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# Catherine Hill Bay and Gwandalan

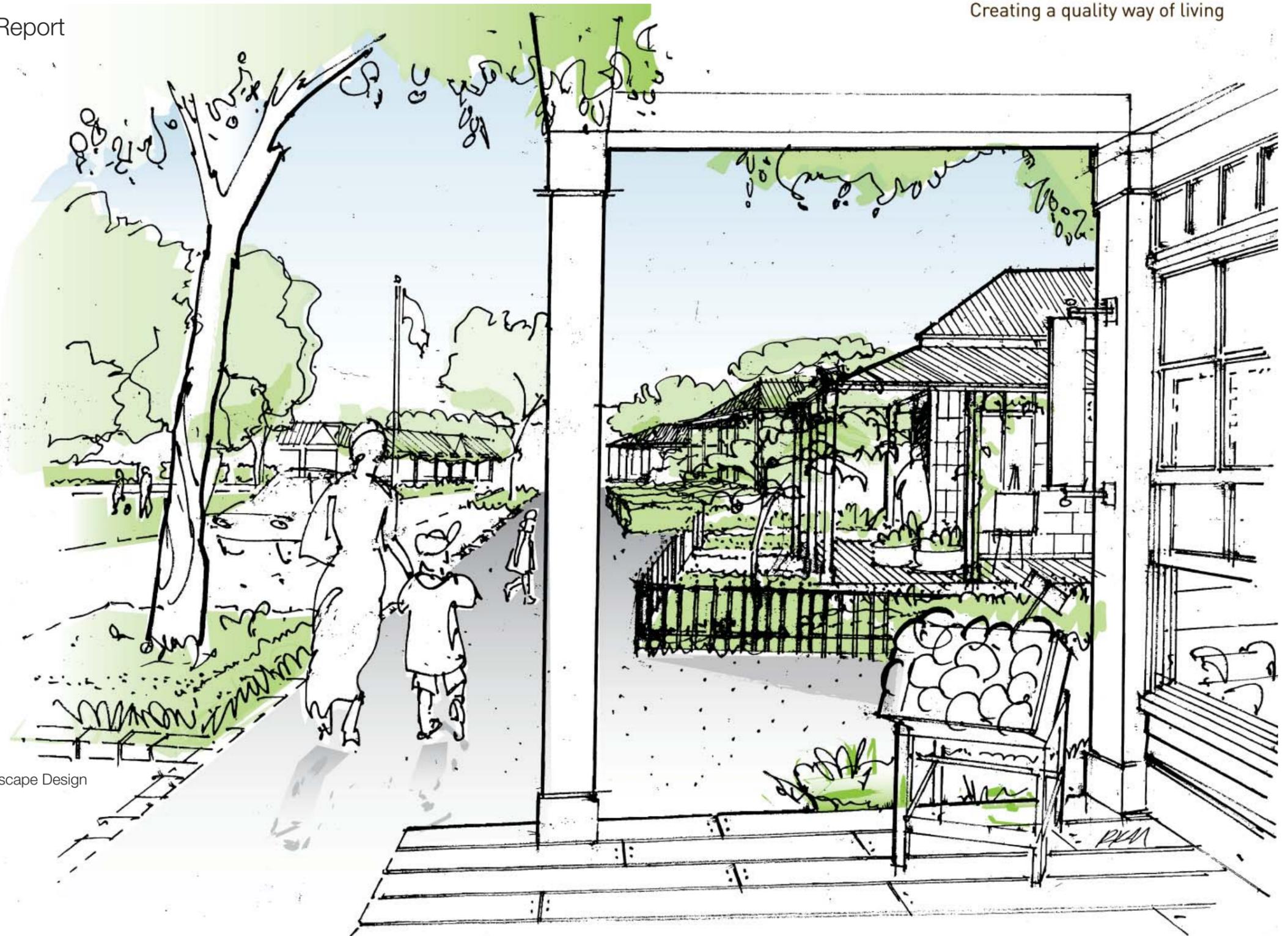
## Concept Plan

Prepared for Preferred Project Report

February 2008

Prepared for  
Rose Property Group Pty Ltd  
51 Riley Street  
Woolloomooloo NSW 2011  
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### Vision Statement

"The trip home to Moonee Beach is always anticipated. We turn off the highway onto Montefiore Parkway and follow the ridge gently down to be greeted by a most beautiful coastal scene at the top of the village, the Clarke Street miner's cottages to the left with Catherine Hill Bay arcing softly to the horizon. To the right we see the newer coastal hamlets, with the white sand of Deep Cave Bay at the bottom of the hill. We always turn right to see the view down across the lush village green out through the wide main boulevard with its large coastal banksias, the glistening water of Deep Cave Bay and the national park to the South. No matter what time of day, the water sparkles and waves push softly up the golden sand.

In winter or the warmer seasons the beach beckons. We rapidly park the car and rush into our painted timber beach house, across the veranda, the smell of the ocean enticing us to visit. Out of our work clothes and into our bathers in summer or walking clothes in winter, we head off to the beach, the soft grassy verges under our bare feet. We don't have the gutters and edges they have in the suburbs. The sandy dunes invite us and sand wrinkles between our toes. A short walk and we're on the beach swimming in the coolness of the summer water or walking along the soft chilled winter sand past the fishermen who seem to come out only when the edges of the water are rougher and less inviting.

Often the beach walk ends with a stroll up to the Village for a coffee or a snack. We look in the small shop windows or pick up some odds and ends at the general store. Home again across the wide village green with the kids playing all sorts of games in the late afternoon. The evening closes with a lazy dinner on the front veranda as the sun sets behind us and the light slowly retreating from Deep Cave Bay and The Moonee Hamlets."



*View of The Moonee Hamlets.*

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### Consultant Team

Masterplanning + Architecture + Heritage  
**CM+ Conybeare Morrison**

Landscape Architecture  
**CONTEXT Landscape Design**

Strategic + Policy Planning  
**Duo Consulting**

Surveying and Environmental Assessment  
**Asquith de Witt**

Civil Engineering  
**Parsons Brinkerhoff**

Traffic Engineering  
**Masson Wilson Twiney**

Bushfire Assessment  
**Barry Eadie Consulting**



## Synopsis of Process in Preparation of the Concept Plan

### Process

In February 2007, CM<sup>+</sup> and CONTEXT were commissioned by Rose Property Group Pty Ltd to review the masterplan concept prepared by EJE Pty Ltd for Catherine Hill Bay and Gwandalan Concept Plan.

This review process reported through Rose Property Group Pty Ltd and an Independent Hearing and Assessment Panel appointed by the Minister for Planning, the Honourable Frank Sartor MP. The Panel members are:

- Ms Gabrielle Kibble AO (Chair)
- Mr Andrew Andersons AO
- Mr Michael Collins

Several meetings were held and presentations made to the Panel and the Committee over the period of March to May 2007. The Panel convened a meeting with the local community in Catherine Hill Bay on 30 May 2007. At this meeting it was stated that a revised Concept Masterplan would be submitted to the NSW Department of Planning covering Catherine Hill Bay, Moonee and Gwandalan together with Project Applications (PAs) for the Village Centre Hamlet, adjoining the headland and the first of a series of seven hamlets located in Moonee, off the Montefiore ridgeline.

The Panel prepared an Interim Report which is attached in the Environmental Assessment.

### Key Planning Principles from the Interim Report

- Conform to NSW Coastal Policy and Guidelines.
- Respect the scenic, aesthetic and cultural heritage of Catherine Hill Bay Village.
- Respect the visual catchment of Catherine Hill Bay Village.
- Provide a classic McHarg landscape and visual analysis of the site.
- Provide low scale development nestled in the landscape with significant tree retention.
- Set development away from headlands, ridgelines or dunes.
- Provide a 100m setback and visual separation from Moonee Beach.
- Provide public access and public road at interface of beachfront, bush and development.
- Ensure sensitive design of building form and detailing.
- Separate development North of the ridgeline from Catherine Hill Bay Village.
- Provide pedestrian and bicycle paths connecting Catherine Hill Bay Village, Middle Camp and Moonee Beach.
- Ensure that technical requirements are met for fire protection and emergency access.

- Limit commercial development and tourist accommodation (limit of 1800m<sup>2</sup>).
- Consider location of Fire Services.
- Consider adaptation of Bin Building.
- Provide small scale development in the Village Centre.

### Gwandalan

Subdivision should be redesigned in accordance with current best practice urban design principles to take account of the site's environmental and ecological attributes.

### Key Design Actions in Response to the Interim Report

- Separation of development from the existing heritage village by a community park.
- Development of seven distinct hamlets, separated by bushland, including a Village Centre limited to 69 dwellings (reduced from 150 in the initial proposal).
- Montefiore Parkway dedicated as a public road with significant bushland buffer from housing.
- Reduction of development footprint overall by pulling back from Moonee Beach and headland.
- Provision of coastal and cliff walkways from Catherine Hill Bay Village to Moonee Beach.
- Protection of ridgeline from development.
- Access to Moonee Beach, with parking along the Perimeter Road.
- Focus of development on areas despoiled by mining.
- Location of new Village Centre away from Catherine Hill Bay Village.
- Provision of a separate precinct includes Wallarah House and Jetty Master's Cottage.
- Inclusion of strict controls over design and construction of all dwellings.
- Gwandalan - complete redesign of subdivision and reduction to 187 dwellings.

### Community Feedback

The first Concept Plan also attracted numerous public and agency submissions. Wherever possible the issues raised in these submissions have been addressed in the redesign of the Concept Plan for the two sites.

### Catherine Hill Bay

The initial concept and subject of the review called for an extension to Catherine Hill Bay Village with a 600 lot subdivision in the structure of a concentric circular and radial urban form. The built footprint of this village extension covered an area of approximately 60 hectares. A modest Village Centre was proposed on the ridge between Hale and Clarke Streets.

The dedication of 84% of the Catherine Hill Bay site—310 hectares – for conservation purposes was proposed in the initial design and retained in this proposal.

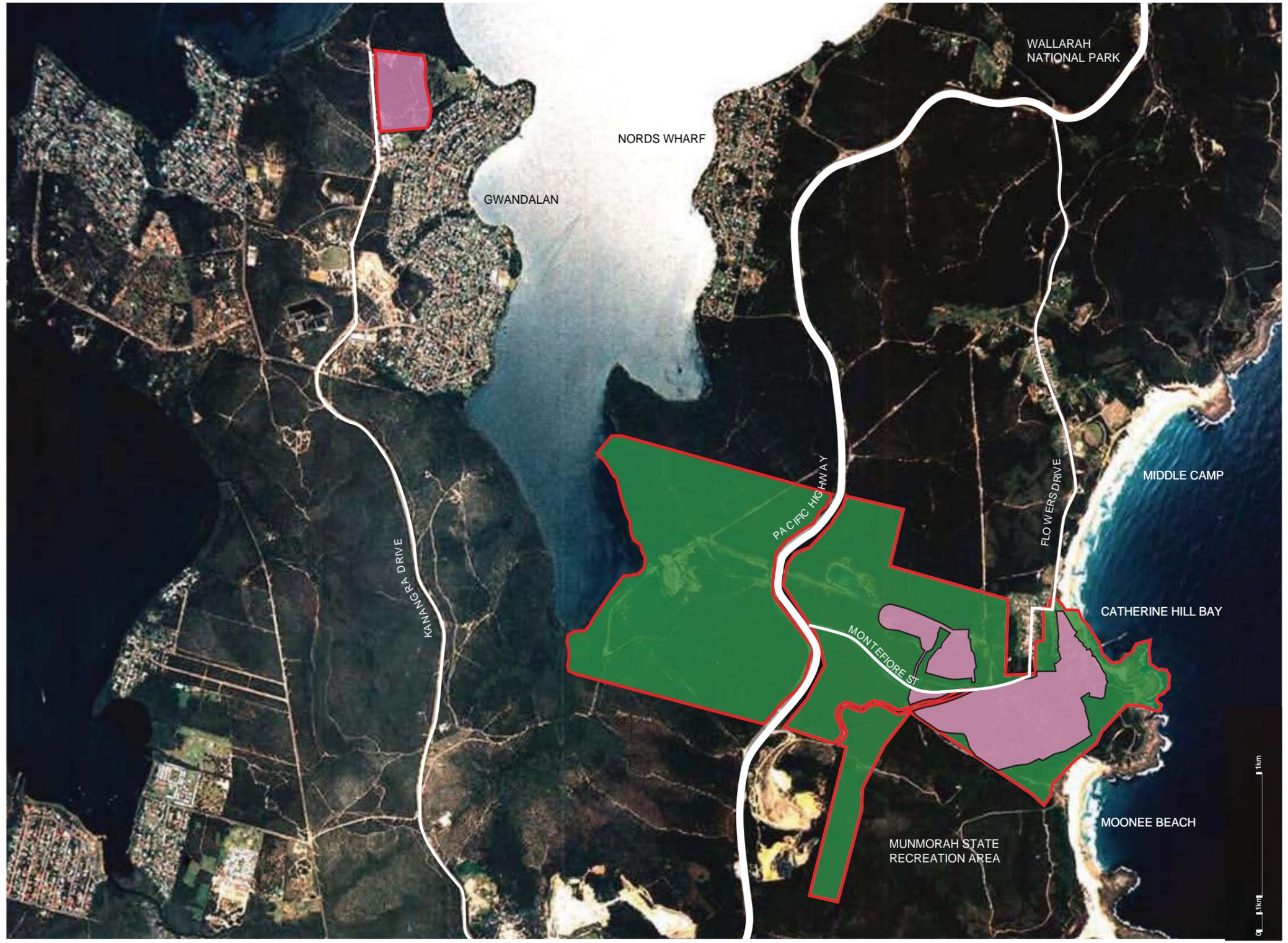
The preparation of the revised concept followed several site inspections and a visual analysis of the proposed development site situated on the closed Moonee Colliery. This also involved a close interaction between the Panel, key stakeholders, Rose Property Group Pty Ltd and its Consultant Team.

The new concept presented a completely different design approach and one strongly based on a sound landscape design philosophy and implementation of the Key Design initiatives:

- Best practice remediation of the largely despoiled colliery site and its return, as near as possible, to the pristine natural environment of a pre-colliery period.
- Reduction of the built form extent particularly in visually exposed or potentially sensitive natural bushland areas.
- Adoption of the idea of a hamlet-based settlement, taking as its cue the modest scale and compact form inherent in Catherine Hill Bay itself.
- Designation of extensive natural landscape zones separating individual hamlets, protecting natural features such as the headland, ensuring continuous ridgeline protection (along Montefiore Street) establishing a permanent 'village park' buffer between the existing village and new hamlet settlements
- Establishment of a coastal walk linking Middle Camp Beach and Moonee Beach and integrating with existing tracks on the headland.
- Identification of a beachfront housing typology in keeping with the heritage architecture of the locality and offering a wide variety of accommodation and building forms.
- Establishment of a unique coastal beachside village identity in keeping with the built heritage and natural landscape values of the locality.

### Gwandalan

The revised concept for Gwandalan abandoned the inclusion of Stage 2 in the rezoning. Stage 1 has been redesigned according to best practice urban design principles taking account of the site's environmental attributes and surroundings. It has sought to improve the interrelationship with the public school and the settlement including the inclusion of a pick up/set down zone, enhanced orientation of building lots, create an identifying green 'parkway' entry, 'address' to the estate and establishment of a clearly defined bus route and shared-way around the perimeter of the settlement incorporating an extensive drainage swale. Two open spaces have been created in areas containing better quality trees linked by the 'parkway'.



— Land Boundary Covered in the Subject Concept Plan    
  Proposed Indicative Future Development Area    
  Proposed Dedicated Lands

Figure 1.1.1. Concept Plan Area illustrating proposed areas for development.



## 1.0 Introduction

### 1.1 Location

The Concept Plan covers 374 hectares of land at Catherine Hill Bay, Moonee Beach and Crangan Bay owned and controlled by Coastal Hamlets Pty Ltd plus an 18 hectare site at Gwandalan controlled by Lakeside Living Pty Ltd. The sites are shown in Figure 1.1.1.

Overall the Concept Plan covers some 392 hectares.

#### The Moonee Hamlets

USE	AREA
Total Area	Approximately 374 hectares
Dedication	At least 310 hectares
Urban Development	Up to 45 hectares
Managed Community Open Space	Residual Area (Approximately 19 hectares)

#### Gwandalan

USE	AREA
Urban Development	Up to 18 hectares

### 1.2 The Site

This Concept Plan applies to three areas:

- 1 Dedication Area
- 2 The Moonee Hamlets Subdivision
- 3 Gwandalan Subdivision

The Moonee Hamlets site comprises approximately 374 hectares of surface land on both sides of the Pacific Highway. The land stretches from the ocean in the East to Lake Macquarie in the West and straddles the Lake Macquarie and Wyong LGA boundary. The Dedication Area is included in the site.

The land included is:

- Lot 5 DP 774923
- Lot 6 DP 774923
- Lot 7 DP 774923
- Pt Lot 2031 DP 841175
- Lot 2 DP 809795
- Lot 201 DP 702669
- Lots 2, 4 and 6 Section F DP 163
- Lots A and B DP 384745
- Residue of the original land grant being private land shown as roads in DP 163 (approximately 2.6 hectares of undetermined ownership claimed by Coastal Hamlets Pty Ltd)
- Public Roads through Lot 2 DP 809795 to be closed (approximately 4 hectares not currently in Coastal Hamlets ownership).
- Lot 3 DP 129431
- Lot 4 DP 129431

The Gwandalan site is part of Lot 3 DP 588206 Kanangra Drive, Gwandalan comprising 18 hectares of land.

### 1.3 Objectives of the Concept Plan

The objectives of the Plan are:

- To provide a long term planning framework for the Concept Plan Area, and facilitate its orderly staged development/conservation.
- To provide the NSW Department of Planning and stakeholders with a plan for the most appropriate form of development for the Concept Plan Area.
- To assist the public to understand the future character of the area.
- To assist consent authorities when they are considering future Project Applications (PAs).

### 1.4 Project Implementation

This Concept Plan is intended to illustrate the overall design for The Moonee Hamlets development that includes Hamlets 1 through 7. Project Applications have been lodged concurrently with this Concept Plan for Hamlets 1 and 2. Information shown for Hamlets 3 through 7 is indicative only and is subject to further design.



Figure 1.1.2. View of proposed character of Village Centre.

### 1.4 The Dedication

The dedication to the NSW Government of a large part of the land holding covered by this Concept Plan provides conservation offsets for all development areas covered in the Concept Plan.

The extent of this dedication is documented in Section 2 of this Concept Plan covering Dedication and Environment Issues. Other sections of this Concept Plan deal solely with areas identified for development.

### 1.5 Permissibility

This Concept Plan is accompanied by a State Significant Site Proposal under Part 3A of the NSW Environmental Planning and Assessment Act 1979.

The State Significant Site Proposal will rezone the land via State Environmental Planning Policy Major Projects. An amendment to the SEPP Schedules will establish the zones and statutory planning controls applying to the development under the Concept Plan.

The proposed zones are R1 General Residential, RE1 Public Recreation Zone and E1 National Parks and Conservation Zone.

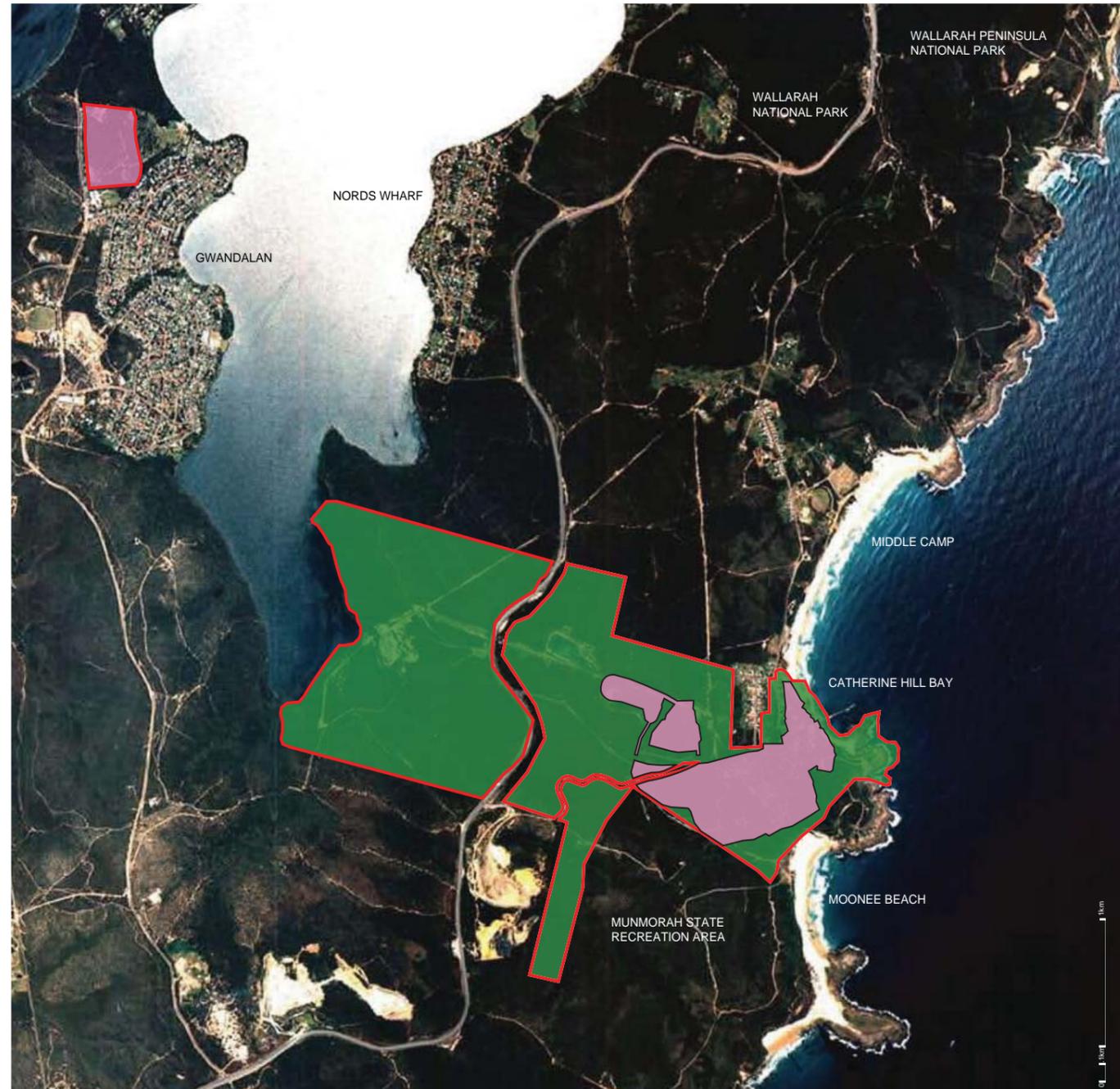
The General Residential zone will apply to all housing and commercial development on the site. In order to limit the extent of commercial development it will be limited to areas identified by hatching on the zone map and a maximum amount of floor area will be set by the provisions of the Concept Plan.

