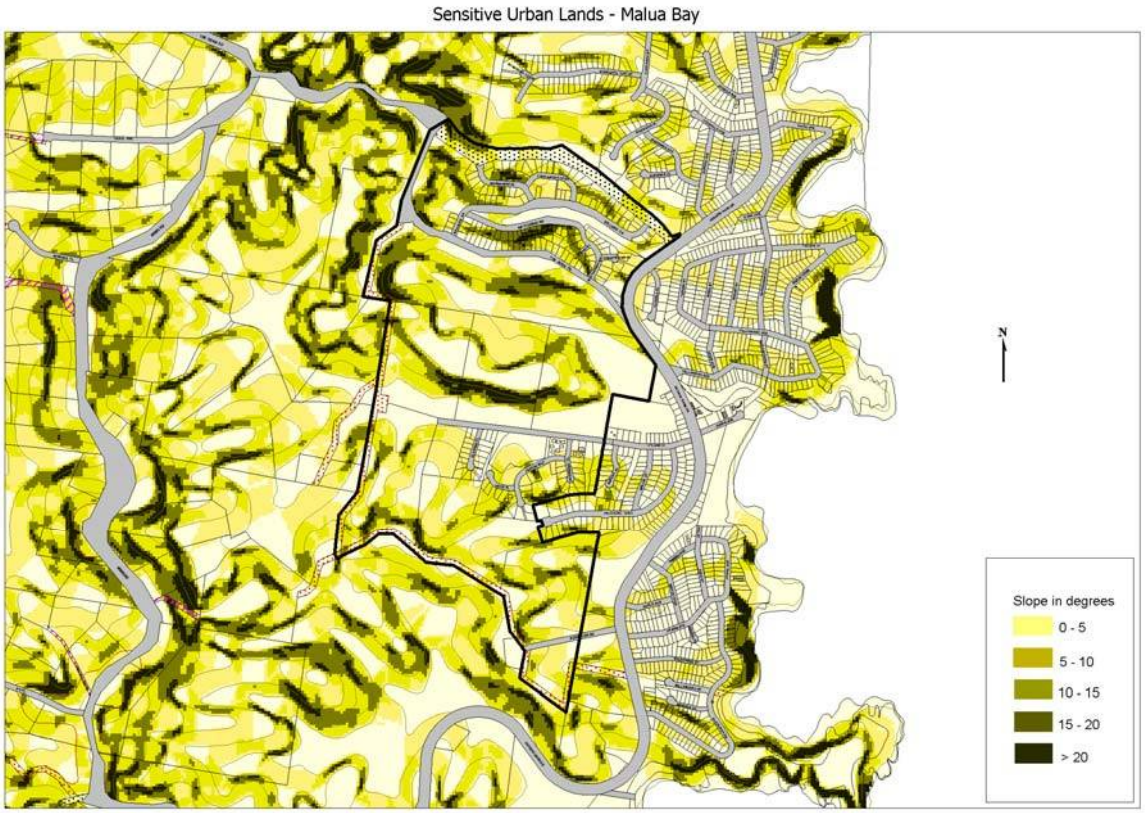



Figure 18 Slope map for Malua Bay sensitive urban land

Figure 18 shows slope in degrees for the Malua Bay sensitive urban land. There are steep slopes traversing the site with some extreme steep ridges in the central part of the site. These areas are classed non-development areas as the disturbance of the vegetation on these slopes could lead to significant erosion problems and sedimentation of creeks and waterways.

### 4.7 SEPP14 Protected Wetlands

There are no SEPP14 protected wetlands on or near the site (no map is included).

### 4.8 Soil Regolith Stability

This area is mapped as being stable and has low erosion potential. Taking this into consideration it is still advised that any clearing of vegetation should be minimal to avoid the risk of erosion and sedimentation due to the steep terrain of the site (no map is included).

### 4.9 Fauna Habitat Linkages

Aggregate core habitat (figure 19) shows that the majority of the Malua Bay sensitive urban land is identified as being of high value habitat. It is important to create and maintain a link between areas of high value habitat for future biodiversity so native animals can move between these areas to feed and reproduce.

The precautionary approach to development in the shire would be to exclude development in areas of moderate or highest core habitat. If development is to be pursued in high core habitat areas, then the development proposal should provide a Species Impact Statement (SIS) as part of an application to determine the likely impact of a particular development on native species.

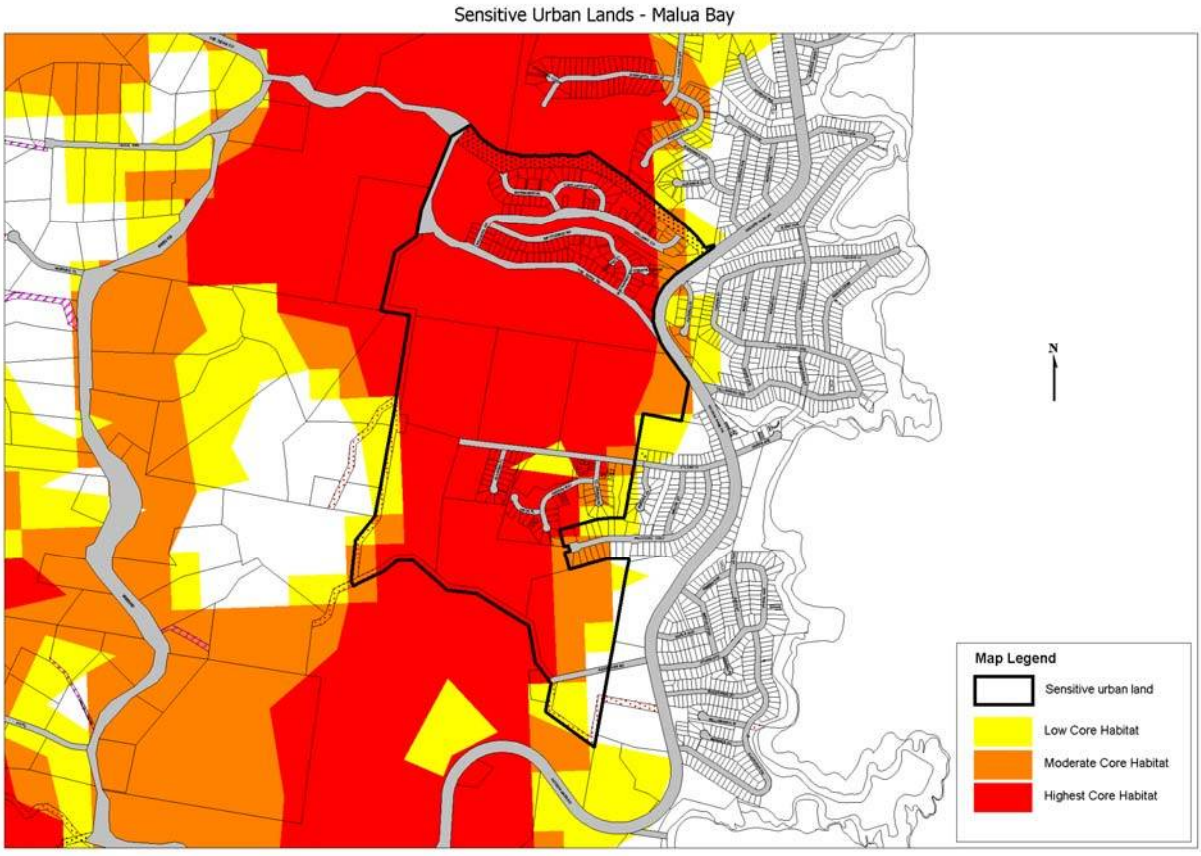



Figure 19 Fauna habitat Malua Bay sensitive urban land

## 4.10 Vegetation Ecosystems

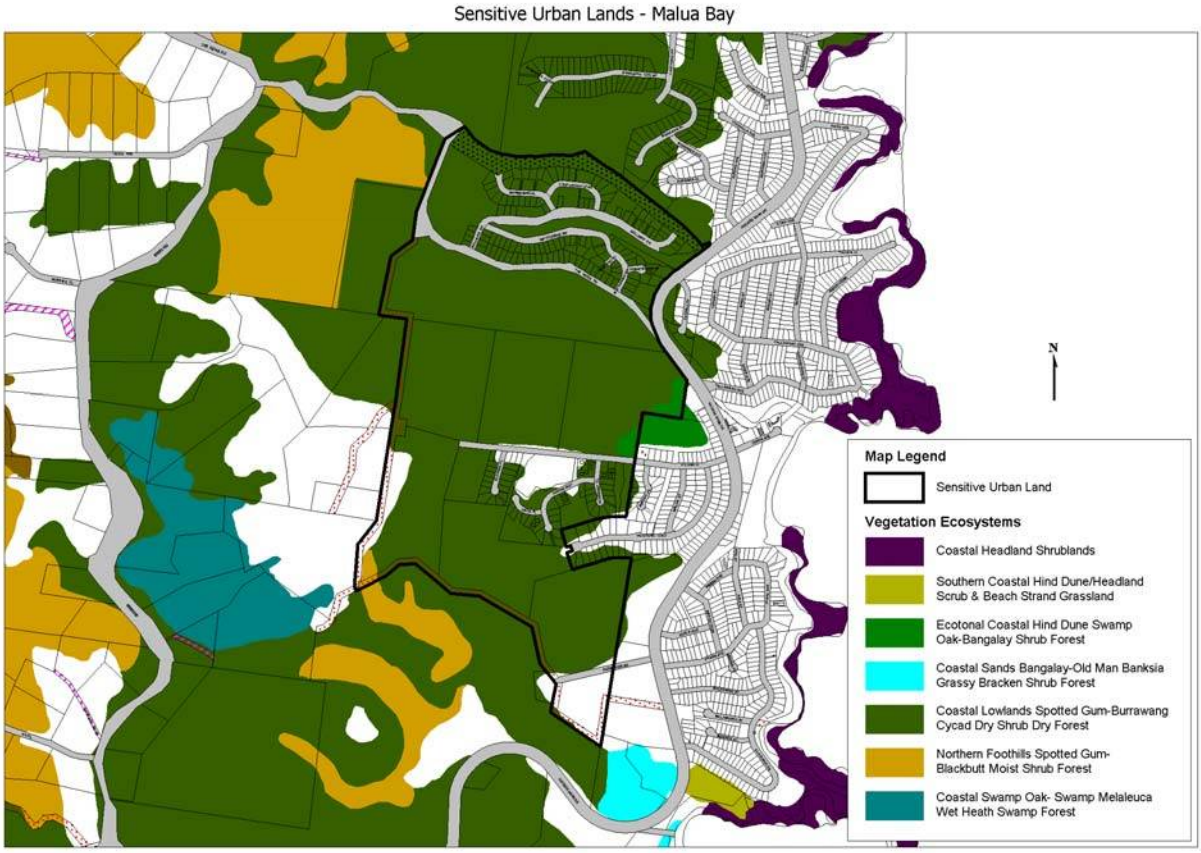



Figure 20 Vegetation Ecosystems Malua Bay sensitive urban land

The Malua Bay sensitive urban land is well vegetated (figure 20). The majority of the land is covered by Coastal lowland spotted gum-burrawang cycad dry shrub forest which has the dominant species Corymbia maculata (Spotted Gum), Macrozamia communis (Burrawang). At the South-Eastern corner of the sensitive urban land boundary is a patch of Coastal Swamp Oak- Swamp Melaleuca Wet Heath Swamp Forest, which has the dominant species Casuarina glauca (Swamp Oak), Melalueca ericifolia (Swamp Paperbark) and this is considered a vulnerable vegetation ecosystem.

There is a small patch of ecotonal coastal hind dune swamp oak-bangalay shrub forest which has the dominant species Casuarina glauca (Swamp Oak), Eucalyptus botryoides (Bangalay), Banksia integrifolia (Coast Banksia), Acacia longifolia (Sydney Golden Wattle). This ecosystem forms part of an Endangered Ecological Community (EEC) under the NSW Threatened Species Conservation Act 1995 (TSC Act) as listed below.

**Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions (Gazetted December 2004)**
Corresponds to Vulnerable Vegetation Coastal Wet Heath Swamp Forest, dominated by *Casurina glauca/Melaleuca ericifolia*, Vulnerable Vegetation Ecosystem South Coast Swamp Forest Complex, dominated by Swamp Oak, *Casurina glauca* and parts of Vulnerable Vegetation Ecosystem Ecotonal Swamp Forest, dominated by *Casurina glauca/Eucalyptus botryoides*. This community is found fragmented around coastal creeks and low laying areas.

Care should be taken to avoid any fragmentation of these vulnerable and endangered communities. EEC's are covered by the TSC Act and carry penalties for clearing and degradation.

## 4.11 Flooding and extreme flooding

Malua Bay sensitive urban land has no flooding issues due to the elevation and the undulating slopes of the land.

## 4.12 Absolute Constraints

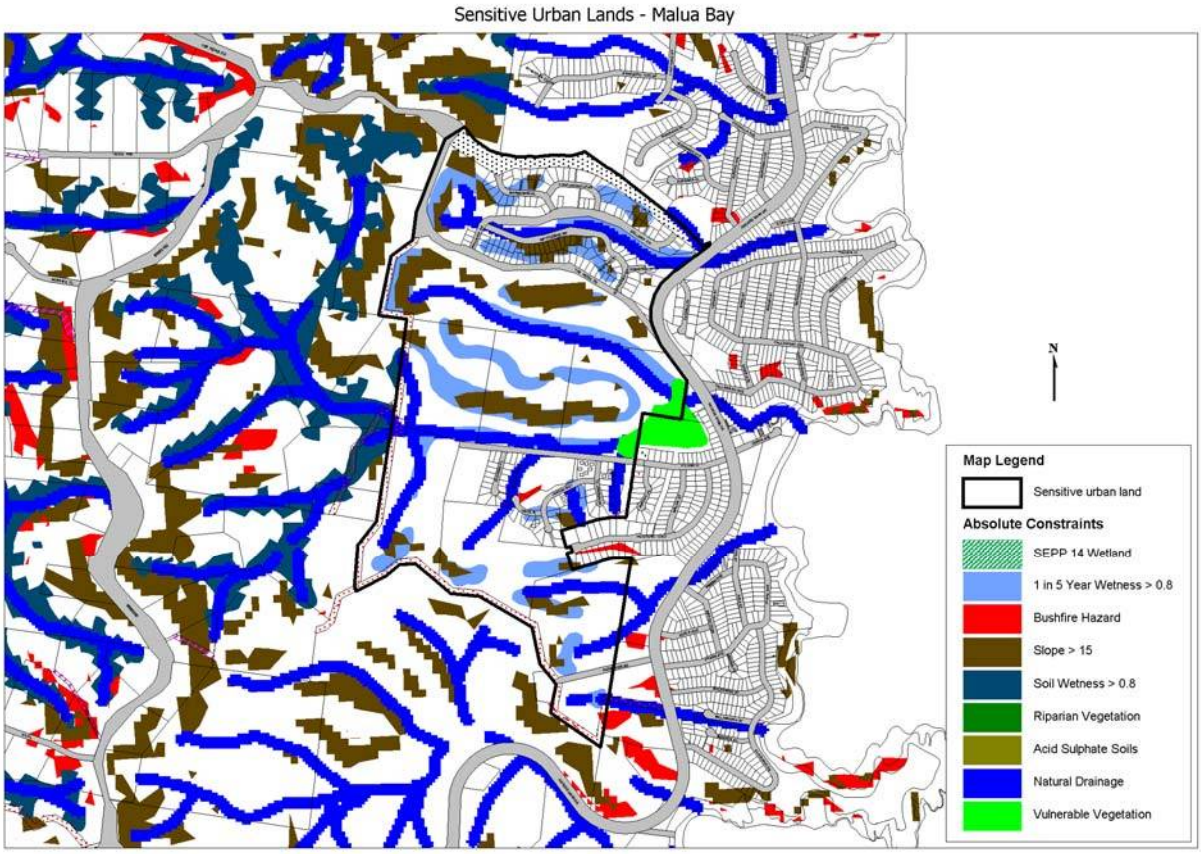



Figure 21 Absolute development constraints for Malua Bay sensitive urban land

The Malua Bay sensitive urban land has several constraints for development. Figure 21 shows the main constraint is soil wetness or soil moisture retention after a 1 in 5-year flood event. This constraint refers to the ability of the soil to absorb moisture. These areas will hold +80% moisture in the event of a 1 in 5-year flood, meaning the water will run off down the catchment and not be absorbed by the ground. This can become an issue in the event of erosion or pollution, as it will flow down the waterway and could damage sensitive ecosystems. The natural drainage lines on the land are also a development constraint and a 20m buffer (vegetated) should be maintained.

There is a development constraint where the slope of the land is greater than 15 degrees (approx. 25%). This becomes an issue for erosion and sedimentation and also requires more vegetation to be cleared for bush fire protection. Extreme bush fire hazard exists on the site, which occurs where there are steep slopes that are heavily vegetated.

