
REVIEW OF LAND SUITABILITY FOR URBAN RESIDENTIAL DEVELOPMENT, PART 1 – LAND ASSESSMENT

Pambula and South Pambula,
Bega Valley Shire, NSW

For Bega Valley Shire Council

sustainable thinking

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1. INTRODUCTION

1.1 Project aims

Coastal local government areas in NSW have seen strong population growth in recent years with out-migration from capital cities to smaller settlements that offer better amenity and relatively cheaper housing. This recent phenomenon, termed the sea change, has placed pressure on land and housing stocks leading to a rise in property values. The conversion of housing for holiday use and the gentrification of attractive coastal villages have compounded this problem. This often occurs in the context of socio-economic disadvantage as small regional communities are typified by low income levels and scarce employment opportunities. By way of example, unemployment in Bega Valley local government area (LGA) has risen from 5.8% of the workforce in 2006 to 7.2% in 2010 whilst the population has increased by 5% over the inter-censal period 2006 and 2011. Bega Valley is also categorised as a low income/low growth area as the growth in average incomes over the financial years 2003/04 and 2007/08 was between 3% and 4.4%.

The purpose of the study is to investigate the feasibility of rezoning certain land at Pambula and South Pambula to an urban residential zone to augment land supply and to facilitate the provision of affordable housing to cater to the needs of the communities of these localities and the wider Merimbula district.

The study is carried out over two parts – Part 1 (this part) is to assess the capability of specified investigation areas for urban residential development and to identify land within those areas that is suitable for the development of affordable housing. These areas have been identified by Bega Valley Shire Council and are located to the west of Pambula and surrounding South Pambula as shown edged in red on the maps below.

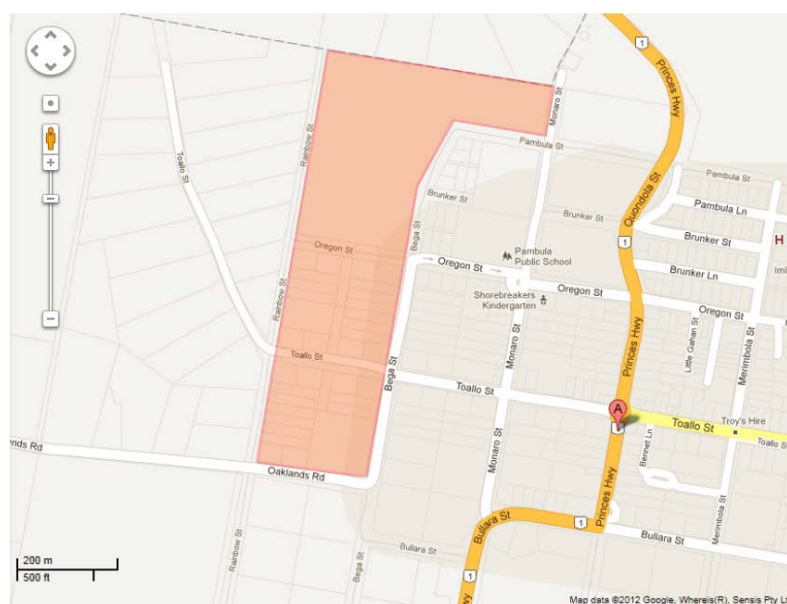


Figure 1.1: The Pambula investigation area. Source: Google Maps, 2012



Figure 1.2: The South Pambula investigation area. Source: Google Maps, 2012

Part 2 of the study comprises preparation of conceptual subdivision layouts for the land identified as being suitable for the development of affordable housing and includes an assessment of the feasibility of servicing this land with reticulated water and sewer, and access roads. Part 2 also involves detailed estimations of lot yield, recommending appropriate land use zones and providing a future land release strategy based on servicing arrangements, land ownership and the likely development of these areas.

1.2 The locality

The locality is recognised for its historic values and landscape qualities. Residential development in the village of Pambula is typically low scale on large allotments. Pambula is characterised by an aging population and there is a growing need to provide for seniors living developments and multi-unit housing.

Lot sizes in the existing settlement of Pambula are typically large with around two-thirds being around 1,000m² in area generally located in the north and east of the township. The remainder located in the west and south are about 2,000m².

The layout of the town of Pambula is in a grid pattern with variation to this occurring in recent development to the east that uses cul-de-sacs and loop roads. Future subdivision should be in keeping with the historic grid pattern and serve as an extension to current arrangements.

South Pambula is a relatively new settlement that is separated from Pambula by the river flats and dairying country. It is popular with young families and comprises a range of lot sizes and house sizes. There is a need to ensure that there is sufficient available urban land to facilitate the continued growth of South Pambula mainly comprising single detached dwellings.

The settlement of South Pambula consists of a range of lot sizes – land that fronts the Princes Highway averages approximately 2,200m² whereas about half of the lots in the centre of the urban area are around 850m², with some smaller lots within the 650 m² to 750m² range. A recent subdivision along Northview Drive contains larger lots in the 2,000m² mark. The layout of South Pambula is random with the use of cul-de-sacs and connector roads. The settlement may benefit through the use of flexible development controls that may assist to retain the existing character.

1.3 Planning for affordable housing

Affordable housing is generally defined as where a household pays no more than 30% of its income towards rent or a mortgage. There are various means for local government to ensure that an adequate supply of affordable housing is available to the community. These include:

- Ensuring an ample supply of zoned land for urban residential development. If supply is constrained then sale and rental value of available land and housing rises,
- Adopting flexible development controls and encouraging the development of housing that is able to be adapted to suit household size and stage in the lifecycle. Controls that specify certain materials and finishes, for example, can add to housing costs,
- Allowing for minimum lot sizes that facilitate inexpensive small dwellings. Affordable housing should, however, be constructed to a standard that is consistent with other dwellings in the vicinity and reinforces settlement character.
- Allowing for dwelling densities to accommodate a range of housing types and styles, including medium density dwellings, to cater to local demographics and specific target groups within the community,
- Facilitating the development of land that is unconstrained. This reduces the need for supporting studies to address geotechnical issues, environmental attributes and the like which keeps planning and design costs to a minimum. Ensuring that the land is relatively flat and unconstrained avoids the need for expensive earthworks and infrastructure that add to construction costs,
- Applying flexible zoning provisions and objectives, such as mixed use zones that allow a range of dwelling types, and inclusionary zoning that requires that a specified proportion of housing development is managed at an affordable standard,
- Offering planning incentives, such as permitting additional floorspace or discounted development contributions, to generate affordable housing stock, and
- Using the developer contributions system to obtain funds to put towards the provision of affordable housing.

Some of these means are pertinent to this study, in particular, ensuring adequate supply of zoned urban land, allowing for appropriate lot sizes and dwelling densities, applying flexible land use zones and minimising/avoiding constraints to development.

These are considered guiding principles for this study and are addressed in the conclusions.

1.4 Methodology

The relevant provisions of state and local planning policies, legislation and practice are identified in chapter 2 to guide the assessment of land capability and to assist with subdivision design in Part 2 of this project.

Chapter 3 considers the demographic characteristics of Pambula and South Pambula using 2006 census data and first release 2011 Census of Population and Housing data where available. Specifically, the age structure, levels of household income, and mortgage and rental payments are analysed to gain an understanding of the level of housing stress being experienced by the local community.

Chapter 4 looks at the current availability of urban land, land and housing values, and recent dwelling and subdivision approvals to gauge demand for and the supply of land zoned for urban residential development at Pambula and South Pambula.

Chapters 6 to 10 provide detailed assessment of the environmental constraints (flora and fauna, landscape factors and cultural heritage) and natural hazards (flooding and bushfire) in the two investigation areas.

In order to determine suitable land for urban development within the investigation areas, the following criteria have been applied having regard to the findings of the constraints analysis:

- i. Slope equal to or less than 15% (to minimise costly earthworks for dwelling and access construction)
- ii. Building capability Class 1 (to avoid costly earthworks or further geotechnical studies)
- iii. Able to utilise or extend existing road access off arterial, main or collector road (to avoid intersection upgrades or construct new access roads)
- iv. Able to be serviced from existing sewer pump station with minor extension of gravity sewers
- v. Not subject to flooding at 1:100 ARI (to avoid need for raised floor level and/or construction of flood-free access)
- vi. Free of environmental sensitivity:
 - Vegetation not an EEC or of high conservation value (to avoid need for further research or siting/design to protect environmental asset and potential sterilisation of land)
 - Not threatened species habitat that is likely to be affected by residential development (to avoid need for further research or siting/design to protect environmental asset)
 - Able to avoid riparian corridors (sufficient area for dwelling construction)
- vii. Predominantly cleared of native vegetation (for bushfire protection and to reduce costs associated with removal)
- viii. No evidence of significant indigenous or non-indigenous cultural heritage items or values (to avoid the need for heritage assessment)
- ix. Adjoins existing urban settlement and will be contiguous (to ensure visual amenity protected and to minimise costs for access roads)

Based on the assessment of environmental constraints and hazards, these criteria have been applied to each investigation area to identify areas of land that are suitable for future urban residential development. The results are provided in Chapter 10 with a focus on the provision of affordable housing.

2. PLANS AND STRATEGIES

The relevant provisions of Bega Valley Shire Council plan and strategies are identified in this chapter. The consideration of land use plans is limited to the draft comprehensive local environmental plan (LEP) which is likely to be gazetted within the second half of 2012 and the draft comprehensive development control plan (DCP) which will take effect upon gazettal of the draft LEP. Details of relevant State legislation and policy are provided in Appendix 1 to this report.

2.1 Social Plan 2006 – 2011

The aim of the Bega Valley Social Plan 2006-2011 is to identify the key social and cultural needs of the community, and to respond to those needs in partnership with other government and private service providers, both. The plan addresses general community social issues and particular target groups within the community. The community issues of affordable housing, transport, health and well-being, and learning and education, were identified as significant for Bega Valley during preparation of the plan. The changing proportion of older people in the community and the increasing trend for people from the cities to retire to coastal areas is noted. The implications of these changes range from the effect on housing costs to planning for services for older people in the future.

The capacity to access housing that is safe, appropriate and affordable is the cornerstone of social justice in Australia. It has long been the policy of Australian governments to encourage home ownership through policies and tax structures.

For those on a low income who are unable to own their home, government support is provided to rent from the private rental housing market (through rent assistance payments) or through social housing (such as public housing or community housing).

Households who pay more than 30% of their income for housing are generally considered to be in housing stress and could be at risk of homelessness.

The need to promote affordable housing is recognised in the plan given that incomes are generally lower in Bega Valley LGA than the NSW average, and that house prices and rental values vary geographically despite comparatively low housing costs. Housing supply is constrained in coastal areas due to higher demand, absentee ownership, the prevalence of tourism accommodation and limited growth capacity. It is stated in the Social Plan that *'The relatively high cost of housing in coastal areas and absence of public and community housing in coastal communities means that most low-income households must look to inland areas for cheaper housing'*. It is also noted that the dispersal of a small population across a large area presents challenges for settlement planning. Population growth is to be targeted towards existing towns and villages to economise on the provision of infrastructure, to minimise environmental impacts and to provide social benefits in the provision of community, cultural and social services to residents.

A range of strategies are recommended to address the issue of affordable housing including:

- Investigate the level of housing stress experienced in the Bega Valley shire and develop appropriate responses, and
- Strengthen Council's planning provisions to deliver a diverse range of residential opportunities

2.3 Merimbula District Structure Report

The Merimbula District Structure Report is a preliminary planning investigation of land use needs for the district for the next 20 years. It was adopted by Bega Valley Shire Council in July 2008 and has been used in preparing draft Bega Valley LEP 2011, e.g. in the allocation of land use zones and the application of minimum lot sizes.