Public areas will be zoned RE1 Public Recreation. This zone will apply to public open space and bushfire asset protection zone areas.

The E1 National Parks and Conservation zone will apply to all natural areas proposed for public dedication.

A number of components of the development proposed by the Concept Plan are permissible under the existing zoning. These include:

- Restoration and changed use of Wallarah House, a heritage item, is permitted with consent under the heritage conservation provisions of Lake Macquarie LEP 2004.
- Subdivision of the 7(4) zone under Lake Macquarie Council LEP 2004 is permitted with consent.
- Subdivision of the 7(1) zone under Lake Macquarie LEP 2004 is permitted with consent.
- Subdivision of the 7(b) zone under Wyong LEP 1991 is permitted with consent.
- Subdivision of the 7(e) zone under Wyong LEP 1991 is permitted with consent.
- Dwelling houses are permitted in the Lake Macquarie 7(1) zone and the Wyong 7(b) and 7(e) zones.



— Land Boundary Covered in the Subject Concept Plan      ■ Proposed Indicative Future Development Area      ■ Proposed Dedicated Lands



Figure 1.1.3. Concept Plan Area illustrating proposed areas for development and dedication land in relation to existing conservation lands.

## 2.0 Dedication and Environment

### 2.1 Dedications

Of the 374 hectares in the Catherine Hill Bay area, more than 80% (or 310 hectares) of the land holding covered by the Concept Plan will be dedicated to the NSW Government for conservation.

The land has been identified as a priority for conservation by the Department of Environment and Climate Change (DECC) and by both regional and state environmental groups including The Wilderness Society. The land will provide a critical link between areas of habitat to the North and South of the site.

The NSW National Parks and Wildlife Service (NPWS) have noted that the forested land proposed to be dedicated is 'extremely significant and provide(s) conservation opportunities for ecosystems and, flora and fauna which are otherwise not well represented in the conservation reserve system of the state'. In particular NPWS also noted that the dedicated land in conjunction with dedicated lands outside the Concept Plan area on adjoining sites 'form a contiguous forested link from Swansea in the North down the Wallarah Peninsula to Munmorah State Recreation Area in the South and Lake Macquarie State Recreation Area in the southwest'\*.

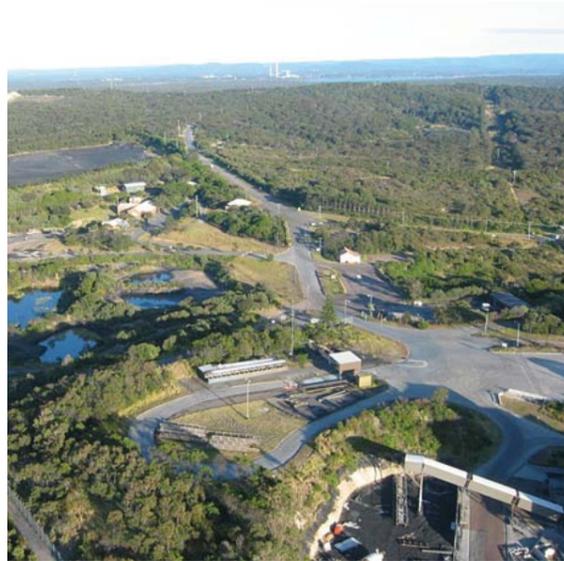


Figure 2.1.1. Aerial view looking West over disturbed land intended for development with native bushland intended for conservation in the background.

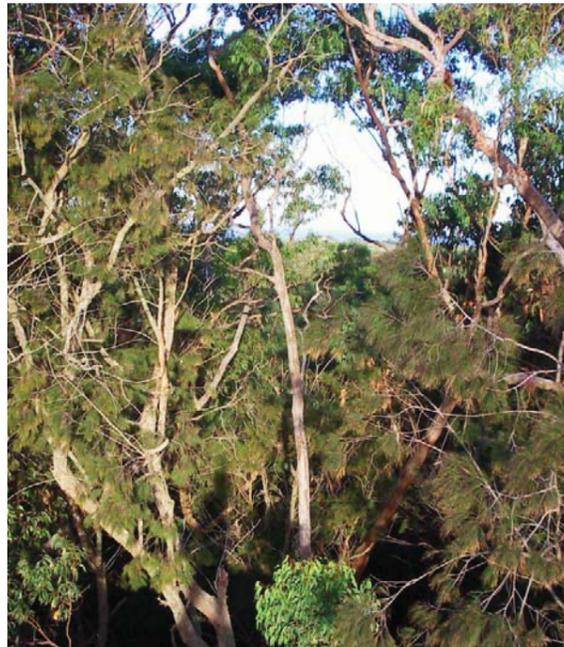


Figure 2.1.2. View looking East over dedicated land with the coastline in the distance.

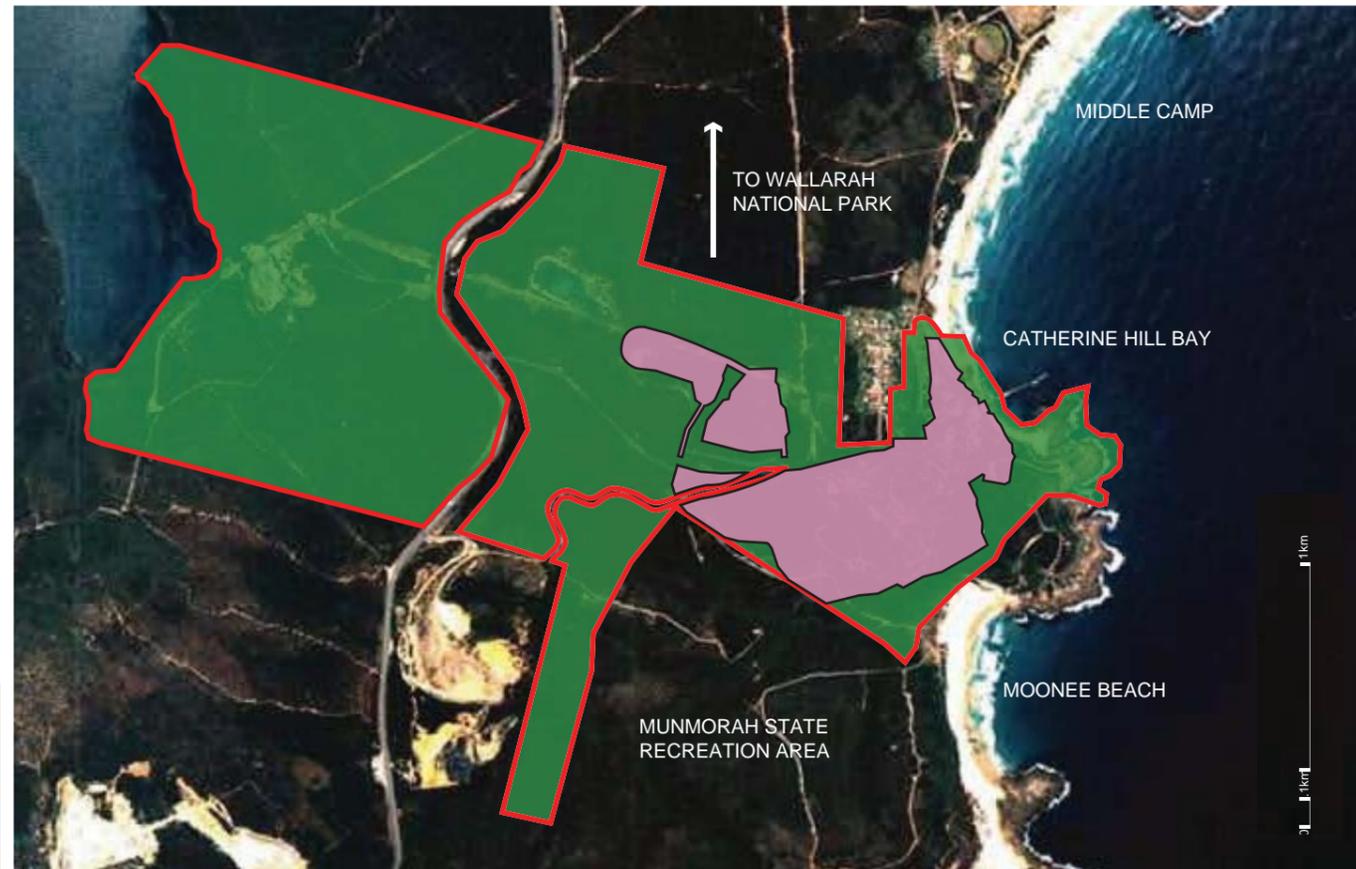
\*The Manager NPWS, Sydney Zone; 2000, on behalf of the Director General - correspondence to the then land owners and mine operators. (from the "Nomination of the Wallarah Peninsula as a National Park", August 2004 submitted by 'Walarah Alliance')

Following a review of several environmental studies completed on the dedication area Asquith de Witt - Consulting Surveyors, Engineers and Town Planners have concluded the land has a substantial range of values that provide for benefits well beyond biodiversity offsets. The known values of the 310 hectares of dedication land include:

- masked owl habitat;
- glossy black cockatoo habitat;
- North-South wildlife corridor protection;
- a minimum of 100 hectares of *tetratheca juncea* habitat;
- approximately 2 hectares of saltmarsh/SEPP 14 land;
- Munmorah Palm-Apple Forest conservation;
- squirrel glider habitat;
- approximately 1.8 kilometres of lake foreshore;
- approximately 1.5 kilometres of coastal foreshore;
- approximately 8 hectares of coastal headland, beach and rock platform;
- part of the heritage listed Catherine Hill Bay railway;
- access to the Catherine Hill Bay coal loading jetty;
- access to Catherine Hill Bay Surf Club;
- the historic original coal mine entrances (now sealed) at beach level;
- protection of potential Aboriginal heritage sites along the Lake Macquarie foreshore;
- substantial reinforcement of the Wyong-Lake Macquarie interregional buffer;
- extension of the National Parks estate; and
- protection of scenic quality.



Figure 2.1.3. View looking through dedicated land off Montefiore Street between the Pacific Highway and Catherine Hill Bay.



— Land Boundary Covered in the Subject Concept Plan      ■ Proposed Indicative Future Development Area      ■ Proposed Dedicated Lands

**Dedication Statistics**

- Total Land Holding - 374 hectares,
- Dedication to NSW Government for conservation - more than 80% (or 310 hectares)
- Total length of Lake Foreshore approximately 1.8 kilometres
- Total length of Coastal Foreshore approximately 1.7 kilometres.

Figure 2.1.4. Plan illustrating the Concept Plan (red border), the areas set aside for development (pink) and land to be dedicated (green) in the context of surrounding existing conservation land.

### 3.0 The Moonee Hamlets

#### 3.1 Statutory Background

##### Background

Coal mining at Catherine Hill Bay commenced in 1873. The land at Catherine Hill Bay is a mixture of high value bushland and areas that have been despoiled by mining activity. Mining, a coal washery, reject disposal, coal stockpiling and coal transport operated at the site until 2002.

The land straddles the boundary between Lake Macquarie and Wyong and the two parcels have been the subject of previous DA applications.

##### Relationship to Other Planning Instruments

The Concept Plan for The Moonee Hamlets has been prepared with reference to:

- Lower Hunter Regional Strategy
- Lake Macquarie LEP 2004
- Hunter Regional Environmental Plan 1989
- SEPP Major Projects
- SEPP 11 Traffic Generating Developments
- SEPP 14 Coastal Wetlands
- SEPP 55 Remediation of Land
- SEPP 71 Coastal Protection
- SEPP Building Sustainability Index (BASIX)
- The Wyong LEP 1991 (land in the Wyong LGA)
- Draft Central Coast Regional Strategy

Other relevant policy documents include:

- Memorandum of Understanding
- NSW Coastal Policy
- NSW Coastal Design Guidelines
- Lake Macquarie City Council (LMCC) DCP 1
- Lake Macquarie Coastline Management Plan
- Wyong Shire Council DCP
- Independent Assessment Panel Concept Plan for Catherine Hill Bay and Gwandalan Interim Report to the Planning Minister
- Mine Closure Plan

##### Lower Hunter Regional Strategy

The Regional Strategy sets the strategic framework for urban growth in the Lower Hunter region. The Moonee Hamlets precinct covered by the Concept Plan is shown as a proposed urban area in the Regional Strategy.

The identified growth area covered by this section of the Concept Plan formerly housed a coal washery and loading facility as well as other industrial structures and also includes previously inhabited and developed sections of the village at Catherine Hill Bay, former subdivisions as well as the Mine Manager's Residence and Jetty Master's Cottage.

##### Draft Central Coast Regional Strategy

The Moonee Hamlets site is also identified in the Draft Central Coast Regional Strategy as being part of the North Wyong Shire Structure Plan Area. The Structure Plan will identify land that is suitable and not suitable, for future development and future land uses that may be appropriate.

##### Memorandum of Understanding

A Memorandum of Understanding (MoU) has been entered into between the Minister for Planning, the Minister for the Environment and the landowners. The MoU sets out the process for rezoning of the growth areas, limits the extent of growth areas and provides for the dedication of land by the owners for environmental conservation and public foreshore. The MoU also defines the development densities. A maximum of 600 dwellings is allowed within the development area in both the Wyong and Lake Macquarie LGAs.

##### Mine Closure Plan

The former mine site at Catherine Hill Bay and Moonee is undergoing a statutory mine closure process. The process provides for remediation of the site to recreation standards. The remediation is based on the findings of environmental site assessments. The Concept Plan will vary the Mine Closure Plan in the following respects:

- Concrete in the area of the former coal preparation plant will be left in place until development works commence to secure current drainage patterns.
- The Bin Building will remain in place for adaptive reuse.



Figure 3.1.1. Lower Hunter Regional Strategy Map (NSW Department of Planning, 2006).

### 3.2 Historical Context

#### European Occupation

Interest in exploiting the 'Wallahah' coal seam can be traced to 1865 when Jacob Montefiore and Thomas Hale took out a mining lease on 265 acres, completing purchase of the allotment ten years later. At the same time, Robert Saddington and Charles Parbury acquired a total of 635 acres in the area. All portions were in the Parish of Wallarah.

- 1867 Catherine Hill Bay acquired its European name following the wreck the Catherine Hill on 21 June 1867.
- 1873 Mine operations commence.
- 1874 The 'Town of Cowper', now known as Catherine Hill Bay, contained 20 houses<sup>1</sup>.
- 1894 The towns population was 440<sup>2</sup>.
- 1900 The main township of Catherine Hill Bay contained 60 households<sup>3</sup>.
- 1921 The town contained the following<sup>4</sup>:
  - Mine Manager's Residence, including garages and stables
  - Clerk's House
  - Office
  - Wharfinger's House
  - Doctor's House
  - Three Shops
- 1947 The town's population stood at 736 and was served by a post office, a hotel, churches and a school in Middle Camp<sup>5</sup>.
- 1964 101 cottages on mine land (including Middle Camp)<sup>6</sup>.
- 2002 Mining activities ceased and only 42 cottages and one hotel remain in the town. A significant number of existing cottages are rented for holiday accommodation.

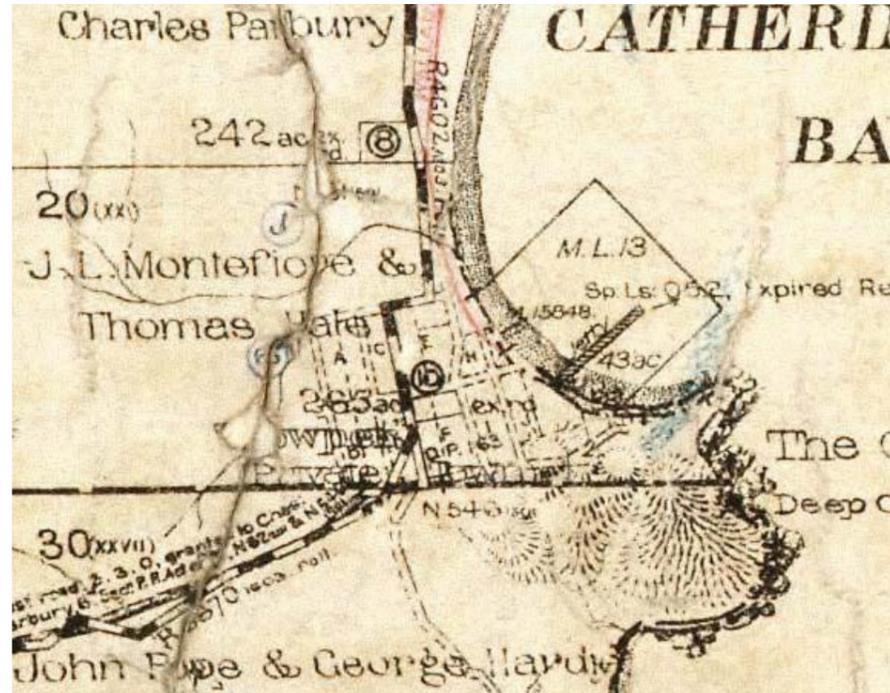


Figure 3.2.1. 1925 Parish Map (Montefiore and Clarke Street dashed). Source: Courtesy EJE

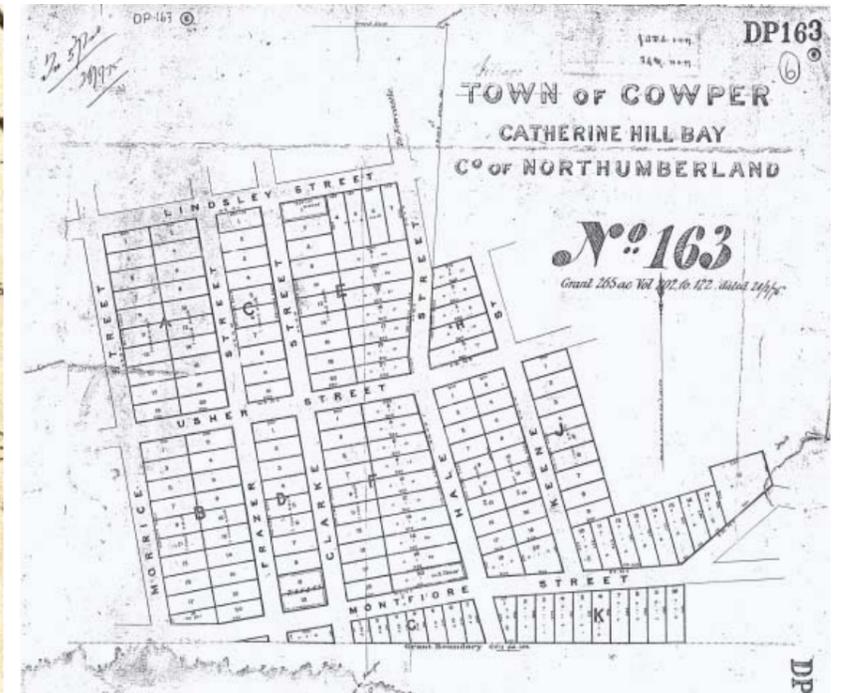


Figure 3.2.2. 1875 - The proposed Town of Cowper (now Catherine Hill Bay). Source: Courtesy EJE



Figure 3.2.3. 1920s photo looking South at the township of Catherine Hill Bay. Source: Courtesy EJE



Figure 3.2.4. Existing view looking up Clarke Street. Source: Courtesy EJE



Figure 3.2.5. Catherine Hill Bay Post Office circa 1940. Source: Courtesy EJE

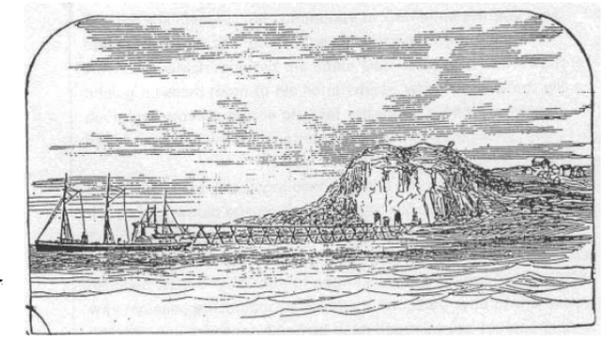


Figure 3.2.6. Catherine Hill Bay circa 1875. Source: Sydney Mail, courtesy EJE

1. *Miners Advocate*, 10 June 1874.  
 2. Hunter History Consultants 2005, *History of Wallarah Colliery*, 2005.  
 3. M. Martin, *Catherine Hill Bay, A Development History*, 1996.  
 4. Hunter History Consultants 2005, *History of Wallarah Colliery*, 2005.  
 5. Hunter History Consultants 2005, *History of Wallarah Colliery*, 2005.  
 6. Hunter History Consultants 2005, *History of Wallarah Colliery*, 2005.