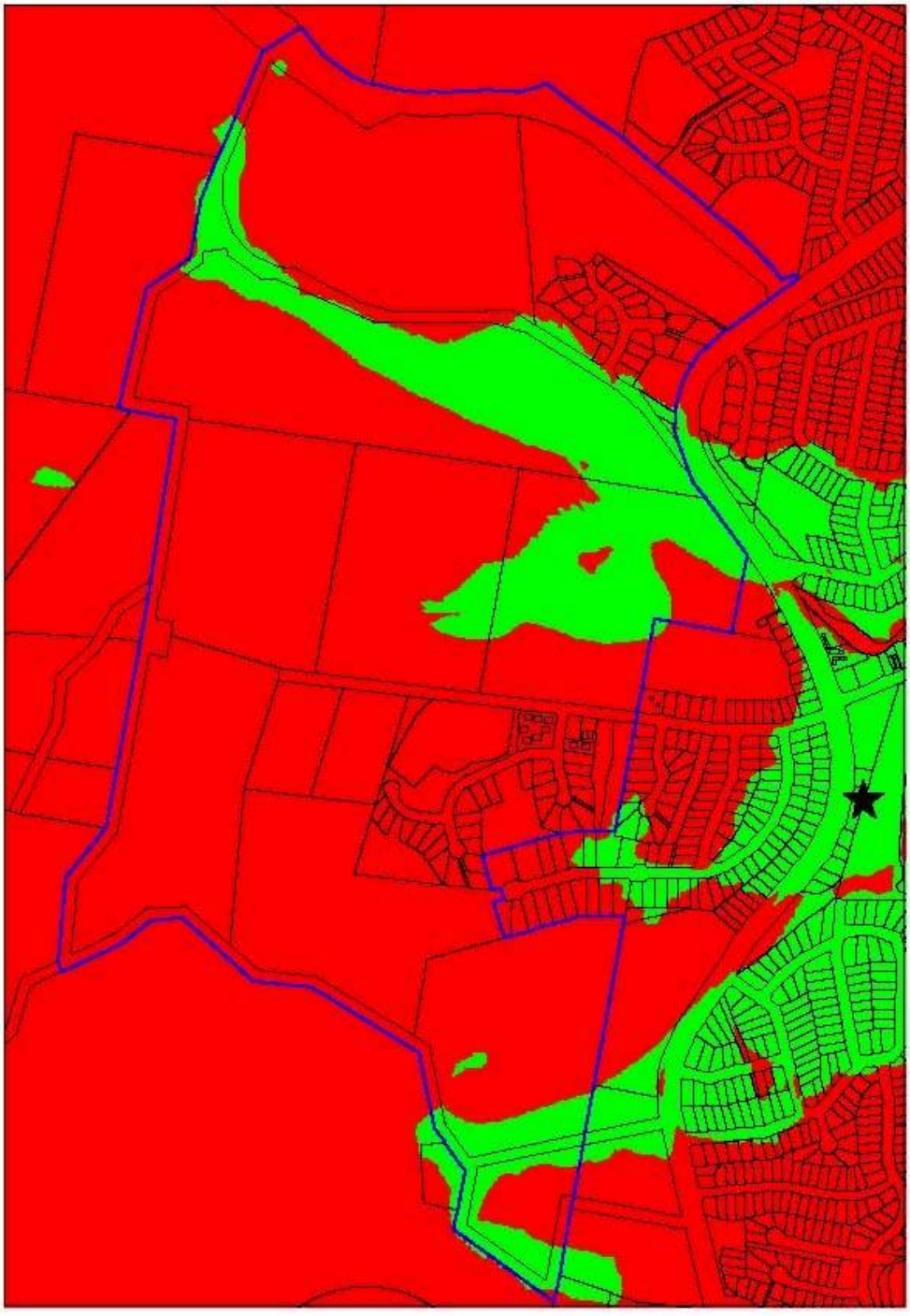
There is a small patch of category 1 vulnerable vegetation to the east of the site that is to be retained and enhanced.


Figure 22 Malua Bay sensitive urban land looking east

### 4.13 Visual Assessment - Malua Bay

The vegetated ridgelines of the Malua Bay urban expansion zone provide scenic values to the built-up urban areas of the existing village and when viewed from the foreshore and ocean. Council carried out a desktop assessment using the MapInfo viewshed tool. This analysis tool uses a 3D model of the landscape to visualise what can and cannot be seen from a user specified point on a map. The results indicate areas of the landscape that are visible and those that are not from the specified point. In this case the user-specified point is looking from the Malua Bay Surf Club at the beach. The results are shown in the image on the following page.

Viewshed Analysis of Malua Bay Urban Expansion Area from Surf Lifesaving Club



= Visible

= Not Visible

★ = Viewpoint

EUROBODALLA SHIRE COUNCIL

## 4.14 Development Capability

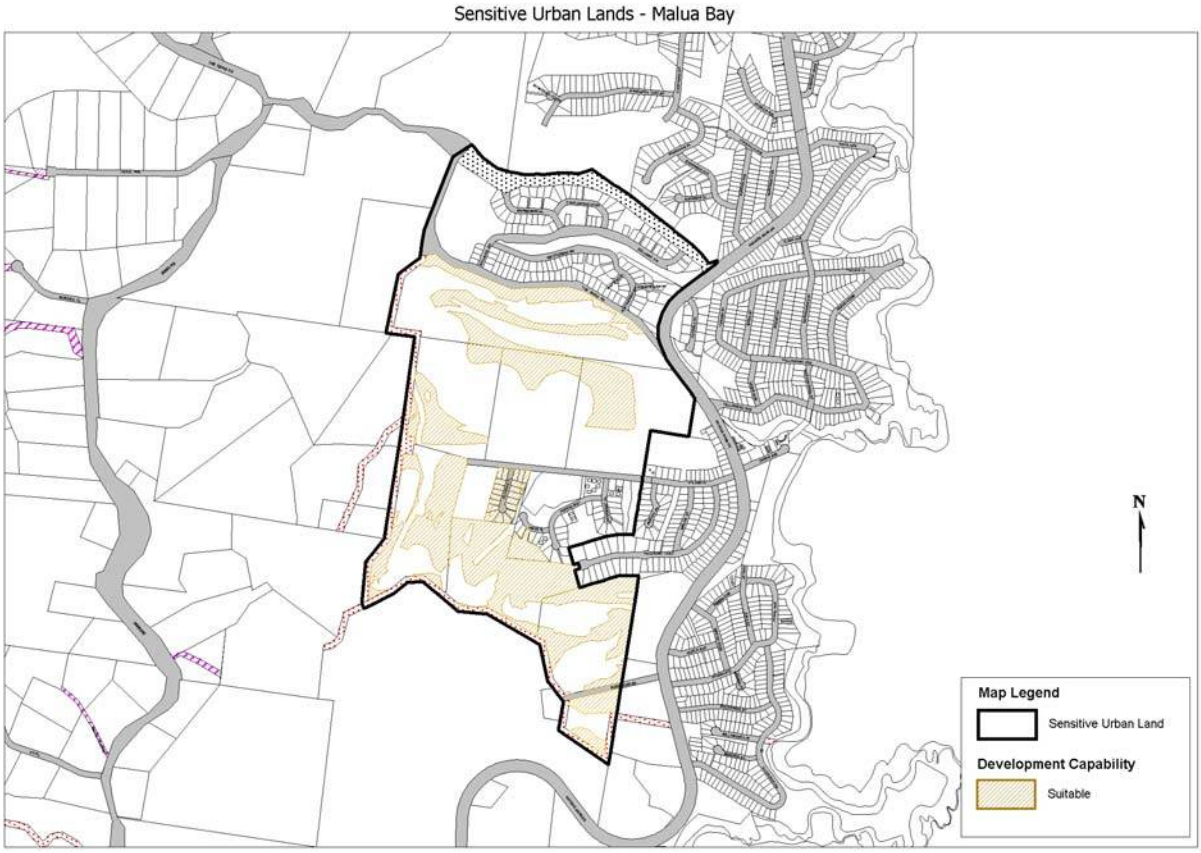



Figure 23 Development Capability Malua Bay sensitive urban land

Figure 22 shows the developable area for the Malua Bay sensitive urban land. This suitable area is obtained by subtracting the absolute constraints from the total area of the land. From this we can get an approximate lot yield as shown below:

Total suitable area = Approx. 36 ha
Minus 25% for servicing (roads, easements etc) = Approx. 27 ha
Estimated Lot yield @ 700sqm (locality average) = Approx. 385 lots

# 5 Analysis – Rosedale

## 5.1 Locality

Figure 24 shows the location of the Rosedale sensitive urban land. It covers approximately 279 hectares of undulating terrain to the west of Rosedale urban area. The majority of the area has been cleared, with a large patch of remnant vegetation remaining in the north east of the site.

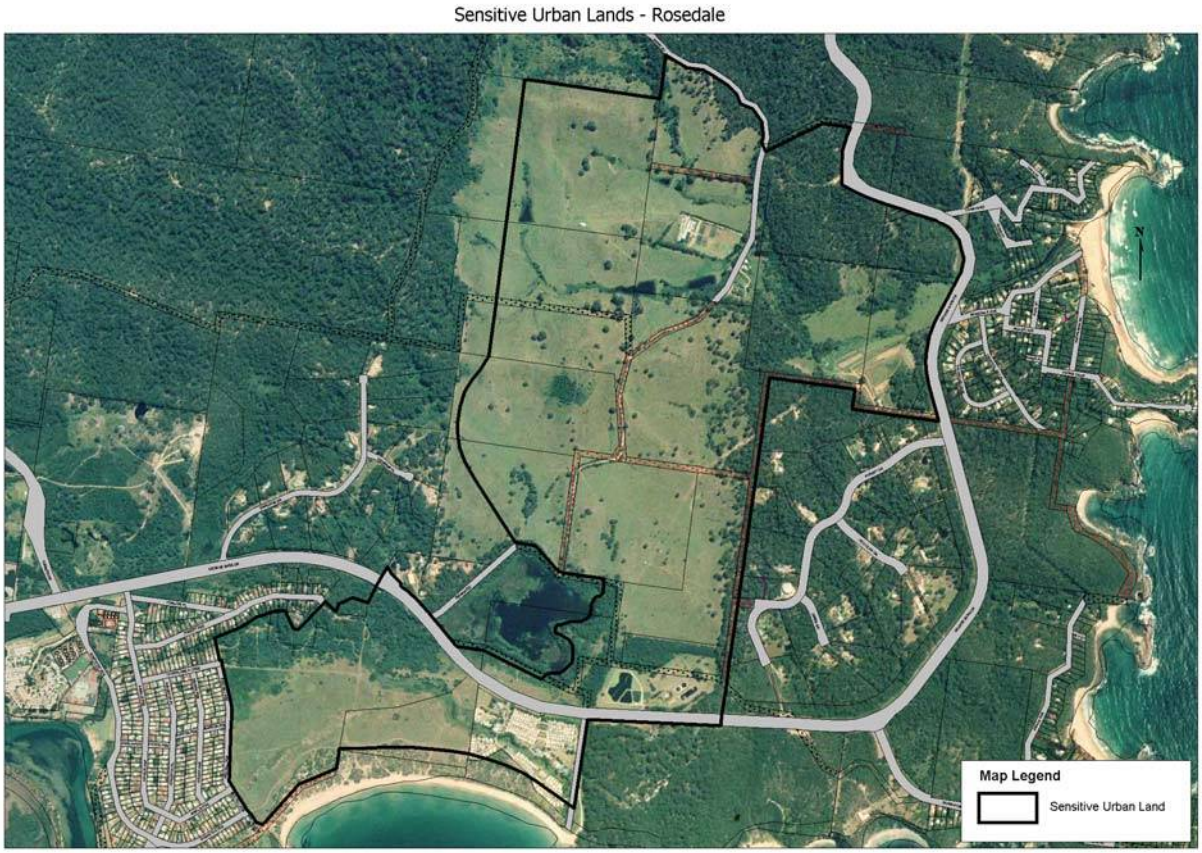



Figure 24 Location of the Rosedale sensitive urban land

## 5.2 Acid Sulphate Soils

Figure 25 shows the occurrence of acid sulphate soils over the Rosedale sensitive urban land. The map shows that there is a low probability of these soils in small areas of the site. These occur mainly over the wet areas and gullies. Despite the low probability care should be taken to avoid any disturbance of these areas.

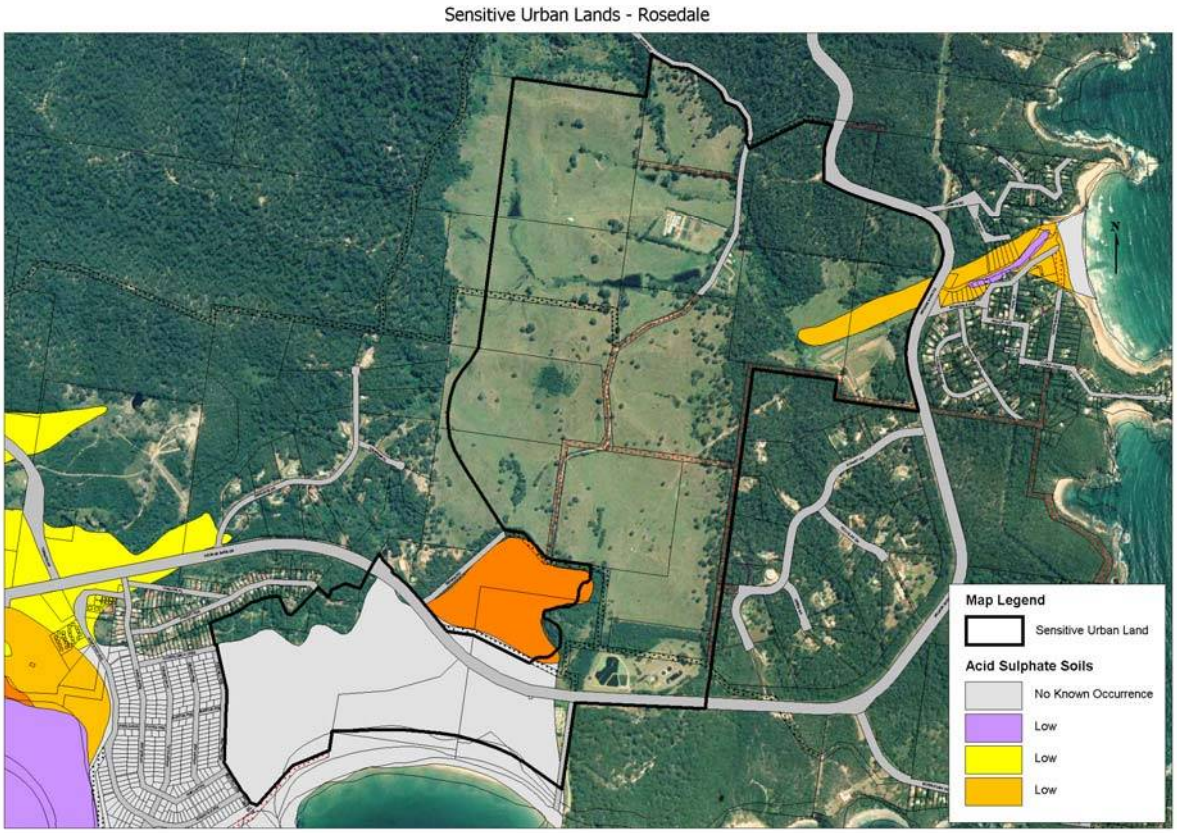



Figure 25 Acid Sulphate Soils on Rosedale sensitive urban land

## 5.3 Bush fire Hazard

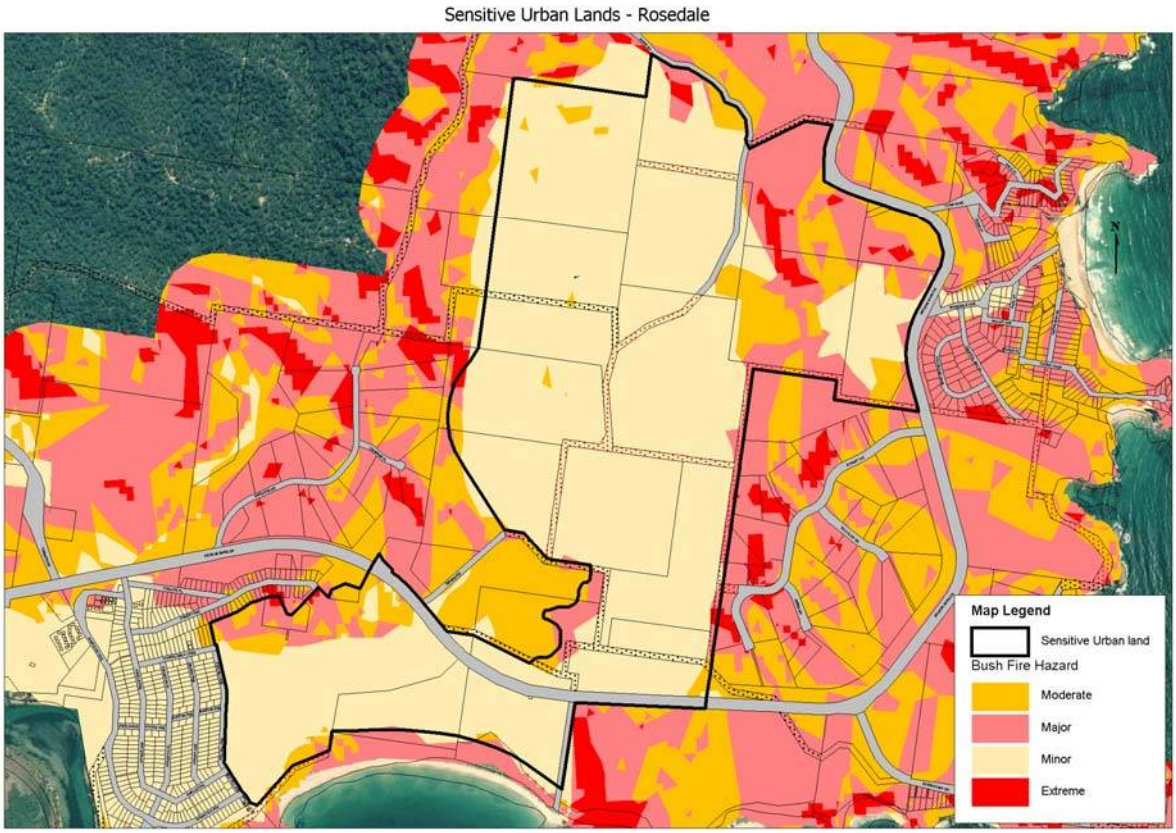



Figure 26 Bush fire hazard for Rosedale sensitive urban land

Figure 26 shows bush fire hazard map for Rosedale. Due to the majority of the Rosedale sensitive urban land is cleared, there is minimum risk for a bush fire event. The patch of vegetation in the north east corner of the site combined with steep slope lead to an area of major and extreme bush fire hazard.