Relevantly, the report defines the desired character and scale of Pambula and South Pambula, defines the boundaries of these settlements, seeks to ensure housing diversity to meet population growth, and identifies environmental values to preserve.

The report identifies local factors that will affect growth. For Pambula these are:

- development is constrained to the existing zoned areas including south and west Pambula,
- its close proximity to important wetland systems providing habitat for a diversity of plants and animals, and
- an important light industrial and bulky retailing area.

For South Pambula the factors affecting growth are:

- development is constrained by water and sewer infrastructure provision, and
- limited lots are available in remaining urban zones.

The report contains data concerning demographic characteristics and residential land availability which inform this review. Pambula is nominated as the major focus for industrial development in the district although the two existing areas are environmentally constrained and at capacity. South Pambula has a large area of industrial zoned land to the west of the settlement which is being investigated for expansion and the provision of sewer to accommodate general or light industry. The need for some limited expansion of commercial zones in Pambula is also highlighted.

Key issues are identified in the report as being of high importance for the district and of these the following are addressed in this review:

- population,
- style of settlement,

- ageing of the population,
- impacts on natural values, and
- infrastructure.

It is noted that Pambula and South Pambula each has a distinct style. Pambula, one of the oldest villages in Bega Valley Shire, is characterised by a village atmosphere, heritage buildings, and low scale residential and commercial development. South Pambula, which is located to the south and separated from Pambula by river flats and dairy farms, in contrast is relatively new, does not have any commercial development and requires augmentation of services to expand. It is recommended that investigation of the capacity to augment services at South Pambula be carried out.

The report also notes that significant growth in aged persons is expected and this will necessitate the provision of smaller, medium density and accessible housing types located close to commercial centres. It is estimated that around half of incoming residents will be over 50 years of age and that the proportion of persons aged 65 years and over will continue to grow generating the need for aged care facilities. However, to meet demand and preferences Council should plan for 65% of new dwellings to be detached housing and about 20% should be multi-unit housing (apartments and units). Given that land and house prices are a challenge to many first home buyers and those on modest incomes, the report makes recommendations to address housing affordability to increase residential land supply in modest priced areas such as South Pambula. Recommendations of the structure report that are relevant to this review are given below with reference to areas identified in Map 9 of the report. These recommendations form the basis of this review and are addressed in *Chapter 8 Identification of developable land*.

Area 24: West Pambula future urban zone

This area will require a new zone as the template does not allow for future urban zones. Further significant development for residential purposes is constrained by topography, road costs and lack of reticulated sewer. It is considered beyond community capacity to sewer this area and the prospective development yield could not fund sewer extension.

It is recommended the area be added into the proposed R5 Large Lot Residential zone to the west. Perhaps in time it might prove economic to service the area and lands to the west and increase the supply of residential lots but this is not warranted in this review.

Subject to site constraints evaluation, it is estimated that the land may have a potential lot yield of an additional 10 residential lots.

Recommendation: That the land be proposed for zoning R5 Large Lot Residential in the CLEP with the lot size map to depict a minimum of 2000m².

Area 25: Crown and Land Council lands north-west of Pambula Urban area

This area surrounds the Primary School and abuts the highway on the northern approach to the town. It is currently zoned part 1(a) Rural General and part 1(c) Rural Small Holdings.

The land has gentle to moderate slopes and is dissected by several creek lines. It is mostly covered in native vegetation at various stages of regeneration. Part of the land is Crown Land and part is owned by the Eden Local Aboriginal Land Council.

The most easterly section adjoining the highway is Crown Land and warrants zoning E2 Environmental Conservation for landscape and environmental reasons. Subject to further environmental assessment, sections of the remainder may be suitable for R2 Low Density Residential Zoning.

No estimation of potential lot yield has been made for this area.

Recommendation: That the section of the land comprising the area east of the extension of Monaro St be proposed for zoning E2 Environmental Conservation in the CLEP. That the remainder of the area be zoned RU2 Rural Landscape as a holding zone and the land be set for review in the next five year period subject to appropriate studies being carried out.

Area 33: Potential addition to urban zone at South Pambula

This area is mostly of moderate slope. There may be some natural resource constraints on developing the land for low density urban such as bushfire, threatened species and European archaeology but otherwise the land may be suitable for addition to the South Pambula urban area. This area continues to have potential to generate more affordable housing lots.

Development would allow closure of the dangerous intersection of Summerhill road and the highway or limitation to left hand turns.

Subject to site constraints evaluation, it is estimated that the land may have a potential lot yield of 150-200 low density residential lots.

Recommendation: That Council zone this land RU2 Rural Landscape as a holding action in the CLEP and include for consideration of R2 in the CLEP and be included for consideration of R2 Low Density in the next five year review, subject to land owners cooperating with the necessary studies.

Area 56: 1(a) land off Furner Street, Griegs Flat

This area consists of small lot ownerships to the east of the Princes Highway and is currently zoned rural 1(a). In the late 1990s Council supported rezoning of the area to allow a dwelling each of the ownerships.

Recommendation: That the small lots in this Area are lot sized to permit a dwelling on each lot.

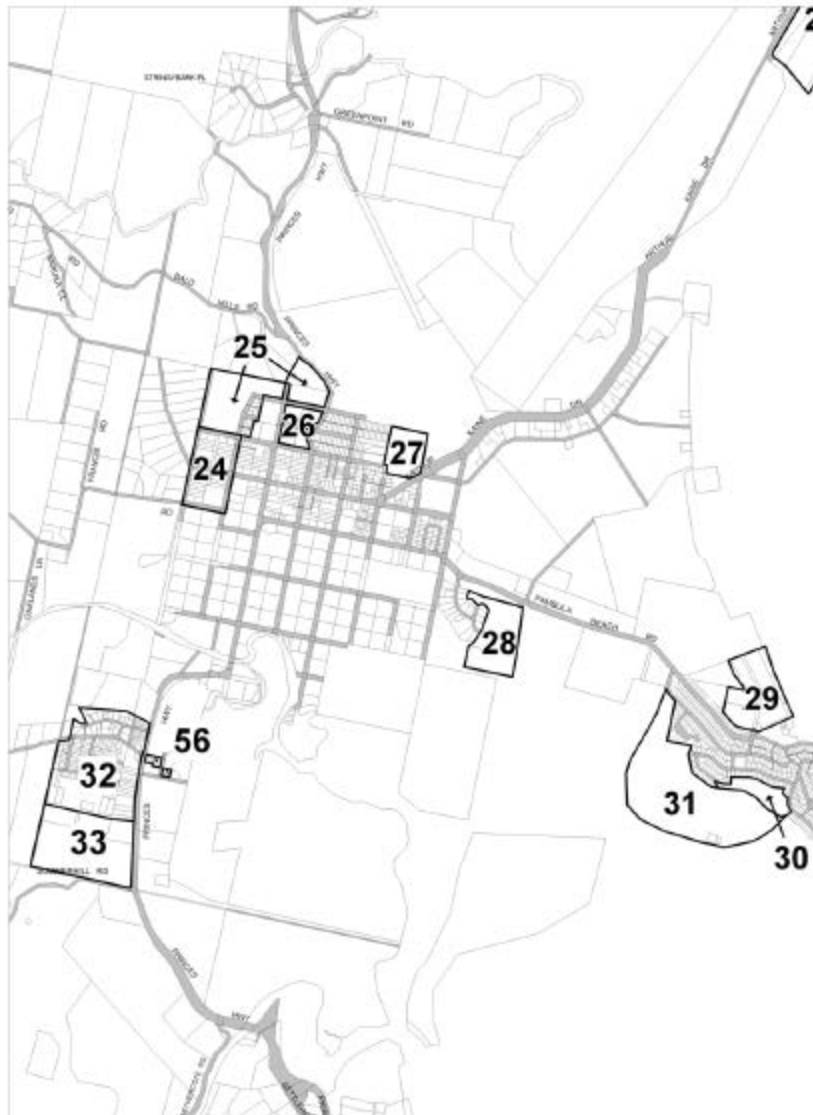


Figure 2.1: Merimbula District Structure Report. Land use recommendations for the urban areas of Pambula, South Pambula and Pambula Beach. Source: Bega Valley Shire Council, 2008

2.3 Draft Bega Valley LEP 2010

Bega Valley Shire Council has prepared draft Bega Valley LEP 2010 as a new comprehensive LEP for the local government area in accordance the NSW Government's standard instrument and in response to the South Coast Regional Strategy.

It is proposed to zone the investigation area adjacent to the settlement of Pambula as part RU2 Rural Landscape and part R5 Large Lot Residential as shown on the extract from the draft plan below. Adjoining land within the existing settlement of Pambula is zoned R2 Low Density Residential. This is separated from the business zone by land zoned R3 Medium Density Residential. Land to the west and north which has been largely developed for rural living is to be zoned E4 Environmental Living and adjoining land to the south is to be zoned RU2 Rural Landscape. The northern investigation area is currently zoned part 1(a) Rural General and part 2(f) Future Urban under Bega Valley LEP 2002.

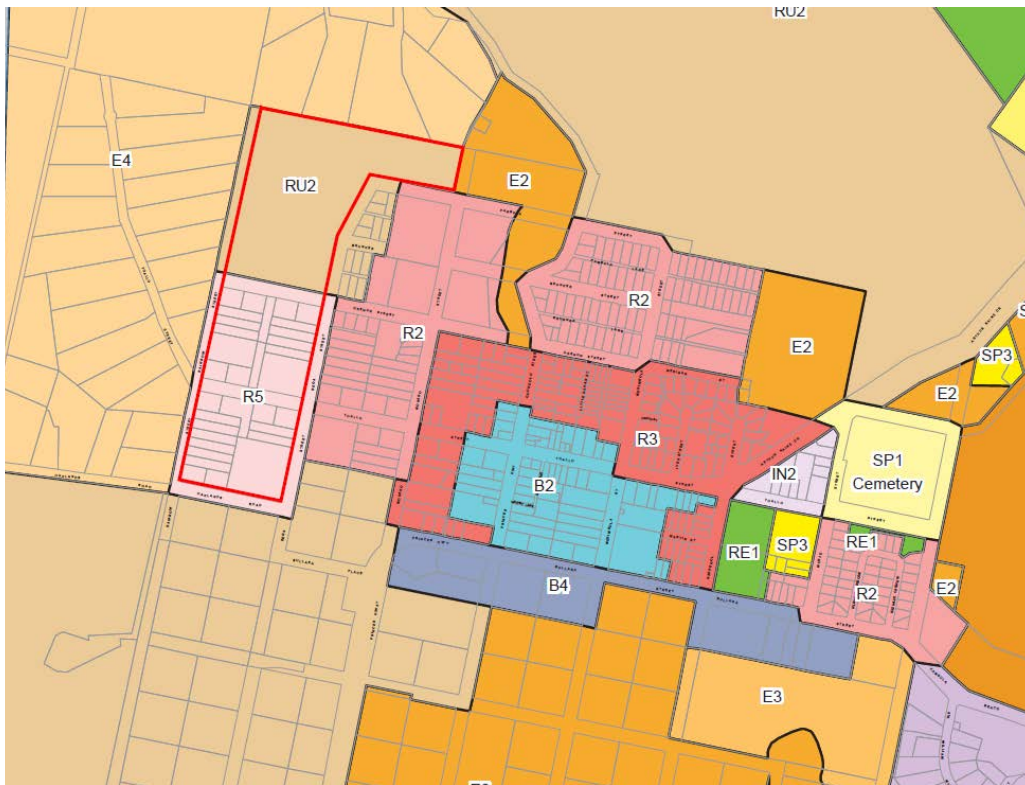


Figure 2.2: Proposed land zoning of Pambula under draft Bega Valley LEP 2010 – the investigation area is edged red. Source: Bega Valley Shire Council 2010

It is proposed to zone the investigation area adjacent to South Pambula as part RU2 Rural Landscape and part E3 Environmental Management as shown on the extracts from the draft plan below. The existing settlement is to be zoned R2 Low Density Residential. Land to the west is to be zoned E3 Environmental Management.