### 3.3 Site Analysis

#### Geology

The geology around the Moonee Colliery is defined as being part of the following soil groups:

- Narrabeen Group-Munmorrah Conglomerate Formation: conglomerate pebbly sandstone, grey green and grey siltstone and claystone.
- Newcastle Coal Measures-Moon Island, Booleroo and Adamstown Subgroups: conglomerate sandstone, tuff, siltstone, claystone and black coal.

Bore logs undertaken by HLA Envirosiences indicate that the local site soils (Moonee Colliery soils) are sandy clays and sandy clay loams. (Yellow podzolic soils with sloth soils on drainage lines).

The site also contains a substantial amount of coal chitter fill.

#### Fauna and Flora

Assessment of the Fauna and Flora has been undertaken by Wildthing Environmental Consultants (Refer to Environmental Assessment Report).

The original site vegetation includes Coastal Heathlands, remnant Rainforest species and Wet Gully vegetation. The existing vegetation on the site, much of which is recent mining revegetation over fill areas in the North eastern corner of the site and at the edges of the coal dump, is heavily invaded by weeds such as bitou bush.

Remaining natural vegetation, which retains a reasonable natural structure and habitat value, is located mostly on the perimeter of the site. These areas will be retained in the development where possible. (Refer Figure 3.3.1.)

A number of single stands of Eucalypt trees and Norfolk Island Pine *Aracaria heterophylla* are located to the North of Montefiore Street.

The vast majority of the natural habitat in the development zone has been lost to mining activities.

The conservation and habitat values of the proposed development areas of the site, consistent with its use, history and extent of disturbance, were found to be low.

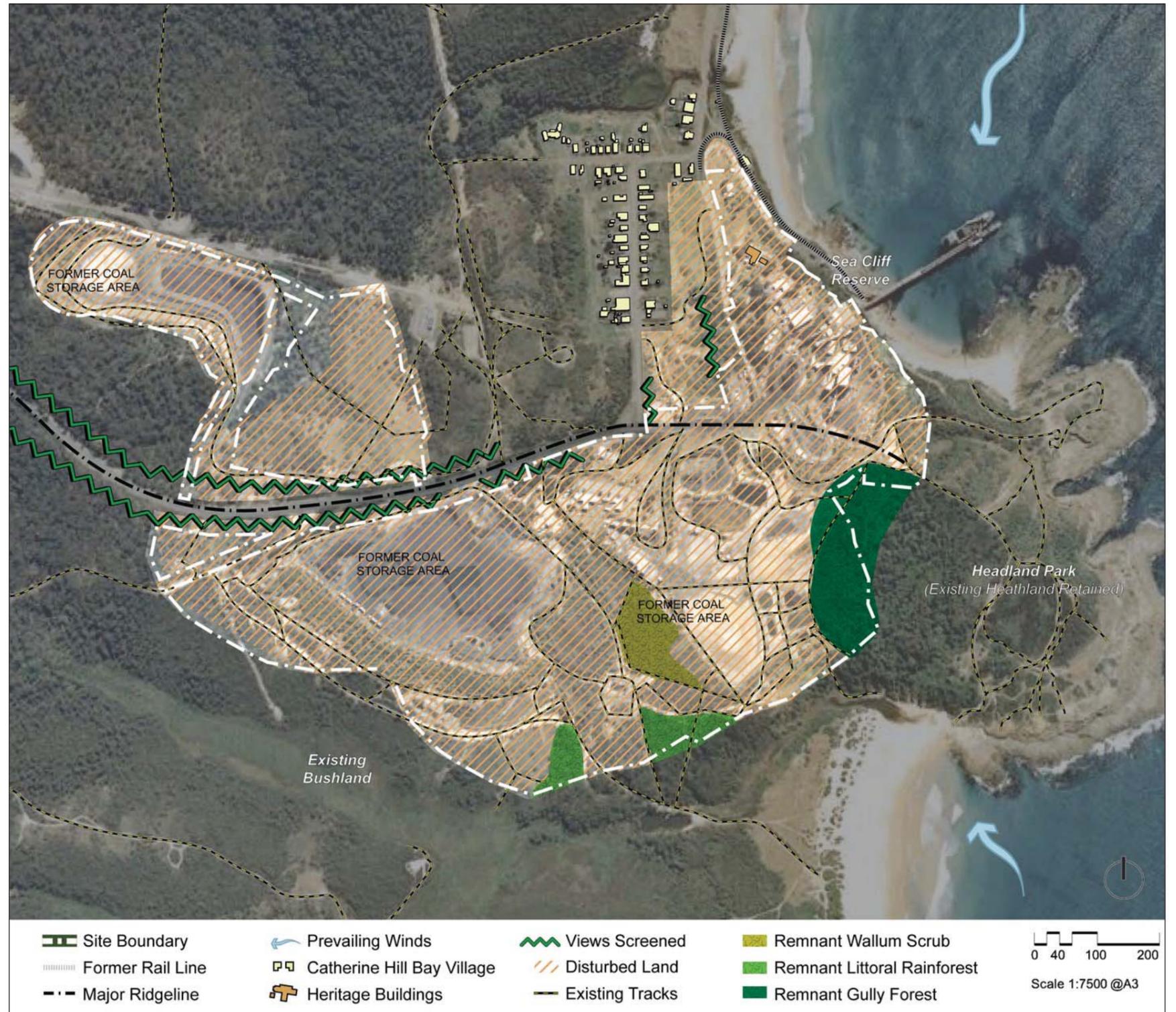


Figure 3.3.1. The Moonee Hamlets Site Analysis.

**Topography and Drainage**

The site is divided by a central ridgeline defined by the length of Montefiore Street, with slopes falling directly to the North and South on either side of the street. The ridge terminates at a high point (RL 50) at the local ocean headland. The indented headland separates Catherine Hill Bay from Moonee Beach.

The topography of the development site (Figure 3.3.2) has been extensively modified by mining activities. Most of the development site has been cleared and disturbed by fill, excavation and paving resulting in levelled areas around the mine maintenance buildings and the former coal storage areas to the East of the maintenance facility.

The steeper slopes, found to the North and South of Montefiore Street (greater than 1:10) are generally the result of earth moving on site. The fill and mine reject emplacement is over 11 metres deep in some locations. A geotechnical report has been prepared (Refer to Environmental Assessment Report).

The site will be regraded for development.

The natural drainage of the site has been heavily modified by development and fill/reject emplacement. South of Montefiore Street, the site drains to Moonee Creek which runs into the ocean at the northern end of Moonee Beach.

The existing mine site drainage system protects the SEPP 14 wetland to the South of the site and controls the quality of water running off the mine areas and coal storage pad through a series of detention ponds.

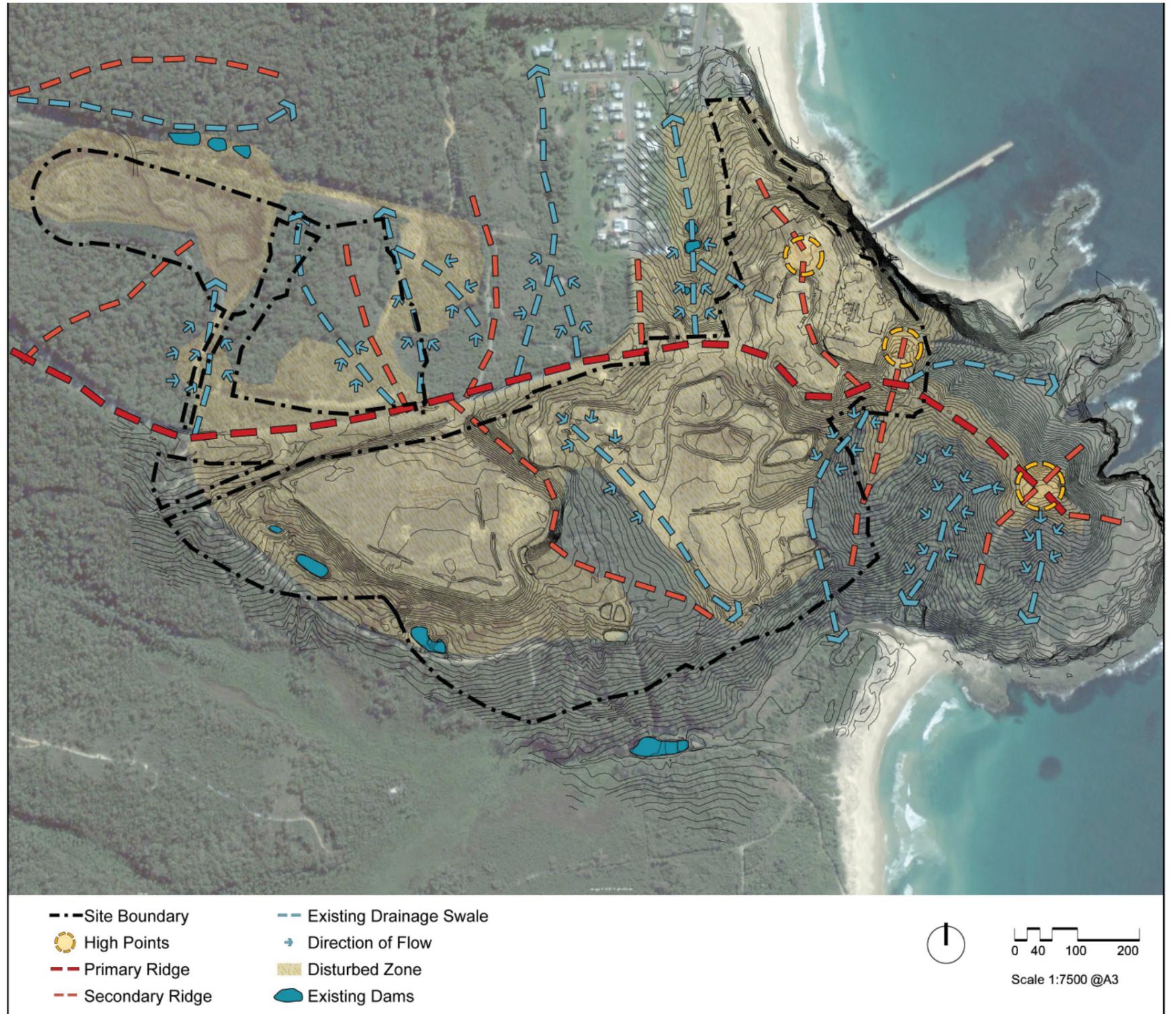


Figure 3.3.2. The Moonee Hamlets Topography and Drainage.

### Visual Analysis

A Visual Impact Assessment for the development has been prepared by CONTEXT and CM+ (Refer to Environmental Assessment Report).

The subject site is located in an area surrounded by bushland and is one of a number of landscape units located within the visual catchment of Catherine Hill Bay Village.

The village is located prominently within an adjoining landscape unit to the north. Most of the mine site is hidden from the village by the existing topography, the Montefiore Street ridgeline and the screen planting to the mine. The visual sensitivity is considered to be moderate and the visual quality is moderate, due to the degraded condition of the mined site.

The most sensitive views of the site are from Middle Camp Beach and Moonee Beach. The two catchments are separated by the Montefiore Street ridgeline.

Looking south from Middle Camp Beach, the most prominent landscape features within this visual catchment include the headland, cliff edge, jetty, ridgeline and Catherine Hill Bay Village. Looking north from Moonee Beach, the site is part of a visual catchment extending from the coastal headland to the east and Munmorah State Conservation Area to the west. The disturbed and unrehabilitated areas of the mine are partially screened by the existing vegetation on the lower slopes

Two areas on the disturbed slopes to the north of Montefiore Street, to be developed as Hamlets 5 and 6, are not visible from Catherine Hill Bay Village or Moonee Beach.

The Visual Impact Assessment identifies and describes the existing visual landscape environment and the likely impact of the development on the visual and landscape quality of the site. It also incorporates recommendations to ameliorate potential adverse impacts from the key viewpoints.

The development will incorporate considerable re-vegetation works in formerly disturbed and degraded areas to screen the development and 'nestle' buildings into the slopes. Vegetation buffers will also be established within the Asset Protection Zones (APZ) and bushland corridors to provide further screening and open space buffers between hamlets.

As a result of the review and adoption of the previous recommendations in the current design, the scenic quality of the site will be protected, viewer access increased and in a range of situations the scenic quality will be enhanced throughout the site

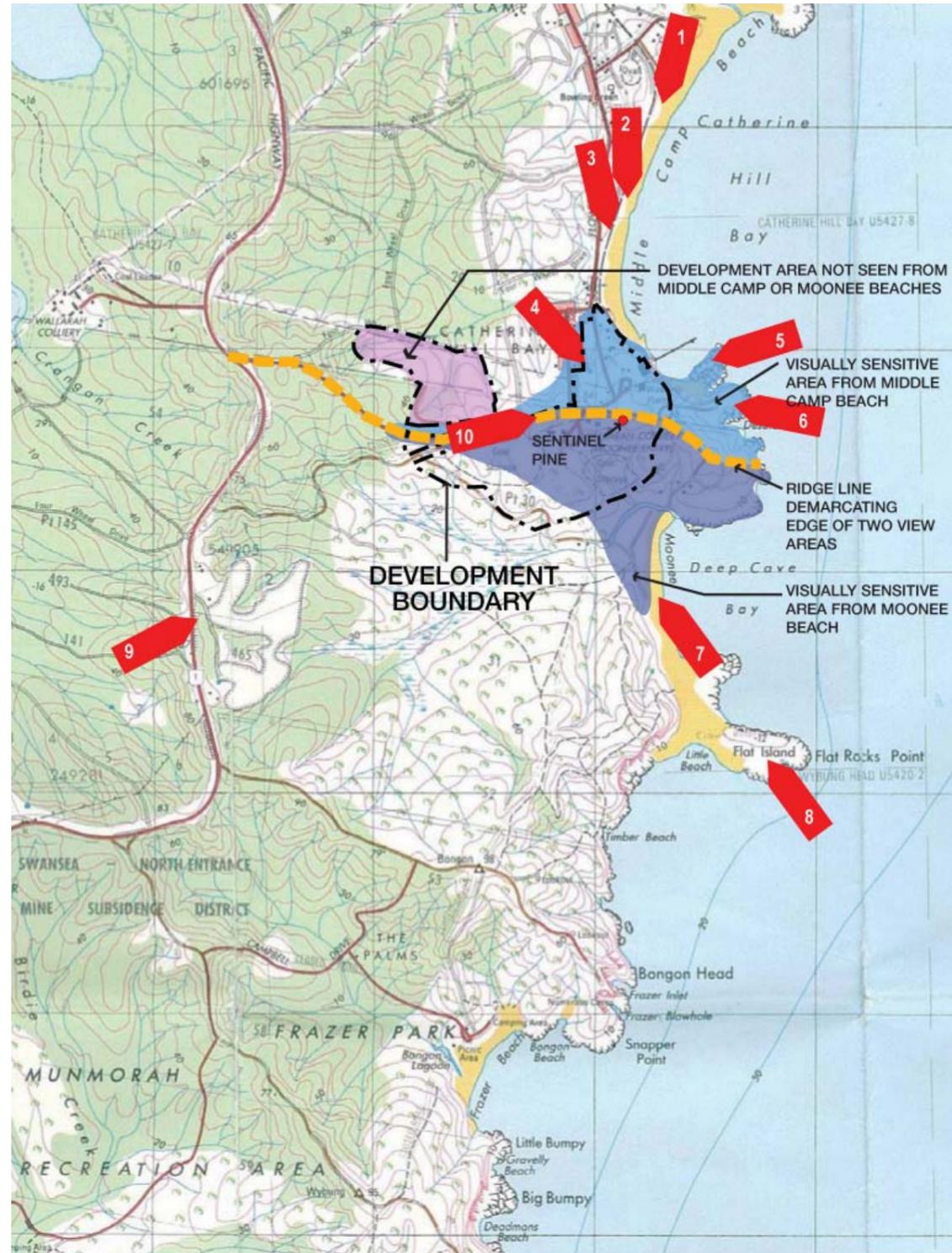


Figure 3.3.3. The Moonee Hamlets Views and Vistas.



Figure 3.3.4. VIEW 1: View from North end of Middle Camp Beach.



Figure 3.3.5. VIEW 2: View from Middle Camp Beach.

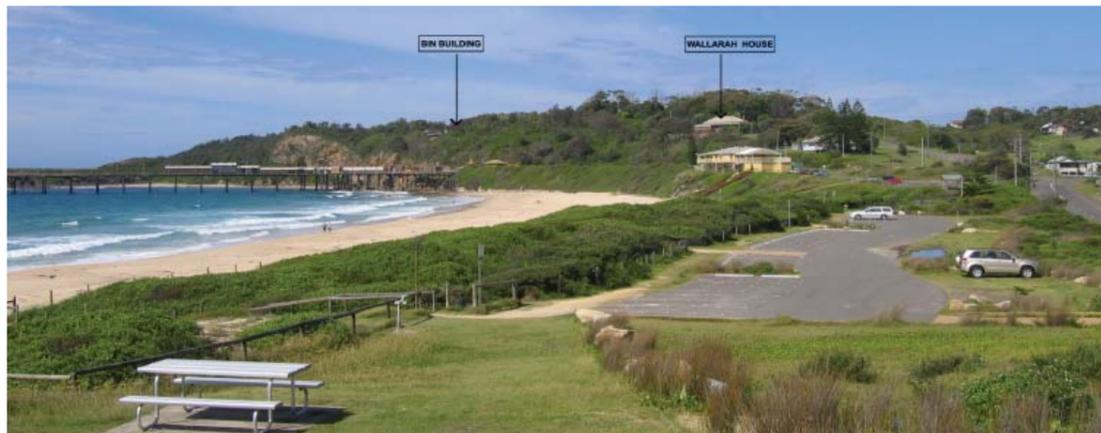


Figure 3.3.6. VIEW 3: View from Middle Camp Beach.



Figure 3.3.7. VIEW 4: View to former Colliery area.



Figure 3.3.8. VIEW 5: View from Headland towards cliffs, Jetty and Bin Building.



Figure 3.3.9. VIEW 6: Existing view from end of walking trail on headland.



Figure 3.3.10. VIEW 7: View from Moonee Beach.



Figure 3.3.11. VIEW 8: View from Flat Rock Point.



Figure 3.3.12. VIEW 9: View from Pacific Highway looking East.



Figure 3.3.13. VIEW 10: View from Montefiore Street looking East.

### 3.4 Site Planning Objectives

The Moonee Hamlets site is a new coastal settlement, situated on the redundant Moonee Colliery site. The Concept Plan aims to:

- ensure that new development lies within a landscape dominated setting as a series of individual hamlets;
- ensure the retention and enhancement of significant views to and from the existing Catherine Hill Bay Village;
- protect the headland, natural shoreline rock outcrops, original vegetation and the natural and 'wild' character of Catherine Hill Bay and Moonee Beach;
- provide close visual and physical boundaries between the natural and built environments;
- establish a population density appropriate to sustainable conservation of the surrounding Moonee Beach and Catherine Hill Bay environment;
- improve community access to parkland, Middle Camp Beach, the headland and, surrounding bushland through defined trails that do not adversely affect the characteristic qualities of the coastal foreshore or wilderness;
- conserve existing heritage listed items with compatible uses and ensure adjacent development is of sympathetic scale and character;
- establish a community within a coastal village that extends the principles of traditional neighbourhoods;
- create an effective network of pathways throughout the hamlets to encourage walking and cycling to reduce the reliance on vehicular transport.
- ensure the built environment and public domain are of high urban design quality and combine to form harmonious views of the Village from the street and the surrounds;
- provide a series of gathering places with different characters and functions, such as The Moonee Hamlets Community Hall, Village Green, Hamlet Commons, Bush Corridors and neighbourhood parks;
- provide community access to convenience shopping and neighbourhood facilities in a Village Centre.
- Provide convenient access to public transport for Catherine Hill Bay residents and The Moonee Hamlets residents;
- provide convenient parking for residents, employees and visitors;
- enhance the landscape setting of Montefiore Street by re-landscaping it as Montefiore Parkway; and
- establish community access to Moonee Beach from neighbourhood streets.