## 5.4 Eurobodalla Rural LEP 1987

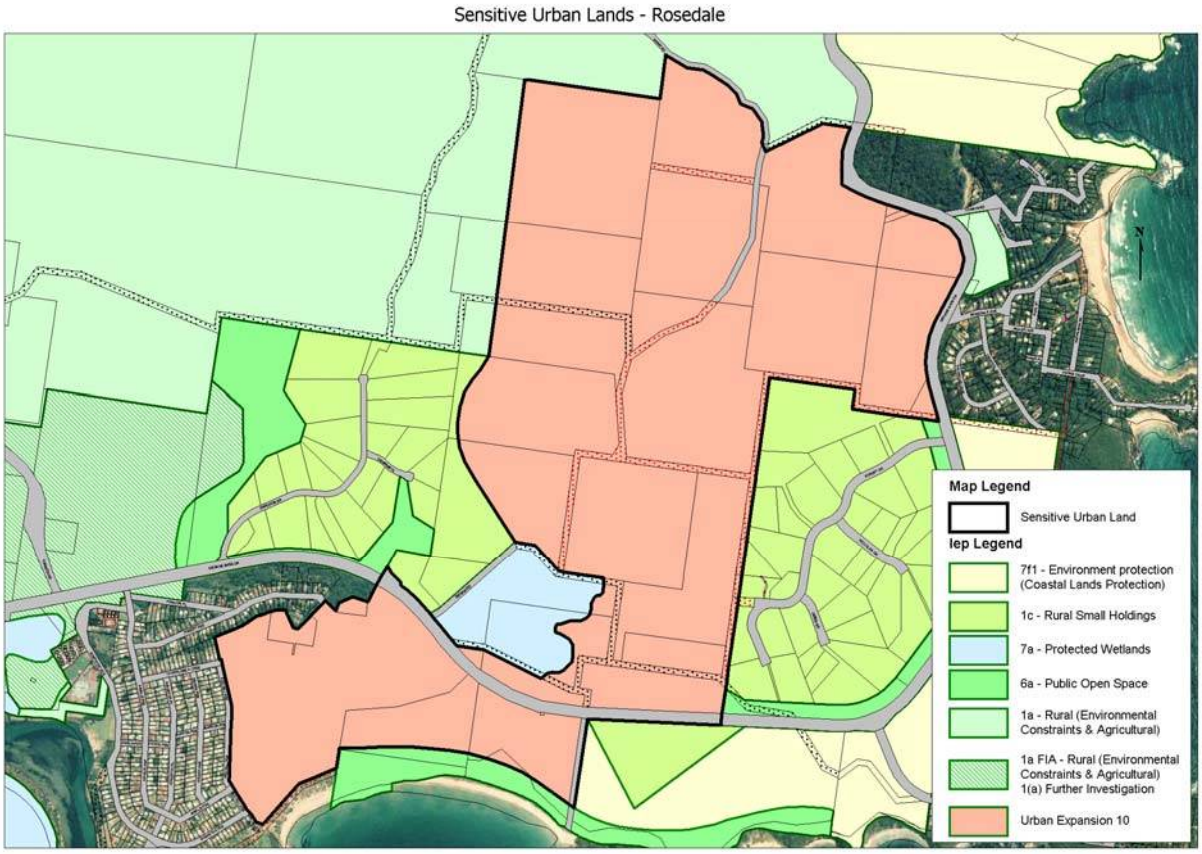


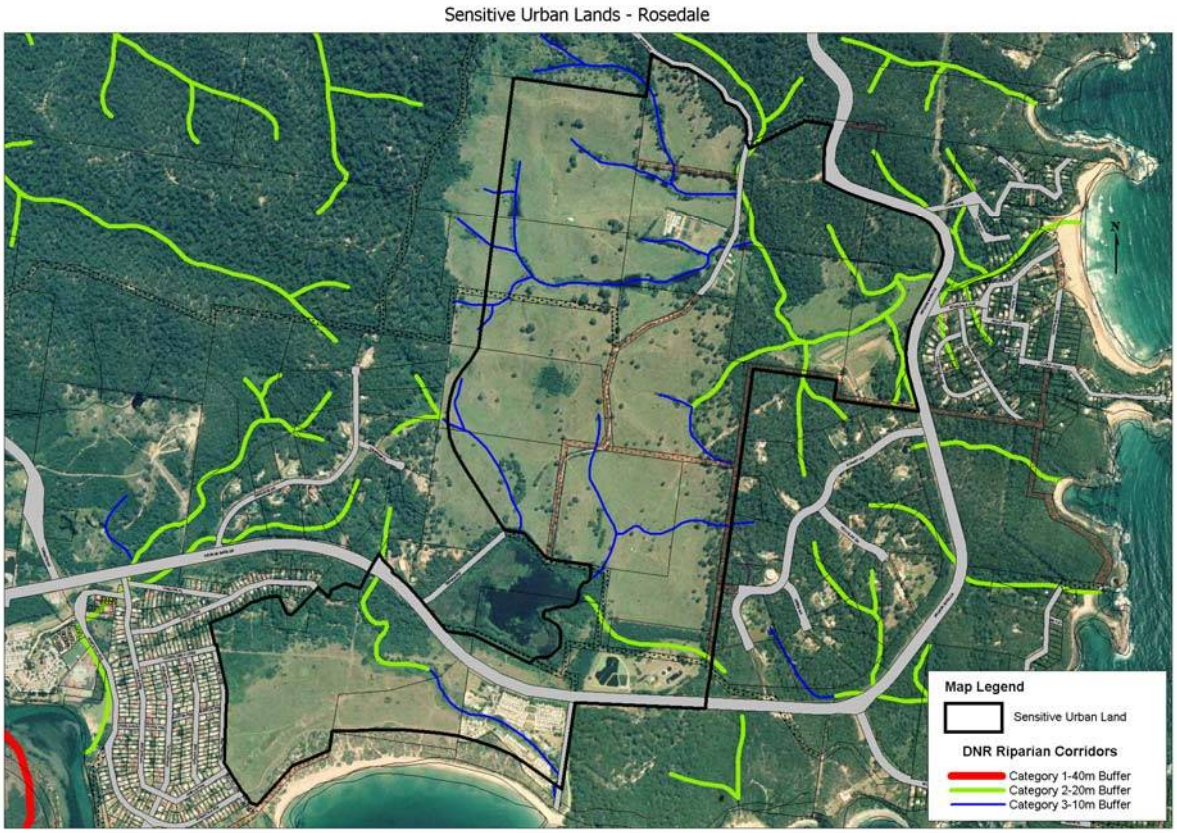

Figure 27 Eurobodalla Rural LEP 1987 Zones

Figure 27 illustrates that the Rosedale sensitive urban land is zoned under the Eurobodalla Rural LEP 1987 as being urban expansion 10 (see 2.1.3 for objectives of zone). There are pockets of 1c – rural smallholdings to the East and West, with a large expanse of 1a – rural (environmental constraints & agricultural) to the north west which is State Forests land. There is a small pocket of 7a - protected wetland just outside the boundary to the West.

## 5.5 DNR Riparian Corridor Management Objectives & Natural Drainage

Figure 28 shows the DNR riparian mapping for Rosedale. The majority of the site has been mapped by DNR as being Category 2 – Terrestrial and aquatic habitat and Category 3 – Bank stability and water quality. Category 2 requires a 20m vegetated buffer from the top of the bank, with category 3 requiring a 10m vegetated buffer from the top of bank.

Several of the creeks and drainage lines flow into the protected wetland to the south west of the site and care should be taken to avoid any disturbance in and around these areas. Any vegetation that is fragmented would require rehabilitation work and ongoing maintenance to ensure the protection and enhancement of these riparian areas.

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gure 28 DNR Riparian Corridor Management Objectives for Rosedale

## 5.6 Slope

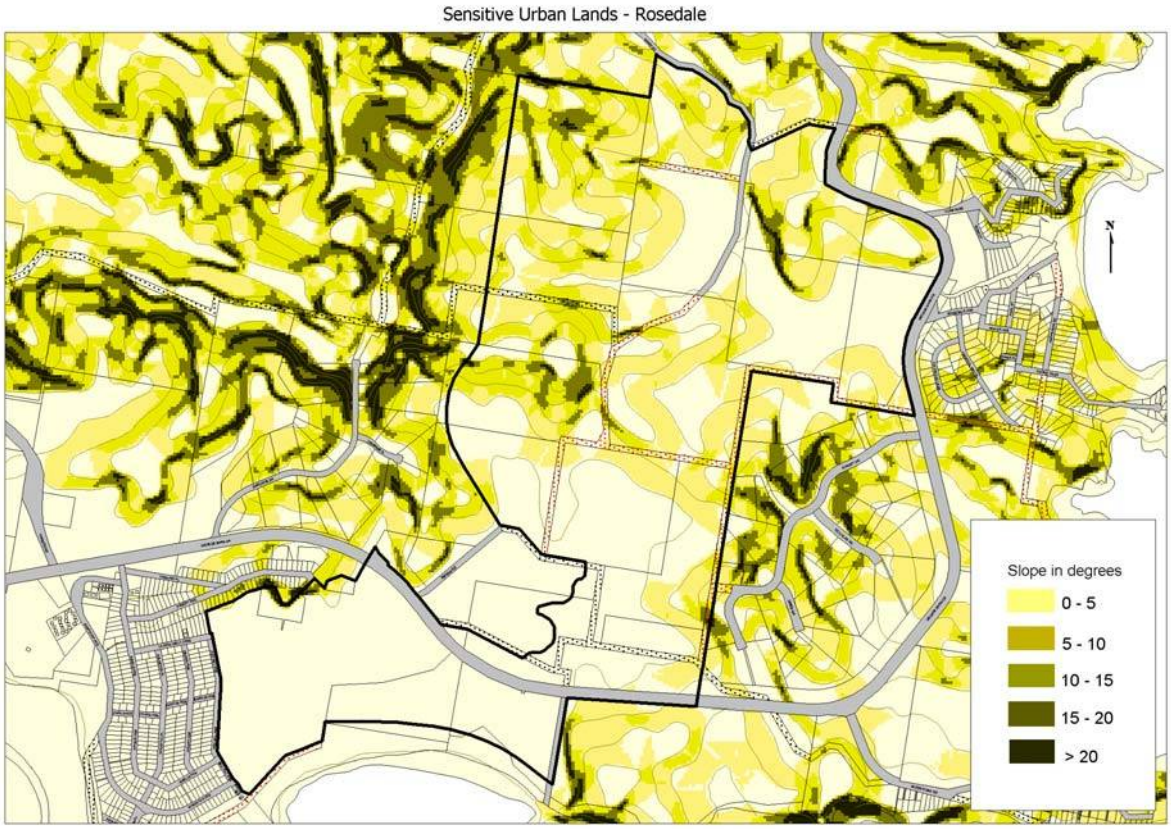



Figure 29 Slope map for the Rosedale sensitive urban land

Figure 29 shows the slope map for Rosedale. The topography of the Rosedale sensitive urban land is undulating and the slopes over the site are low, with only a few small areas that are in the 10-20 degrees range.

## 5.7 SEPP14 Wetlands

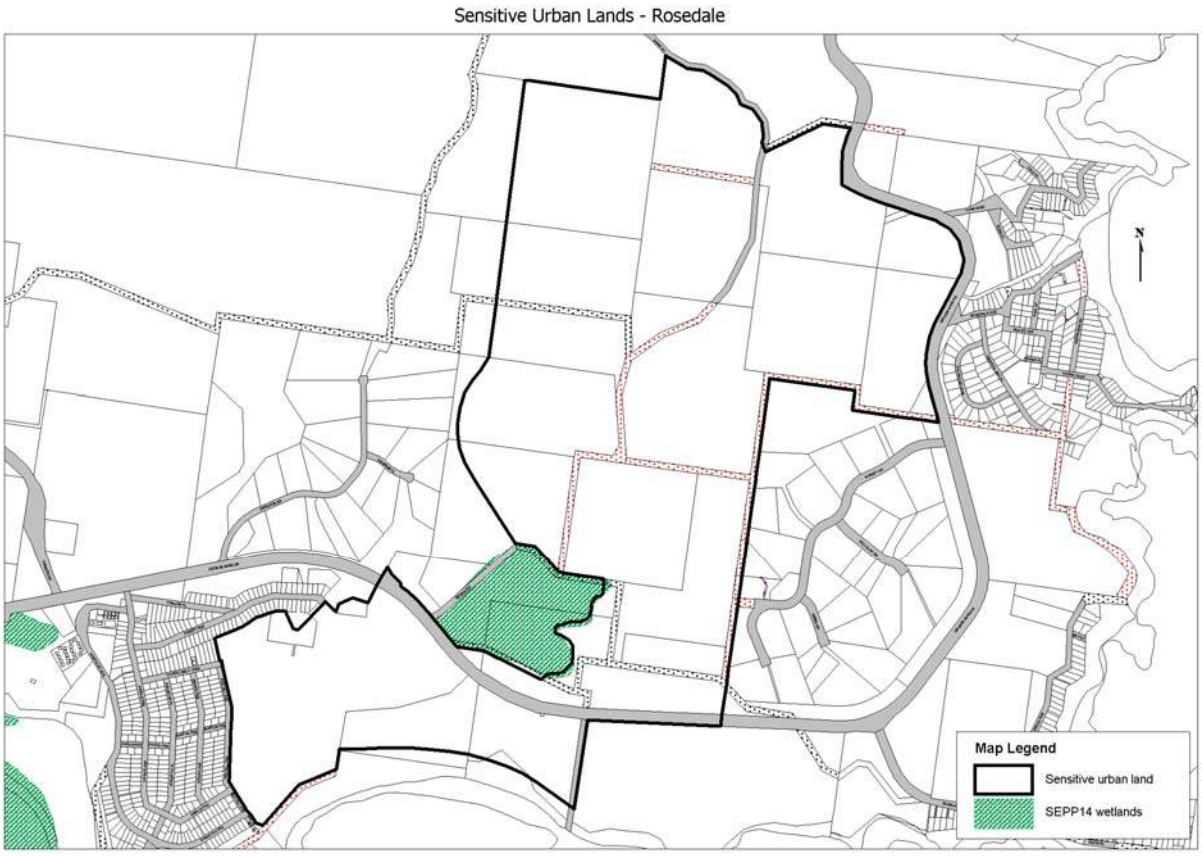
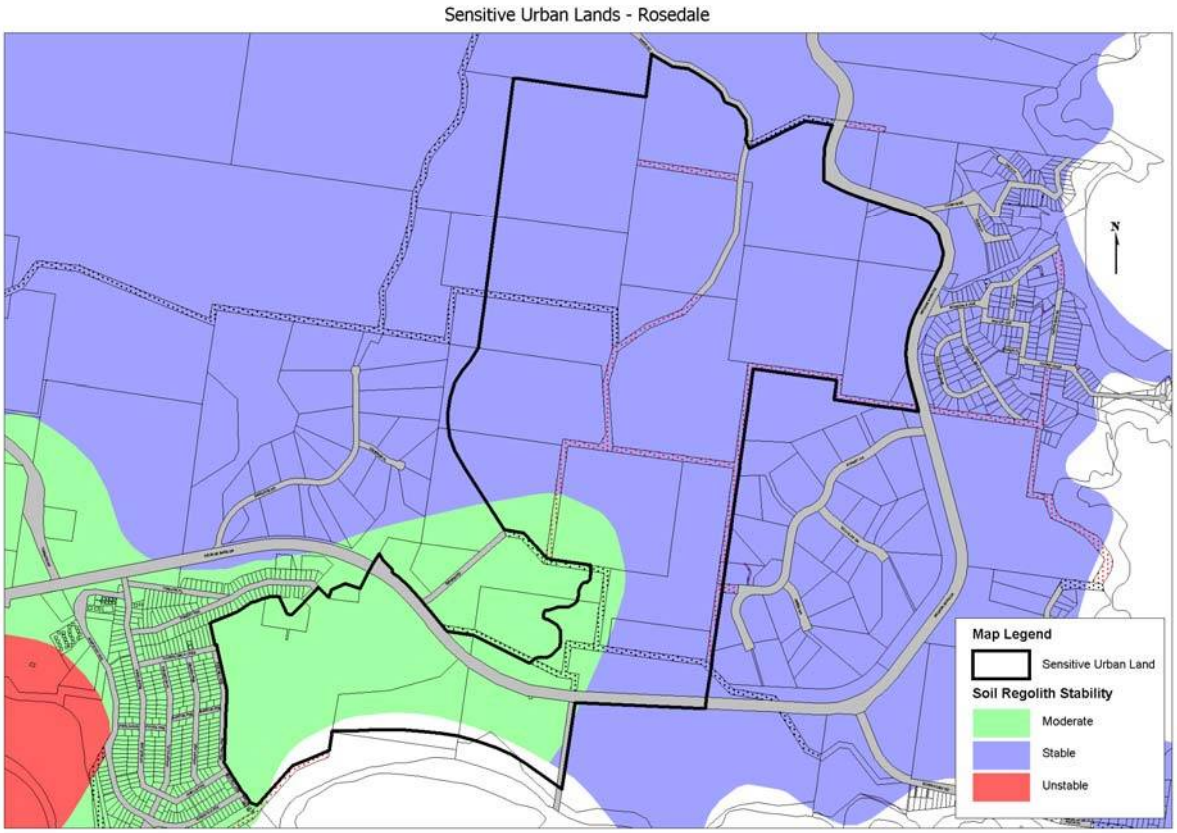