Further to the west is a large area of industrial land that is partially occupied. Adjoining land to the east, north and south is to be zoned RU2 Rural Landscape. The southern investigation area is currently zoned 1(a) Rural General under Bega Valley LEP 2002 as is that part of the existing settlement of South Pambula located south of Mount Darragh Road.

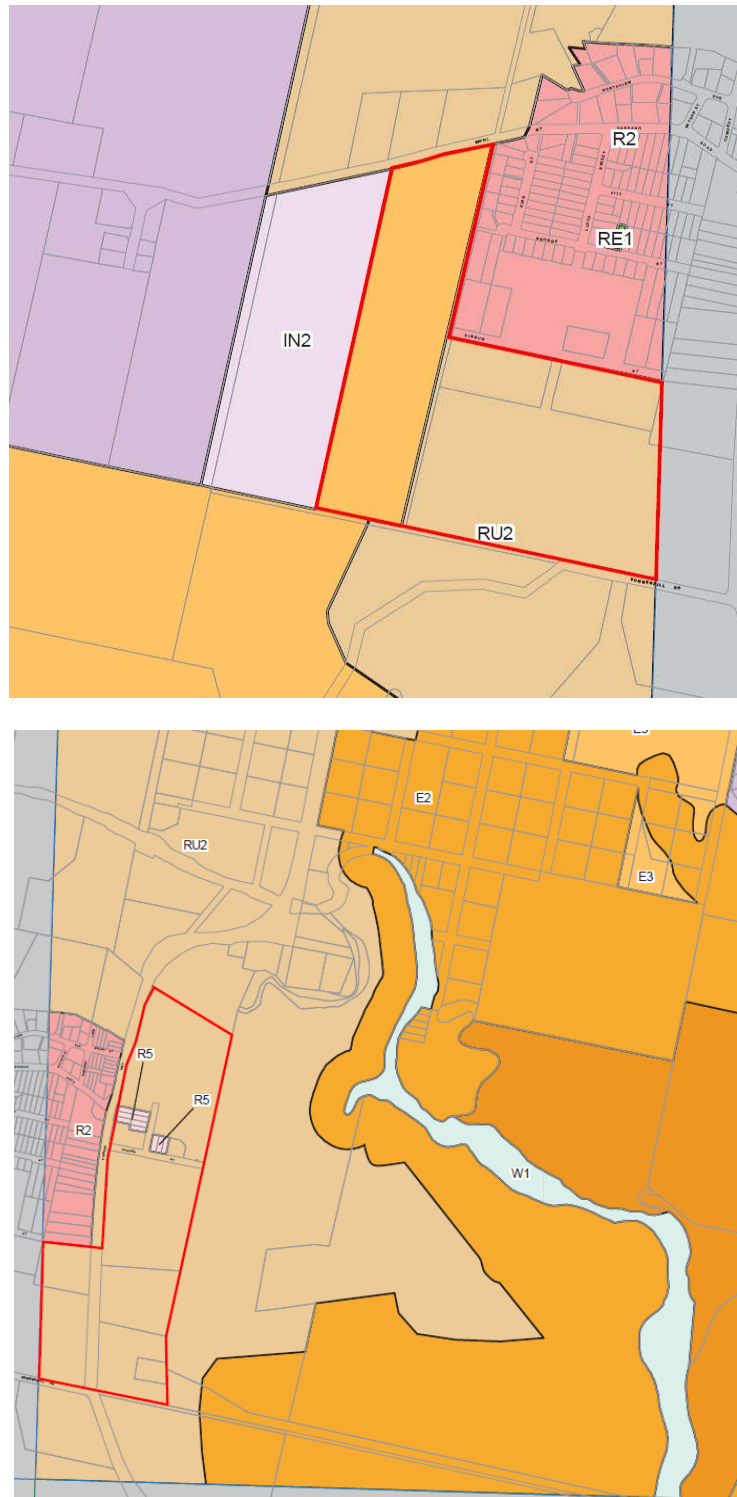


Figure 2.3: Proposed land zoning of South Pambula under draft Bega Valley LEP 2010 – the investigation area is edged red. Source: Bega Valley Shire Council 2010

Maps that accompany the draft LEP indicate that the following development standards apply:

- a maximum floor space ratio of 0.5:1 applies to the urban area of Pambula adjoining the northern investigation area and to the whole of South Pambula. An FSR of 0.6:1 applies to the land to be zoned R3 in Pambula. There is no maximum FSR nominated for land within either investigation area,
- a maximum building height of 10 metres applies to both investigation areas and the existing settlements of Pambula and South Pambula,
- a minimum lot size of 2,000 square metres applies to land to be zoned R5 at the Pambula investigation area and 120 hectares to the land to be zoned RU2. Lots sizes of 550m² and 1,000m² apply to land to be zoned R2 and R3 in Pambula respectively, and
- a minimum lot size of 1 hectare applies to the land to be zoned E3 at South Pambula investigation area and 120 hectares land to be zoned RU2. A lot size of 550m² applies to the existing settlement of South Pambula

Relevantly, clause 4.1B *Minimum lot sizes for dual occupancy, multi dwelling housing and residential flat buildings* seeks to achieve planned residential densities in zones R2 and R3. Attached dual occupancy development is permitted where the lot size is 550m² or more, multi dwelling housing on lots 500m² or more and residential flat buildings on lot of 800m² or more.

Maps that accompany the draft LEP indicate that the land is affected by the following natural resource sensitivities:

- most of the northern investigation area is covered by significant vegetation as is the western section of the southern investigation area. Provisions of the draft plan require Council to consider the impacts of any proposed development on ecosystem integrity,
- the northern investigation area is affected by five separate watercourses that flow in a north to south direction towards the floodplain. The south eastern corner of the southern investigation area is affected by two watercourses which join before entering a wetland to the east. Parts of the western section of the southern investigation area are affected by a watercourse joined by three tributaries which flow from south to north. Considerations apply to enable Council to assess the impact of any development proposal on land shown as a watercourse or within 40 metres of the top of a bank of a watercourse on water quality and habitat values, and
- the south eastern corner of the northern investigation area is constrained land. The north eastern and a very small area at the north western corner of the southern investigation area is constrained land. Council must consider the potential for adverse impacts of building work on any land with slopes greater than 25%, any land subject to high erosion potential and any land with a high proportion of rock outcropping.

Schedule 5 Environmental Heritage of the draft plan lists heritage items and heritage conservation areas. There are 41 items listed in Pambula ranging from cottages to commercial buildings to public facilities. There are 4 heritage items listed in South Pambula being cottages and a former dairy and inn. The Pambula Main Street Conservation Area is also listed in Schedule 5. Provisions of the draft plan serve to retain the heritage values of these listed items and the conservation area by ensuring that any new development respects these values, including their fabric, settings and views.

2.4 Draft Bega Valley DCP 2012

The draft Bega Valley DCP 2012 is scheduled to take effect on the day of gazettal of draft Bega Valley LEP 2012. It is a comprehensive DCP that complies with legislative requirements to have a single DCP applying to any parcel of land within the LGA.

The draft DCP contains the following descriptions of the existing character and desired future character of Pambula (section 3.1.12) and South Pambula (section 3.1.14):

Pambula

Existing character

Pambula is one of the oldest villages in the Bega Valley Shire and has retained some of its early heritage buildings as well as a village atmosphere. This is reflected in the low scale residential and retail development and small size of the village. Pambula is a neighbourhood service centre with a strong heritage and tourist theme.

Many of the buildings in and around Pambula have interesting architectural and historical associations that contribute to the town's heritage, aesthetic and social values. Members of the community and Council are keen to foster the areas heritage buildings, streetscapes and visual character to ensure that Pambula remains a living, working community.

Residential development in Pambula is low scale even when combined with commercial land uses. The residential areas have a strong historic grid street pattern. Many historic buildings are prominent in the streetscapes and most other development is in harmony with the form and scale of those buildings.

Desired future character

Pambula's local heritage significance is conserved by protecting heritage items and ensuring that future development does not detract from the heritage character of the town. Development in the vicinity of buildings with historical importance is compatible with the form and scale of those buildings.

The management of Pambula's streetscapes is consistent with the town's historic character, and the management of the town's perimeter and setting is consistent with its historic and aesthetic values.

Future residential development enhances the existing built environment with boundary setbacks and building heights that will maintain residential amenity and heritage values while allowing design flexibility.

The historic pattern of Pambula as a village is continued, historic buildings are not adversely impacted by new development and remain visually prominent in the streetscape, historically significant items, views and streetscapes are conserved, and development in the vicinity of buildings with historical importance is in harmony with the form and scale of those buildings.

South Pambula

Existing character

South Pambula is a relatively new settlement, separated from Pambula by the Pambula River Flats and dairy pasture. South Pambula is fairly small with no retail activity and a large industrial area adjoining the western edge. The existing capacity for expansion and infill development of the South Pambula residential zone is limited.

Desired future character

Future development in South Pambula complements the spacious urban style of settlement.

The draft DCP contains specific requirements for 'Premium Rural Landscapes'.

The areas east of the Princes Highway in the South Pambula investigation area is within precinct 2 and land immediately west of the highway and south of the existing settlement of South Pambula is within precinct 4 as shown on the extract from the draft DCP below.

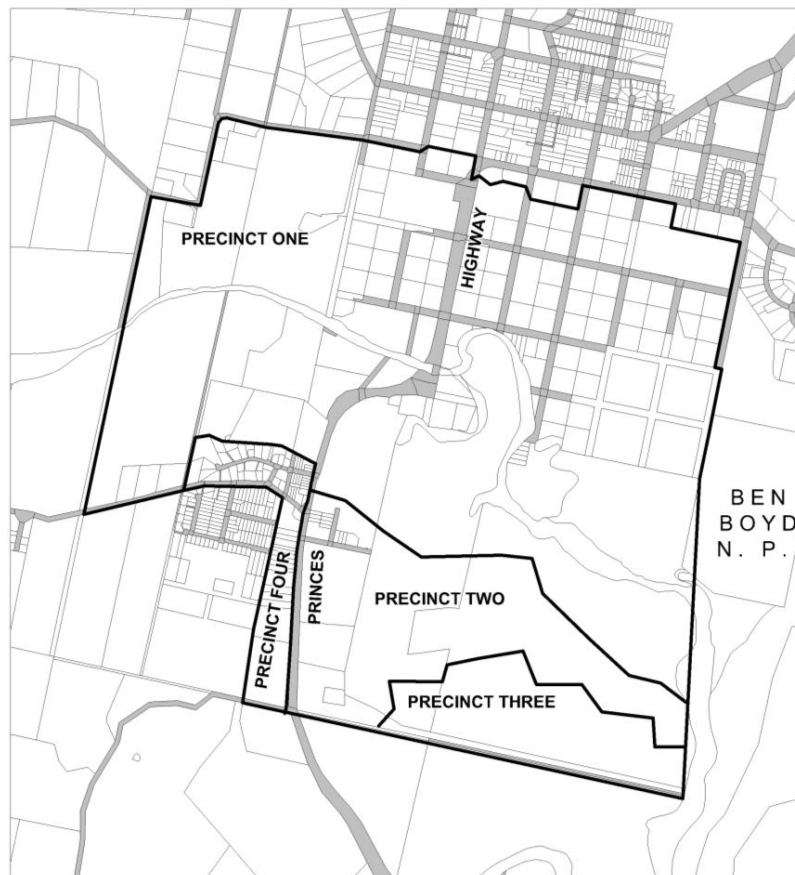


Figure 2.4: Premium Rural Landscapes – Pambula. Source: Draft Bega Valley DCP 2012

The objectives for the Premium Rural Landscape are to:

- Conserve the visual value of the Pambula Main Street vista,
- Retain the Pambula River Flats and lower slopes as open space between Pambula and South Pambula, and
- Conserve the cultural integrity of the Pambula River Flats and South Pambula Rural landscape.