Figure 3.4.1. The Moonee Hamlets Site Planning Principles Plan.

### 3.5 Development Principles

Land use principles of The Moonee Hamlets have been developed to ensure new development does not impose on the visual character of the existing village and its setting and provides a consistent design image through all hamlets. A review of the NSW Coastal Planning Guidelines (SEPP 71) was undertaken and the principles of these guidelines have been incorporated. The key land use principles are:

#### Hamlet 1

Hamlet 1 will have a coastal village character and will include a limited number of neighbourhood shops accessible to the greater Catherine Hill Bay community. Development will occur within the disturbed land and footprint of the existing mine and will be primarily outside the visual catchment of the existing Catherine Hill Bay Village. Hamlet 1 will incorporate part of a publicly accessible coastal walk and coastal reserve extending from Middle Camp Beach to the headland.

The top of the Bin building will be integrated with the coastal walk to create a public terrace/ viewing area with a café and shelters.

The detailed layout of Hamlet 1 is yet to be prepared. Hamlet 1 will be developed according to development principles designed to minimize the visual impact of the hamlet from Catherine Hill Bay Village and Middle Camp Beach.

#### Hamlet Residential (Hamlets 2-7)

The Moonee Hamlets is a new residential community planned to equitably reconcile traditional local amenity aspirations and State urban consolidation policies. Residential accommodation is to be provided through a mix of dwelling types that maintain the scale and character of a coastal village.

#### Heritage/Adaptive Reuse

A distinct precinct has been identified to include Wallarah House, which is a heritage structure and the Jetty Master's Cottage. Any use or development of these items will take into consideration their significance in the development of Catherine Hill Bay and views from the existing village, beachfront and water. Ongoing development within this precinct, will be consistent with the adaptive reuse of Wallarah House and be guided by an appropriate Conservation Management Plan. In order to preserve the open view from Catherine Hill Bay Village to the sea, no new buildings will be located between Wallarah House and the Jetty Master's Cottage. Any new structures in this area will be kept below 1.8 metres above existing grade.

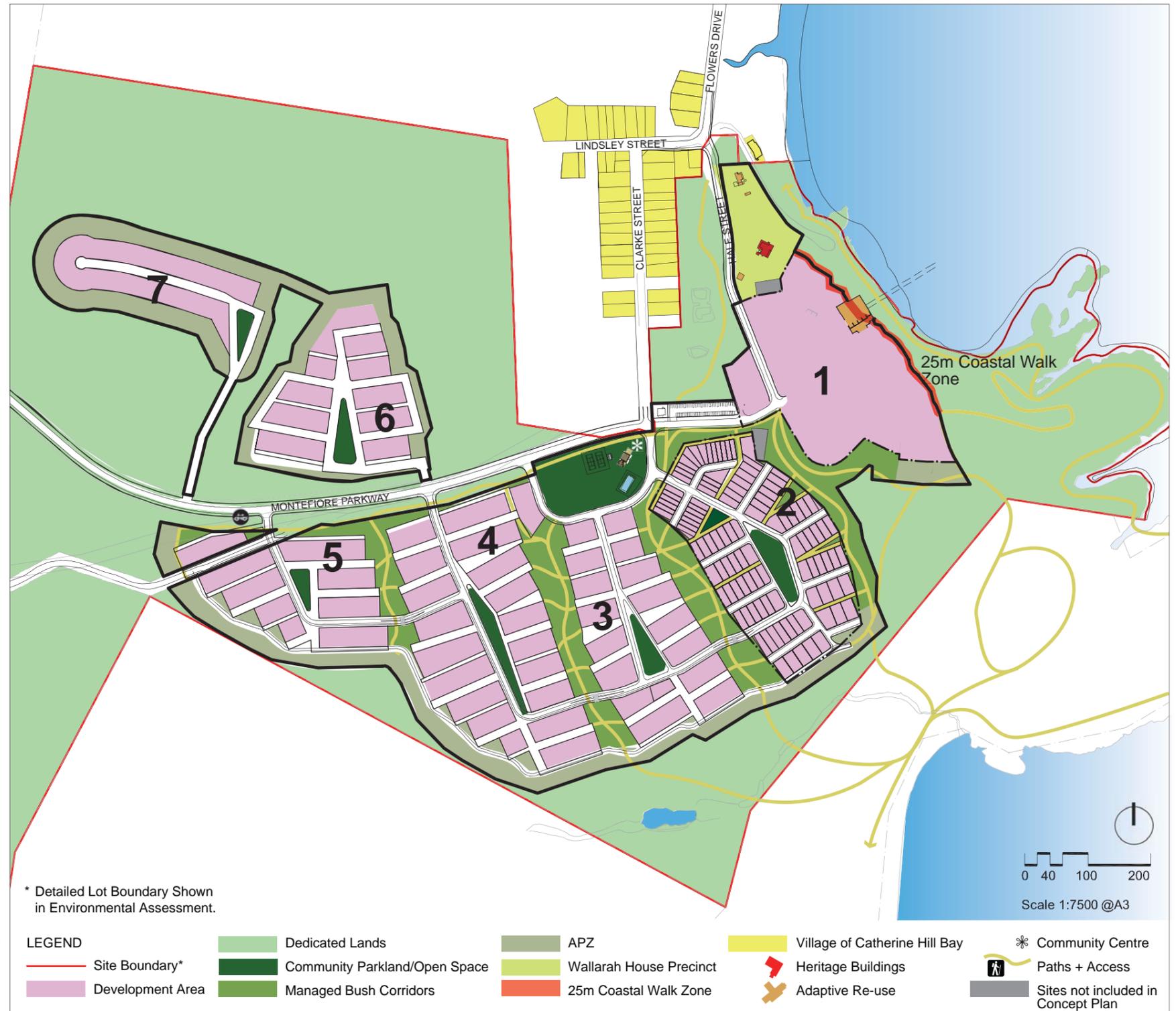


Figure 3.5.1. The Moonee Hamlets Land Use Principles Plan.

**Munmorah State Conservation Area Public Open Space Transition**

The area between the Hamlets and the Munmorah State Conservation Area will be managed for bushfire protection and to enable public access to the surrounding bushland and associated walking trails.

**Major Public Open Spaces**

There are three designated major public open spaces.

- The Sea Cliff Reserve will incorporate a Coastal Walk linking Catherine Hill Bay, the Headland and Moonee Beach.
- The Village Park will provide a ‘green lung’ between the existing Catherine Hill Bay Village and The Moonee Hamlets and maintain the open space relationship between the Village and Wallarah House.
- The Headland Reserve will be free from development and the existing bush tracks retained and enhanced for public enjoyment.

**Community Recreation and Associated Activities**

The Moonee Hamlets Community Centre will cater for outdoor recreation uses including an informal playing field, children’s playground, swimming pool and tennis courts in a landscaped open space. The space will also ensure convenient community pedestrian access and permeability.

**Community Open Space**

Passive open space will be provided within The Moonee Hamlets to provide a curtilage to the existing village and green links between the existing urban development and the coastal foreshore. The desired character of the space will be dominated by landscape offering vantage points to the sea.

Although not all precincts are fully designed, plans for Hamlet 2 are designed in detail. The plan has been included to provide an indication of the Architectural and Urban Design themes proposed for these areas.

Hamlet 1 is subject to a future design study to be undertaken consistent with the design principles indicated in this report.



Figure 3.5.2. View of Community Open Space.



Figure 3.5.3. View of Typical Hamlet Common.

### Hamlet 1

Hamlet 1 is the focus of the Moonee Hamlets development. It will have a coastal village character and will include a place for some limited retail activity for the community, visitors and residents of the existing village.

The Hamlet structure will be developed through further study, but will include a link to the existing Bin building, a village centre, a northern residential area and southern residential area. The village centre will provide for the daily needs of the residents and visitors alike in a central location. It is envisaged that the village centre will be near the Bin Terrace, and accommodate the likes of a general store, café, fish and chip shop, in keeping with the small scale 'corner store' retail typically found in coastal villages.

The highest level of the top of the Bin Building will be reserved for a public terrace overlooking the sea and providing expansive views of the coast. A lightweight shelter will be located on this terrace providing some shelter from sun and wind. This place forms the logical termination of Montefiore Parkway at the village centre while referring to some of the original colliery infrastructure of the Moonee Colliery.

A minimum 25 metre wide sea cliff reserve and walkway will be created (refer Figure 3.6.2) to provide public amenity and a buffer zone between the hamlet, headland and cliff edge. A Village Park to the west of Hale Street will provide passive open space and a visual buffer between the Hamlet and Catherine Hill Bay Village.

### Design Principles

The Project Application and detailed layout for Hamlet 1 is yet to be prepared but will be developed to the following principles:

#### Urban Design and Built Form

- Development other than that associated with the Bin building will be set back from the cliff edge by 25 metre to respect the need to provide adequate width for the coastal walk and to provide a suitable cliff stability zone. Refer Figure 3.5.5.
- Dwellings will be set back a further 15 metre from the 25 metre setback line along the Coastal Walk. The 15 metre setback zone will be enhanced with landscaping and may include landscape structures such as pools, fences, pergolas and shelters. Refer Figure 3.5.5.
- All dwellings will be one storey, as defined in the Standard Instrument (LEP) Order 2006, to minimize visibility.



#### Hamlet 1 Elements

- 1 Bin Building

#### Surrounding Elements

- 2 Wallarah House
- 3 Middle Camp Beach
- 4 Village Park
- 5 Village of Catherine Hill Bay
- 6 Manager's Residence
- 7 Parking Area
- 8 Managed Bush Corridor
- 9 Coastal Walk

Figure 3.5.4. Hamlet 1 Plan and Surroundings.

- All buildings in the visual catchment of Catherine Hill Bay Village and Middle Camp Beach will be no more than 5 metres high unless it can be demonstrated that the visual impact of these buildings is acceptable. Refer Figure 3.5.10.
- Buildings in areas outside the visual catchments of Catherine Hill Bay village or Middle Camp Beach, may be up to 7.5 metres high. This will allow enhanced urban design outcomes in areas where the realisation of these outcomes does not compromise the effort to minimise visual impacts of the development elsewhere. Refer Figure 3.5.11.
- Areas where buildings are unlikely to be visible as the development proceeds will allow varying building heights, to a maximum of 7.5 metres subject to a clear demonstration of acceptable impacts. The Project Application, when lodged, will identify building envelopes in order to ensure that impacts are acceptable and minimised. Refer Figure 3.5.12.
- Areas of high visual sensitivity from the Catherine Hill Bay Village or Middle Camp Beach will be allowed only 40% of the site to be built on and will have 50% soft landscaping to ensure a low key impact on the existing village and headland. Areas outside the high sensitivity zone will not be subject to this rule to achieve a strong urban design outcome. Refer Figure 3.5.14.
- Major roads will be aligned perpendicular to the coast to allow views from roadways to the water.

#### **Massing Strategy**

- Frame the visual axis along the ridgeline to the water.
- Provide a variety of lots sizes and configurations to create village character and provide for a varied streetscape experience.
- Provide variety in roof and building massing within a consistent architectural vernacular.
- Break up large massing into smaller volumes.
- Address streets with residential entrances.

#### **Open Space and Landscaping**

- Provide a Coastal Reserve and public walkway from Middle Camp Beach to the Headland as a public amenity and landscape buffer to the hamlet.
- Provide public open space in the vicinity of the Bin building to form of a village 'heart' incorporating the Bin building terrace, café, and landscaping.
- Create a network of pathways through the Village to link with adjacent public open spaces and the headland.
- Where private open space is provided, allow visual connectivity with public rights of way.
- Provide landscaping using indigenous coastal species, to unify the development and screen the hamlet from visually sensitive locations.

#### **Village Centre Retail Space**

- Provide retail with a main street address and presence.
- There will be a maximum retail space of 750 m<sup>2</sup> in Hamlet 1.



Figure 3.5.5. Cliff Line Location



Figure 3.5.5a. Area where buildings will be single storey.



Figure 3.5.6. Area of Visual Sensitivity from Catherine Hill Bay Village.



Figure 3.5.7. Area of Visual Sensitivity from Middle Camp Beach.

NOTE: In order to ensure that there is a consistent relationship between the edge of the cliff and the walkway some minor deviation from this definition is used to the South of the Bin Building where the defined edge fluctuates dramatically. This deviation is an averaging approach so there is no net increase in developable area over the Panel definition and the intent of the Design Review Panel (protecting a broad corridor and a cliff stability zone) is respected and enhanced.

- |             |  |  |   |
|-------------|--|--|---|
| Cliff Line  | DOP Cliff Line (20.9% Slope)           | Area of Low Sensitivity                      | Precinct with Varying Building Heights of 5m and 7.5m           |
| 25m Setback | Visual Sensitivity Area from Village   | Precinct where Building Heights are 5m Max   | Areas where Lots will have Min 50% Landscape and 40% Site Cover |
| 40m Setback | Visual Sensitivity Area from the Beach | Precinct where Building Heights are 7.5m Max | Area where Buildings will be Single Storey                      |



Figure 3.5.8. Area of Low Visual Sensitivity from Catherine Hill Bay Village and Middle Camp Beach.

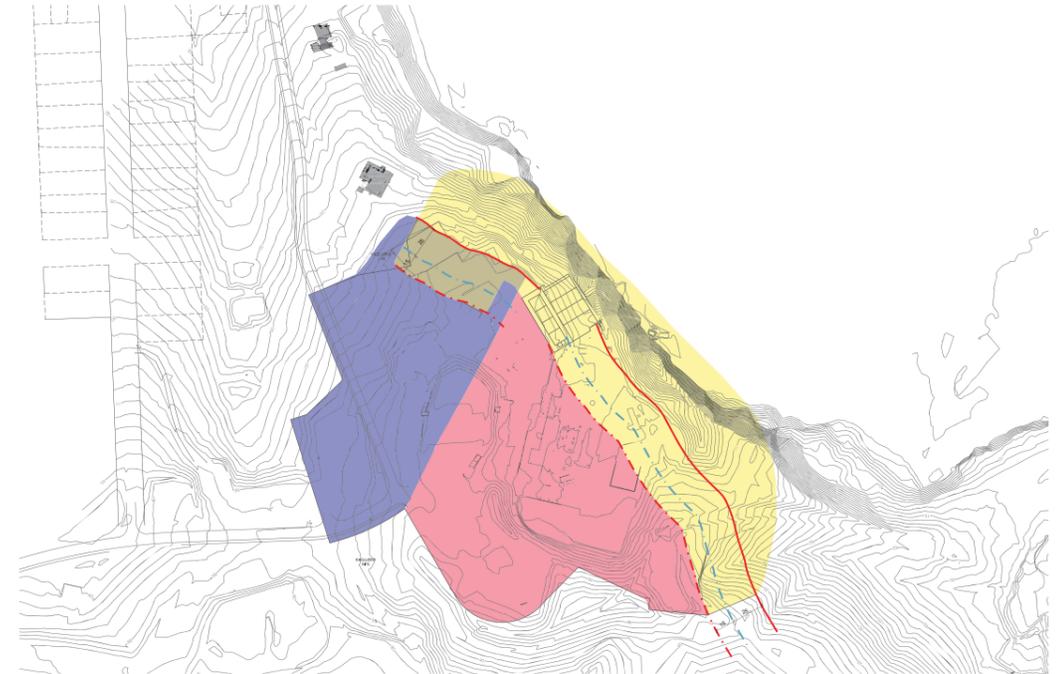


Figure 3.5.9. Hamlet 1 Visual Sensitivity.



Figure 3.5.10. Area where buildings will not be higher than 5m.



Figure 3.5.11. Area where buildings will not be Higher than 7.5m

- |             |  |  |   |
|-------------|--|--|---|
| Cliff Line  | Visual Sensitivity Area from Village   | Area of Low Sensitivity                      | Precinct with Varying Building Heights of 5m and 7.5m           |
| 25m Setback | Visual Sensitivity Area from the Beach | Precinct where Building Heights are 5m Max   | Areas where Lots will have Min 50% Landscape and 40% Site Cover |
| 40m Setback |  | Precinct where Building Heights are 7.5m Max | Area where Buildings will be Single Storey                      |



Figure 3.5.12. Area where building heights vary between 5 -7.5m - Subject to visual impacts.

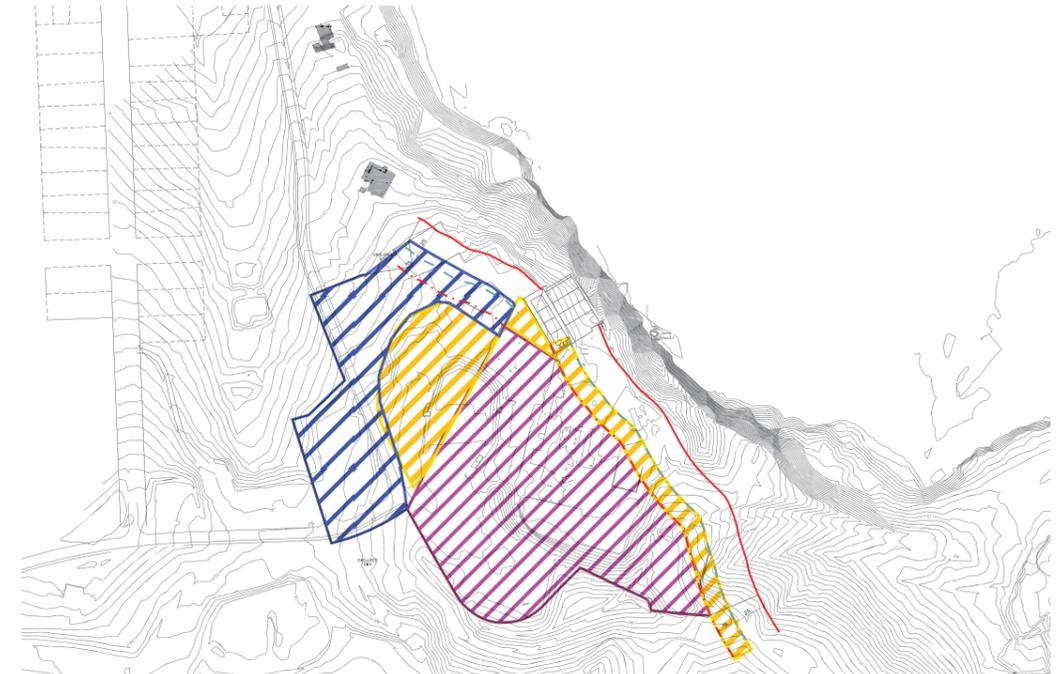


Figure 3.5.13. Hamlet 1 building heights.



Figure 3.5.14. Area where lots will have a minimum of 50% landscape and 40% site cover.

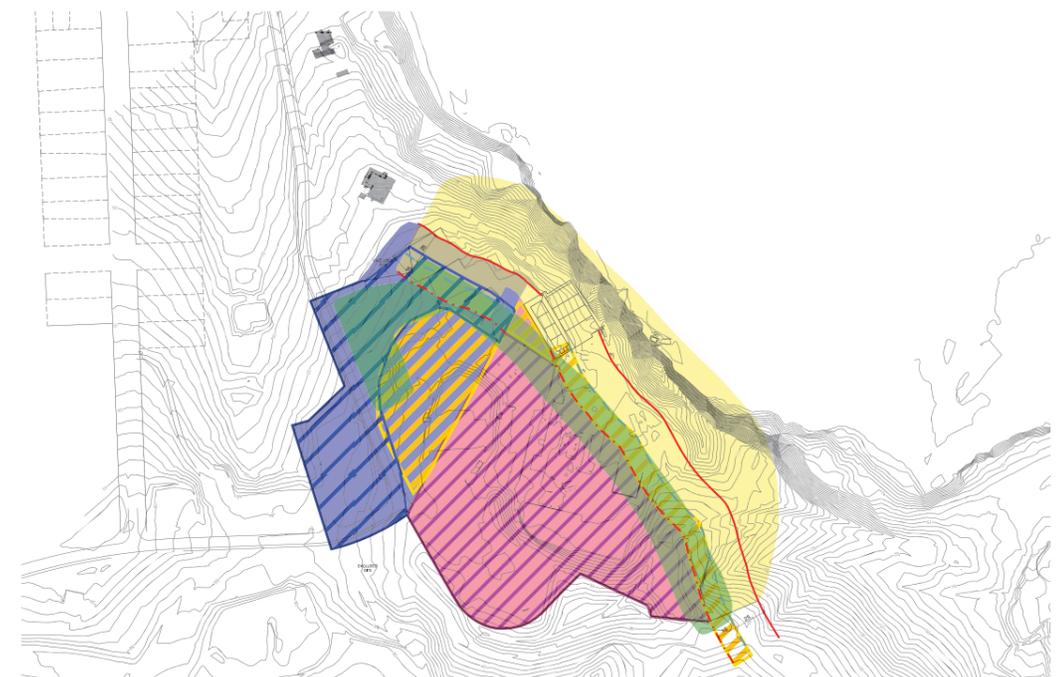


Figure 3.5.15. Hamlet 1 Principles.