Figure 30 SEPP14 Wetlands Rosedale

There is a SEPP 14 protected wetland to the west of the site (figure 30). The natural drainage lines across the central part of the site drain into this wetland, so care must be taken to avoid sedimentation or soil disturbance. It is recommended that these drainage lines are protected and enhanced with riparian vegetation to avoid future erosion problems that could cause pollution of the wetland. It is also recommended that suitable buffers be implemented to the wetland to give adequate protection to its integrity.

## 5.8 Soil Regolith Stability

Figure 31 shows the soil regolith stability for the Rosedale sensitive urban land. It shows that most of the site is classed as stable, with an area to the South West being classed as moderately stable. This moderate stability class is due to sandy soils in the dune region of the landscape. Sandy soils are prone to sheet wash, with sediment transport over short distances and are prone to wind erosion.




Fi

gure 31 Soil regolith stability for Rosedale sensitive urban land

## 5.9 Fauna Habitat Linkages

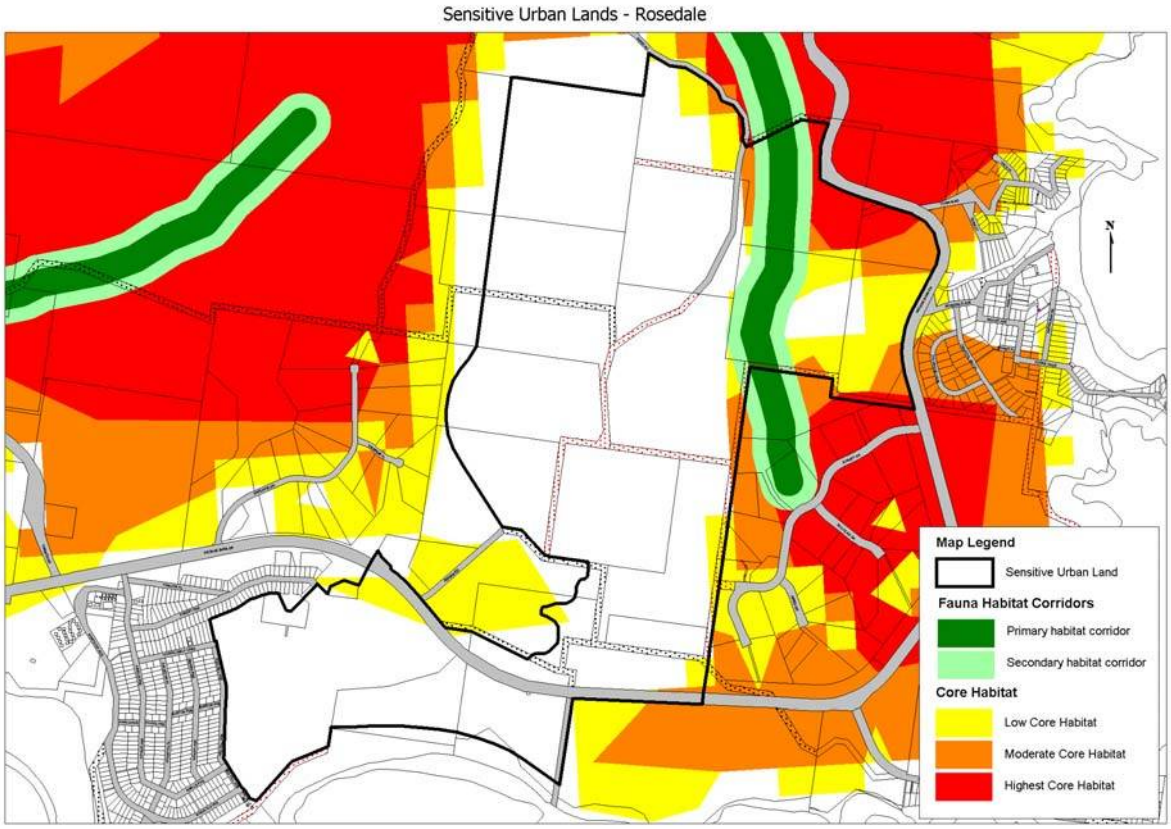



Figure 32 Core habitat and habitat corridors for Rosedale sensitive urban land

Figure 32 shows the core habitat and habitat corridors for Rosedale. Most of the Rosedale site has been cleared of vegetation. There is an area of sparse vegetation to the North East of the site, which has been classified as highest core habitat. This should be retained and enhanced through any development. This area has also been identified as being part of a habitat corridor linking other high value habitat areas.

## 5.10 Vegetation Ecosystems

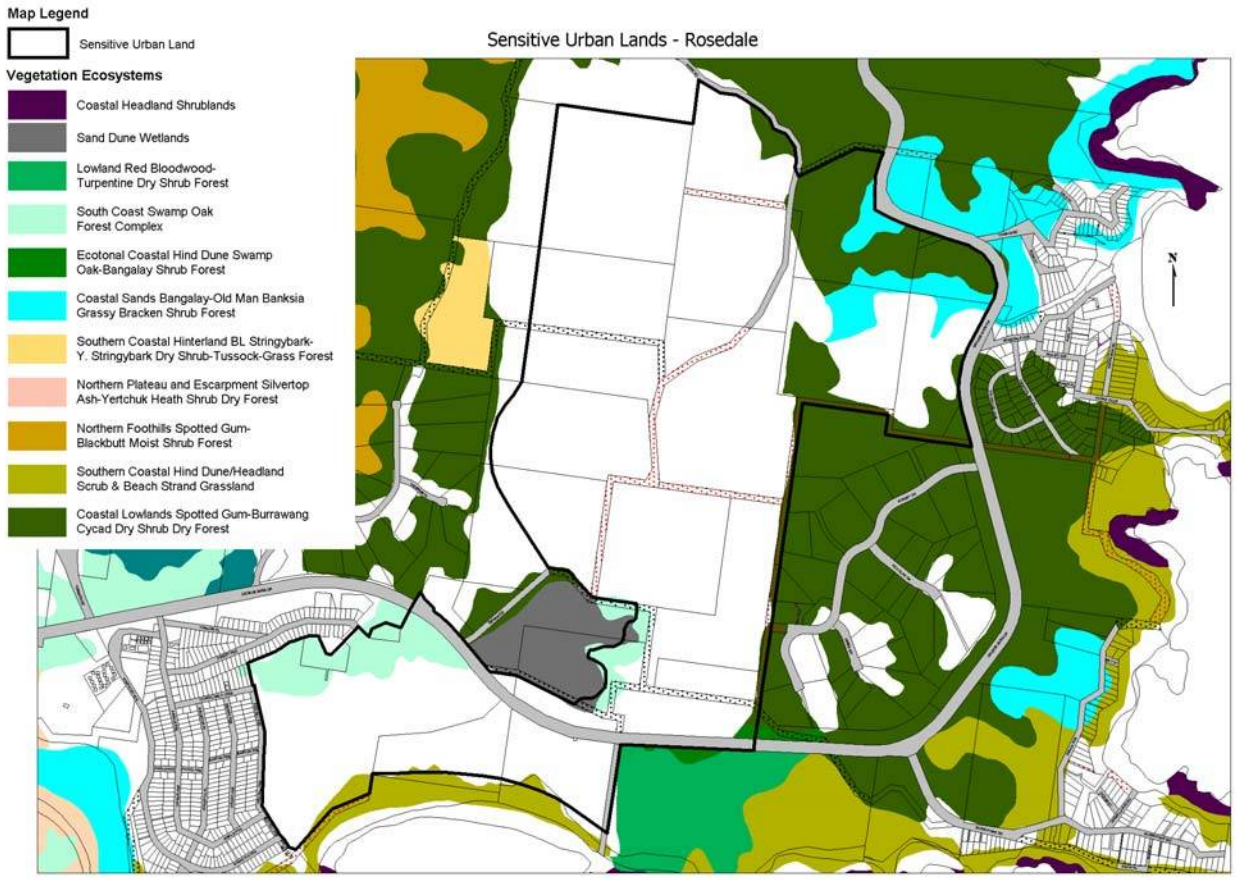



Figure 33 Vegetation Ecosystems for Rosedale sensitive urban land

There is a patch of remnant vegetation on the site (figure 33), mapped as coastal lowlands spotted gum-burrawang cycad dry shrub forest with the dominant species being Corymbia maculata (Spotted Gum), Macrozamia communis (Burrawang). There is also small patches of Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest having the dominant species Eucalyptus botryoides (Bangalay), Banksia serrata (Old-man Banksia). This is considered to be a vulnerable vegetation type that is to be preserved and maintained.

Around the back of the Barlings Beach area there is a patch of South Coast Swamp Oak Forest Complex with the dominant species being Casuarina glauca (Swamp Oak), Acacia sophorae (Coastal Wattle), Avicennia marina (River Mangrove). This ecosystem is considered to be an EEC and therefore is protected by the TSC Act.

Due to the fragmented nature of the vegetation, it is recommended that all the vegetation be preserved where possible to add to the visual amenity of the site and to keep habitat areas intact.

## 5.11 Absolute Constraints

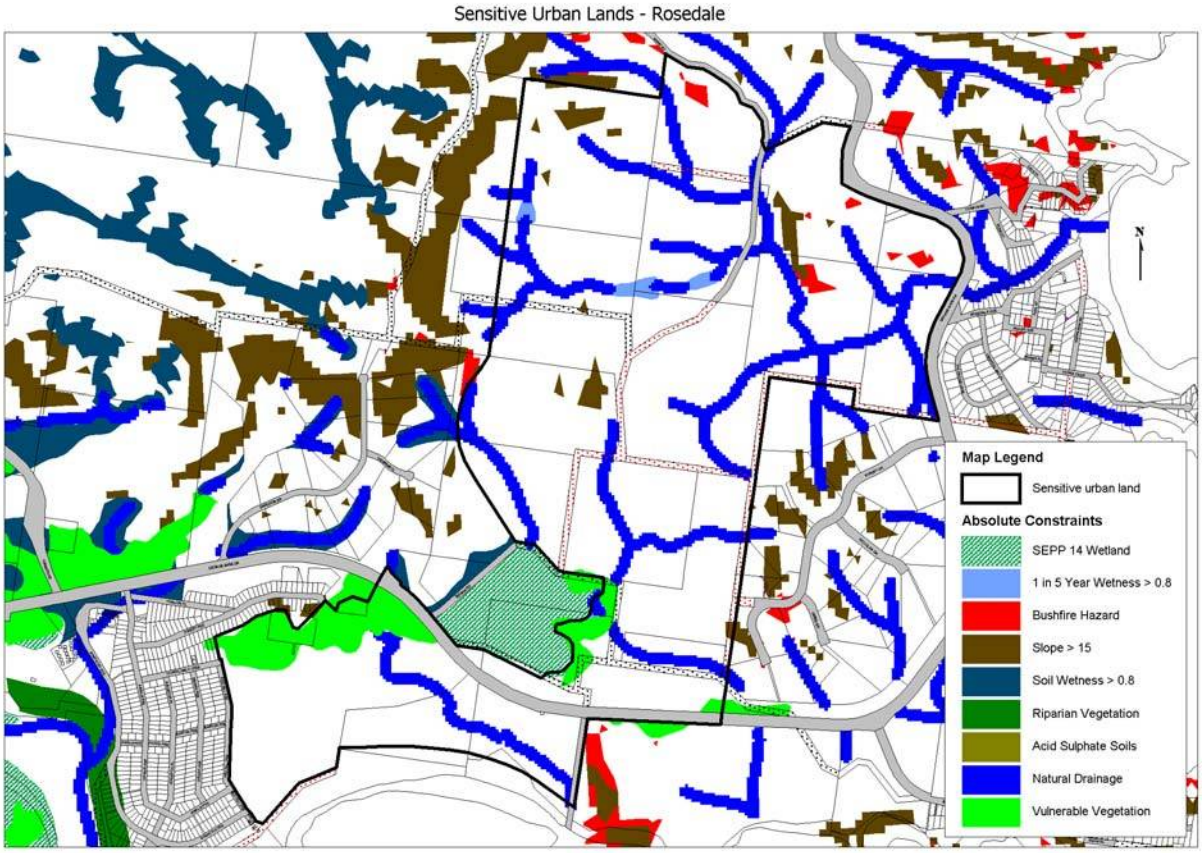



Figure 34 Absolute Development Constraints for Rosedale sensitive urban land

The main constraints over the Rosedale site are the natural drainage lines (figure 34). There are some areas of slope exceeding the 15 degree limit, with patches of extreme bushfire hazard where there are steep, vegetated slopes. Vulnerable vegetation exists in the Barlings Beach area and around the protected wetland to the East of the site.

## 5.12 Visual Assessment – Rosedale

Most of the Rosedale urban expansion area is relatively unconstrained in terms of scenic values. The cleared undulating terrain allows for development to be screened providing that ridgelines remain undeveloped. The cleared area is partially visible from settlements to the south, such as Tomakin, Mossy Point and to some extent Congo. The vegetated north eastern corner provides limited scenic value to the existing settlement of Rosedale to the east and for motorists travelling along George Bass Drive. Figures 36 and 37 show examples of the visual amenity for Rosedale sensitive urban land.

Figure 35 Aerial view of Rosedale sensitive urban land looking south

Figure 36 Rosedale sensitive urban land (looking north from Melville Pt.)