The requirements for precinct 2 South Pambula are:

- The built landscape, if visible from the Princes Highway, should reflect a theme of the late 19th early 20th Century rural cottage style.
- Visibility of new dwellings from regionally or locally significant public roads and vantage points (principally the Princes Highway) should be minimised by planting trees and shrubs between the view site and the structure and immediately adjacent to the structure.

The requirements for precinct 4 – the residential strip adjoining the highway and Mt Darragh Road are:

- All development should improve landscaping so that there is partial screening of this South Pambula urban area while preserving reasonable views for residents.

Land along Mount Darragh Road that is within the South Pambula investigation area adjoins land to be zoned industrial. An extractive industry was approved on 27 September 2011 on adjoining Lot 31 DP 749613 that enables the extraction and stockpiling of 25,000m³ of material over 5 to 10 years after commencement. Although section 4.7.1 Minerals and Extractive Industries applies to land zoned RU1 Primary Production, the objectives and requirements are considered relevant to future residential development within the South Pambula investigation area.

The objectives are to:

- minimise adverse environmental impacts of quarrying activities and mitigate potential conflict with other land uses, particularly those of a residential nature, and some farming activities, and
- prevent the sterilisation of existing and potential extractive resource.

The draft DCP requires that buffers be in place round quarries, the size of the buffer to be determined on merit based on topographic, climatic, site conditions or production techniques. Council will generally not approve residential development within buffer areas to existing quarries and extraction sites unless Council reviews the deposit and concludes that further extraction is unlikely.

Section 5.6.1 of draft DCP 20.12 concerns flood planning. The objectives of this section are to:

- Minimise the impacts of flooding on development within flood prone land or potentially flood prone land,
- Ensure that development on flood prone land is consistent with the objectives of the NSW Flood Prone Land Policy 1984 and the NSW Floodplain Development Manual 2005, and
- Ensure the impact of climate change is considered when assessing development on flood prone land.

This Section applies to development on flood prone land as well as land that is not classed as flood prone but meets one of the following criteria:

- is within 40m of a creek,

- is within 10m of a major drainage system, local overland flood path or drainage easement that has a history of flooding, or
- is considered to be flood prone by Council's development engineer

Controls that apply to development on flood prone land depend on the hydraulic and hazard conditions for a site, which can only be determined if flood information is available. The potential effects of climate change are to be taken into account based on the NSW Government's previous sea level rise planning benchmarks of 0.4 metres by 2050 and 0.9 metres by 2100 (as measured by an increase above 1990 mean sea levels). It is noted that the NSW Government has recently announced a review of these benchmarks.

Land that is subject to flooding and beneath the flood planning level within the investigation areas at Pambula and South Pambula is to be excluded from consideration for the development of affordable housing due to the costs associated with analysing flood behaviour and impacts on the land of filling and subsequent development construction costs to ensure structural safety.

Draft DCP 2012 contains subdivision standards (section 5.8) to ensure that land is subdivided and developed in accordance with the principles of ecologically sustainable development and to facilitate development that is integrated with the landscape while ensuring the conservation of identified ecological, scenic and cultural values. These standards relate to access and servicing, dedication of public reserves, natural hazards, threatened species and significant and endangered ecological communities, Riparian areas, estuaries and wetlands, energy efficient design and minimum lot dimensions to locate infrastructure services. These standards are supported by engineering requirements for roads and easements, parking and driveways, soil and stormwater management, and the provision of utility services. The subdivision standards and engineering requirements are to be used to guide preparation of concept subdivision layouts in Part 2 of this project.

3. DEMOGRAPHIC INDICATORS

Key demographic features of the settlements of Pambula and South Pambula are described using data obtained from Council and the ABS Census of Population and Housing. This includes current characteristics and recent trends in population growth, household income and occupancy rates. First release 2011 census data has been used where available. Comparisons to Bega Valley local government area and NSW are provided. Population projections prepared for Bega Valley Shire Council by Forecast.id have been used to predict the likely future size of each settlement.

The level of housing stress and the demand for affordable housing is estimated based on average land and house values relative to socio-economic characteristics of the local population. This analysis assists to determine the type and density of future residential development that is needed to satisfy future housing needs.

3.1 The State Suburbs of Pambula and South Pambula

The statistical census area of Pambula, known as a *State Suburb* for the purposes of the Census by the ABS, covers 13.2 square kilometres. A state suburb is an aggregation of statistical areas to approximate suburbs. The ABS acknowledges that it poorly represents gazetted localities in rural parts of Australia. In this case the suburb of Pambula includes the urban settlements of Pambula and Pambula Beach as well as intervening rural land.

The statistical area of South Pambula covers 5.2 square kilometres which includes the existing urban settlement and some surrounding rural land as shown in the map below. As for Pambula the defined suburb of South Pambula does not adequately represent the actual locality but does provide the best available data. The boundaries of ABS State Suburbs of Pambula and South Pambula are illustrated in Figures 3.1 and 3.2 below.

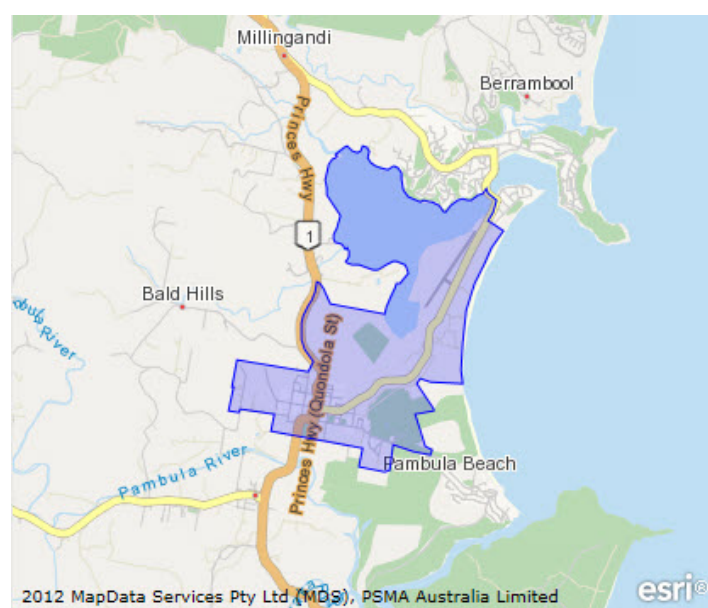


Figure 3.1: The ABS suburb of Pambula

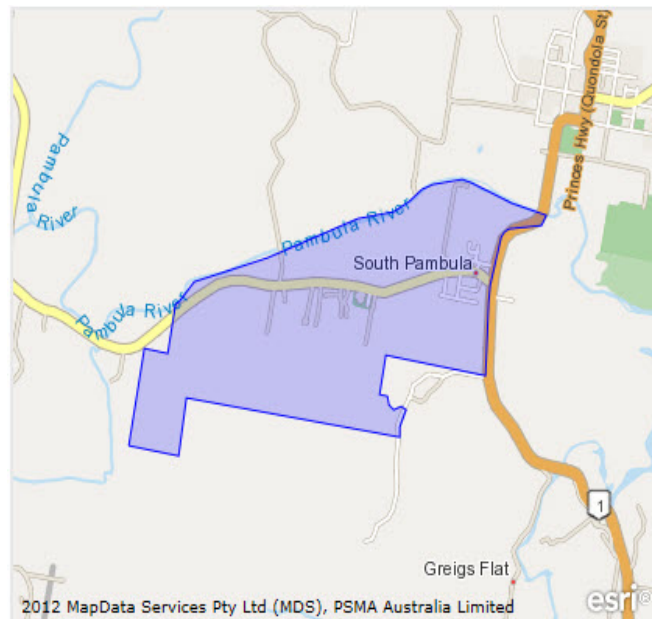


Figure 3.2: The ABS suburb of South Pambula

3.2 Age structure

The population of Bega Valley Shire has been increasing steadily over the last 15 years. At the time of the 2001 ABS Census of Population and Housing there were 29,593 persons living in Bega Valley LGA. The population rose by 5% to 31,060 persons in 2006. It has increased by a further 3% to 31,950 persons in 2011. This is predominantly due to sea change in-migration as inhabitants of Sydney, Melbourne and Canberra seek a coastal lifestyle, particularly aged persons as evidenced by the proportion of persons aged over 45 years being 54% of the total population of Bega Valley in 2011.

The population in 2011 in Pambula was 867 persons, approximately one quarter of whom are aged 65 years or more. Similarly, around a quarter is aged less than 20 years. The proportion of young people is roughly the same as in Bega Valley Shire and NSW. The proportion of aged persons is greater in Pambula than in the LGA as a whole and 11 % higher than in NSW. The bulk of the residents of Pambula are of working age, with just under 50% aged between 20 and 64 years.

The age distribution is illustrated in the Figure 3.2 and a table showing age distribution is provided in Appendix B.

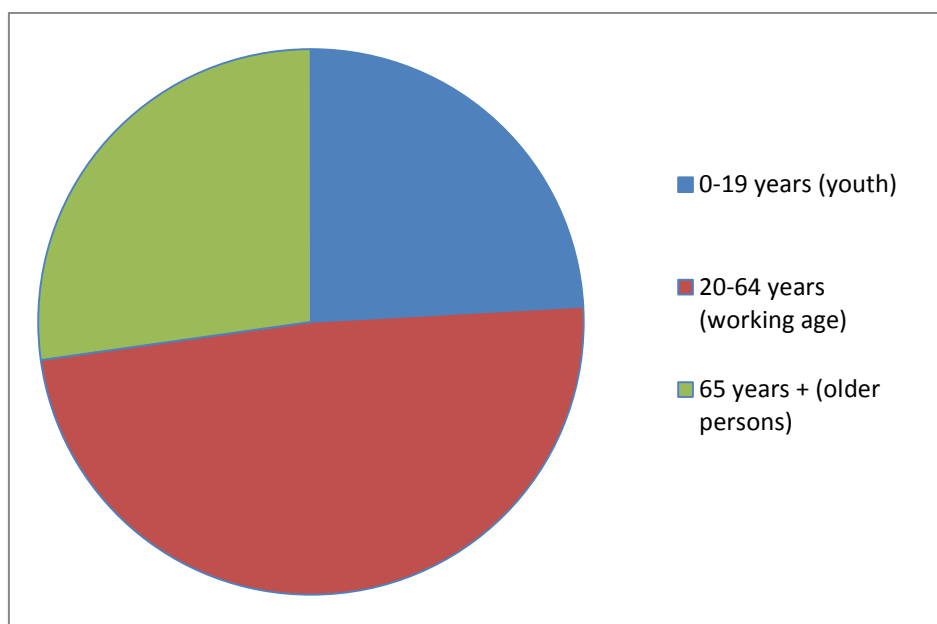


Figure 3.3: Age breakdown in Pambula, 2011. Source: ABS, 2012

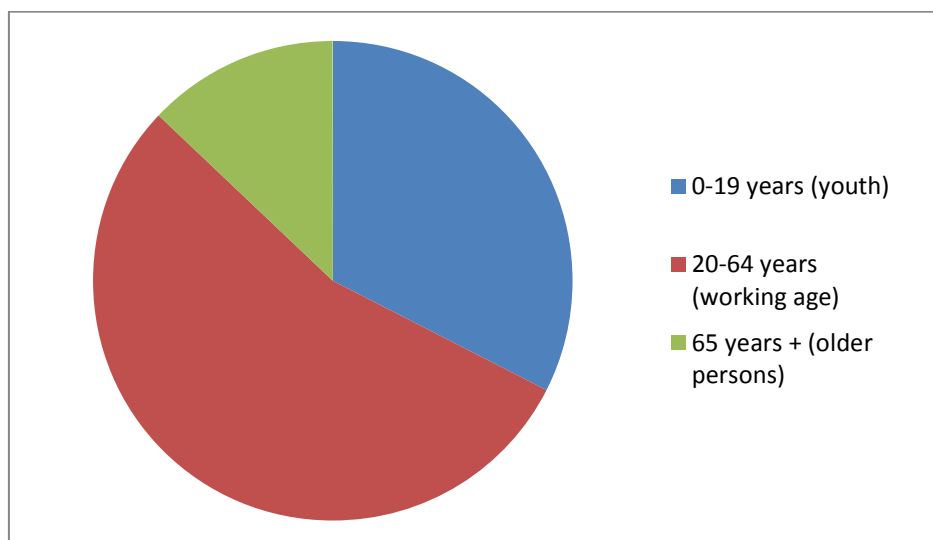


Figure 3.4: Age breakdown in South Pambula, 2011

In contrast to Pambula, the population of South Pambula is more youthful with a greater proportion of all residents being aged less than 20 years (33%), and more than half of working age (55%). Only 13% of all residents are aged more than 65 years. Census 2011 gives the population of South Pambula as 418 persons.