- |   |  |  |   |
|---|--|--|---|
|  Cliff Line  |  Visual Sensitivity Area from Village   |  Area of Low Sensitivity                      |  Precinct with Varying Building Heights of 5m and 7.5m           |
|  25m Setback |  Visual Sensitivity Area from the Beach |  Precinct where Building Heights are 5m Max   |  Areas where Lots will have Min 50% Landscape and 40% Site Cover |
|  40m Setback |  |  Precinct where Building Heights are 7.5m Max |  Area where Buildings will be Single Storey                      |

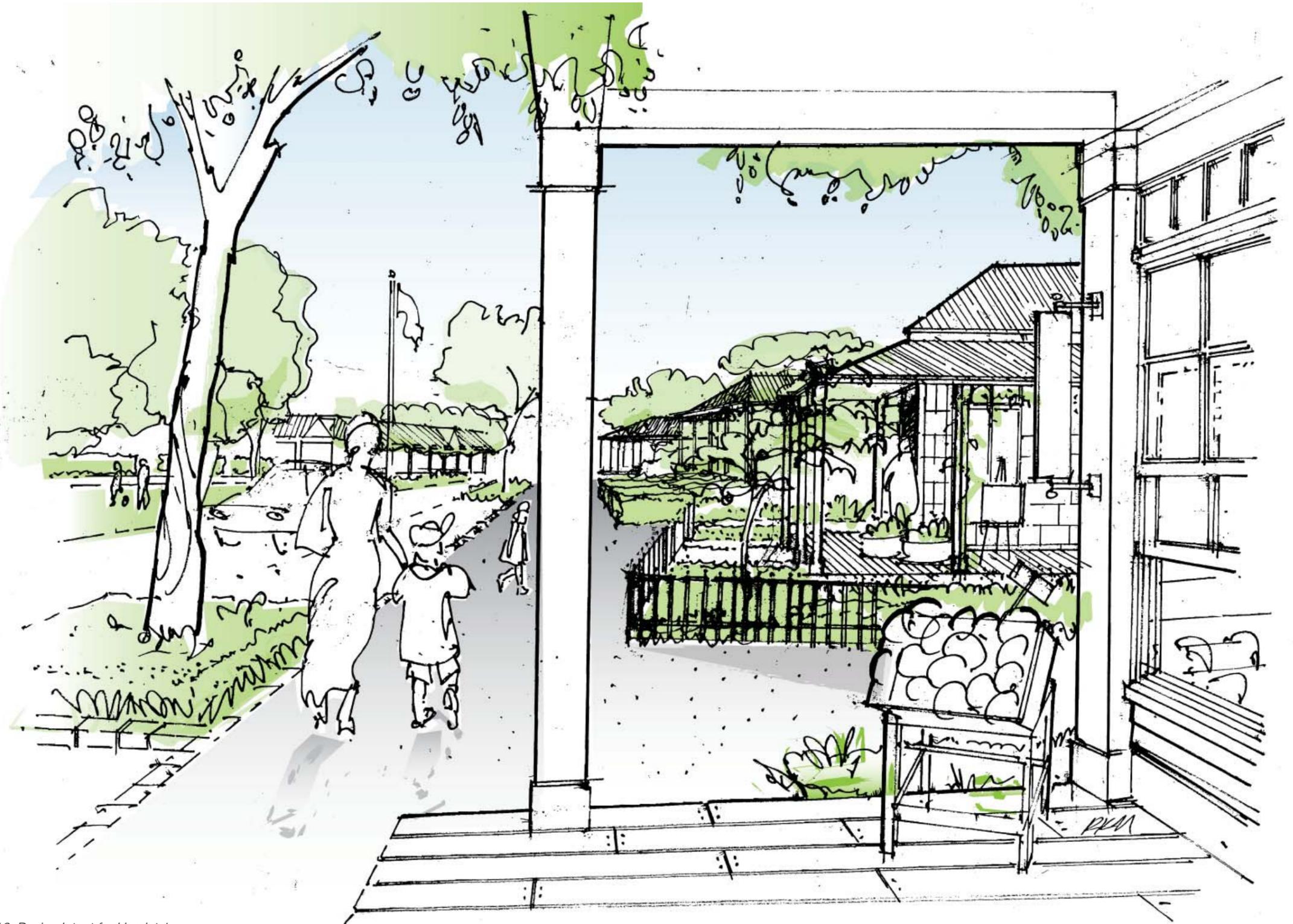


Figure 3.5.16. Design Intent for Hamlet 1.

### Hamlet 2

The Moonee Hamlets subdivision pattern is based on a concept of distinct hamlets set in a landscape setting. These residential hamlets will form individual communities set around a Village Green but will also provide full permeability to surrounding bushland and to the beach beyond. The hamlets vary in size and street pattern, but are based on a consistent structural framework. Each hamlet is organised around a Hamlet Common that provides a focus and point of identity for that hamlet. The hamlets are separated by a bush corridors that are contiguous with surrounding bushland and the bush buffer along Montefiore Parkway.

Hamlet 2 is the closest residential hamlet to the Village Centre Hamlet. It is entered from Montefiore Parkway along the Village Green. The local road through the community forms a spine off which the various car courts and pedestrian laneways provide access to individual dwellings.

The main route through the hamlet and the common slopes toward the south and allows for views out over the community toward the ocean. At the southern end of this common the local road turns West and links through the bush corridor to Hamlet 3. The linking roadway will cross over a drainage swale at the bush corridor forming a demarcation between hamlets.

Car courts and pedestrian lanes fan out from the local road in short lengths to the individual dwellings. The car courts will essentially be driveways to the dwellings and provide for visitor parking and residential parking. Garage driveways off this will provide for a carpark space on individual lots and garage access.

Pedestrian lanes provide access to the front of dwellings and define an informal neighbourhood gathering place where front porch life can take place. These spaces open out to the surrounding bush corridors and link to the larger bush track network. The pedestrian lanes vary in width reflecting the informal nature of the development. Along the northern edge of the hamlet a pedestrian lane provides access to the first row of dwellings and links the Village Green Hamlet 1.

The Village Green Precinct is adjacent to Hamlet 2 at Montefiore Parkway. It provides space for The Moonee Hamlets community facilities such as tennis courts, swimming pool and community centre.



Figure 3.5.17. Hamlet 2 Plan and Surroundings.



Figure 3.5.18. View along Entry Road to Hamlet 2.

### 3.6 Landscape and Open Space

#### 3.6.1 Landscape Vision

The landscape setting will be a major theme and focus of the development, reinforcing the project vision of a series of villages seamlessly nestled within a restored and enhanced coastal landscape.

The key landscape principles will include the following:

- retain and protect sites of significant vegetation where possible including the headland, pockets of remnant littoral forest and sheltered gully forest (identified as Area 2 and 3 in the Environmental Constraints Assessment Study by EcoBiological October 2006);
- restore the coastal vegetation ecology to integrate with the National Park backdrop;
- integrate new buildings with the restored contours and landscape;
- establish green links as open space buffers between villages and as habitat corridors;
- keep the principle ridgeline(s) green with no buildings;
- provide a variety of public open spaces that complement local passive recreation needs with the natural ecology, heritage values and coastal setting of the area;
- public open spaces to be predominantly landscaped with indigenous species; and
- introduce Water Sensitive Urban Design (WSUD) principles to manage and polish the runoff from the site.

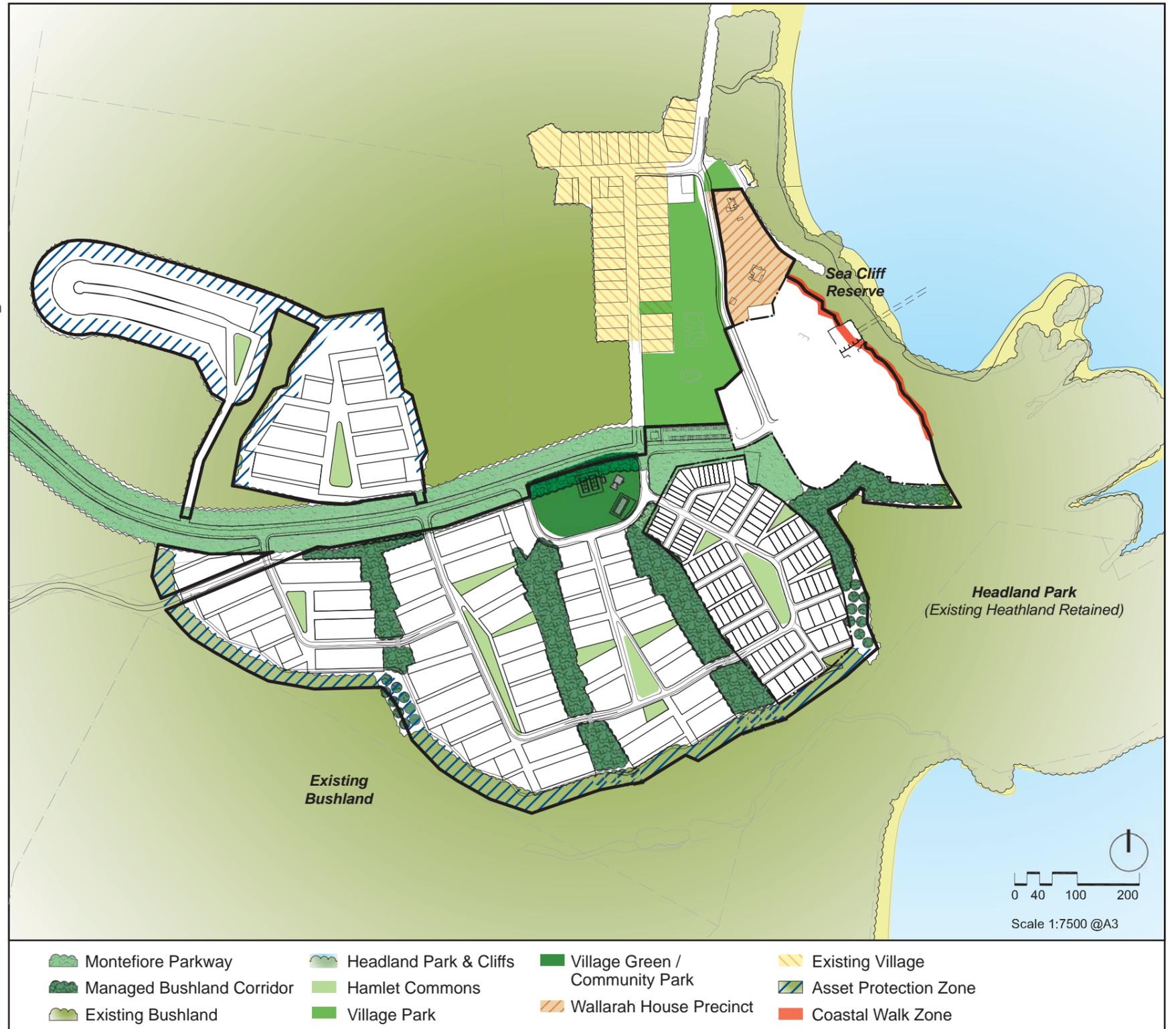


Figure 3.6.1. The Moonee Hamlets Landscape Structure Plan.

**Legend**

- |                           |                                |
|---------------------------|--------------------------------|
| 1 Bin Building            | 9 Headland Reserve             |
| 2 Hamlet Common           | 10 Montefiore Parkway          |
| 3 Village Park            | 11 Hale Street                 |
| 4 Coastal Walk            | 12 Clarke Street               |
| 5 Village Green           | 13 Middle Camp Beach           |
| 6 Managed Bush Corridors  | 14 Moonee Beach                |
| 7 Asset Protection Zone   | 15 Perimeter Road with Parking |
| 8 Wallarah House Precinct |                                |



Figure 3.6.2. The Moonee Hamlets Landscape Master Plan.

**3.6.2 Major Public Landscape Precincts**  
**Sea Cliff Reserve and Coastal Walk**

The existing coastal vegetation will be stabilised and integrated with an informal Park and Coastal Walk extending from Catherine Hill Bay to Moonee Beach. The Walk will integrate with existing tracks on the headland.

**Headland Reserve**

The headland together with the coastal heath vegetation will be conserved, enhanced and managed as public open space with walking trails.

**Village Park**

The land between the existing Catherine Hill Bay Village and the Wallarah House Precinct will be upgraded to a Village Park. The existing public open space at Catherine Hill Village will be enhanced as a public park with riparian planting, pathways, seats and interpretive playground.

**Montefiore Parkway**

Montefiore Parkway will be landscaped and enhanced with indigenous native trees to create a parkway along its entire length. A minimum 15 metre wide landscaped zone on each side of the street will provide a visual buffer to Catherine Hill Bay Village and maintain a green ridgeline.



Figure 3.6.3. Coastal Walk.



Figure 3.6.4. Headland Reserve.



Figure 3.6.5. Village Park.



Figure 3.6.6. Village Green.

**The Village Green**

A Village Green will be provided as a primary community gathering place for passive and active recreation. This open space situated along the ridge at Montefiore Parkway will provide facilities such as community rooms, change rooms, children’s playground, swimming pool, tennis courts and an informal field.

**Managed Bush Corridors (Green Links)**

Managed ‘Bush Corridors’ of between 30 to 50 metre wide will act as landscaped buffers between the hamlets. These corridors will lead from the ridge at Montefiore Parkway to Moonee Beach and allow for pedestrian and cycle trails and an uninterrupted access way for residents and the public to reach the beach. Exercise locations and trail distance markers are to be provided in selected locations. The ‘green links’ also function as passive open space, habitat corridors and zones for water polishing ponds.

**Hamlet Commons**

A neighbourhood park will be provided within 400 metres (or 5 minute walk) of all dwelling lots. Their primary objective is to provide passive public open space for all ages and for neighbourhood residents to interact. Planted with predominantly native trees, these will take the form of the Hamlet Commons located as a focal point of identity for each hamlet. Each neighbourhood park will include footpaths, shade, informal play structures and seating.



Figure 3.6.7. Managed Bush Corridors.

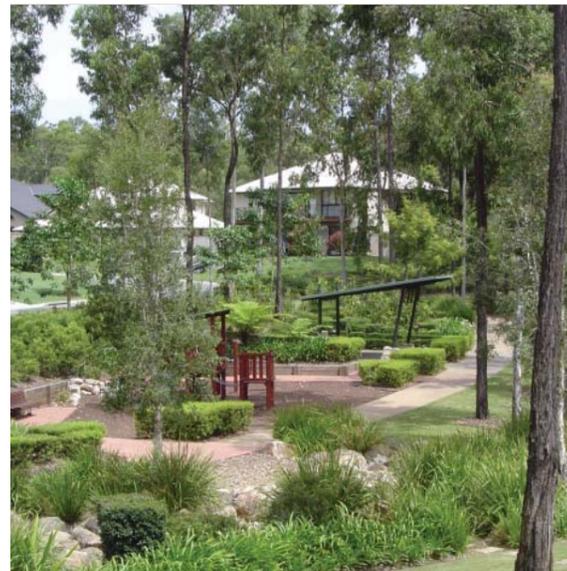


Figure 3.6.8. Hamlet Commons.



Figure 3.6.9. Bin Terrace.

### 3.6.3 Private Open Space

All residential lots will be landscaped with a range of indigenous and exotic coastal species. In order to maintain a predominantly landscaped visual character of each hamlet. Typical landscape plans are provided in the Project Application plans.

### 3.6.4 Wallarah Gardens and Grounds Precinct

A sympathetic coastal landscape setting will complement Wallarah House, incorporating a series of garden precincts, lawns, fencing, planted hedges and augmenting the existing stands of Norfolk Island Pines.

### 3.6.5 Planting Principles

The key landscape principle is the revegetation of the disturbed site to create a visual structure dominated by landscape. In addition the planting design will:

- encourage a sense of place
- frame or screen views
- create scale
- define edges
- define road speed zones
- encourage wildlife habitat areas

The planting palette is based on endemic species and cultural plantings typical of coastal villages in the region. Tree planting within the neighbourhoods will include the following character precincts:

#### i) Montefiore Parkway

Montefiore Parkway: Species representative of Narrabeen Wallarah Sheltered Grassy Forest community including *Angphora costata* (Smooth Bark Apple), *Eucalyptus piperita* (Sydney Peppermint), *Eucalyptus haemastoma* (Scribbly Gum), *Eucalyptus capitellata* (Brown Stringybark), *Eucalyptus acmenoides* (White Mahogany), *Corymbia gummifera* (Red Bloodwood), *Allocasurina littoralis* (Black She Oak), *Glochidion ferdinand* (Cheese Tree).

#### iii) Residential Street Planting

Informally planted copses of indigenous street trees including *Angphora costata* (Smooth bark Apple), *Eucalyptus piperita* (Sydney peppermint), *Eucalyptus haemastoma* (Scribbly gum), *Eucalyptus capitellata* (Brown Stringybark).

#### iv) Major Parks/Village Green

Varieties of indigenous trees such as Tuckeroo and Banksias highlighted with occasional signature plantings of *Araucaria heterophylla* where appropriate.

#### v) Hamlet Commons

Groupings of indigenous trees and shrubs such as *Eucalyptus haemastoma* (Scribbly gum), *Glochidion ferdinandi* (Cheese Tree), *Angphora costata* (Smooth Bark Apple) *Leptospermum laevigatum* (Coastal Tea Tree) *Banksia* varieties.

#### vi) Bush Corridors

These will be planted with indigenous trees and shrubs to match the range of vegetation assemblages found on the adjacent contour, ranging from Narrabeen Wallarah Sheltered Forest varieties on the ridge top to Coastal Headland Complex and Coastal Sand Wallum Heath Scrub on the lower slopes adjacent to Moonee Beach.

#### vii) Swale Landscapes

Stormwater swales planted with turf and macrophytes will be located within the road verge to perform storm water uptake and nutrient removal.

#### viii) Residential Landscapes

Native and exotic, salt tolerant species, such as *Albizia*, *Lassandra* and Frangipani will provide variety and colour within the private rear residential gardens and courtyards. Only non invasive species will be planted.

### 3.6.6 Open Spaces and Landscape Management Plan

A management plan will be prepared to address the ongoing management of the ecological, environmental and maintenance aspects relating to the public open space and Asset Protection Zones.

**Public  
Open Space**



**Private  
Open Space**



Figure 3.6.10. The Moonee Hamlets Planting Palette.



Figure 3.6.11. Proposed Intersection of Flowers Drive and Hale Street.

The Moonee Hamlets - Indicative Road Sections

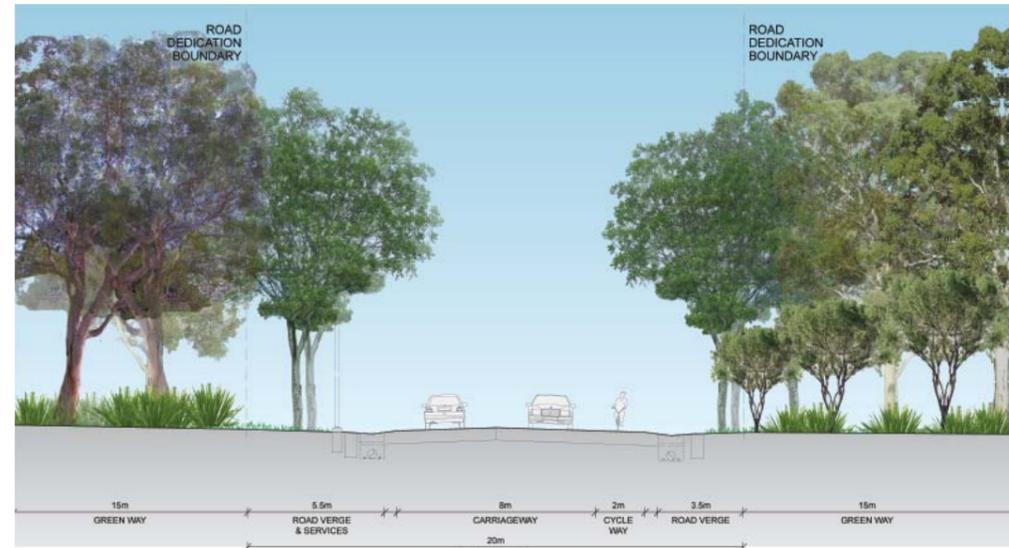


Figure 3.6.12. Section A-A through Montefiore Parkway.