## 5.13 Development Capability

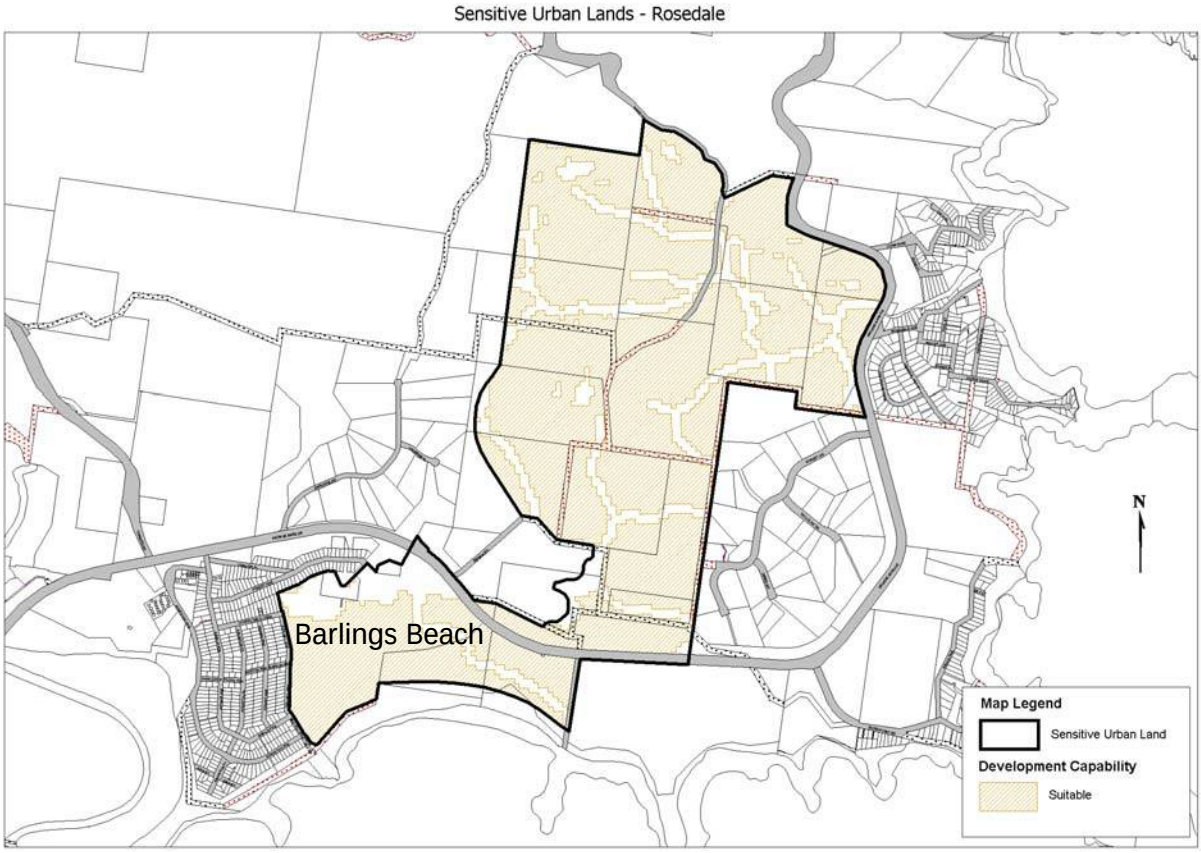



Figure 37 Development Capability for Rosedale sensitive urban land

Figure 35 shows the developable area for the Rosedale sensitive urban land. This suitable area is obtained by subtracting the absolute constraints from the total area of the land. From this we can get an approximate lot yield as shown below:

Total suitable area = Approx. 179 ha
Minus 25% for servicing (roads, easements etc) = Approx. 134.25 ha
Estimated Lot yield @ 1200sqm (locality average) = Approx. 1120 lots

Note that a DA has been approved for the Barlings Beach component of this UEZ. This area is excluded from the developable area and from the lot yield estimate.

# 6 Analysis – Moruya Heads

## 6.1 Locality


Figure 38 Location of the Moruya Heads sensitive urban land

Figure 38 shows the location of the Moruya Heads sensitive urban land. The area covers approximately 70 hectares of undulating terrain, with 2 of the 3 portions fronting the Moruya River estuary. The area is well vegetated and is surrounded by delicate ecosystems in the wetlands and estuary.

## 6.2 Acid Sulphate Soils

Figure 39 shows the probability of acid sulphate soils for the Moruya heads sensitive urban land. The map shows that there is a high probability for the occurrence of these soils. Any disturbance of these soils can have a detrimental effect on the wetlands and river.

Eurobodalla Council has a policy for the management of these soils. The purpose of Council's Acid Sulphate Soil policy is to prevent and minimise the environmental consequences caused by the exposure of potentially acid sulphate soils.

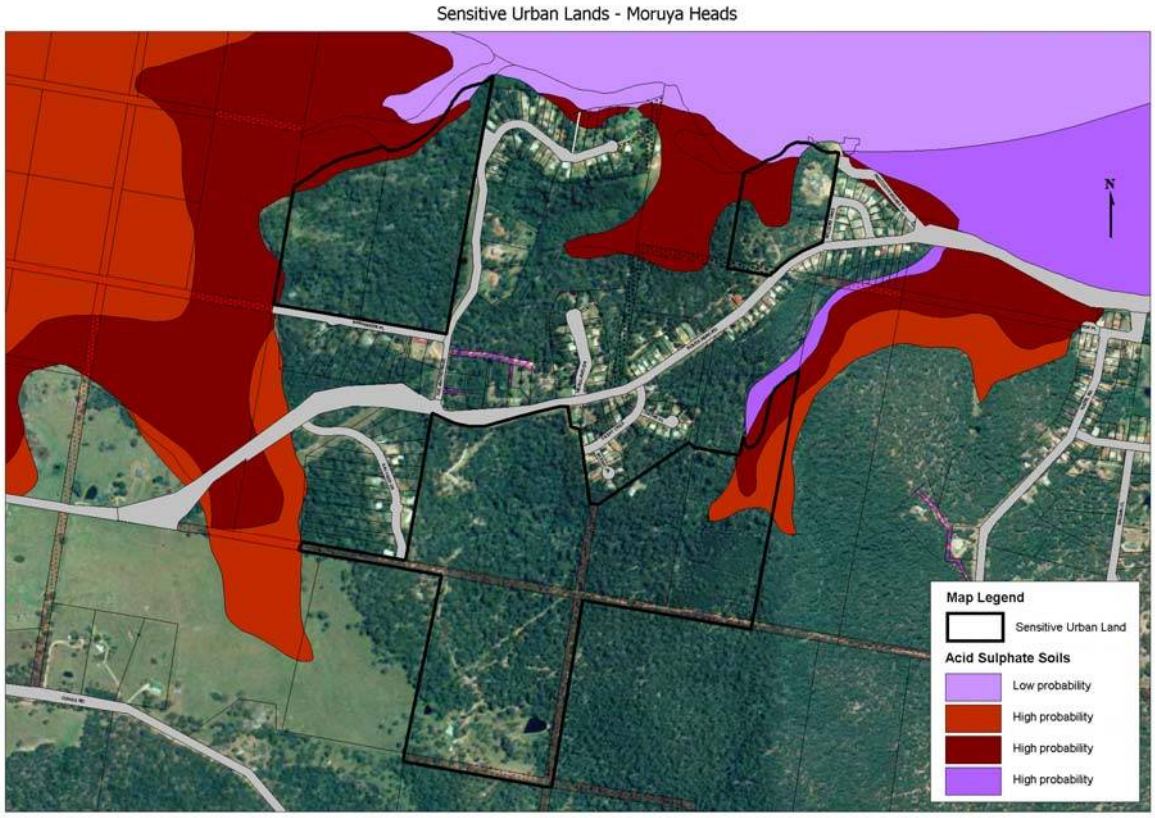



Figure 39 Probability of acid sulphate soils

## 6.3 Bush Fire Hazard

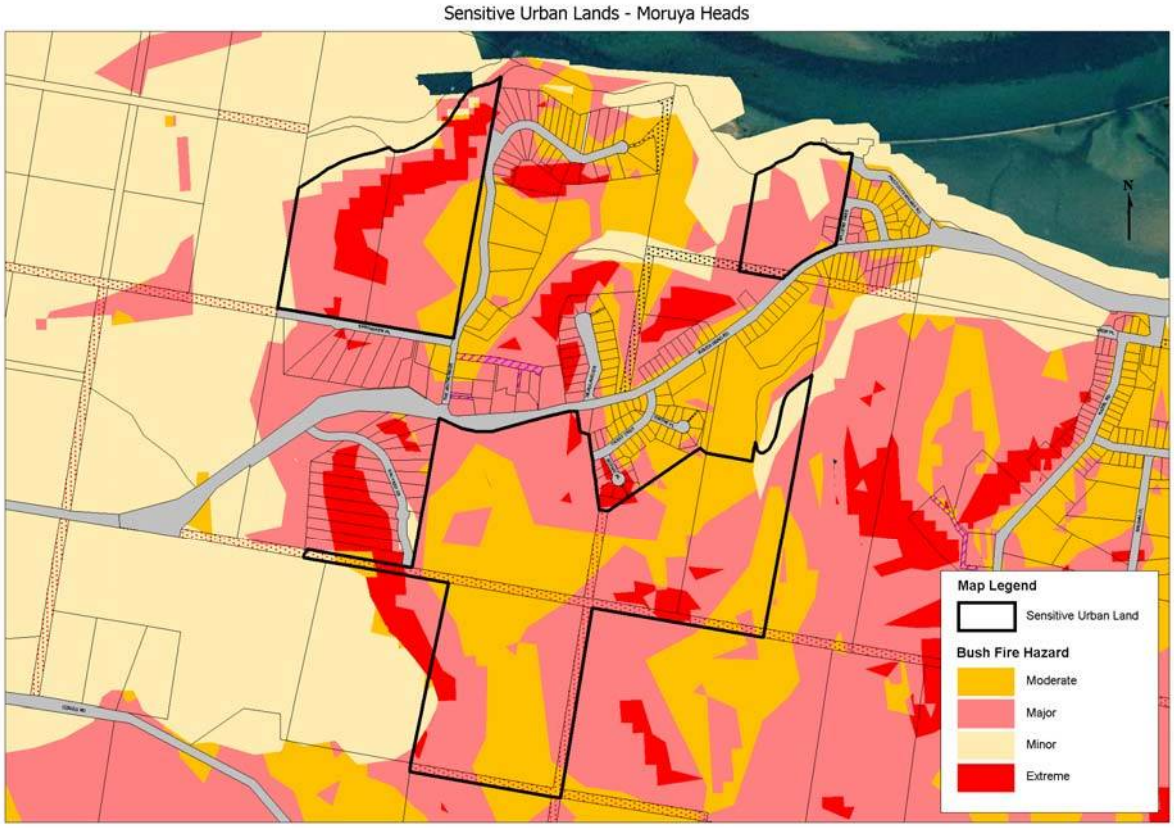



Figure 40 Bush fire hazard map

Figure 40 shows the bush fire hazard map for Moruya Heads. The map shows that there is a moderate to major bush fire concern over the site due to the vegetation and slope of the area.

## 6.4 Eurobodalla Rural LEP 1987

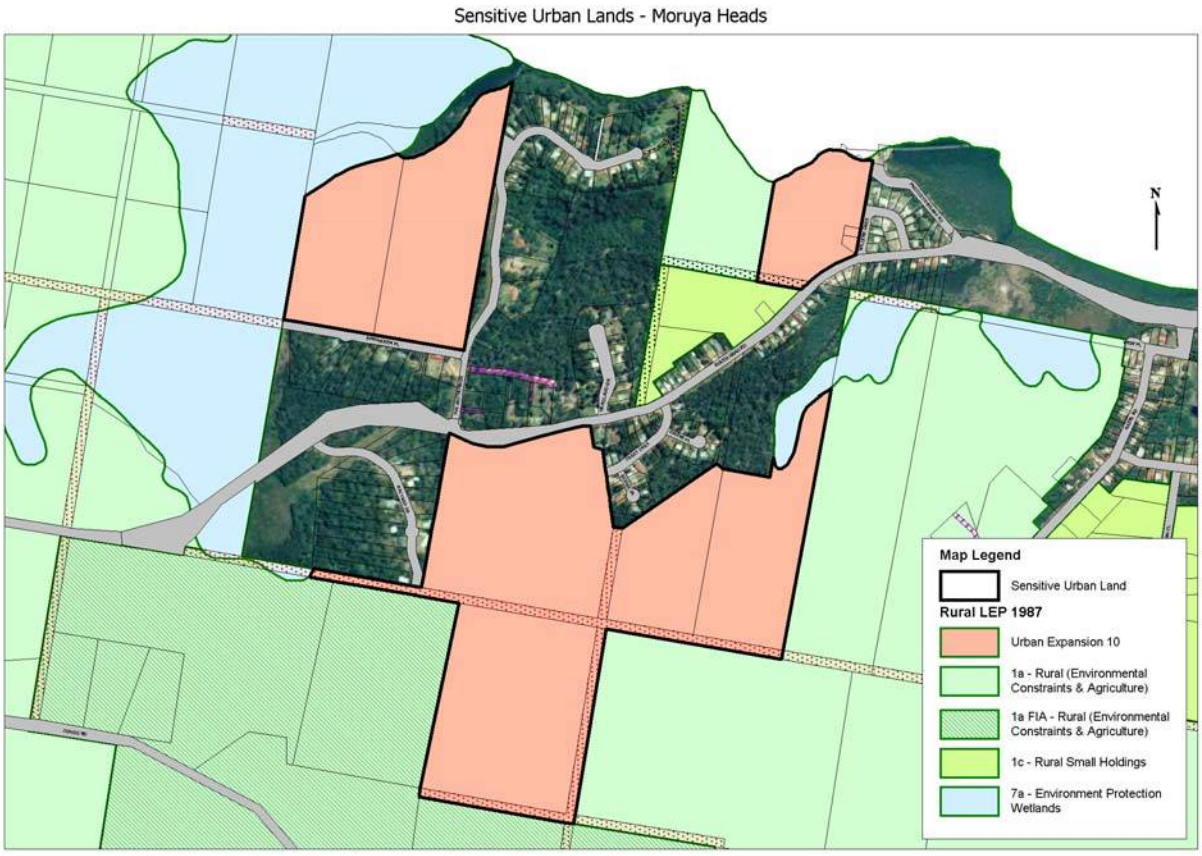



Figure 41 Eurobodalla Rural LEP 1987 Zones

Figure 41 shows the zoning for Moruya Heads sensitive urban land as Urban Expansion 10 (see 2.1.3 for objectives of zone). The majority of the surrounding land is zoned 1a – Rural (Environmental Constraints & Agriculture), with a large expanse of 1a FIA – Rural (Environmental Constraints & Agriculture) 1(a) – Further Investigation to the South of the area. There are also 7a – Environment Protection Wetlands to the East and West of the site.

## 6.5 DNR Riparian Corridor Management Objectives & Natural Drainage

Figure 42 shows the Riparian Corridor Management Objectives for the Moruya Heads sensitive urban land. The map shows that the creeks and gullies across the land have been classified as category 2 - Terrestrial and aquatic habitat. These riparian areas require protection and rehabilitation to allow bank stability and ensure water quality guidelines are met.


Figure 42 DNR Riparian Corridor Management Objectives for Moruya Heads

## 6.6 Slope


Figure 43 Slope Map for Moruya Heads

Figure 43 shows the slope across the Moruya Heads sensitive urban land. The area is undulating with some steep slopes though the majority is in the 5 – 10 degree range.

## 6.7 SEPP 14 Wetlands

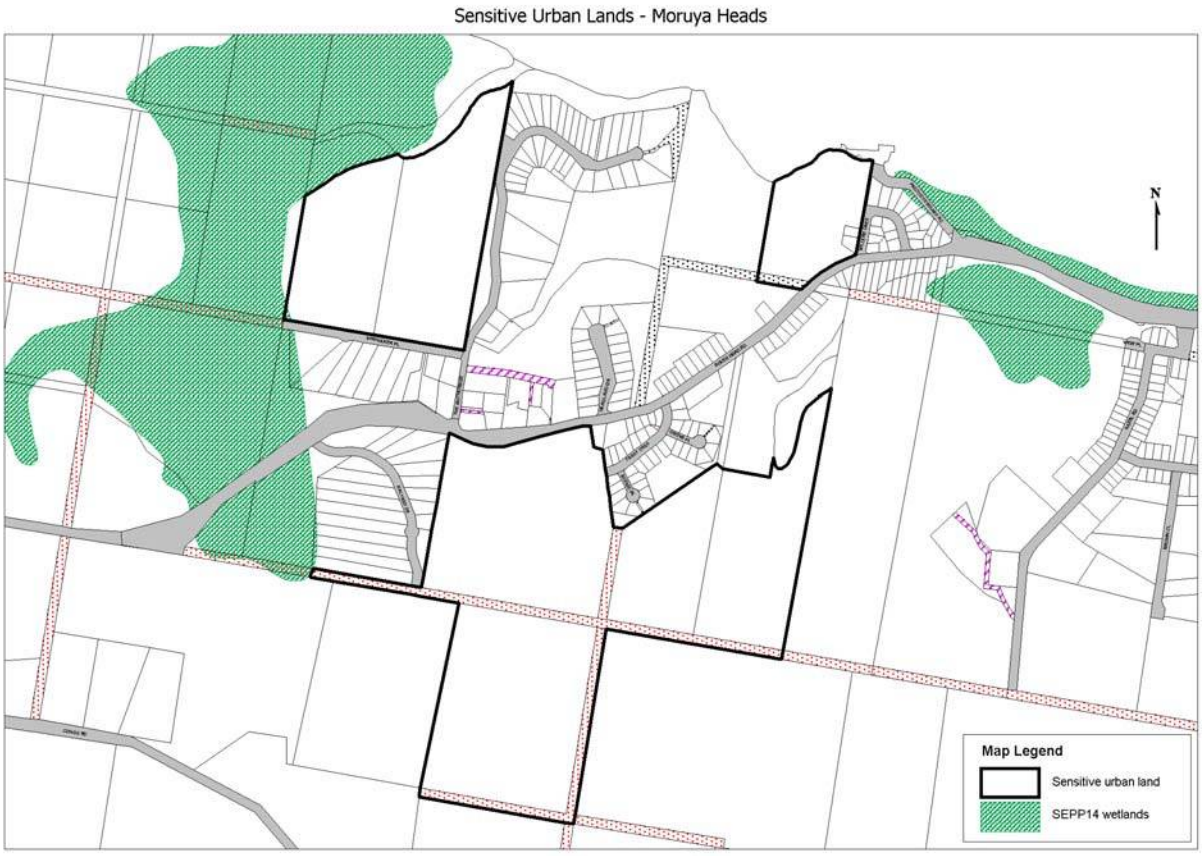



Figure 44 SEPP14 Wetlands for the Moruya Heads sensitive urban land

Figure 44 shows there are two protected wetland areas around the site. Natural drainage lines running across the site flow into these wetlands. Special care needs to be given to these creeks and gullies to ensure that bank stability is maintained through Riparian Corridor Management Objectives administered by DNR. Special permission is needed to develop in or near a SEPP 14 wetland, as they support a unique ecosystem. The degradation of these wetlands can also degrade water quality in the Moruya River estuary adjoining them.