3.3 Growth forecasts

Bega Valley Shire Council has commissioned Forecast.id to analyse demographic data and to produce forecasts for a range of demographic characteristics. Forecast population growth and residential development for Pambula is given below, noting that the Pambula area includes the localities of Pambula, Pambula Beach, South Pambula, Greigs Flat and Broadwater.

Growth forecasts have also been calculated for this project for the specific urban settlements of Pambula and South Pambula using an anticipated average annual growth rate of 0.4% per annum derived from Forecast.id projections. Population growth has also been projected at the rate of 1% per annum for Pambula and South Pambula for comparative purposes. These growth forecasts are used to estimate the need for additional housing in Chapter 3 The Land Market.

Table 3.4: Population growth estimates (at average annual growth rates of 0.4% and 1% per annum)

Locality	2011	2021		2031	
	Actual population	0.4% growth	1% growth	0.4% growth	1% growth
Pambula & district	2,373	2,469		2,569	
Pambula	867	902	958	939	1058
South Pambula	418	435	462	453	510

3.4 Housing tenure

Over two-thirds of occupied private dwellings in Pambula are separate houses. These accommodate 78% of the population and just under half of these dwellings are owned outright.

A third are under mortgage and 18% are being rented. Less than a third of occupied private dwellings are categorised as flats, units or apartments and a lesser proportion of these types of dwellings are owned outright.

A much higher proportion of medium density dwellings are on the rental market – 44% as compared to 18% for separate dwellings. In contrast, South Pambula is entirely made up of separate houses.

Of these, a third are owned outright and almost half are under mortgage. A similar proportion of separate houses are being rented (17%).

Table 3.1: Dwelling structure and tenure, Pambula and South Pambula, 2011

Occupied private dwelling	% of all dwgs		% of population		Owned outright (% of dwg type)		Mortgage (% of dwg type)		Rental (% of dwg type)	
	Pambula	Sth Pambula	Pambula	Sth Pambula	Pambula	Sth Pambula	Pambula	Sth Pambula	Pambula	Sth Pambula
Separate house	68	100	78	100	46	34	35	46	18	17
Semi-detached, villa, townhouse, etc	0		0		0		0		0	
Flat, unit or apartment	28		19		39		11		44	
Other (caravan, cabin, shop-top, house etc)	4		3		81		0		19	

3.5 Occupancy rates

The average household size in South Pambula in 2011 is 2.8 persons compared to 2.2 in Pambula. Occupancy rates have been decreasing over time. The Pambula Community Portrait 2006 prepared by The Public Practice Pty Ltd indicates that the average household size for the Pambula district was 2.54 in 2001 and 2.33 in 2006.

3.6 Household income

Around 18% of households in Pambula earn less than \$400 per week. This is substantially higher than in South Pambula (8%) but similar to Bega Valley as a whole (16%). Half of Pambula households have a weekly income in the range of \$400 to \$1,249, compared to 47% in South Pambula and 46% in Bega Valley LGA.

The median weekly household income is highest in South Pambula at \$1,055 being closest to the state median of \$1,237. This is likely to reflect the higher proportion of working age persons resident in South Pambula with higher labour force participation. Tables of weekly household income for Pambula and South Pambula in 2011 by income range are provided in Appendix B.

3.7 Mortgage repayments

According to the 2011 Census, the median monthly mortgage repayment in Pambula is \$1,365 being similar to that for Bega Valley Shire of \$1,300. Repayments for South Pambula are highest at \$1,492 due to the higher proportion of separate dwellings that accommodate younger families and a higher percentage of working age persons. This figure also coincides with the higher proportion of dwellings under mortgage in South Pambula. Full details of monthly mortgage repayments, Pambula and South Pambula in 2011 are given in Appendix B.

3.8 Weekly rent

According to the 2011 Census, the median weekly rent in Pambula is \$210 and in South Pambula is \$225. The percentage of separate dwellings being rented is similar for both settlements. It would be expected that rents for separate houses would be the same for both settlements that are in such close proximity to each other and to commercial and institutional services. Full details of weekly rents in Pambula and South Pambula in 2011 are given in Appendix B.

3.9 Selected medians and averages

For 11.6% of NSW households rent payments are 30% or greater of household income, up from 10.7% in 2006. For 10.5% mortgage payments are 30% or greater of household income, up from 9.6% in 2006

Table 3.3: Summary – selected medians and averages, 2011

Statistic	Pambula	Sth Pambula	Bega Valley	NSW
Median age (years)	48	39	48	38
Median total household income (\$/week)	\$752	\$1,055	\$848	\$1,237
Median mortgage repayment (\$per month)	\$1,365	\$1,492	\$1,300	\$1,993
Median rent (\$/week)	\$210	\$225	\$200	\$300
Average household size (persons per dwelling)	2.2	2.8	2.3	2.6

Cross tabulation of 2011 census data is not yet available for Bega Valley LGA, however, the Bega Valley Housing Portrait 2006 prepared by The Public Practice Pty Ltd for Bega Valley Shire Council indicates that the level of housing stress may be greater in Pambula and South Pambula than in the state based on an analysis of household incomes and weekly rents.

The analysis found that 30% of renting households in Bega Valley LGA are within the housing stress zone, that is, where they are paying more than 30% of their weekly income in rent. Households that contribute less than 20% of household income to rent represent 48% of total households, whilst the remaining 22% of households may or may not be suffering housing stress.

3. THE LAND MARKET

The Merimbula District Structure Plan contains data on land supply in the existing urban zones of Pambula and South Pambula as at 2008. This information has been updated using data captured by Council since preparation of that plan for subdivision and development approvals, and construction commencements to enable a current estimate of urban land availability.

Knowledge of recent development of urban land assists to project the take up of land that is found to be suited to future urban development within the investigation areas. Construction commencements are considered an accurate measure of demand as approvals do not always proceed to actual works. Forecast demand assists to estimate the likely timing of development of additional urban land to inform the land release strategy.

Sales and rental values data is also given to assist to gain an understanding of the local property market.

5.1 Land supply

Land supply estimates given in the table below were calculated in 2007 by adding the total number of vacant subdivided lots and unsubdivided land.

The yield of unsubdivided land has been calculated by dividing the total area of vacant land by 1,000 square metres. This area includes an allowance for services noting that the current minimum lot size is 550 square metres.

This method has been applied to vacant within existing urban areas as well as potential urban areas and did not take into account the distribution or pattern of existing lot sizes.

Table 5.1: Land supply Pambula, 2007. Source: Merimbula District Structure Report, July 2008

Pambula	Total area (hectares)	Total lots	Area of vacant land (hectares)	Total vacant lots	Potential Lot Yield
2(b) Residential Medium Density Zone	21	146	1	9	16
2(a) Residential Low Density Zone	28	116	3	5	43
2(f) Future Urban Zone	14	31	1	7	14
	63	293	5	21	73

Table 5.2: Land supply South Pambula, 2007. Source: Merimbula District Structure Report, July 2008

South Pambula	Total area (hectares)	Total lots	Area of vacant land (hectares)	Total vacant lots	Potential Lot Yield
2(a) Residential Low Density Zone	5	31	0	0	0
1(a) Rural General Zone	27	152	8	15	119
	32	183	8	15	119

Data contained in the Merimbula District Structure Report has been updated by deducting from potential lot yield estimates any vacant lots that have been developed since the data was first collected in 2007 (see Table 5.3 below).

Table 5.3: Potential lot yield 2012, updated for dwelling commencements since 2007

	Total vacant lots 2007	Potential Lot Yield 2007	Lots approved since 2007	total vacant lots 2007	Lots built upon since 2007	Total vacant lots 2012	Potential lot yield 2012
Pambula	21	73	4	25	23	2	69
Sth Pambula	15	119	2	17	6	11	117

5.2 Demand for urban land

The demand for urban residential land has been assessed using recent Council approval data for dwellings and urban subdivisions, and construction commencements. Property values were obtained from the website realestate.com.au.

Table 5.4: Approvals and construction commencements, 30 June 2007 to 30 June 2012. Source: Bega Valley Shire Council, 2012

	Dwelling approvals			Urban residential subdivisions (no. new lots approved)	Construction Certificates issued
	Single dwelling	Dual Occupancy	Multi-Dwelling Housing		
Pambula	21	2	1 (4 units)	4	39
South Pambula	6	0	0	2	11
Total	27	2	1	6	50

A total of 50 construction certificates have been issued by Bega Valley Shire Council over the 5 year period – an average of 10 dwellings per year.

Forecast.id has prepared an estimate of growth in residential development for Bega Valley Shire Council over the years 2011 to 2031 expressed as dwelling commencements. The Housing Unit Model is used to forecast future levels of residential development and the resulting impact on the total population and the number of households. This data covers the Pambula district which includes the localities of Pambula, Pambula Beach, South Pambula, Greigs Flat and Broadwater. It suggests a lower level of demand with 7 annual dwelling commencements over the years 2011 to 2023 falling to 6 per year from 2024 to 2031.

In order to estimate housing needs and land supply for the state suburbs of Pambula and South Pambula, population forecasts have been calculated for average annual population growth rates of 0.4% (derived from the Forecast.id population projections for Bega Valley LGA) and 1% for comparison. Full results are given in Table C3 in Appendix C and summarised in Table 5.5 below.

Table 5.5: Population growth and housing requirements (at average annual growth of 0.4% p.a.)

	2011	2021	2031	Additional persons	Housing needs at 2011 ABS Census occupancy rates
Pambula	867	902	939	72	33 (2.2ppd)
South Pambula	418	435	453	35	12 (2.8ppd)

Table 5.6: Population growth and housing requirements (at average annual growth of 1% p.a.)

	2011	2021	2031	Additional persons	Housing needs at 2011 ABS Census occupancy rates
Pambula	867	958	1058	191	87 (2.2ppd)
South Pambula	418	462	510	92	33 (2.8ppd)

The total dwelling requirements for the 20 year period from 2011 to 2031 at average annual growth of 0.4% and assuming occupancy rates remain stable at 2011 levels is 33 dwellings for Pambula and 12 for South Pambula. Using the potential available lot yields given in Table 5.3 above, these needs can be satisfied by existing available land, giving a surplus of 36 lots in Pambula and 105 lots in South Pambula.