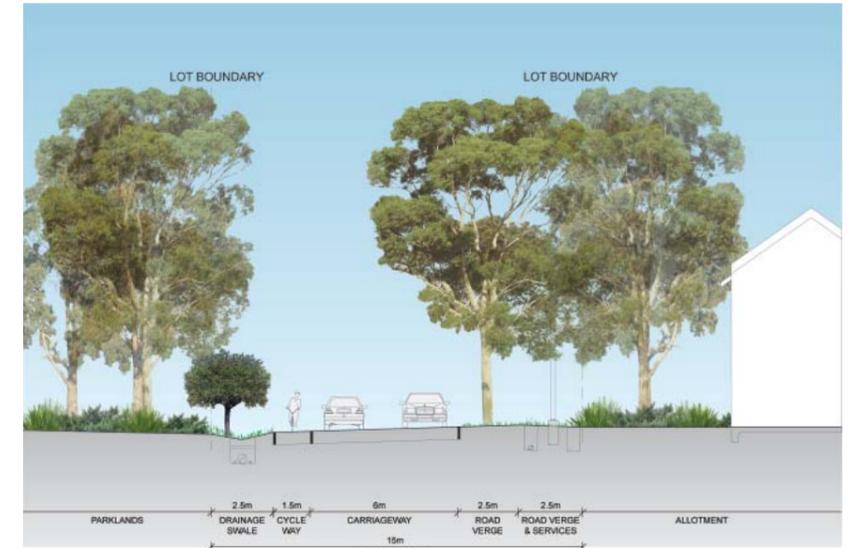
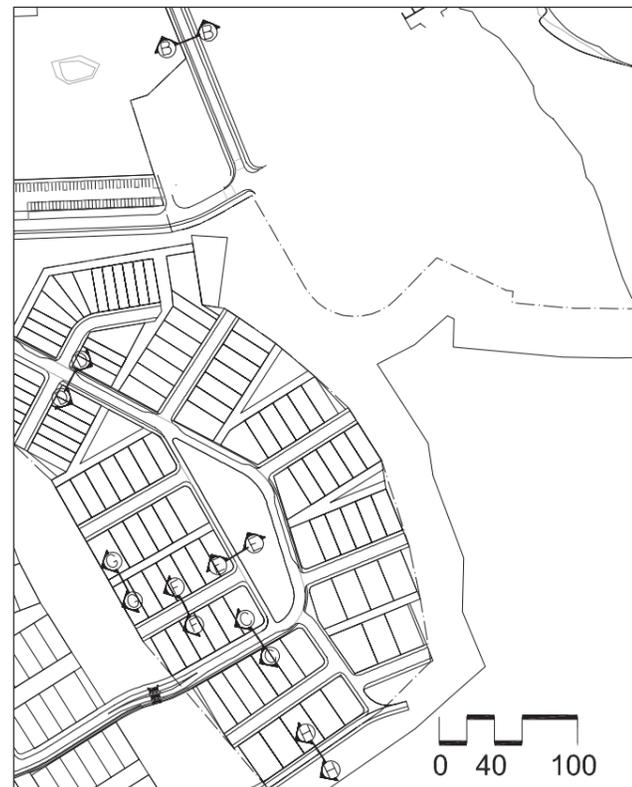


Figure 3.6.13. Section B-B through Hale Street with Cycleway.



Key Plan

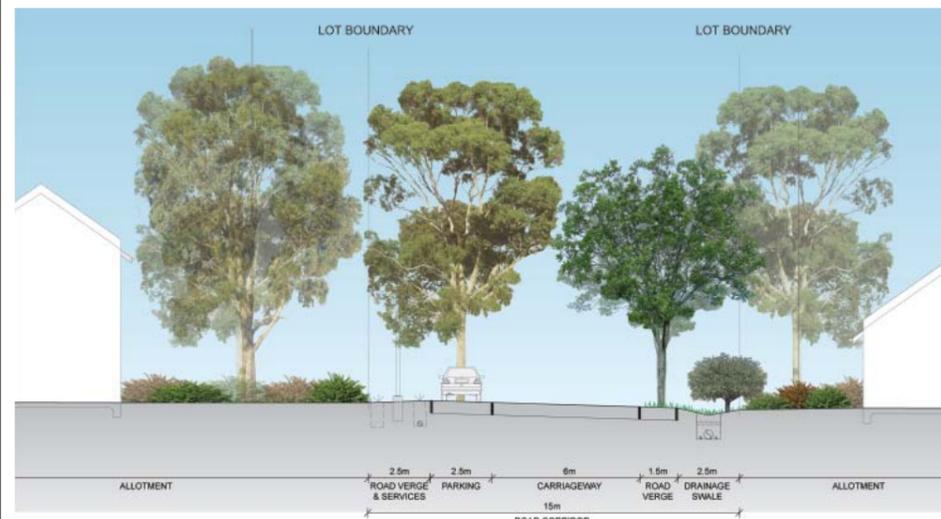


Figure 3.6.14. Section C-C through 15 metre Wide Local Road - With Parking.

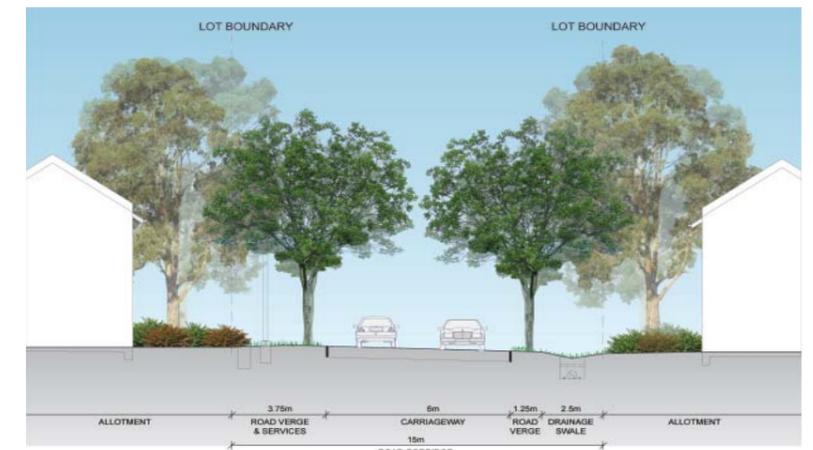


Figure 3.6.15. Section D-D through 15 metre Wide Local Road - No Parking.

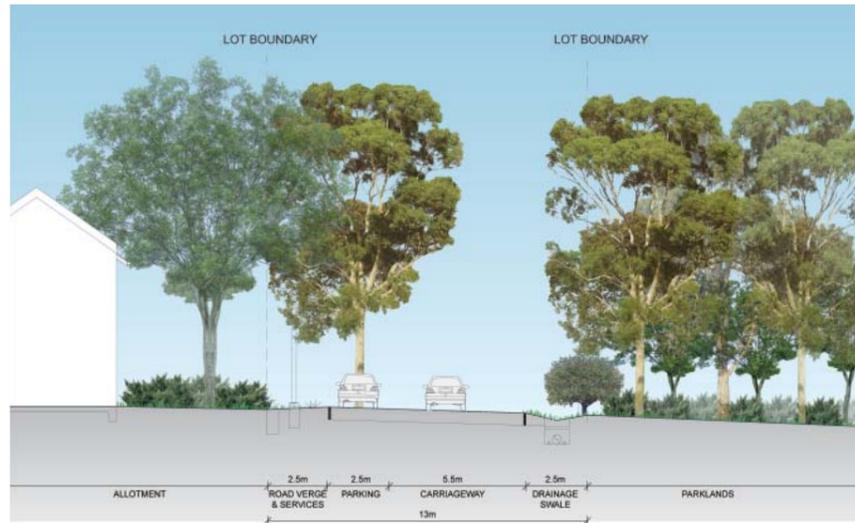


Figure 3.6.16 Section E-E through One Way Local Road.

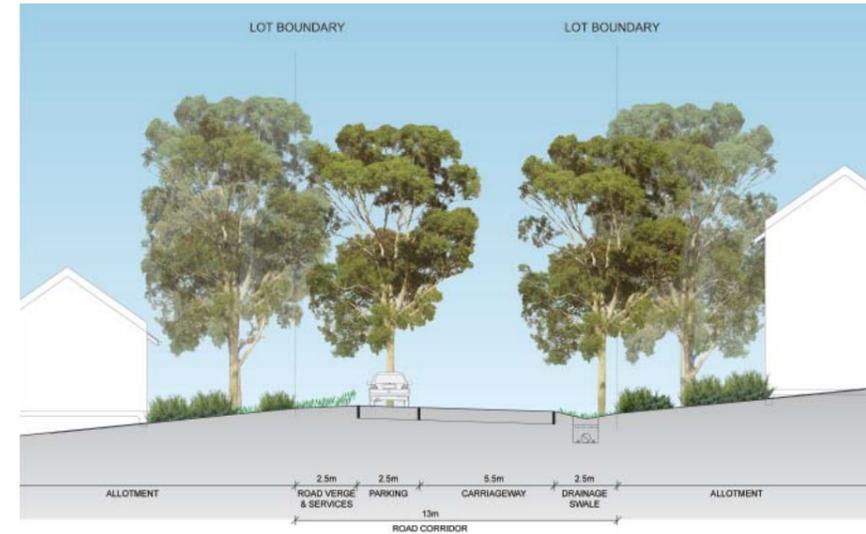


Figure 3.6.17. Section F-F through Car Court.

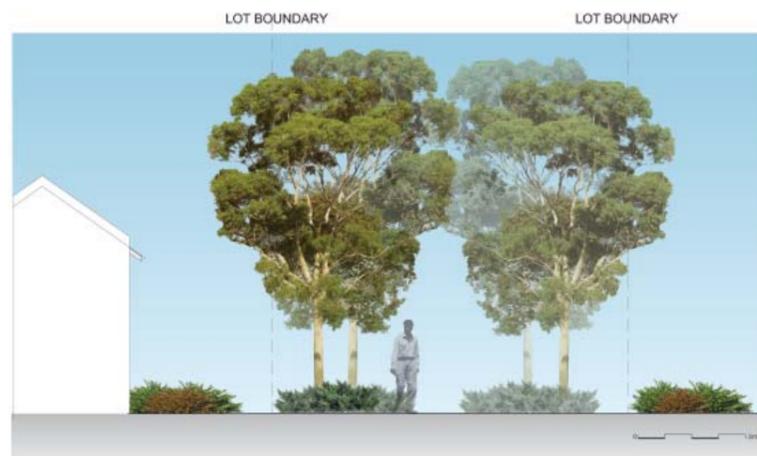
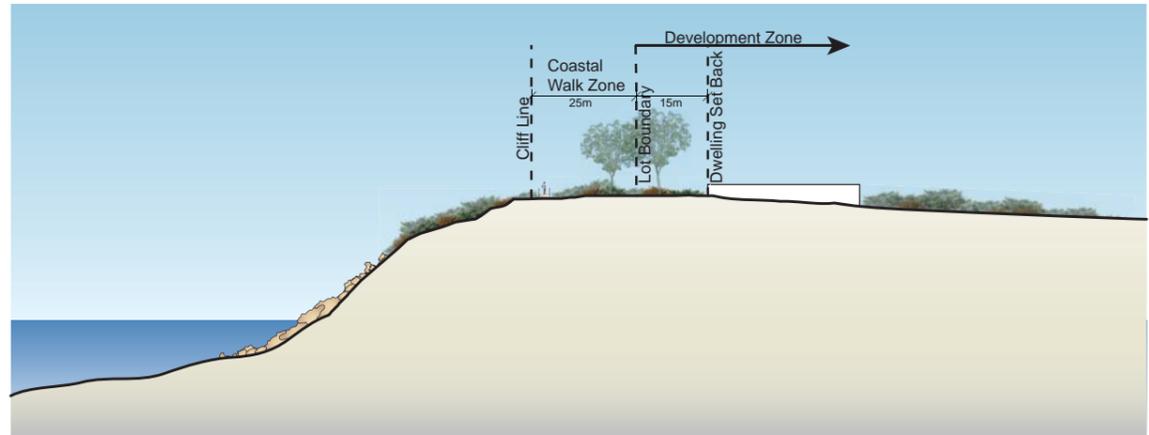


Figure 3.6.18. Section G-G through Pedestrian Walkway.

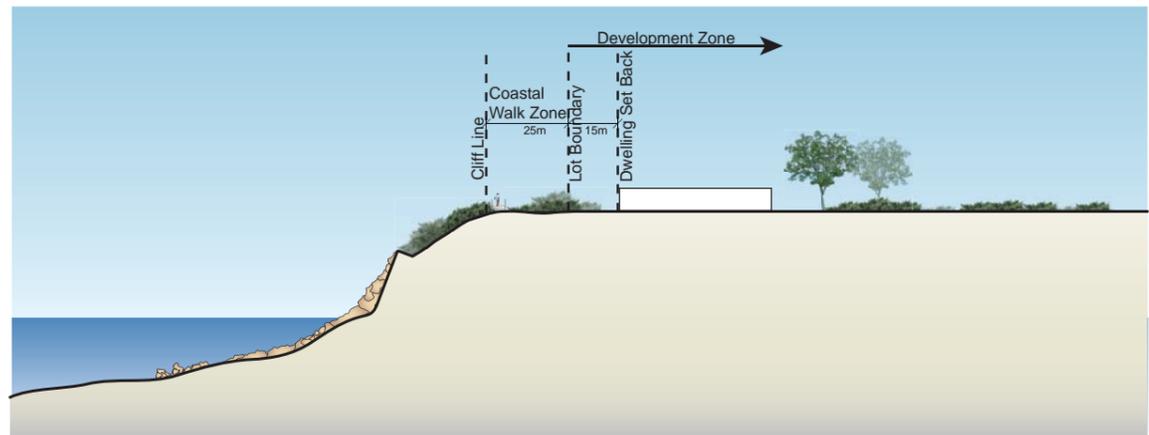


Figure 3.6.19. Section H-H through Perimeter Road.



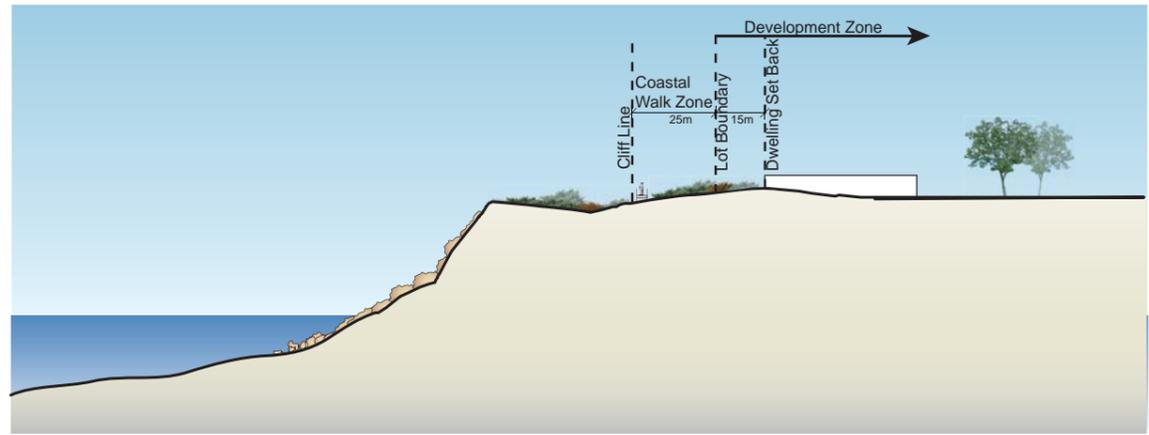
SECTION A

1:1000



SECTION B

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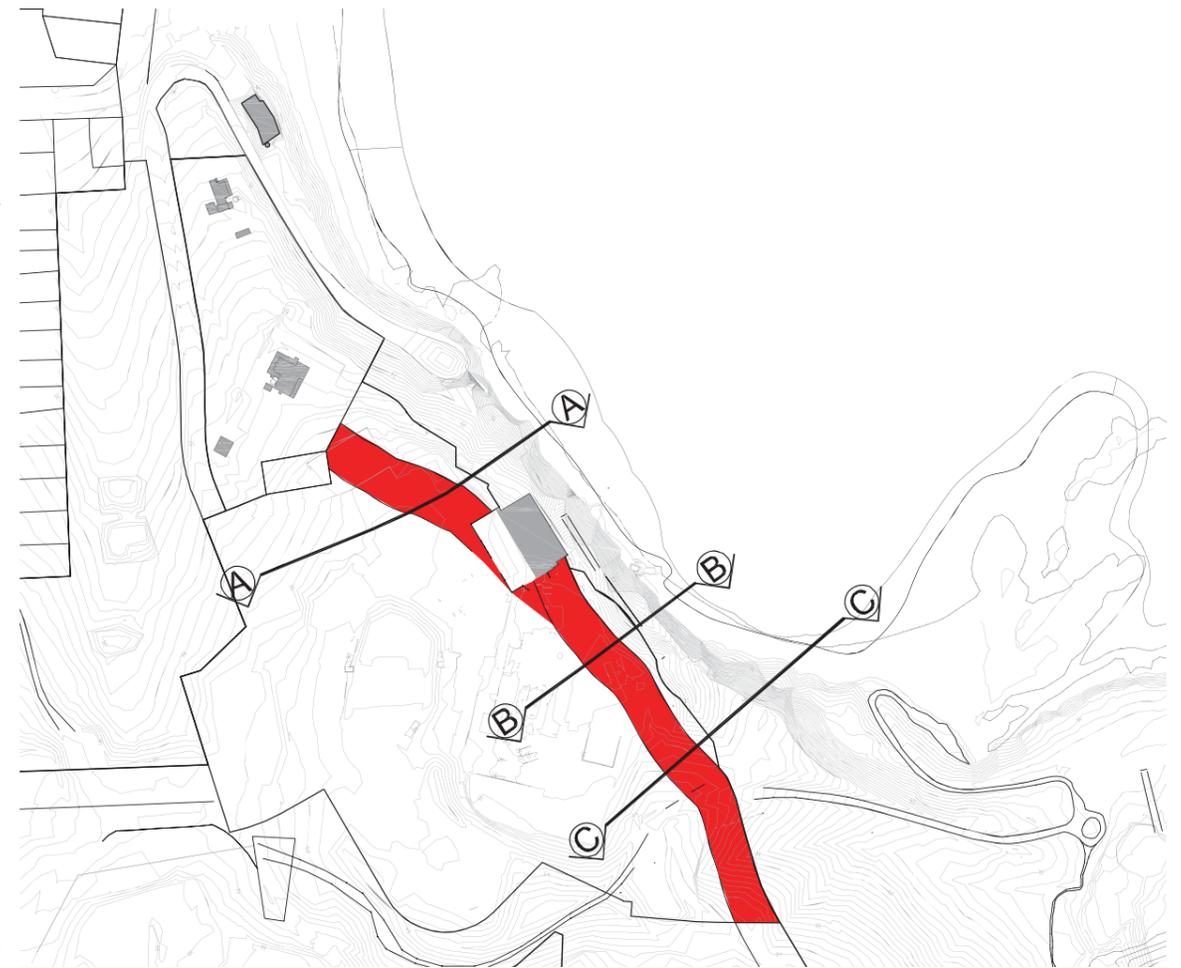
SECTION C

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Figure 3.6.20. Sections through Coastal Walk.



Figure 3.6.21. Proposed Coastal Walk.



Key Plan

 COASTAL WALK ZONE

1:1000@A1



Figure 3.6.22. View of Open Space in Courtyard House Beach Precinct.

### 3.7 Access, Parking and Circulation

The objectives of The Moonee Hamlets related to access, parking and circulation are:

- Provide a coordinated access and circulation network designed to conveniently and safely serve the Village community in terms of:
  - Pedestrian movement;
  - Private motor vehicles;
  - Bicycles;
  - Public transport;
  - Service and emergency vehicles; and
  - Car parking to Australian Standards.
- Provide a level of public access and permeability comparable to that existing in the adjacent residential neighbourhood.
- Provide any necessary external traffic and circulation improvement works arising from the development in a coordinated and timely fashion.
- Minimise hardstand area and potential surface run-off and maximise potential stormwater absorption and area available for soft landscape treatment.