## 6.8 Soil Regolith Stability

Figure 45 shows the soil stability for the Moruya Heads sensitive urban land. The mapping illustrates that the site is made up of stable and moderately stable soils. Fine silts and clay make up the moderate stability class which exhibit moderate rilling, gully development where exposed. Care should be taken in these moderately classed areas to avoid sedimentation and erosion.

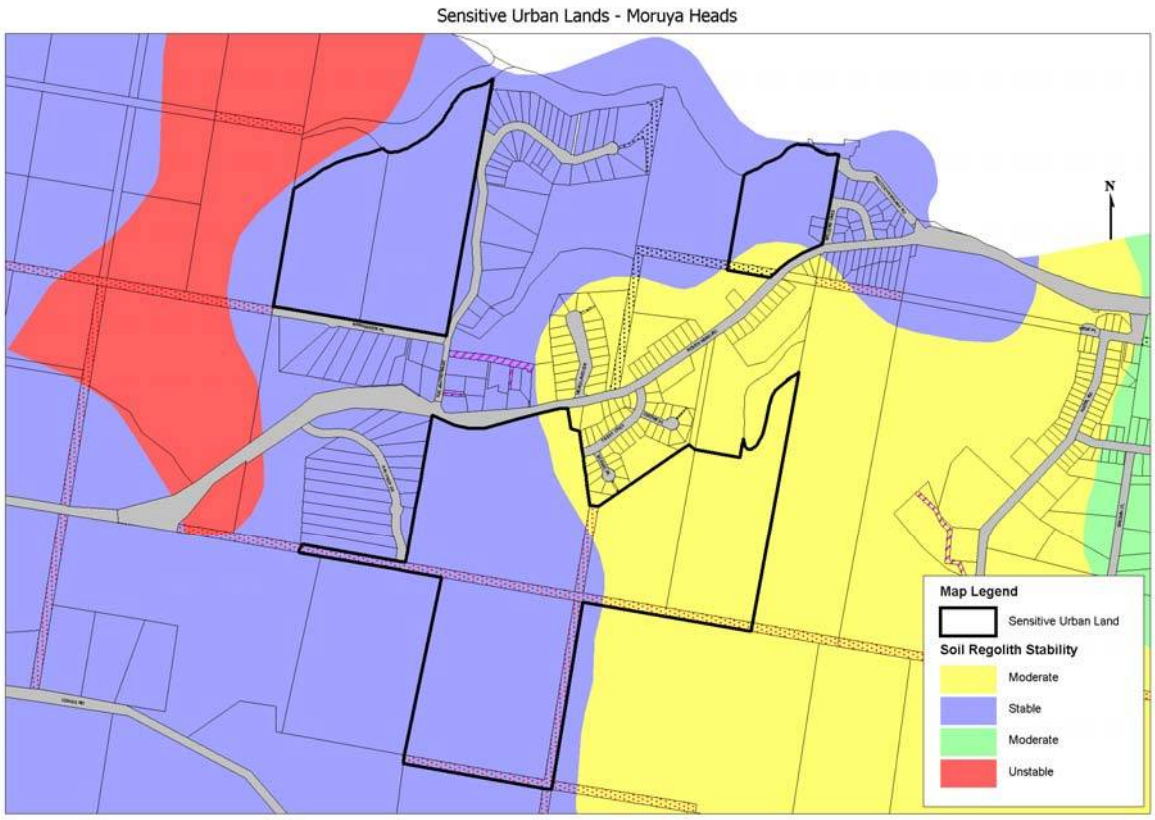



Figure 45 Soil Regolith Stability for Moruya Heads

## 6.9 Fauna Habitat Linkages


Figure 46 Core habitat and habitat corridors for Moruya Heads sensitive urban land

Figure 46 shows the core habitat and habitat corridors for the Moruya Heads sensitive urban land. The site has been identified as having highest core habitat over the south western portion and moderate to low core habitat over the remainder. A habitat corridor has also been identified connecting the high value habitat area in the south west of the sensitive urban land, with other high value habitat to the south. These areas have been recognised by environmental experts as having high biodiversity, which should be retained and enhanced across the shire.

## 6.10 Vegetation Ecosystems

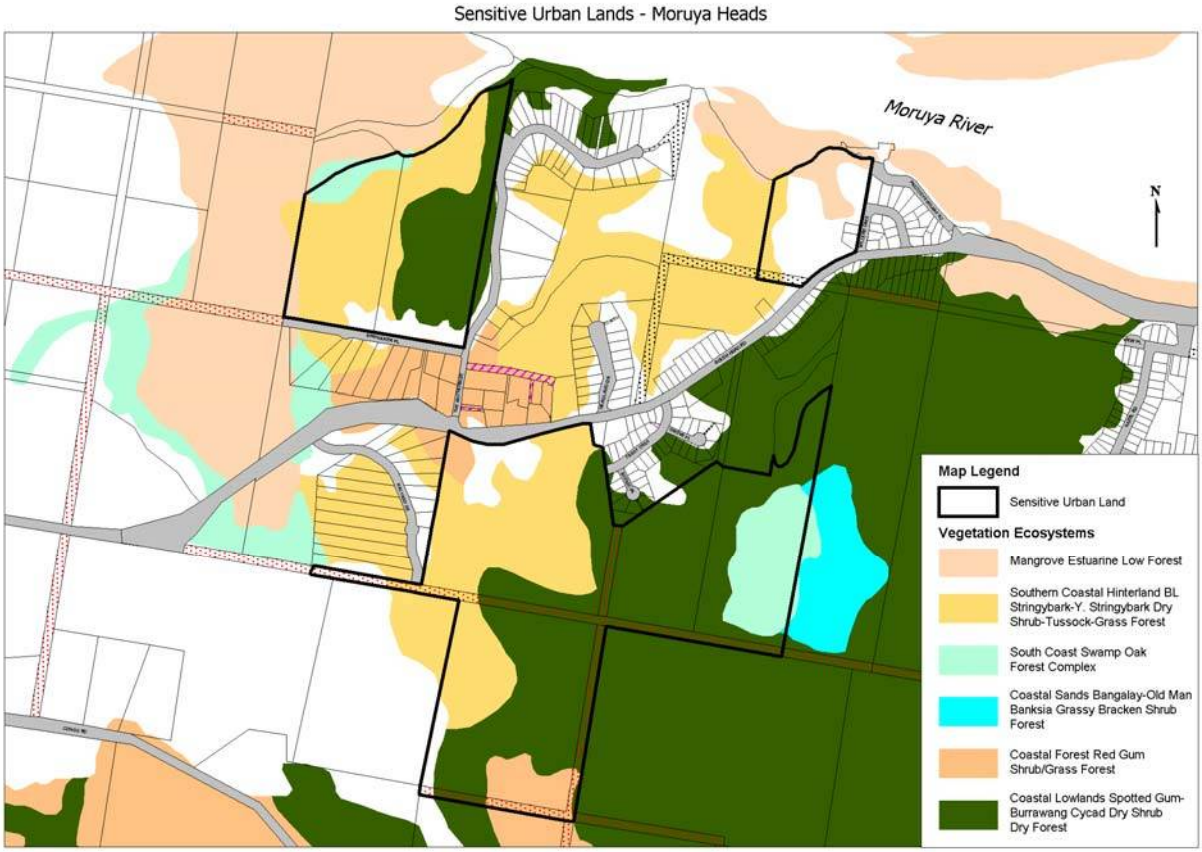



Figure 47 Vegetation ecosystems for the Moruya Heads sensitive urban land

The Moruya Heads sensitive urban land is well vegetated with several different vegetation ecosystems in the area (figure 47). This diverse range of vegetation provides a unique habitat for a variety of fauna and also for visual amenity. Four of the ecosystems in this area are regarded as being vulnerable and should be retained and enhanced throughout any development process.

The following vegetation types have been mapped on and around the sensitive urban land:

- Mangrove Estuarine Low Forest dominated by Aegiceras corniculata (Grey Mangrove), Avicennia marina (River Mangroves). This is considered to be a vulnerable vegetation ecosystem.
- South Coast Swamp Oak Forest Complex dominated by Casuarina glauca (Swamp Oak), Acacia sophorae (Coastal Wattle), Avicennia marina (River Mangrove). This is considered a vulnerable vegetation ecosystem, with Casuarina glauca being classed as an EEC.
- Coastal Sands Bangalay-Old Man Banksia Grassy Bracken Shrub Forest dominated by Eucalyptus botryoides (Bangalay), Banksia serrata (Old-man Banksia). This is considered a vulnerable vegetation ecosystem.

- Coastal Forest Red Gum Shrub/Grass Forest dominated by Eucalyptus tereticornis (Forest Red Gum), Eucalyptus globoidea (White Stringy Bark) and Angophora floribunda (Rough-barked Angophora). This is also considered to be a vulnerable vegetation ecosystem, with Eucalyptus tereticornis currently being nominated as an EEC.
- Southern Coastal Hinterland BL Stringybark-Y. Stringybark Dry Shrub-Tussock-Grass Forest dominated by Eucalyptus agglomerata (Blue-leaved Stringybark), Eucalyptus muelleriana (Yellow Stringybark).
- Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest dominated by Corymbia maculata (Spotted Gum), Macrozamia communis (Burrawang).

## 6.11 Absolute Constraints

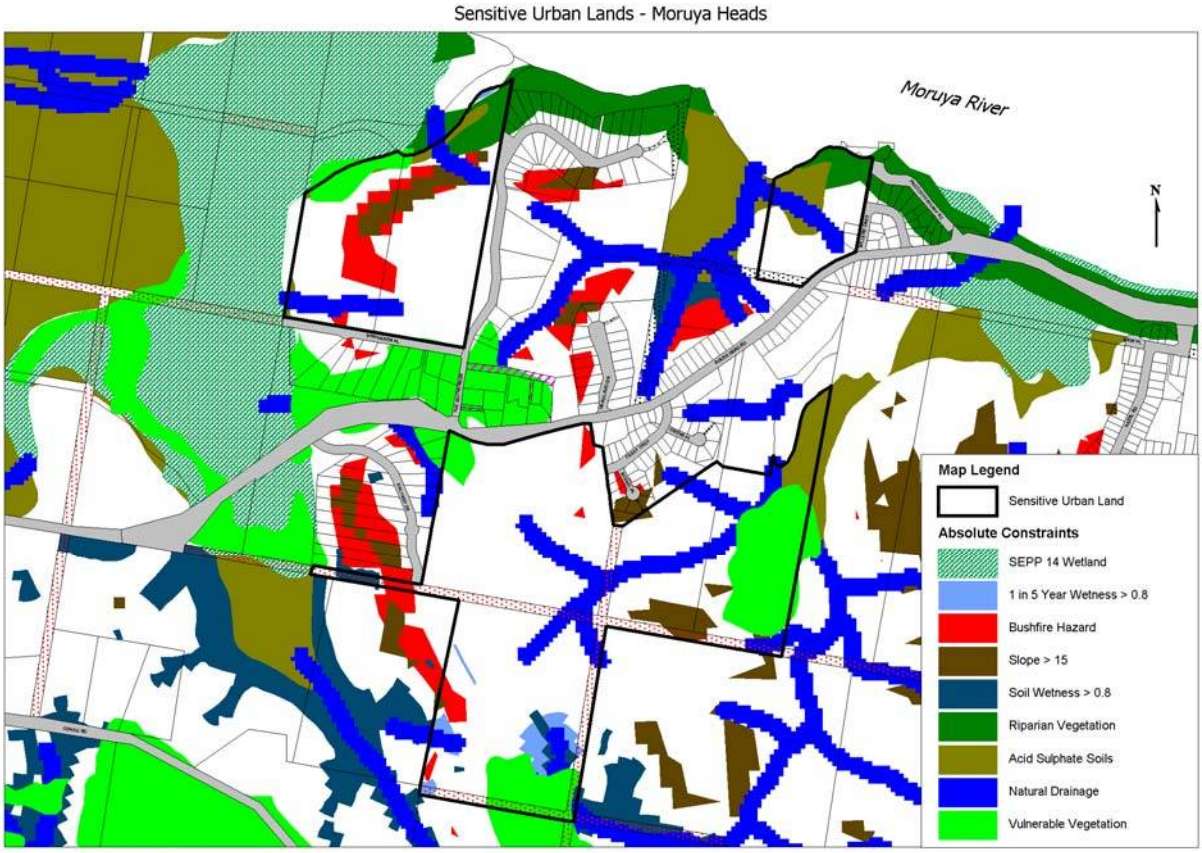



Figure 48 Absolute Constraints for Moruya Heads sensitive urban land

Figure 48 shows the absolute constraints for Moruya heads sensitive urban land. There are natural drainage lines across the site, which flow into the protected wetland. They have riparian values (as mentioned in 6.5) that need to be maintained and enhanced. Also along the bank of the Moruya River the Riparian Corridor Management Objectives need to be administered.

There are several vulnerable vegetation ecosystems across the sites that need to be retained and enhanced. Acid sulphate soils are also present, with bushfire and slope concerns in the steeper vegetated terrain.

## 6.12 Flooding and Extreme Flooding


Figure 49 Flooding and extreme flooding for Moruya Heads

Figure 49 shows the results of a flood study for the Moruya River estuary. The mapping shows that there is a concern for flooding in and around the sensitive urban land boundary. Both the 1% floodline and the extreme floodline encroach into the lands. Further information can be obtained from the document *Moruya Valley Floodplain Development Control Plan* available for viewing at Eurobodalla Shire Council or on Council's website.

## 6.13 Visual Assessment – Moruya Heads

The town of Moruya is characterised by a ring of bushland that surrounds the settlement. The western edges of the Moruya Heads urban expansion area provide a section of this ring of bushland. This edge is visually important on the approach to Moruya Heads when looking or travelling towards the east. The sections that front the Moruya River foreshore are also of high scenic value when viewed from the estuary and from North Head Drive along the northern bank. A high knoll centred in the north western section of the zone is visually significant. Figures 50, 51 and 52 show some of the visual amenity of the Moruya Heads sensitive urban land.

Figure 50 Moruya Heads sensitive urban land viewed from North Head Drive

Figure 51 Moruya Heads sensitive urban land looking from North Head Drive

Figure 52 Moruya heads sensitive urban land looking east from South Head Rd.

### 6.14 Major Projects Application (MP 05_0200)

An application to subdivide Lot 2 DP 534555 South Head Road, Moruya Heads has been made to the Department of Planning under Part 3A of the Environmental Planning and Assessment Act (MP 05_0200). The proposal is to subdivide the 14.4 hectare allotment into 107 lots. The Department has advised that the Director-General's requirements for information to accompany the application will not be issued until after the independent panel concludes investigations and reports on its findings.

Aerial photography has revealed that approximately 2.5 hectares of the site (Lot 2 DP 534555) has recently been cleared in advance of the granting of consent for the proposed subdivision. Council is investigating this activity with a view to commencing legal proceedings for a possible breach of the Environmental Planning and Assessment Act for unauthorised land clearing and for a breach of the Protection of the Environment Operations Act relating to the lack of erosion and sediment controls.

## 6.15 Development Capability


Figure 53 Development capability for Moruya Heads sensitive urban land

Figure 53 shows the developable area for the Moruya Heads sensitive urban land. This suitable area is obtained by subtracting the absolute constraints from the total area of the land. From this we can get an approximate lot yield as shown below:

Total suitable area = Approx. 28 ha
Minus 25% for servicing (roads, easements etc) = Approx. 21 ha
Estimated Lot yield @ 1500sqm = approx 140 lots

# 7 Analysis – South Narooma

## 7.1 Locality


Figure 54 Location of the South Narooma sensitive urban land

Figure 54 shows the location of the South Narooma sensitive urban land. It covers approximately 80 hectares of undulating terrain to the south of the Narooma urban area. The eastern portion of the site is well vegetated, with the western portion having been cleared of the majority of native vegetation.

## 7.2 Acid Sulphate Soils

Figure 55 shows the probability for the occurrence of acid sulphate soils over the sensitive urban land area. The mapping shows there is no real concern for these soil types in this area. A small area of low probability is identified in the north eastern portion of the site, which flows into Little Lake.