The total dwelling requirements for the same period at an average annual growth of 1% in population is 87 dwellings for Pambula and 33 for South Pambula. This also indicates that forecast dwelling requirements can be accommodated within land that is already zoned for urban use or within the boundaries of the settlement of South Pambula with a surplus of 84 lots. However, there will be a deficit of 18 lots in Pambula should this growth rate be achieved.

It is essential that there is ample supply, or even an oversupply, of zoned urban land available for development to contain values and ensure that housing remains affordable. The land market is also unpredictable and without a staged release program that is managed by Council the development and release of land onto the market is subject to the aspirations of land owners, their access to capital and disposition to risk.

As a comparison to the above estimates, should the recent demand for housing continue – an average of 10 construction certificates issued per year for the last five years – then stocks would be exhausted in Pambula within 7 years and in South Pambula within 12 years. It is therefore considered prudent to augment supply by finding additional land suitable for urban residential development and to control the staged release of that land by enabling logical extensions of existing settlements to be made available that are capable of being serviced at least cost.

5.3 Land values

An appraisal of current land values was made by obtaining current sale prices for land, houses and villas/townhouses in Pambula and South Pambula from the website *realestate.com.au*. This site is an advertising portal for any participating real estate agents and is not affiliated with any particular business group. Details of properties available on the market at the time of writing are given in Appendix C.

This search was carried out on 27 July 2012. At that time only one vacant property was for sale in Pambula at the rate of \$103.81 per m². Nine properties were for sale in South Pambula with an average price of \$106.66 per m².

Dwelling houses are generally more expensive in Pambula than South Pambula. The average price for a 4 bedroom house in Pambula is \$374,167 whilst in South Pambula the single 4 bedroom property on the market is \$349,000.

Similarly, the average price for a 3 bedroom house in Pambula is \$321,778 compared to \$307,000 in South Pambula. There are no villas or townhouses for sale in South Pambula. In Pambula the average prices for these medium density dwellings ranges from \$214,500 for 2 bedrooms up to \$327,600 for 3 bedrooms, the latter size dwelling being more expensive on average than a similar size single dwelling in either settlement.

According to a Suburb Report prepared by Residex on 10 September 2012, the median value of houses in Pambula is \$309,500 and of units is \$226,500. The median value of separate

houses has increased by 38% since July 2003 and the value of units has increased by 39%. The median weekly rent of a separate house has increased by 32% to \$290 over the same period of time and that of a unit by 53% to \$230.

A Suburb Report prepared by Residex on 10 September 2012 for South Pambula indicates that the median value of houses in that settlement is \$381,000 and of units is \$242,000. The median value of separate houses has increased by 27% since July 2003 and the value of units has increased by 18%. The median weekly rent of a separate house has increased by 7% to \$310 over the same period of time and that of a unit by 50% to \$180.

These reported increases in house prices and weekly rents are significantly greater than increases in incomes. As stated in Chapter 1. Introduction, Bega Valley is termed a low income/low growth area with growth in average incomes over the financial years 2003/04 and 2007/08 being between 3% and 4.4%.

5. FLORA AND FAUNA

5.1 Vegetation communities

The Pambula site is located to the north-west and west of the town, with the bulk of the undisturbed forest being located north and west of the Primary School. The terrain in this part of the site is hilly, but only about 50 metres above sea level at the water reservoir near the north-east corner, running down to less than 10m ASL on the upper edge of the Pambula River floodplain at Oaklands Road at the southern end of the site. Virtually all of this site appears to be located on Devonian sandstone, which gives rise to a sandy, infertile soil, though the extreme southern end of the site is on alluvium. The forested northern end of the site is dissected by two incised gullies, but these become shallower and discontinuous in the more developed southern end of the site.

The forested part of this site includes elements of two forest communities on the more elevated areas and a third in the lower parts of the gullies. The most abundant community is Southeast Lowlands Dry Shrub Forest (map unit DSF e46B in Tozer *et al.*, 2010) which is typically dominated by Red Bloodwood (*Corymbia gummifera*), Blackbutt (*Eucalyptus pilularis*) and Silvertop Ash (*E. sieberi*). There is also a minority element of Far South Coastal Foothills Dry Shrub Forest (map unit DSF e32B) indicated by the presence of Red Ironbark (*E. tricarpa*) and Woollybutt (*E. longifolia*). Both these communities contain White Stringybark (*E. globoidea*) and have an understorey dominated by the small tree Black She-oak (*Allocasuarina littoralis*), while additional small trees *Acacia falciformis* and *Acacia implexa* are most typical of Far South Coastal Foothills Dry Shrub Forest. A diverse range of shrubs includes peas (*Daviesia mimosoides*, *Bossiaea obcordata*, *Podolobium ilicifolium*), wattles (*Acacia terminalis*, *A. obtusifolia*, *A. ulicifolia*) and other shrubs, of which the most common is *Platysace lanceolata*. Groundcover is generally sparse but relatively diverse (14 native forbs, 11 grasses and 9 graminoids such as *Lomandra* spp and the small grass tree *Xanthorrhoea concava*).

The gullies are not deep or fire-protected enough to carry a completely different vegetation community from those on the adjacent slopes, but there are elements of a wetter community present in the form of the trees Monkey Gum (*E. cypellocarpa*), Yellow Stringybark (*E. muelleriana*) and *Acacia subporosa*, and the greater abundance of Sweet Pittosporum (*Pittosporum undulatum*). The closest matching vegetation community is Southeast Hinterland Wet Shrub Forest (map unit WSF e14), which tends to occur on less fertile soils (such as those derived from Devonian sediments as on this site) than do the other far south coast gully communities described by Tozer *et al.*

These vegetation communities are generally of low to moderate conservation significance, being not much cleared historically for farming, although under increasing pressure for residential development in the coastal strip. They are adequately represented in conservation reserves in the region. However, they may be highly significant for threatened fauna species, especially Southeast Lowland Dry Shrub Forest (see under threatened fauna below).

There is a tiny fragment of an Endangered Ecological Community at the extreme southern end of the site, north of Oaklands Road and west of a small creekline, where a cluster of Blue Box (*E. baueriana*) and Forest Red Gum (*E. tereticornis*) on the edge of the floodplain indicate the presence of the community Bega Wet Shrub Forest (DSF e19). When occurring on a coastal floodplain this community fits within the definition of the EEC River-flat Eucalypt Forest on Coastal Floodplains, listed as an EEC in NSW under the *Threatened Species Conservation Act*. However, in this instance the native understorey has been largely replaced by exotic garden plants and the groundcover appears to be almost entirely composed of exotic grasses. In this case, despite the tree density being probably similar to that of the original forest, it is doubtful if the EEC could be said to still be present. The remnant is isolated in the mouth of a small gully, with the adjacent larger floodplain (off-site to the south) having been cleared.

Figure 5.1: Dry forest in the north-east corner north of Pambula Primary School, with a large emergent Blackbutt. This area is disturbed by the presence of a power line easement



Figure 5.2: Wetter forest community typical of drainage lines, dominated by Monkey Gum, with understorey removed in an asset protection zone west of houses on Bega Street (south-western part of area)



Figure 5.3: Small stand of River-flat Eucalypt Forest dominated by Blue Box on a developed lot immediately north of Oaklands Road at the southern end of the site



Figure 5.4: Yellow-bellied Glider sap-feed tree on the western edge of the Pambula site. One other such tree was found on this site and six on the South Pambula site, all relatively small (20-30cm diameter) Red Bloodwoods. None looked freshly used, suggesting Yellow-bellied Gliders may no longer be active in these areas



The South Pambula site is located to the south, west and east of South Pambula, also a mixture of developed rural residential lots and relatively undisturbed forest. The bulk of the forest is located to the south-west of South Pambula. The terrain is generally flatter than the Pambula site but also between about 50 metres above sea level near the south-west corner, running down to 10m ASL on the upper edge of the Pambula River floodplain in the north-east corner. The geology underlying this site appears to be mostly Devonian sandstone, with some rhyolite influence at the southern end, basalt in the south-east corner (the cleared land east of the highway) and alluvium on the edge of the floodplain in the north-west and north-east corners. The forested southern end of the site is dissected by a branched gully, which is flat and non-incised.

The forested part of this site is similar to that of the Pambula site, with Southeast Lowlands Dry Shrub Forest (characterised by Red Bloodwood) being the predominant community on the more elevated areas, though including some elements of Far South Coastal Foothills Dry Shrub Forest. The influence of rhyolite geology is seen in the southern part of the site, in the presence of *Melaleuca armillaris* and localised dominance of the understorey shrub *Kunzea*

ambigua, both typical of rhyolite outcrops. There are no such outcrops on the site, but some do exist south of Summerhill Road, which forms the southern boundary of the site.

The drainage lines on this site are flat-bottomed, not incised, and hence poorly drained. They carry a slightly different community to the gullies on the Pambula site, although the dominant tree species are similar, Monkey Gum (*E. cypellocarpa*) and Woollybutt (*E. longifolia*). The understorey includes Black She-oak (*Allocasuarina littoralis*) and shrubs or small trees *Kunzea ambigua* and *Acacia longifolia*, with localised patches of *Callistemon citrinus* and *Sannantha plurifolia* (formerly *Baeckea virgata*) in the wettest areas. This vegetation is closest to Eden Shrubby Swamp Woodland (map unit FoW m15), although not entirely typical of this community, which usually has a dense groundcover of Saw-sedge (*Gahnia clarkei*), a species which is only very sparsely present on this site. Eden Shrubby Swamp Woodland is usually restricted to narrow bands along drainage lines, so is not abundant in the region. However, it is likely to be adequately conserved in the coastal reserve system.

Developed areas were not surveyed west of the Princes Highway as they were assumed to carry largely exotic vegetation, but the cleared farming land east of the highway was surveyed, as it appears to carry the remnants of an Endangered Ecological Community. This is indicated by the presence of Forest Red Gum in paddocks and on the verges of Furner Street.

A brief survey through paddocks and of the Furner Street verges revealed the presence of indicator species for two EECs, Lowland Grassy Woodland (Southeast Lowland Grassy Woodland, GW e20p229, in the SCIVI classification) and River-flat Eucalypt Forest on Coastal Floodplains (Bega Wet Shrub Forest, DSF e19 in the SCIVI classification).

Regrowth paddock trees include Forest Red Gum (*E. tereticornis*), Coast Grey Box (*E. bosistoana*), both typical of Lowland Grassy Woodland, and Blue Box (*E. baueriana*), typical of River-flat Eucalypt Forest. The two communities would formerly have overlapped on the lower slopes adjacent to the floodplain, but have been largely cleared and replaced with largely exotic pasture and scattered regrowth trees. A few scattered Blackthorn (*Bursaria spinosa*) and wattles (*Acacia mearnsii*, *A. implexa*) and patches of Kangaroo Grass (*Themeda australis*) are all that is left of the original understorey. Neither EEC could be said to be still present on the site.

Figure 5.5: Southeast Lowlands Dry Shrub Forest at South Pambula. Note the absence of large trees



Figure 5.6: Wetter forest community typical of drainage lines, dominated by Woollybutt, with a dense understorey of small trees and shrubs



Figure 5.7: Forest Red Gum on Furner Street east of the highway indicates the past presence of Lowland Grassy Woodland EEC on a small area of fertile basalt-derived soil. The Pambula River floodplain in the background continues to carry some areas of EEC in the form of wetlands



Disturbance of vegetation communities

The degree of disturbance varies throughout the two sites, from almost complete replacement of native vegetation on developed rural residential lots and grazing paddocks east of the highway at South Pambula, to a very low level of disturbance in the forested northern end of the Pambula site. The forested parts of the South Pambula site are much younger than the Pambula site. The South Pambula forest appears to all be regrowth varying from about 20 to 40 years old, presumably after earlier clearing for grazing. Not a single hollow-bearing tree was found on the South Pambula site, although they are quite abundant in the older forest on the Pambula site.