Location	No. Public Parking Spaces
Hamlet 1	To be determined.
Hamlet 2	68
General	60

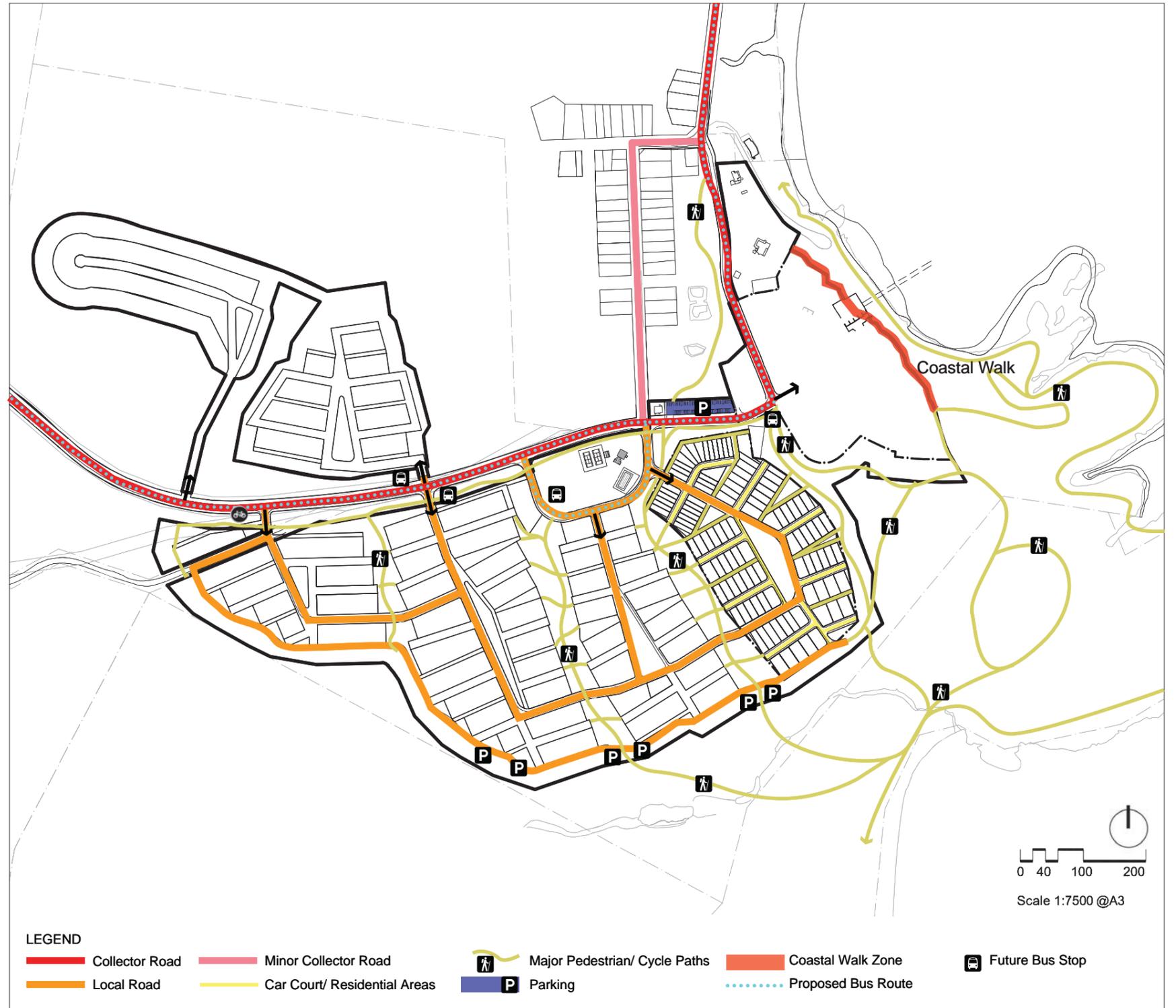


Figure 3.7.1. The Moonee Hamlets Access, Parking and Circulation Plan.

### Streets

The Moonee Hamlets road system will have a main collector road, local roads, car courts and pedestrian and cycle paths and routes. Each hamlet will be focused around an open space.

### Access Road

The Moonee Hamlets is connected to the Pacific Highway via two access roads from the:

- North, via Flowers Drive via Hale Street and Clarke Street; and
- South West, via Montefiore Parkway.

Access from Montefiore Parkway will be the primary access to the hamlets, with access on this route providing direct access to the main street and residential streets.

### Local Roads

Local roads that will provide residential access are to utilise, wherever practicable, continuous loop roads. Cul-de-sacs are to be limited to areas where loop roads are impractical or, terminate at a destination such as a lookout or starting point for active recreation such as bush-walking.

### Perimeter Road

A sealed perimeter road extending from Montefiore Street to Hamlet 2 will be established at the southern edge of the Moonee Hamlets.

The road will be 6 metres wide and will also serve as the fire trail for emergency purposes.

The road will have an informal, coastal character without kerbs and gutters.

Up to 30 informal parking spaces will be provided along the roadway, grouped in landscaped embayments.

### Car Courts

Most dwellings will be accessed through pedestrian laneways in front and Car Courts in the rear of lots. Car Courts are effectively driveways from the street to the dwellings. These areas will be visually delineated from the road network and will serve a dwelling access function only.

### External Traffic Improvements

The necessary external works required will be determined with RTA and local authorities based on consultant studies. Anticipated improvements include the:

- existing intersection of Montefiore Street and the Pacific Highway; and
- Hale Street and Flowers Drive Intersection.

### Internal Road Hierarchy

The road hierarchy is planned around hamlets described by a network of 'open access way' roads connecting to the external public road system. Ownership of the roads will be a mix of Council and community title. Each hamlet is arranged along a central spine road that encompasses a 'hamlet common'. From this central spine a series of short car courts and pedestrian spines provide access to dwellings. The hamlets are interconnected by linking the spine roads across the hamlets and by the continuity of pedestrian ways through to neighbouring hamlets.

### Public Access

'Open access ways' are defined in the Community and Land Management Act, which adopts the definition of 'public place' in the Local Government Act 1993. Open access ways can be considered also 'public roads' with the exception that the Community Association, not the Council, is responsible for maintenance. Private Access Ways will be provided where the function is for purely resident or service access to a distinct development or building. Private access roads will have restricted public access.

A major section of Montefiore Street is on private land. Those private sections of the road are proposed to be dedicated.

### Road Standards

AMCORD, Australian Standards and Council requirements are the guiding principles in the detailed design of roads. The achievement of urban design objectives, on-street parking, heritage preservation, stormwater management and other considerations may determine alternate design guidelines.

### Traffic Calming

Contained carriageway widths, surfaces, street geometry and landscaping are to be the primary traffic calming devices in the design of access streets. Speed humps, chicanes and similar devices are not to be used. Roundabouts, where required, are to be designed to accommodate buses and large rigid trucks and will incorporate landscape beautification. Where possible traffic calming should be implemented to draw attention to key destinations and vistas through the site.

### Public Transport

Public bus is the only mode of public transport that currently services the greater Catherine Hill Bay area. A northbound service connects to Charlestown and a South bound service to Wyong. The proposed collector road will provide for a slightly modified bus route to pass within 400 metres (approximately 5 minutes walk) of most dwelling lots, should the existing bus route alter to include The Moonee Hamlets. No formal agreements have been reached with the existing providers.

### Traffic Generation

A traffic report by Masson Wilson Twiney is included in the Environmental Assessment for the development of the Concept Plan site.

### Visitor Parking

Residential visitor parking is to be provided on-street to AS 2890. It is to be integrated into the fabric of the village in car courts and also provided in a public carpark located on Montefiore Parkway. Retail/Commercial parking is to be provided in the Village Centre at the front and rear of premises.

### Access for People with Disabilities

Provision for access for people with disabilities will be incorporated in accordance with AS 1482.1 as applicable.

### Access to Moonee Beach

Access to Moonee Beach is proposed to be provided via the perimeter road

### Pedestrian and Bicycle Movement

In order to maintain a predominantly landscaped visual character to the village there will not be large expanses of formal footpaths. As an alternative pedestrian and bicycle movement through the village will be facilitated by an interconnected network of informal tracks and residential streets which will be cycle shared ways. Informal paths will be designed to connect community focal points such as the Village Centre, Village Green and neighbourhood parks. On the perimeter of the settlement, informal tracks will connect with trails into the surrounding bushland.

### Bicycle Parking

Parking racks or bollards will be provided in appropriate places around the hamlets.

### Emergency and Service Vehicle Access

The road network is to be designed to facilitate emergency and service vehicle access. Roads and turning areas are to be designed to discourage reversing movements. Wherever possible loop access roads are to be used.

### Sustainable Development

All roads, pedestrian and cycle routes are to be designed to minimise hardstand area and surface run-off and to maximise the area available for soft landscape treatment and its potential stormwater absorption. A network of mounds and swales will be utilised to distribute water runoff from hardstand areas with the objective to manage stormwater within the settlement footprint.

### 3.8 Ownership

Land ownership categories for The Moonee Hamlets are as follows:

#### Dedicated Lands

Land to be dedicated to the public includes the foreshore land, cliff top reserve, headland reserve, Village Park and the majority of Montefiore Street. No foreshore land will remain in private ownership.

#### Hamlets 1 to 5

All lots within these Hamlets will be subdivided into Torrens Title lots and Community Title lots within a larger Precinct Subdivision. The Precincts will be grouped into a Master Community Subdivision arrangement. The Village Green and part of Montefiore and Hale Street will be Master Community Property. Strata titling and neighbourhood schemes are also envisaged within Hamlet 1 for the Commercial/Retail area and Courtyard Houses.

#### Hamlets 6 and 7

All lots within these Hamlets will be subdivided into Torrens Title lots and possibly part of a Community Subdivision arrangement separate to the Moonee Community.

Wallarah House Precinct will remain as a single lot and will not form part of the Moonee Community.

#### Public Access rights and Permeability

All roads within Community/Precinct property will be 'open access ways'. Easements for public access may also be used if required.

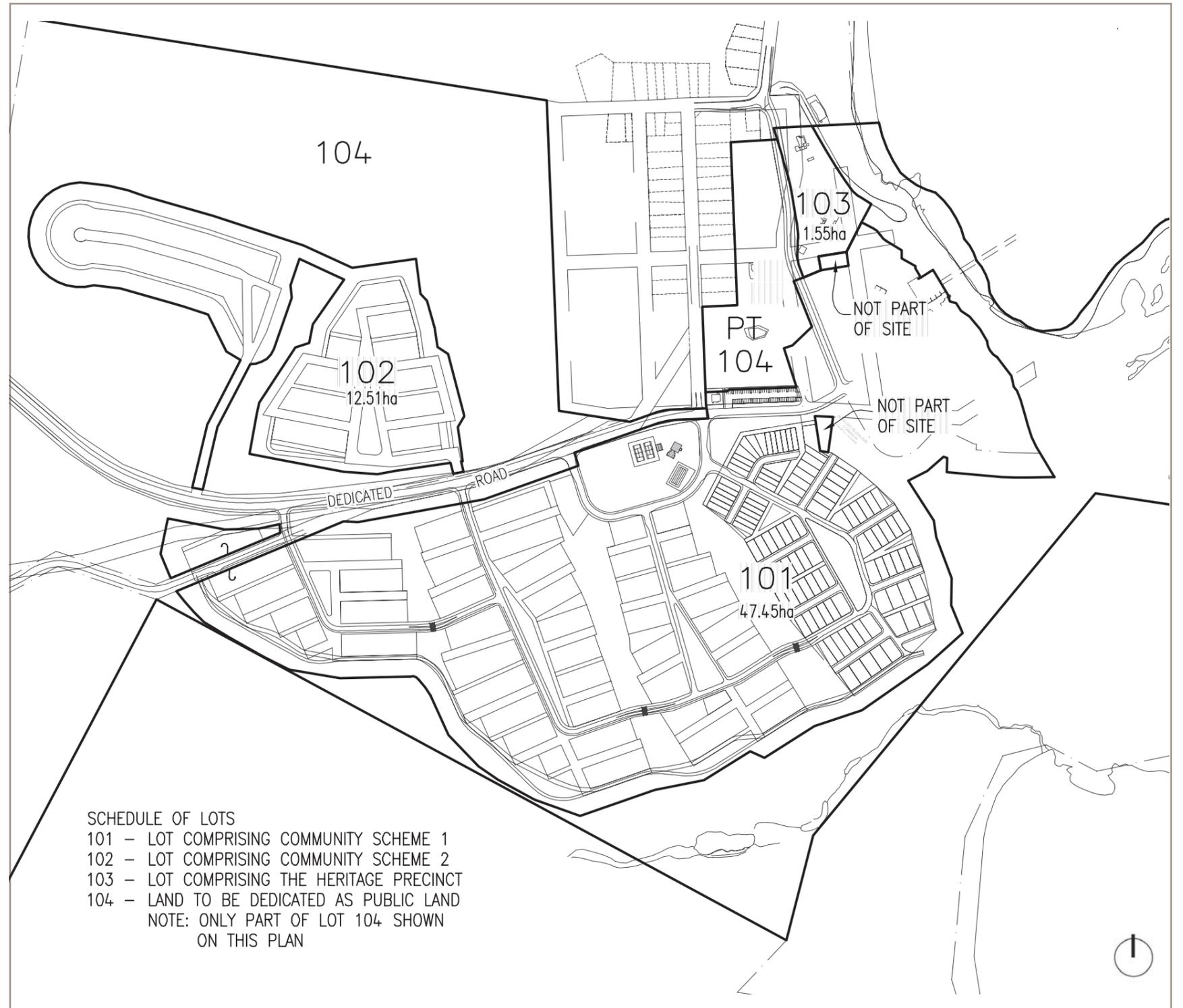


Figure 3.8.1. The Moonee Hamlets Ownership Plan.

### 3.9 Service Infrastructure

#### Water Supply

While the site lies across the boundary of the Hunter Water Corporation and the Gosford/Wyong Water authority, an agreement has been cemented that will see the Hunter Water Corporation responsible for all water supply approvals.

Potable water is to be brought to the site from the North (Swansea) via a system of mains and reservoirs sufficient to supply the existing villages as well as the proposed development. The application of a stormwater recycling system (refer to Chapter 3.13 Environmental Sustainability) will reduce potable water demand. Design of the trunk water supply system is currently being undertaken in consultation with the Hunter Water Corporation, who is supportive of the proposal.

A water reticulation system, including supply for fire fighting purposes will be designed and installed on the site in accordance with the Schematic Utilities Services Plan.

#### Stormwater

The site is adjacent to a SEPP 14 Wetland, located to the South. Careful attention has been paid to ensure that no additional or untreated water discharges to the wetland. This is achieved by applying Water Sensitive Urban Design (WSUD) to the proposed hard stand areas of the site, reducing the runoff profile to natural conditions in terms of both quality and quantity. Any stormwater in excess of the capacity of the WSUD controls will be directed along the southern boundary of the site, so as not to enter the SEPP 14 wetland. Any additional stormwater attenuation that is required would be provided so as not to impact on the SEPP 14 Wetland.

WSUD In summary means:

- each road or car court will drain to a vegetated swale, which performs both stormwater attenuation and quality control functions, as well as providing the main drainage conduit from top to bottom of the site; and
- all roof water will be collected and recycled, so as to curb any increase in the annual volumetric discharge from the site. (Refer to Chapter 3.13 Environmental Sustainability).

Roof stormwater lines are shown on the Schematic Utilities Services Plan (Figure 3.9.1.)



Figure 3.9.1. The Moonee Hamlets Utilities Services Concept Plan.

### Stormwater Recycling

In addition, potable water demand is to be reduced by the recycling of stormwater in accordance with the principals of WSUD. A dedicated roof water drainage system will be installed to convey rainwater from dwellings on a hamlet by hamlet basis. Each of the hamlets will then have an in ground reservoir comprising an excavated void, which will be lined and backfilled with sand to support a revegetated surface. The sand will also give a high efficacy in treating the collected water to an appropriate standard for garden watering, toilet flushing and clothes washing. Each reservoir will have a pressure actuated pump system to return the water on demand to a reticulation system servicing the dwellings from where the water is sourced. The stormwater recycling system will contribute to each dwelling's compliance with the BASIX requirements for water efficiency. Maintenance of the roof drainage pipes, the pumps and the return reticulation will be the responsibility of each of the hamlet precinct associations.

Hamlet 1 is subject to further study.

### Sewer

The site will be serviced by a combination of gravity mains, pump stations and rising mains to deliver sewage to the northernmost tip of the development (WWPS B) on Figure 3.9.1. A pump station will be installed at this point to transfer waste water to another pump station at Middle Camp and then into the existing network at Wallarah. Trunk sewer services will have sufficient capacity, to accommodate connection of the existing Catherine Hill Bay Village, as well as other future proposed development within the region.

Preliminary analysis shows that the entire site can be drained by gravity to the proposed sewer system, however detailed design may require the installation of a common effluent pumping system for the cliff top lots at the eastern side of the site.

Design for the trunk sewer system is currently being undertaken in consultation with the Hunter Water Corporation, who is supportive of the proposal.

### Electricity

Electricity is to be supplied to the site from a new Zone Substation, to be designed and installed by Energy Australia in accordance with capacity identified in the Lower Hunter Regional Plan. Energy Australia is currently planning to accommodate the new zone substation in their forward network planning and is supportive of the proposal.

Up to five local kiosk substations would be required on the site to break supply down from 11KV to 415V three phase (240V single phase). These have been tentatively located adjacent to Montefiore Parkway, to permit access for maintenance and installation vehicles. Indicative locations of the kiosk substations are shown on Figure 3.9.1.

Street lighting will be provided in accordance with Australian Standard 1158 and could be provided by a range of mains supplied, solar powered or combination fittings. Where possible, solar power will be used to improve the efficiency of street lighting in accordance with the principles of ecologically sustainable development (ESD). Lighting to pedestrian pathways will be provided by a series of low level bollards, utilising the most efficient light sources reasonably available at the time, ie Light Emitting Diodes (LEDs).

Electricity supply will be reticulated throughout the proposed development in Common Services Trenches, as identified on Figure 3.9.1. Common Service Trenches will also carry telecommunications cabling as well as electrical services.

### 3.10 Built Form - Hamlets 2 - 7

#### Objectives

The building envelope and built form objectives are to provide reference points for the relevant Consent Authorities' merit-based assessment of Development Applications at The Moonee Hamlets.

They are to:

- ensure that all hamlets share an architectural language to provide a consistent image throughout the development and enable visual cohesion to The Moonee Hamlets as a whole;
- recognise that the built form take its cues from the existing village;
- acknowledge and enhance the prominent visual relationship of the site to the coast and its environs;
- provide a vision for the future built character of the The Moonee Hamlets;
- establish principles of building arrangements and envelopes and their relationships to site features, adjacent development and the public domain;
- acknowledge and enhance the existing structure of Catherine Hill Bay Village and its relationship with the coast and surrounding bushland; and
- ensure the scale of the future built character is generally consistent with that of the existing village.

#### Streetscape and Public Domain Character

The vision for The Moonee Hamlets is a:

- cohesive small scale building context in a natural setting visually dominated by the landscape;
- streetscape of one and, two storey structures that generally address the public way with verandahs and low height street front elements;
- public domain formed by rectilinear built forms with simple geometric roofs and linear ridgelines; and
- series of streets and public open spaces defined by buildings and landscape, framing the ocean and bushland in the background.

#### Crime Prevention Through Environmental Design

The development has been designed with regard to the principles of crime prevention through environmental design (CPTED). These are principles of design adopted by police forces around the world to encourage crime minimization through design. The development will make a positive contribution to security in the commercial precinct increasing levels of passive surveillance. There are four key action areas in CPTED:

- **Surveillance**  
The proposed development maintains strong visual surveillance on public areas. The Village Green, Hamlet Commons and pocket parks are open on all sides and surrounded by roads or other public ways allowing for open sightlines and good surveillance by passers-by. Bush corridors contain a network of through paths that link seamlessly to the car court and pedestrian lane network. Public areas are also overlooked by the dwellings. This will ensure that there is always strong surveillance of public areas. Car courts and pedestrian lanes are, for the most part, straight and are fully visible from the spine road of the hamlet. Individual dwellings and shops will have articulated living edges in the form of bay windows, porches, and decks that allow for activities and surveillance of public ways.
- **Access Control**  
Dwellings will have their own locks and security facilities. Dwellings will be located in clusters along car courts which will provide a sense of community 'ownership' and surveillance of these access points.

#### Territorial Reinforcement

There is clear delineation between private and public domains. Each lot will be clearly defined by planting and/or low height fencing in contrast to the openness of the common areas. A clear sense of identity is provided by the hamlet layout principle whereby all dwellings in a hamlet are accessed from a main spine road which encircles the Hamlet Common. Individual dwellings and shops will have articulated living edges in the form of bay windows, porches, and decks that allow for activities and provide a sense of 'evident ownership' of private areas.

#### Space Management and Maintenance

As the area is managed under community title the area will be kept in good repair with graffiti removed, lighting maintained and facilities cleaned on a regular basis. This, along with strong surveillance will ensure that the area remains secure.



Figure 3.10.1. View of the existing village from Flowers Drive.



Figure 3.10.2. Existing view looking South along Clarke Street.



Figure 3.10.3. Recently altered and extended Catherine Hill Bay residence.

### Building Types

The following residential building types will be built in The Moonee Hamlets responding to different locations, market sectors and lifestyles.

#### Single Houses

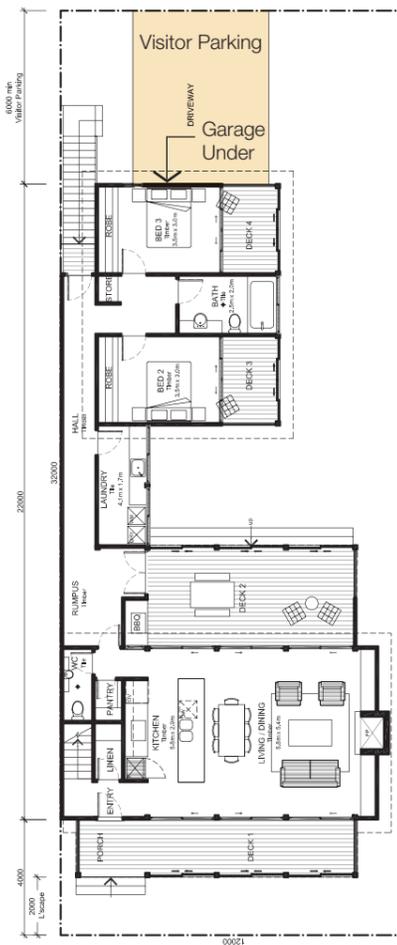
Single dwellings, with gardens in a visual setting dominated by landscape. The scale of the existing coastal cottages has been referenced in the scale of the proposed houses, by breaking down the building into several pavilions. The character of the existing village houses has also been reflected in the new houses by using materials and building elements such as the covered verandah and the pitched roofs. The pavilion elements will serve to define exterior rooms for family living and, where site slopes permit, will step up or down the slopes further defining a smaller scaled massing.