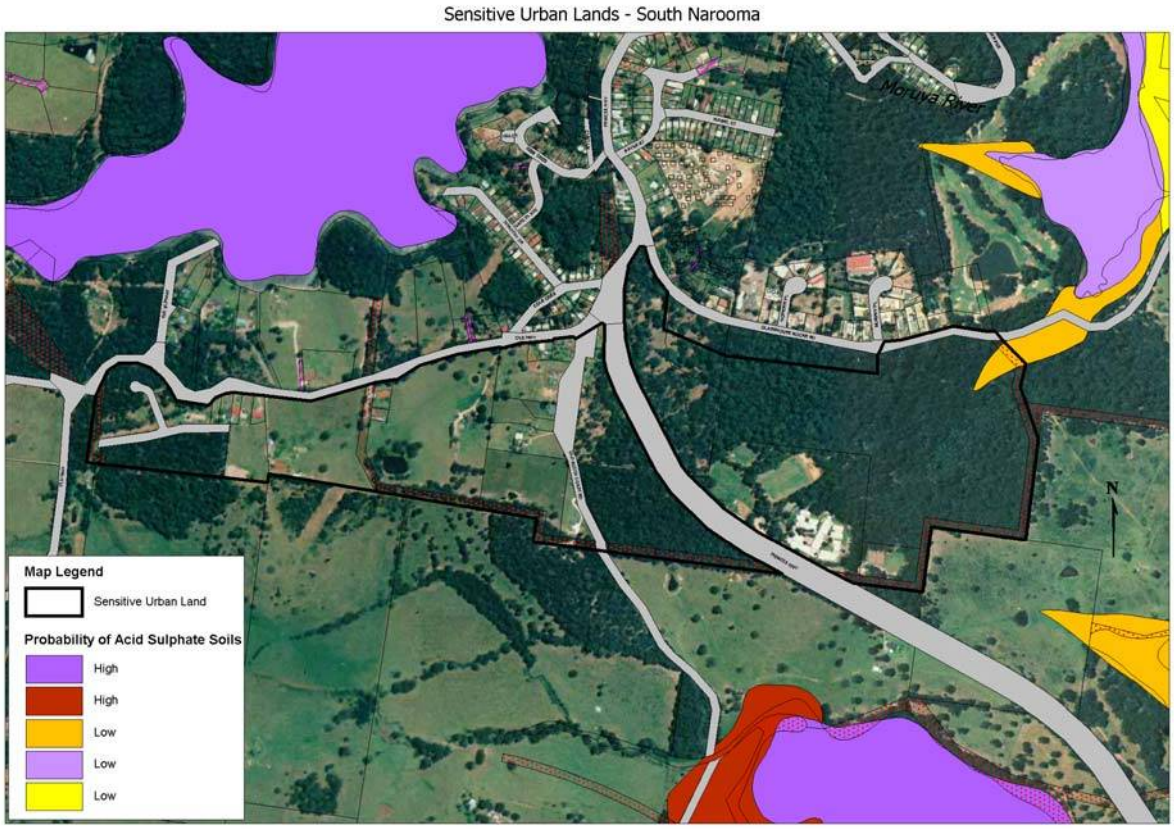



Figure 55 Acid Sulphate Soils on South Narooma sensitive urban land

## 7.3 Bush Fire Hazard

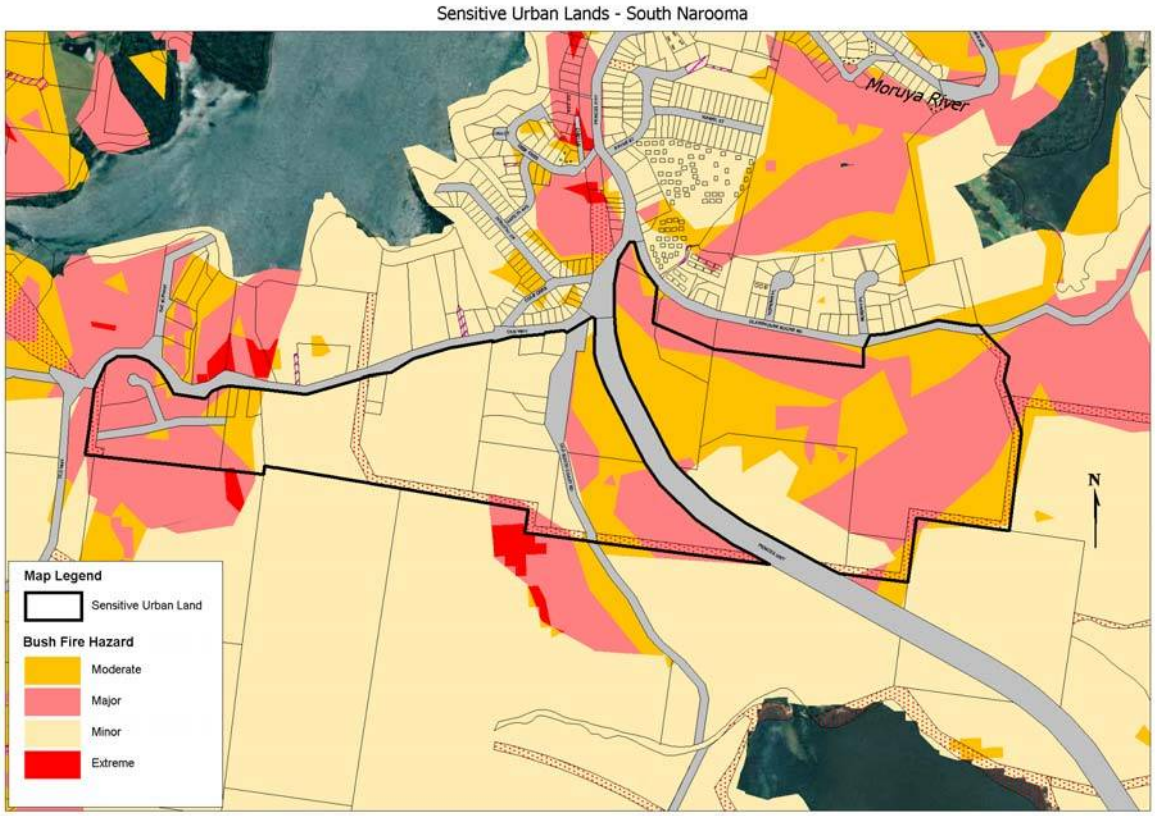



Figure 56 Bush fire hazard for South Narooma sensitive urban land

Figure 56 shows the bush fire hazard map for South Narooma. Major bush fire hazard has been identified in the vegetated area of the western portion, but due to the lack of vegetation across the remainder of this portion, bush fire hazard is minor. The eastern portion however has been mapped as having moderate to major bush fire hazard due to the dense vegetation and undulating terrain. There is no extreme bushfire hazard on the site, probably due to the lack of steep terrain.

## 7.4 Eurobodalla Rural LEP 1987

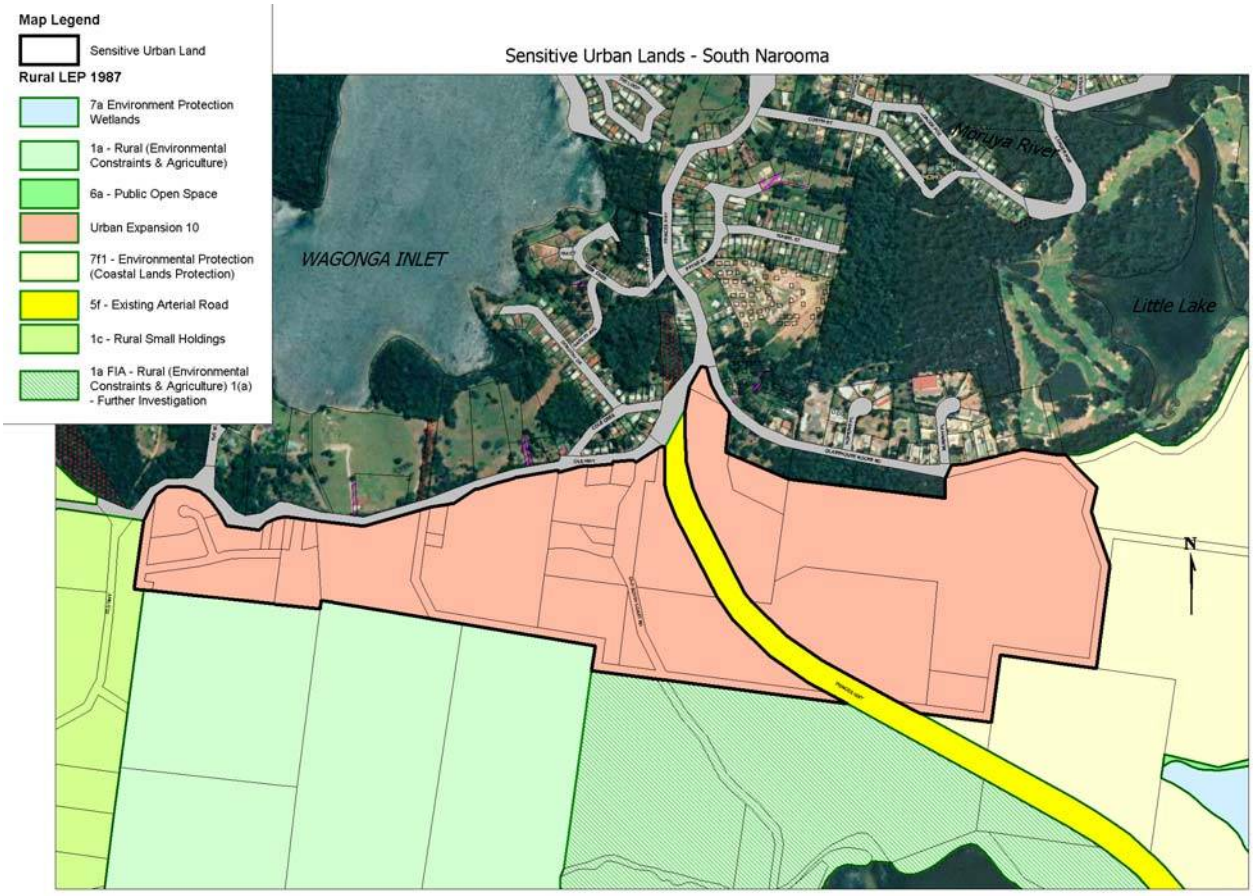



Figure 57 Eurobodalla Rural LEP 1987 Zones

South Narooma sensitive urban land is zoned under the Eurobodalla Rural LEP 1987 (figure 57) as being urban expansion 10 (see 2.1.3 for objectives of zone). The site is has the zone 7f1 – environment protection (coastal lands protection) to the east, with 1c – rural small holdings to the west. The site is bounded to the south by 1a – rural (environment constraints & agricultural) and 1a FIA – Rural (environmental constraints and agricultural) 1(a) – further investigation. An existing arterial road (Princes Highway) splits the site.

## 7.5 DNR Riparian Corridor Management Objectives & Natural Drainage

Figure 58 shows the site has been mapped as having categories 1, 2 and 3. The eastern portion of the site is identified as having a category 1 that drains into Little Lake. The category 2 stream is a smaller arm of the category 1, which also feeds into the lake. The DNR suggested buffer must be applied to these areas to maintain bank stability and preserve the ecology of the lake and streams. The western portion of the site has been mapped as having category 1 streams feeding into a category 2. These areas may require rehabilitation and maintenance to achieve the Riparian Corridor Management Objectives.

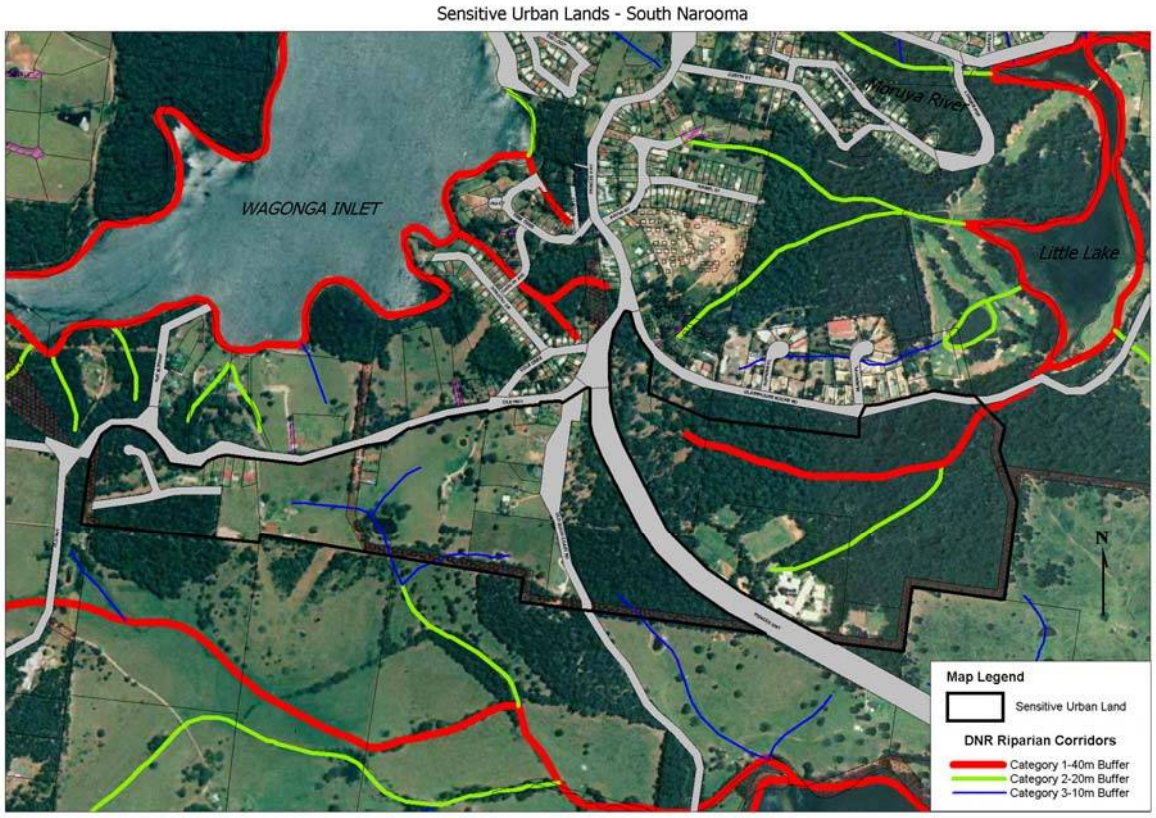



Figure 58 DNR Riparian Corridor Management Objectives for South Narooma

## 7.6 Slope

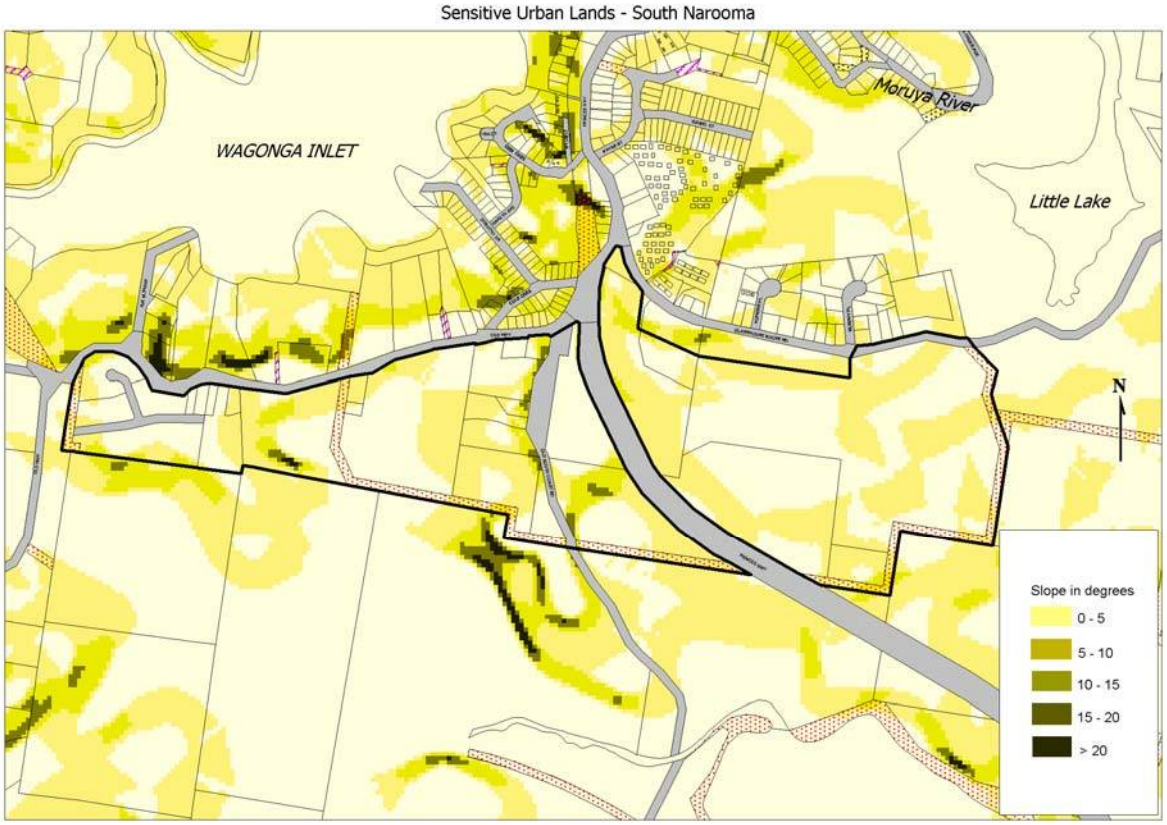



Figure 59 Slope map for South Narooma sensitive urban land

Figure 59 shows the slope map for South Narooma. Most of the South Narooma sensitive urban land is reasonably flat, with only a few small pockets being in the 10 – 20 degree range. The majority of the site is in the 0 – 10 degree range which poses no constraint to development.