The low fertility soils on most parts of both sites means that there are few weeds within the forested parts, despite their proximity to residential areas. Disturbed areas such as road verges, developed house blocks and an under-scrubbed asset protection zone on the western side of the Pambula site, are weedier. However, very few noxious weeds were recorded. At South Pambula there is Fireweed (**Senecio madagascariensis*) scattered throughout the area, from pasture to forest, Blackberry (**Rubus ulmifolius*) in pasture east of the highway and a few plants of African Lovegrass (**Eragrostis curvula*) on the verges of Furner Street. At the Pambula site a few African Lovegrass plants were seen along the edges of the track to the water reservoir on the eastern edge of the site and a little Blackberry and Fireweed on powerline easements and road verges.

Fauna survey results

Fauna and fauna sign was recorded opportunistically during the vegetation survey but the only specific fauna survey undertaken was 30-45 minutes of spotlighting at each site and 30 or 60 minutes of listening on dusk for calls of emerging nocturnal fauna.

Little fauna was seen or heard, at least partly due to the poor survey timing in mid-winter and cool conditions on both survey days. At Pambula the following forest birds were detected: Common Bronzewing Pigeon, Rainbow Lorikeet, White-throated Treecreeper, Red Wattlebird, Crescent Honeyeater, Eastern Spinebill, Grey Fantail, Eastern Yellow Robin, Rose Robin, Brown Thornbill and Pied Currawong, while a Wedge-tailed Eagle was seen circling over the township. Scat of Swamp Wallaby was found commonly. During spotlighting one Common Ringtail Possum was seen near nest boxes which have been affixed to trees behind the Primary School. A local resident reported that the Common Brushtail Possum occurs in the vicinity. Nothing was heard during an hour of listening on dusk. The only evidence of threatened fauna presence was the finding of two Yellow-bellied Glider sap-feed trees, small Red Bloodwoods with heavily marked trunks where Gliders had chewed away the bark to feed on the sap flow. The markings on these trees did not look fresh, suggesting that they had not been used for some time.

At South Pambula the following forest birds were detected: Common Bronzewing, Grey Shrike-thrush, Grey Fantail, Eastern Yellow Robin, Crescent Honeyeater, Bell Miner, Brown Thornbill, Leaden Flycatcher, Pied Currawong and Grey Butcherbird. In the cleared land east of the highway a Whistling Kite, Little Black Cormorant and Willy Wagtail were seen.

Mammals detected were Common Brushtail Possum (by scat), Swamp Wallaby (scat), European Red Fox (smell), Eastern Grey Kangaroo (seen). No fauna was heard during 30 minutes of listening on dusk, and the only fauna detected by spotlighting was a single Eastern Grey Kangaroo. A local resident reported seeing Common Brushtail Possums, and occasional Feathertail Gliders (presumably brought in dead by domestic cats, the usual means of detection for this very cryptic species). Again, the only evidence of threatened fauna species was Yellow-bellied Glider sap-feed trees, of which six were found in the southern part of the site, near the end of Lloyd Street. These trees also did not appear to have been recently used. Characteristic conical diggings made in sandy soil, often under Black She-oak trees, were seen in several areas of the forest at South Pambula, but not at Pambula. These are most likely to have been made by the still relatively common Long-nosed Bandicoot. There is a slight possibility that they were made by the threatened Southern Brown Bandicoot, although no records of this species came up on the ALA website within a 10km radius of Pambula. However, as they are difficult to detect, this is not definite evidence of their absence.

On both sites mature female Black She-oak (*Allocasuarina littoralis*) trees carrying cones were checked for the presence of chewed cones under the trees, indicating feeding by the vulnerable Glossy Black-cockatoo. No chewed cones were found, but given the relatively large size of the two sites and the abundance of Black She-oak, the search for this evidence of use of the area by Glossy Black-cockatoo was not exhaustive.

5.2 Threatened flora and fauna occurrence and impacts

Threatened flora species

No threatened flora species were found and few would be expected, based on the forest types on the site. The habitat assessment for the species which could occur in the area, summarised in Table 1 in Appendix 2, indicates that species are either large and conspicuous and can definitely be said not to be present, have habitat requirements which are not met on the site, or are inconspicuous and possible to overlook but have a very low likelihood of occurrence due to a lack of local records and only marginal habitat suitability.

The Atlas of Living Australia database was consulted for records of listed threatened species within a radius of 5km and 10km of Pambula, supplemented by personal knowledge of threatened flora and fauna records. Table 1 in Appendix D lists some of the flora species which have been recorded in the South East Coastal Plains sub-region of the Southern Rivers CMA, and discusses their habitat requirements and likelihood of occurring on the site. It excludes a number of species found in the sub-region for which the habitat found on the site would not be suitable. The following species have been excluded: *Acacia constablei*, *Leionema ralstonii*, *Zieria formosa*, *Zieria buxijugum*, *Zieria parrisiae*, all known only from rhyolite or similar volcanic rock outcrops located west of Pambula in the Lochiel – Nullica area, and at Narrabarba south of Eden, a group of species recorded only in the extreme south of the region in Nadgee Nature Reserve or Ben Boyd National Park (*Pseudanthus ovalifolius*, *Senecio spathulatus*, *Viola cleistogamoides*) and three species associated with saltmarsh or other saline habitats (*Wilsonia backhousei*, *W. rotundifolia* and *Distichlis*

distichophylla) since this type of habitat is not present on the site, although it does occur immediately to the east of it on Panboola reserve. Saltmarsh in and adjacent to the Panboola reserve has been surveyed previously and none of these three species has been found.

Of the species potentially occurring in the region, seven have records within 10km of Pambula (*Astrotricha* sp. 'Wallagaraugh', *Pomaderris bodalla*, *Leionema ralstonii*, *Westringia davidii*, *Zieria buxijugum*, *Z. formosa*, *Z. parrisiae*). The latter five species grow only in the Lochiel-Nullica area on rhyolite rock outcrops, which do not occur on either site, though there are some located south of Summerhill Road. The outcrops south of Summerhill Road are not known to harbour any of the rhyolite endemics. *Astrotricha* sp. 'Wallagaraugh' is locally common around Tura Beach and known from one site at Merimbula, but not from Pambula. *Pomaderris bodalla* is known from two sites at Merimbula and one at South Pambula (a Travelling Stock Reserve on the Mt Darragh Road). It was considered to be the only threatened flora species with a moderate probability of occurring on the sites, and drainage lines were searched for it, although not exhaustively at South Pambula due to the density of the regrowth vegetation in some areas. It was not found.

Endangered Ecological Communities

There are nine EECs currently listed under the *Threatened Species Conservation Act* which occur in Bega Valley Shire, two grassy woodland types (Lowland Grassy Woodland, Brogo Wet Vine Forest), two rainforests (Littoral Rainforest and Dry Rainforest of the South East Corner), Bangalay Sand Forest, occurring on coastal dunes and sand sheets, and four communities associated with floodplains of coastal rivers (Coastal Saltmarsh, Freshwater Wetlands on Coastal Floodplains, Swamp Oak Floodplain Forest and River-flat Eucalypt Forest on Coastal Floodplains). Of these only one (Littoral Rainforest) is also currently listed under the *Environmental Protection and Biodiversity Conservation Act*.

The Pambula River floodplain would formerly have carried all of the latter four floodplain EECs, and though now largely cleared for farming, it still does carry remnants of all four. Both Pambula and South Pambula sites intersect with the floodplain at a single location. On the Pambula site this is just north of Oaklands Road, where there is a small remnant of River-flat Eucalypt Forest, degraded by invasion of exotic species to the point where the EEC would either be no longer present, or would be in "low" condition. At South Pambula the site extends onto the floodplain at the lower end of Furner Street in the north-east corner, but at this location there is currently only exotic pasture. The north-west corner of the site might also be said to be part of the floodplain, but this has been developed as a rural residential lot and the native vegetation largely replaced by exotics.

Immediately east of the Princes Highway in the south-east corner of the South Pambula site, there is a small area of basalt derived clay soil which appears, from the presence of Forest Red Gum, to have formerly carried the EEC Lowland Grassy Woodland. However, this has been cleared for farming and is now represented only by a sparse scattering of regrowth Forest Red Gum and very occasional shrubs and small trees typical of this community. The

groundcover has been largely replaced by the exotic pasture grass Kikuyu. The EEC is no longer present as a functioning ecosystem at this location.

Although there are no areas of functional EEC remaining within the two sites, the Pambula River floodplain does include some areas of more or less intact Freshwater Wetland, Swamp Oak Floodplain Forest (characterised by a dense cover of Swamp Paperbark, *Melaleuca ericifolia*, at this location) and Coastal Saltmarsh. There is thus some potential for impacts on off-site EECs from development of either site, since both sites drain onto the floodplain. Such impacts could occur through water pollution, increased stormwater flows and general impacts of increased residential development in close proximity, such as an increase in weed seed incursion from nearby gardens, or an increase in predation on native fauna by roaming domestic pets.

Threatened fauna species

The Office of Environment and Heritage Wildlife Atlas database was not functioning at the time, but had been previously consulted for records of listed threatened fauna species in the South East Coastal Plains sub-region of the Southern Rivers CMA. The resulting records, plus those obtained by a current (July 2012) search of the Atlas of Living Australia for a 10km and 5km radius around Pambula, were used to determine which threatened fauna species might have the potential to occur in the vicinity. Records of the Far South Coast Birdwatchers for the period from 1996 to the present were also consulted, as this group undertakes regular surveys of Panboola reserve on the floodplain south-east of Pambula.

A large number of species have been recorded from the South East Coastal Plains sub-region, including some likely to be no more than rare vagrants in Bega Valley Shire and many with specialised habitat requirements which are not met on these sites, such as beaches, wetlands and heathlands. A large number of records also exist in the area within 10km around Pambula (31 birds, 2 frogs, 14 mammals). Migratory species listed nationally under the *Environment Protection and Biodiversity Conservation Act* also require consideration, although many of these species are still quite common and very likely to occur around Pambula.

The following bird species have been excluded from consideration, on the grounds that suitable habitat does not occur on either site: Sooty Oystercatcher (coastal rock platforms), Pied Oystercatcher, Beach Stone-curlew, Hooded Plover and Little Tern (beaches and estuary shorelines), Little Penguin (pelagic), Black Bittern and Australasian Bittern (heavily vegetated wetlands), Black-tailed Godwit and Curlew Sandpiper (mud flats), Osprey (coastal water bodies over which to hunt fish) and Eastern Ground Parrot (coastal heaths). Clearly habitat does occur for some of these species on the nearby floodplain and in the Pambula River estuary, and indirect impacts are possible. For example, an increase in the population of the area could cause increasing disturbance to beach nesting birds such as the Hooded Plover and Pied Oystercatcher on nearby beaches. However, given the annual influx of tourists during the breeding season of these birds, any such increase in resident population is unlikely to have a significant impact.

The following species have been excluded from consideration on the grounds that they are likely to be only rare vagrants in the region: Grey Falcon, Regent Honeyeater and Purple-crowned Lorikeet (species with a predominantly inland distribution), Magpie Goose and Black-necked Stork (historically present in southern Australia but now largely restricted to the far north), Superb Fruit-dove (a rainforest species from Queensland and the NSW north coast), Brown Treecreeper and Hooded Robin (species of grassy woodlands of the tablelands and slopes), Pink Robin (species of dense wet forests, predominantly at higher altitude).