### 7.7 SEPP 14 Protected Wetlands

There are no SEPP 14 protected wetlands on or near the South Narooma site (no map is included).

### 7.8 Soil Regolith Stability

Soil stability is mapped as being stable across the site. This poses no constraint to development (no map is included).

### 7.9 Fauna Habitat Linkages

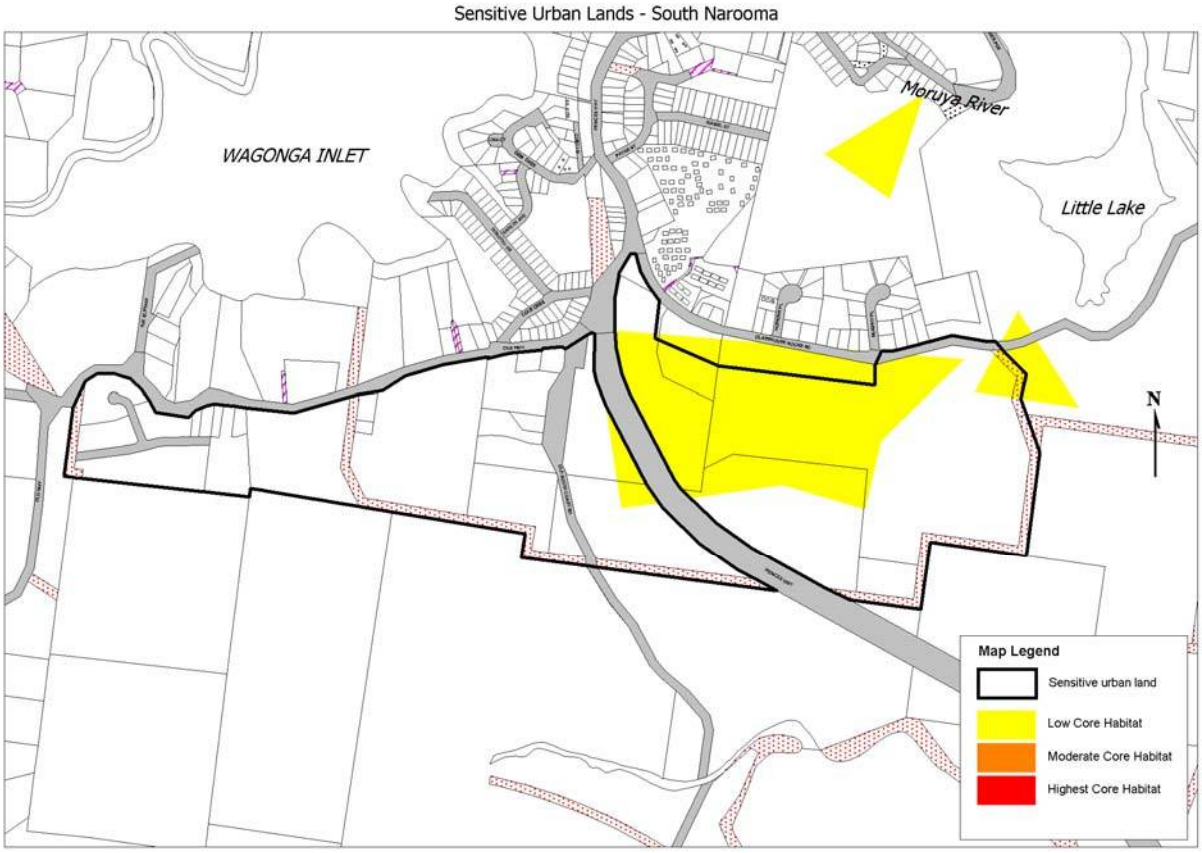



Figure 60 Core habitat for South Narooma sensitive urban land

Figure 60 shows the core fauna habitat mapped in the area of South Narooma sensitive urban land. The mapping identifies the eastern portion of the site as having low core habitat value. This mapping is compiled in a broad context that does not illustrate the full biodiversity of this area. Further investigation should be performed to firmly establish the core environmental values for the site.

## 7.10 Vegetation Ecosystems

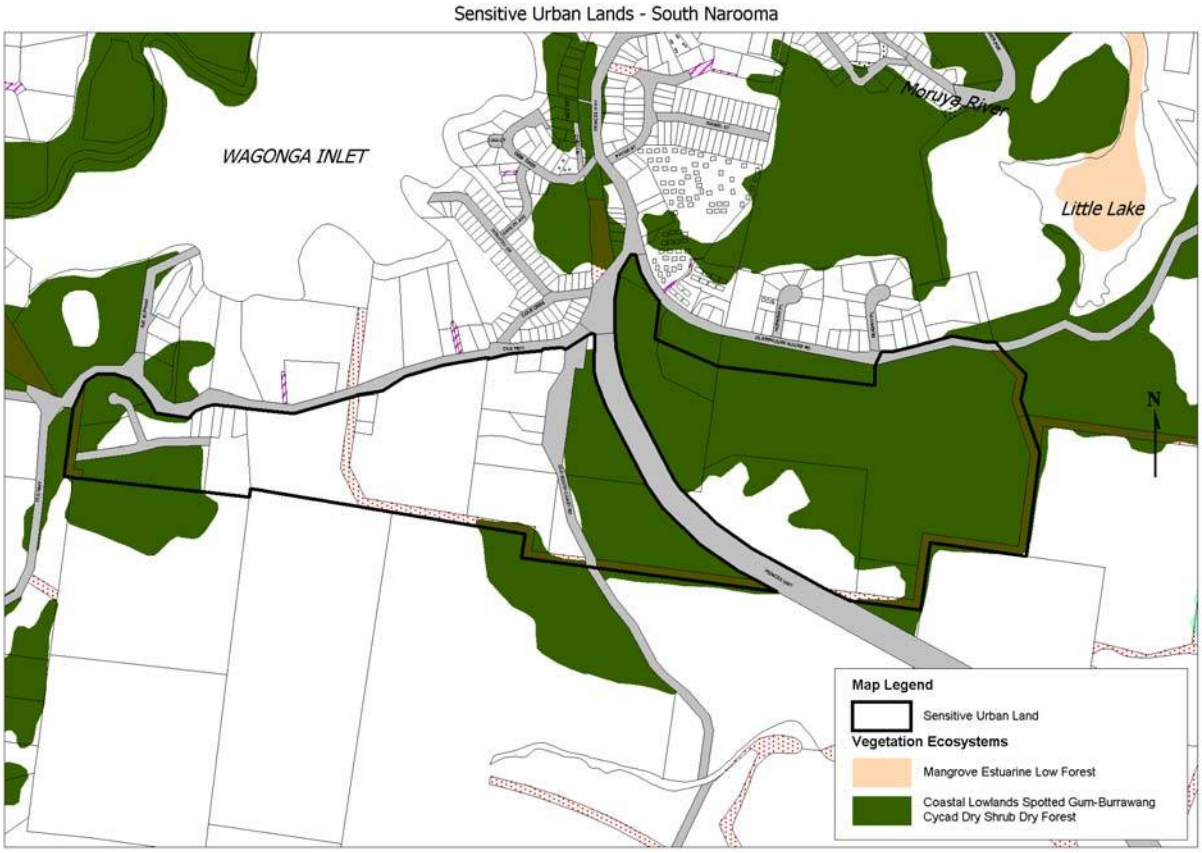



Figure 61 Vegetation ecosystems for South Narooma sensitive urban land

Figure 61 shows the vegetation ecosystems for South Narooma. The main ecosystem identified in the area is Coastal Lowlands Spotted Gum-Burrawang Cycad Dry Shrub Dry Forest dominated by Corymbia maculata (Spotted Gum), Macrozamia communis (Burrawang). There is a small pocket of vulnerable vegetation to the North West of the site which could be directly affected from poor management of the riparian areas across the eastern portion of the site.

## 7.11 Absolute Constraints

Figure 62 shows absolute constraints for the South Narooma sensitive urban land. The main constraints for the land are the natural drainage lines, which incorporate DNR Riparian Corridor Management Objectives buffers, with soil moisture retention, or soil wetness.

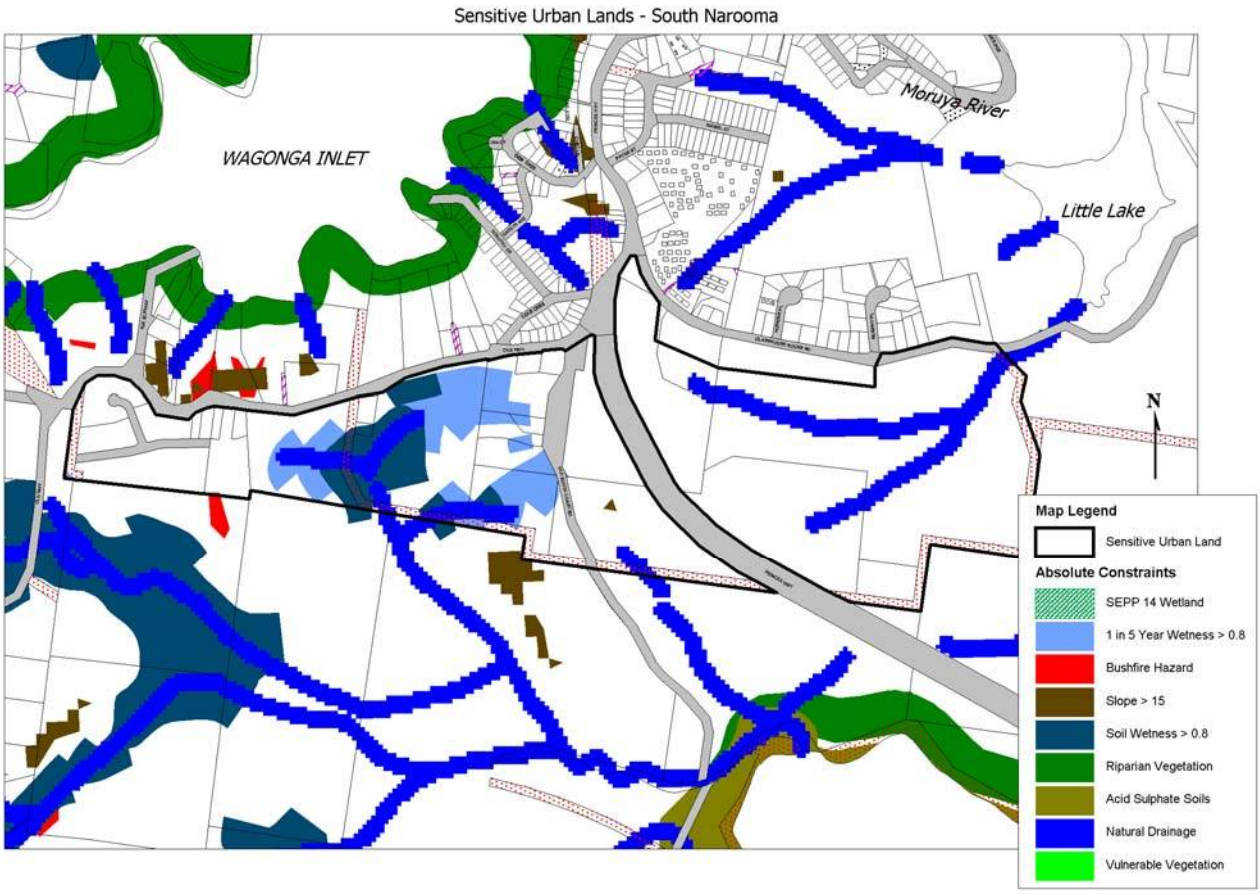



Figure 62 Absolute constraints for South Narooma sensitive urban land

### 7.12 Visual Assessment – South Narooma

The urban expansion zone located south of the town of Narooma was identified in the Narooma Plan (adopted by Council in December 2005) as being subject to further investigation. The section east of the Princes Highway is heavily vegetated and has important visual qualities particularly on approach from the south and as a defined edge to the settlement. The plan establishes that development of this area should be in accordance with the 2ec Residential – Environmental Constraints zone, i.e. large lot with a predominance of native vegetation. Figures 63 and 64 show the visual amenity of the South Narooma sensitive urban land.

The Narooma Plan contains controls to ensure that minimal vegetation is removed along settlement entry roads and that the coastal farm character is maintained. The section west of the highway is largely cleared and is partially farmed.

Figure 63 Aerial view of South Narooma sensitive urban land

Figure 64 South Narooma sensitive urban land looking east from old highway

## 7.13 Development Capability

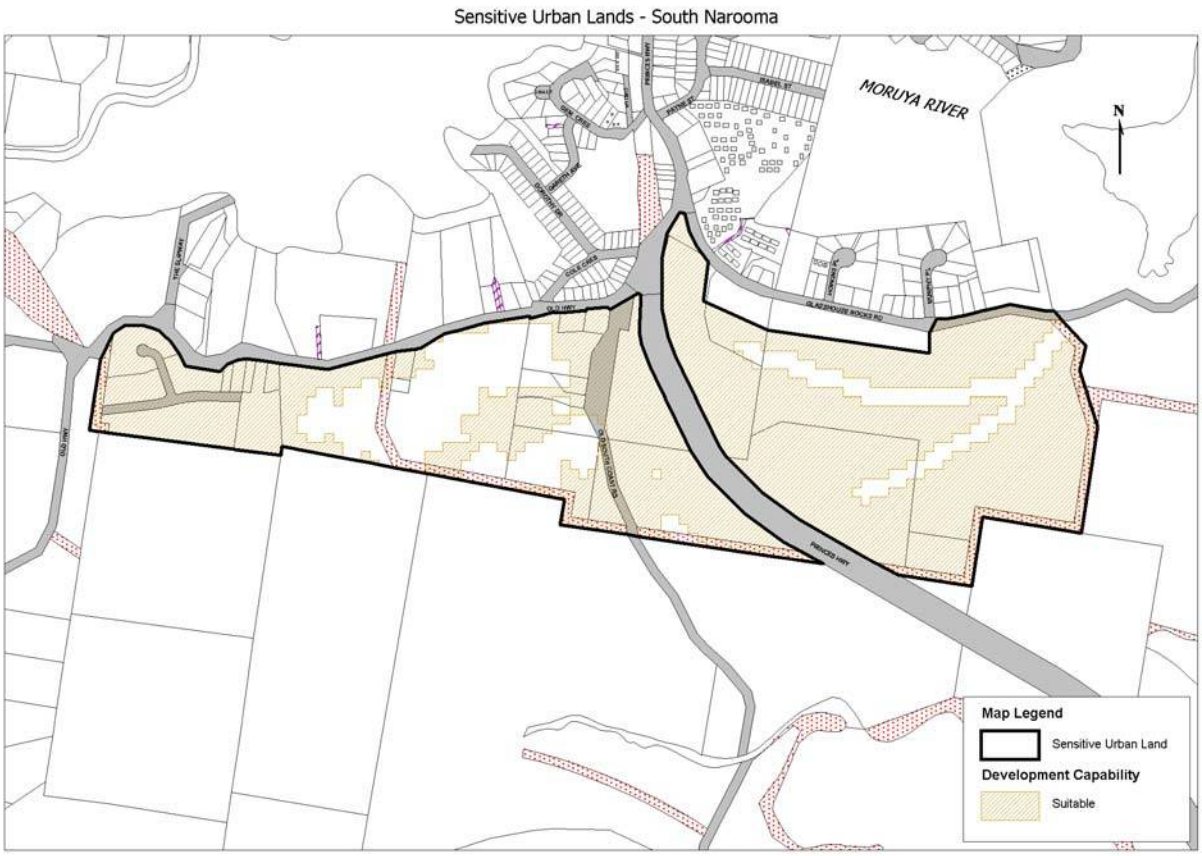



Figure 65 Development Capability South Narooma sensitive urban land

Figure 65 shows the developable area for the South Narooma sensitive urban land. This suitable area is obtained by subtracting the absolute constraints from the total area of the land. From this we can get an approximate lot yield as shown below:

Total suitable area = Approx. 63 ha
Minus 25% for servicing (roads, easements etc) = Approx. 47.25 ha
Estimated Lot yield @ 1200sqm = Approx. 394 lots