Table 2 in Appendix D discusses the habitat requirements of the remaining species and their probability of occurring on either site.

Although definite evidence of only one threatened fauna species (Yellow-bellied Glider) was detected, on both sites, consideration of the habitat available in Table 2 in Appendix D indicates that many of the locally occurring threatened fauna species have some potential to occur on the sites. Some might be resident; more are likely to use the sites intermittently, either because they are seasonal migrants to the area, or as part of a larger territory in adjacent forest. Forested parts of the two sites are the most likely to provide habitat for threatened fauna, but the floodplain located to the east has been recorded as the habitat of several threatened bird species (Little Eagle, Square-tailed Kite, Black and Australasian Bittern, White-fronted Chat), despite being largely cleared. Development of either site could have indirect impacts on such species, though the probability of this is not very high. Such impacts could come about by increased predation by wandering domestic pets or by degradation of off-site habitat quality due to indirect impacts such as pollution and increased weed invasion of remaining native vegetation.

Impacts on forest-dependent fauna would be more definitely deleterious. Residential development of either site would be likely to result in substantial habitat destruction for forest-dependent species. Some may survive on larger rural residential lots where substantial native forest cover is retained, as may have been the case to date with the Yellow-bellied Glider at South Pambula. However, if the sites are developed as standard suburban lots, then almost all native vegetation other than riparian corridors, and consequently fauna habitat, is likely to be lost.

The species for which this is most likely to be significant are the less mobile species (mammals and frogs rather than birds). The significance of the habitat loss would be mitigated to some extent by the fact that the South Pambula site is all regrowth, lacking any hollow-bearing trees, and by the fact that both areas abut substantial areas of forest. However, as most of this forest appears to be privately owned, there is no guarantee that it, too, will not be developed in time.

Once a definite development proposal exists, there would need to be more thorough fauna survey work, conducted at a more appropriate time of year, to determine what fauna species actually are present. More thorough searches for Yellow-bellied Gliders and Glossy Black-cockatoo feeding sign, forest owls (using call playback), nests of Square-tailed Kite, use of hollow-bearing trees at the Pambula site for breeding and anabat survey for bat species

would be the minimum required to determine the significance of clearing of either area for threatened fauna.

In addition to threatened fauna, several additional bird species have protection through being listed as migratory species under the *EPBC Act*, and impacts on them also need to be considered. Relevant species at this location are the small forest-dwelling birds Rufous Fantail, Satin Flycatcher and Black-faced Monarch, all of which are moderately common summer visitors to the south coast. All prefer wet sclerophyll forests with a dense understorey and are quite likely to be found in the gullies on either site, in the warmer months. Residential development would also be likely to result in substantial loss of habitat for these species on the site. Migratory water birds are also listed under the *EPBC Act*, and these might occur on the Pambula River floodplain where they could be affected by indirect impacts of the development of either area. Such species are Latham's Snipe, Eastern Great Egret, Cattle Egret and Common Sandpiper. The two egret species are common at Pambula. For example, a flock of 60 Cattle Egrets was recorded on Pambula flats by the FSC Birdwatchers in 2011, while the Eastern Great Egret is almost always present in small numbers around wetlands on the Pambula flats (pers. obs.). The White-bellied Sea-eagle is another species listed as significant under the *EPBC Act* which is common on the far south coast and, although primarily feeding on fish, it is quite likely to also hunt for waterfowl over the Panboola wetlands. It is not likely to be affected by development of the two sites.

6. RIPARIAN BUFFERS

The site is in the catchment of Pambula Lake which is listed in the Directory of Important Wetlands of Australia. As this lake is tidally well flushed it may be able to cope with some limited additional development in its catchment provided buffers for water quality protection are incorporated.

Pambula Lake is one of only a few NSW oyster-growing lakes that has been classified to allow for direct harvest of oysters due to its excellent water quality. Any urban expansion within the catchment should not be allowed to compromise this rating.

Riparian land adjoins or directly influences a body of water, including:

- land immediately alongside small creeks and rivers including the river banks itself;
- gullies and depressions that sometimes run with surface water;
- areas surrounding lakes; and
- wetlands on river floodplains which interact with the river in times of flood.

Future land use rezoning should recognise a development-free riparian protection buffer to the local waterways (measured from the top of each bank). The riparian zones extending along creek and gully lines provide a number of important biological functions including:

- provision of a buffer as part of the transition from terrestrial and floodplain environments to aquatic environments,
- facilitation of the migration of terrestrial and aquatic animals,
- stabilisation of banks and streambeds,
- filter for pollutants, and
- provision of shade.

Planning for these functions is facilitated by categorising riparian corridor widths. The riparian categories and objectives promoted by the NSW Office of Water are based on the Strahler system of categorising streams. The riparian corridor (RC) widths and vegetated riparian zone (VRZ) widths along the channel from NSW DoW 2012 are summarised in Table 6.1 below.

Table 6.1: Riparian corridor widths and vegetated riparian zones. Source: NSW Office of Water, 2012

Watercourse type	VRZ width (each side of watercourse)	Total RC width
1 st order	10 metres	20m + channel width
2 nd order	20 metres	40m + channel width
3 rd order	30 metres	60m + channel width
4 th order and greater (includes estuaries, wetlands and any parts of rivers influenced by tidal waters)	40 metres	80m + channel width

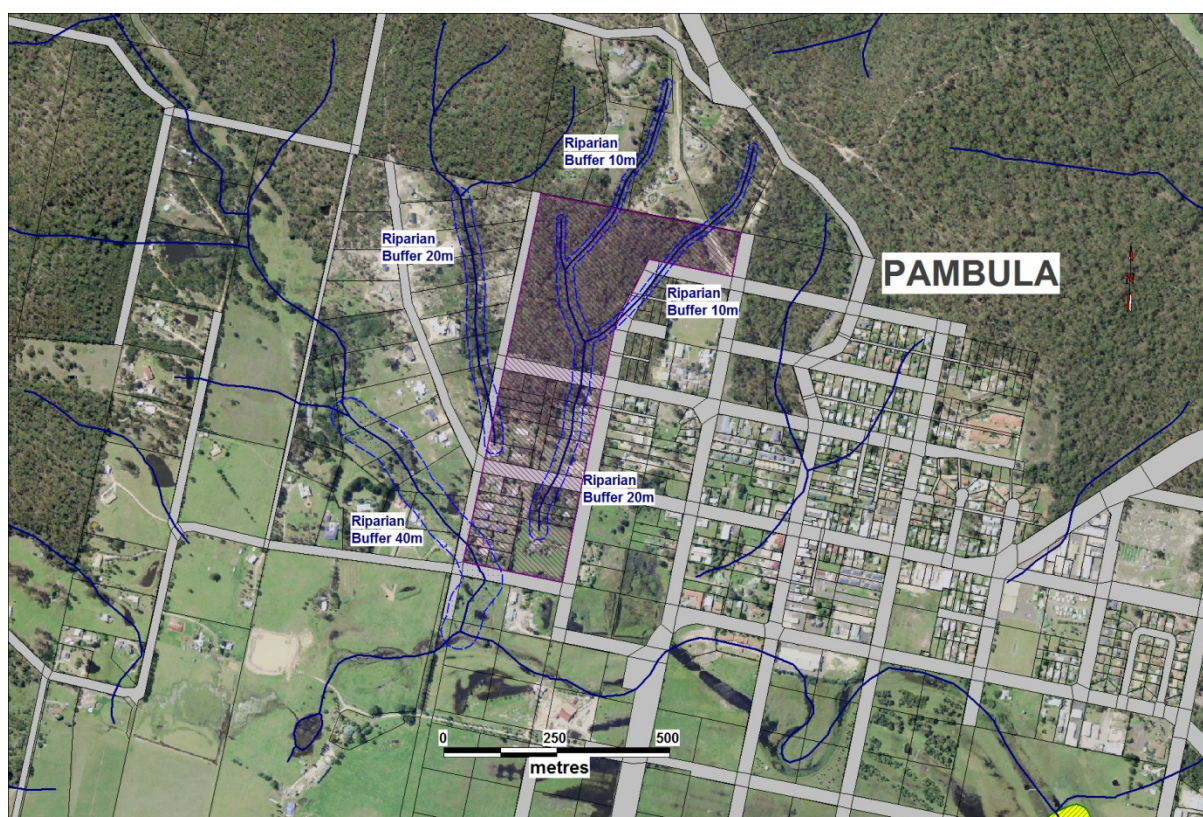


Figure 6.1: Riparian buffers, Pambula

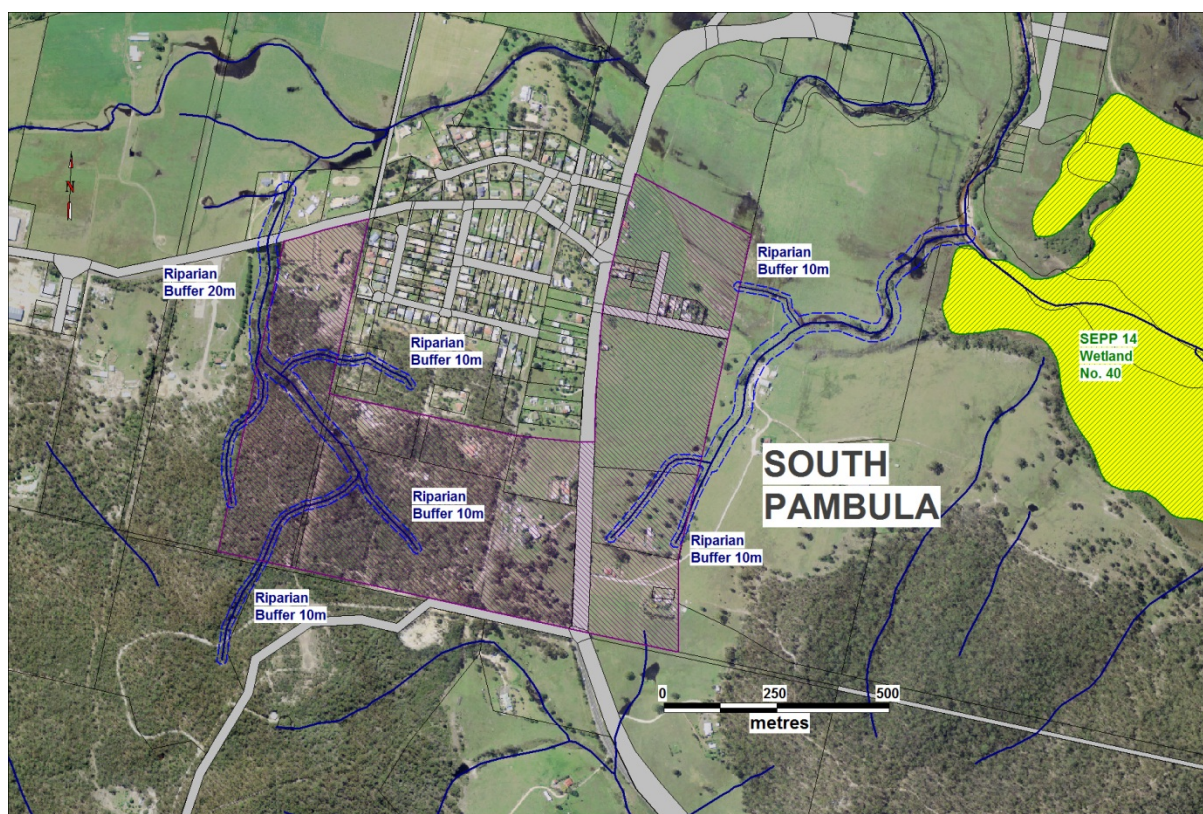


Figure 6.2: Riparian buffers, South Pambula