#### Courtyard Houses

Small scale single storey attached residential dwellings with courtyard gardens. These dwellings, located in the Village Centre, are built around landscaped walled courts allowing for a true indoor/outdoor living experience.

Courtyard houses feature large sliding glass walls that allow the main living spaces to flow out into the courtyard.

A large sliding gate in the courtyard wall provides access to the community green space and allows the private courtyards to be opened up to the outside on occasion.



Hamlets House



Courtyard House

Figure 3.10.4. Indicative House Plans.

### Building Height

The predominant condition in Catherine Hill Bay, particularly established development along Clarke Street is single storey to the street and some with two storeys behind. Consistent with existing development, new built form will consist of both one and two storey structures.

### Building Heights in Hamlets 2 through 7

Building heights in Hamlet 2 through 7 are to be designed to minimise the impact of new development on adjoining areas and to ensure that buildings are appropriately scaled in relation to streets and open spaces. Buildings are to be a maximum of two storeys. Loft spaces will not be included as a storey where they do not significantly alter the roof design or building bulk.

Architectural features such as lanterns, cupolas and balconies may project above this height where they do not form more than 25% of a buildings profile measured in the horizontal direction on the longest side.

### Solar Access, Light and Privacy

The location, planning and orientation of buildings and open space is to maximise opportunities for solar access, natural light and privacy to dwellings and assist with the achievement of BASIX requirements.

### Mass and Proportion

Objectives:

- To ensure the scale of new development is compatible with existing village structures.
- To provide for a viable pedestrian streetscape framing, view corridors and allowing breezes through.
- To maintain a residential scale that allows the natural environment to visually dominate.

### Roof Form

Objectives:

- To enable the natural environment to visually dominate The Moonee Hamlets.
- To minimise the visual prominence of roofs being overlooked by residents at higher elevations.
- To provide an articulated skyline to the village from distant viewpoints.
- To provide visual relief to the streetscape.
- To provide articulated roof profiles against the sky. Hipped and gable type roofs, with wide eaves are to be the predominant roof form.
- To integrate all roof top services, vents and lights into the roof design.

### Façade Treatment

Objectives:

- To enrich the streetscape in detail.
- To break down the scale of facades, particularly those defining streets, by modulation of light and shade through articulated secondary architectural detail, contrasting with heavier wall and roof elements.
- To include elements such as eaves, sun control, hoods, louvres, shutters, pergolas, verandahs, balconies, balustrades, porticos, loggias, dormers, roof lanterns and ventilators as part of the scaling devices so that the façade is seen as a total design.

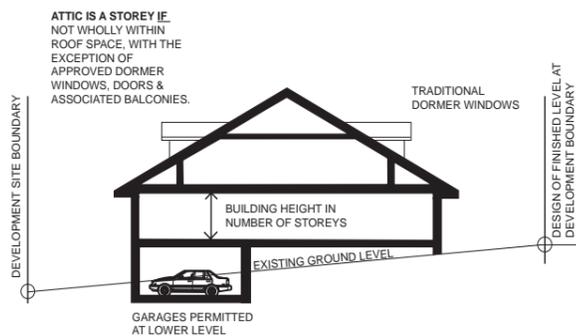


Figure 3.10.5. Building height diagram.



Figure 3.10.6. Proposed character of Village Centre.



Figure 3.10.7. Buildings are composed of smaller volumes.

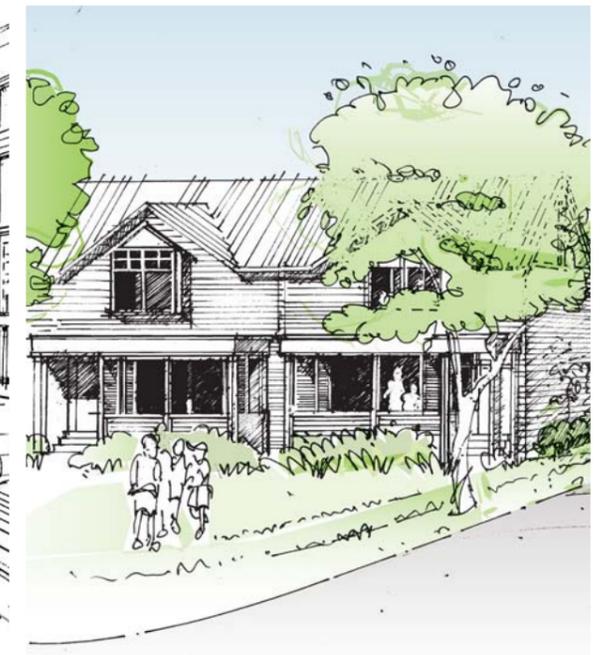


Figure 3.10.8. Future character of The Moonee Hamlets.

### Address The Public Way

Objectives:

- To provide active frontages for public ways which reinforce security and sense of community.
- To define public ways so that dwellings have their primary access and address from public laneways or streets.

### Setbacks

Objectives:

- To provide amenity while allowing for interaction. Setbacks for streets will be determined by amenity and landscape performance requirements. Setbacks on pedestrian lanes shall be smaller than those on car courts to foster neighbourhood interaction.
- Generally setbacks at car courts shall be deep enough to allow a visitor car to park in the dwelling driveway.
- Generally setbacks on the pedestrian lanes or front of houses shall allow for a minimum of 2m of landscaping in front of any portion of the structure.

### Colour and Light

Objectives:

- To enhance the amount of light and reflected light available to public and private domains in a comparatively dense built environment.
- The predominant wall colours are to complement the surrounding environment.
- The predominant colour for secondary architectural detail is to be white.

### Ancillary Built Elements

All built elements (fences, garden and retaining walls etc) not part of a building are to be designed to blend into the landscape or be sympathetic with the main building to minimise their visual intrusiveness.



Figure 3.10.9. Address the public way.



Figure 3.10.10.



Figure 3.10.11. Consistent light coloured detailing.



Figure 3.10.12. Deep eaves provide shade.

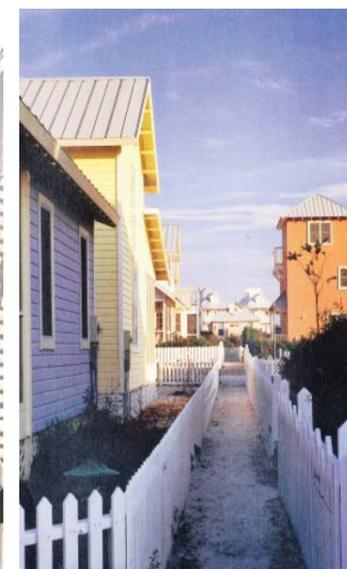


Figure 3.10.13. Pedestrian lanes provide human scale access.

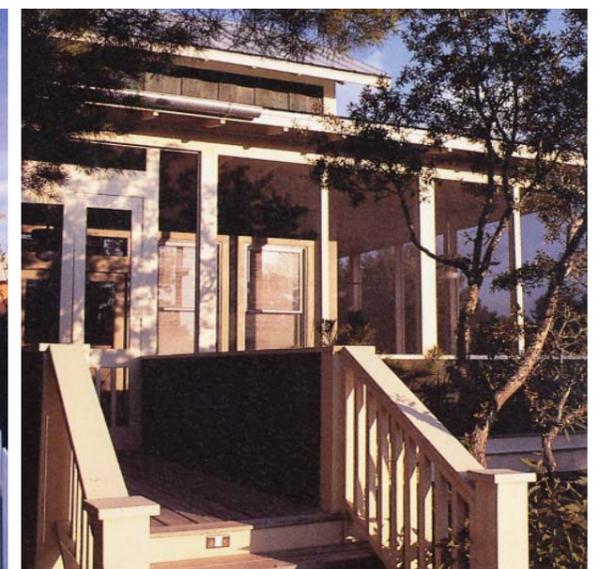


Figure 3.10.14. Front porches and verandahs provide places for neighbourhood interaction.

The Moonee Hamlets - Indicative Materials Selection

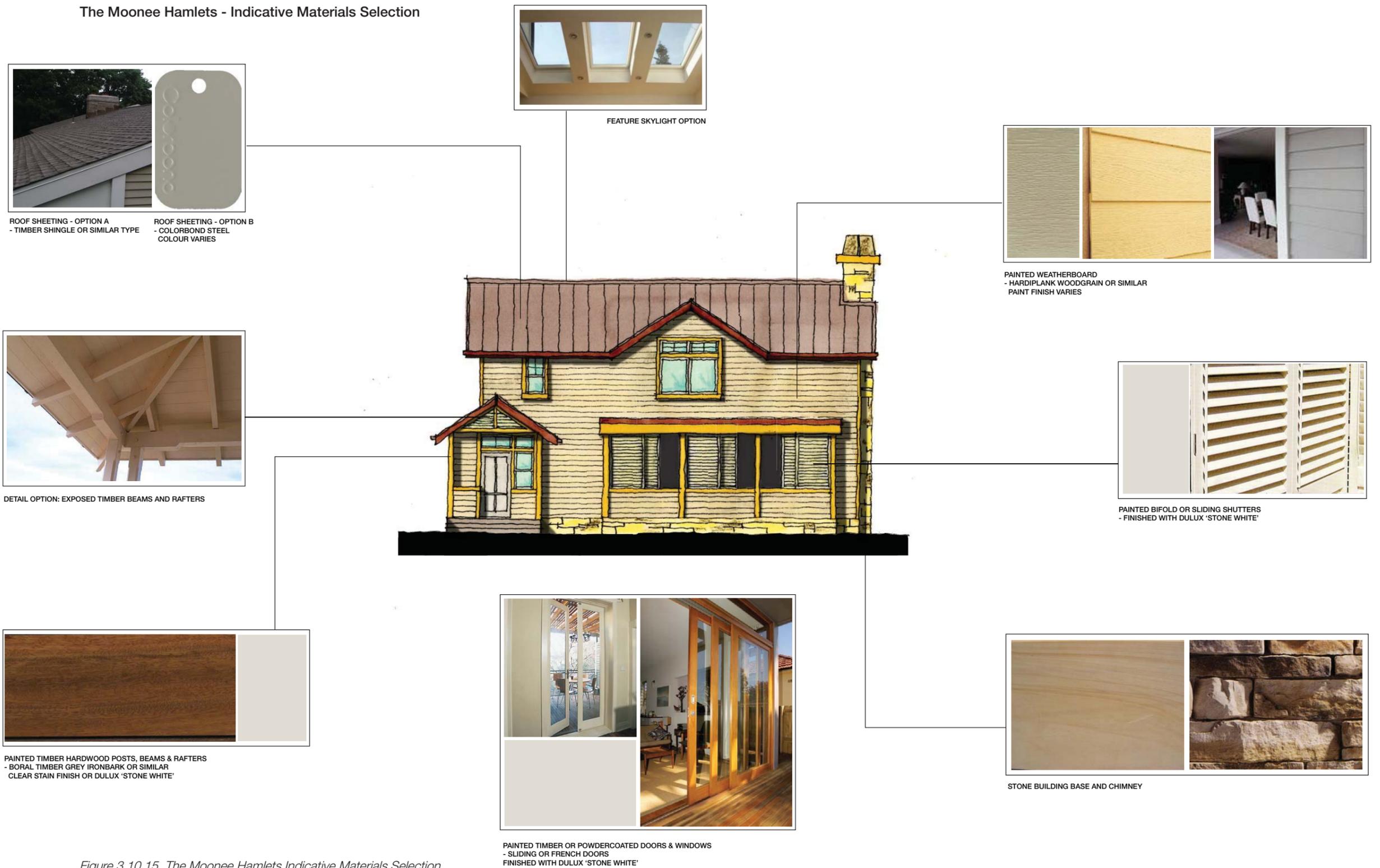


Figure 3.10.15. The Moonee Hamlets Indicative Materials Selection

**The Moonee Hamlets - Ancillary Elements**

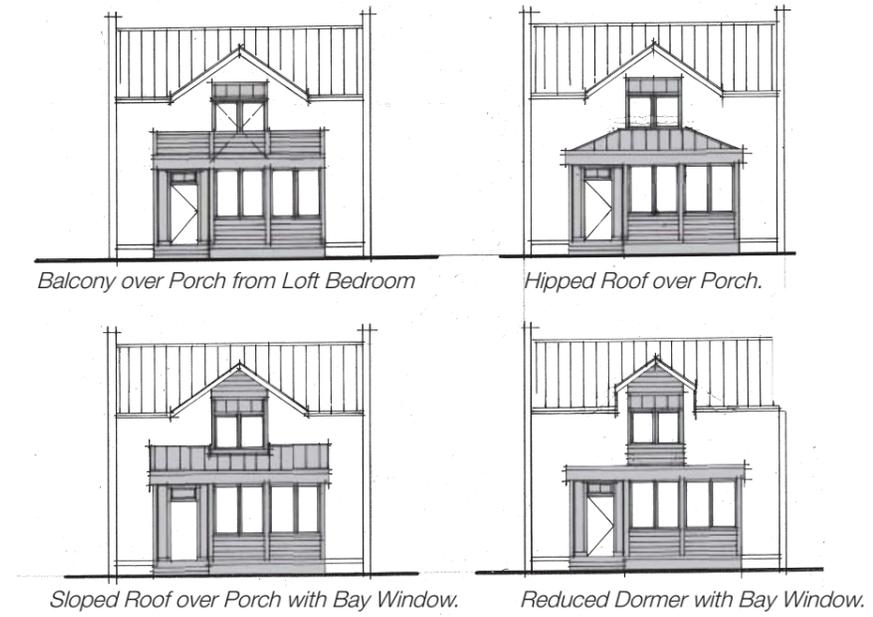


Figure 3.10.16. Alternative Front Porch Details.

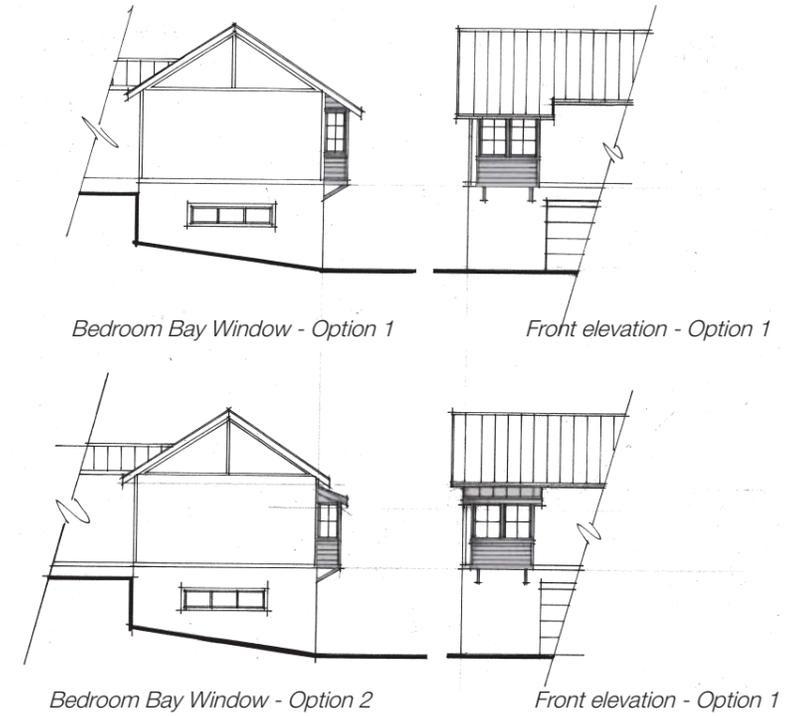


Figure 3.10.17. Alternative Bay Window Details.

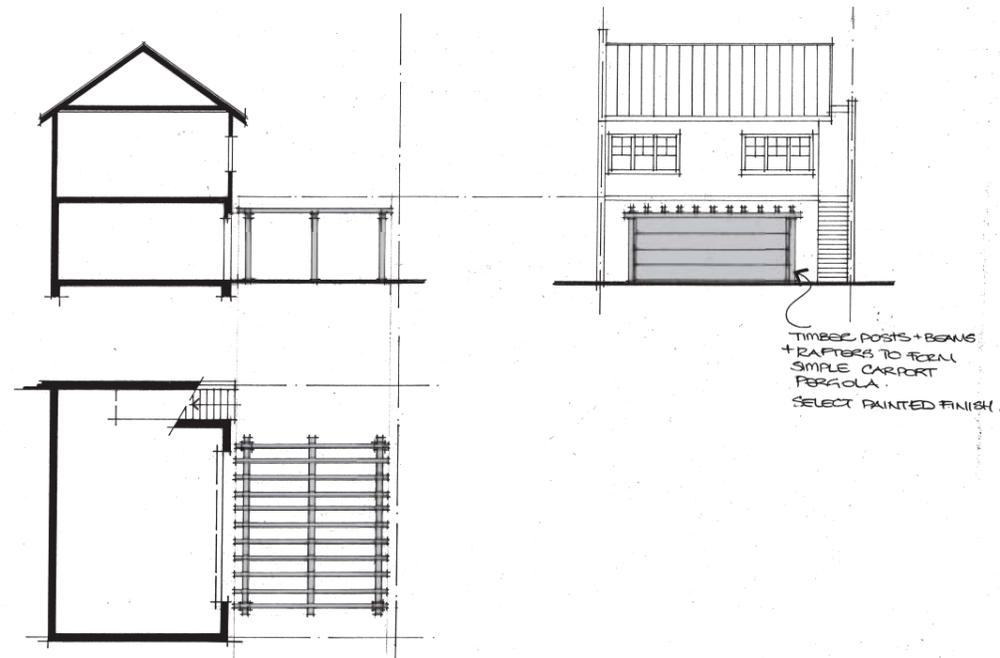


Figure 3.10.18. Optional Carport Pergola - Painted Timber.

### 3.11 Heritage Conservation

The primary objective of heritage conservation will be to recognise and reinforce the existing historic landscape setting of the village and its relationship to surrounding natural landscape features.

The buildings and structures contained within The Moonee Hamlets that are scheduled as heritage items in the LMCC LEP 2004 are limited to:

- 'Wallahah House' (The Mine Manager's Residence, 1a Keene Street, Lot 2031, DP 841175); and
- The Catherine Hill Bay Colliery Railway (Mine Camp to the coal loader jetty).

The site North of Montefiore Street is located within the Catherine Hill Bay Heritage Conservation Area. The subject site is also adjacent to the heritage listed 'Coal Loader Jetty' and a number of listed houses along Clarke and Lindsley Streets.

It is the intention of the Concept Plan to restore and adaptively reuse Wallarah House as a residential dwelling. This may include additional separate buildings to the South of Wallarah House not within the sensitive view curtilage. The Concept Plan has defined a precinct around Wallarah House, extending to include the Jetty Master's Cottage, to be reserved for future development consideration of a limited nature.

The Colliery Railway line corridor and any remains are to be conserved and will be interpreted as an extension of the Coal Loader Jetty.

Although not heritage listed, the potential exists to adaptively reuse other items of historical interest such as the Jetty Master's Cottage and the Bin Building. The top of the Bin Building is proposed to be a 'viewing' platform, below which will be residential or mixed use spaces accommodated in the stepped structure of the building.

Careful consideration of views and vistas, their retention and enhancement, is a significant requirement of conservation planning. No new buildings will be located between Wallarah House and the Jetty Master's Cottage, resulting in the retention of the visual and landscape setting of Catherine Hill Bay historic village, noted as an aim of the LMCC Heritage Guidelines. The Concept Plan does not compromise distant views from the significant vantage points:

- South along Flowers Drive; and
- North and South from the intersection of Montefiore and Clarke Streets.

The Concept Plan expands the view curtilage of Wallarah House, taking in the Jetty Master's Cottage and extending to the historic village with planned landscaping. The proposal is for the Colliery Railway line to be contained within a corridor curtilage in combination with a pedestrian walk along the cliff top. The curtilage of Catherine Hill Bay village is not affected by the proposal as new development is located on the other side of the southern ridge, or screened by substantial landscaping to the South East.

Proposed architectural design will be contemporary and not attempt to imitate existing structures.

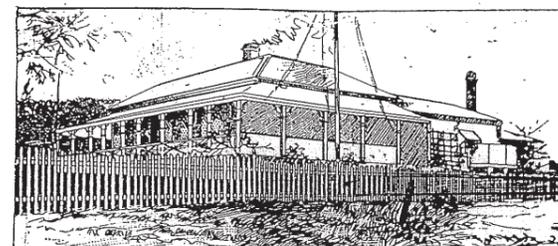


Figure 3.11.1. Engraving of Wallarah House 1897. (Source: Town and Country Journal December 1897)



Figure 3.11.2. Wallarah House 1890s. (Courtesy of EJE)

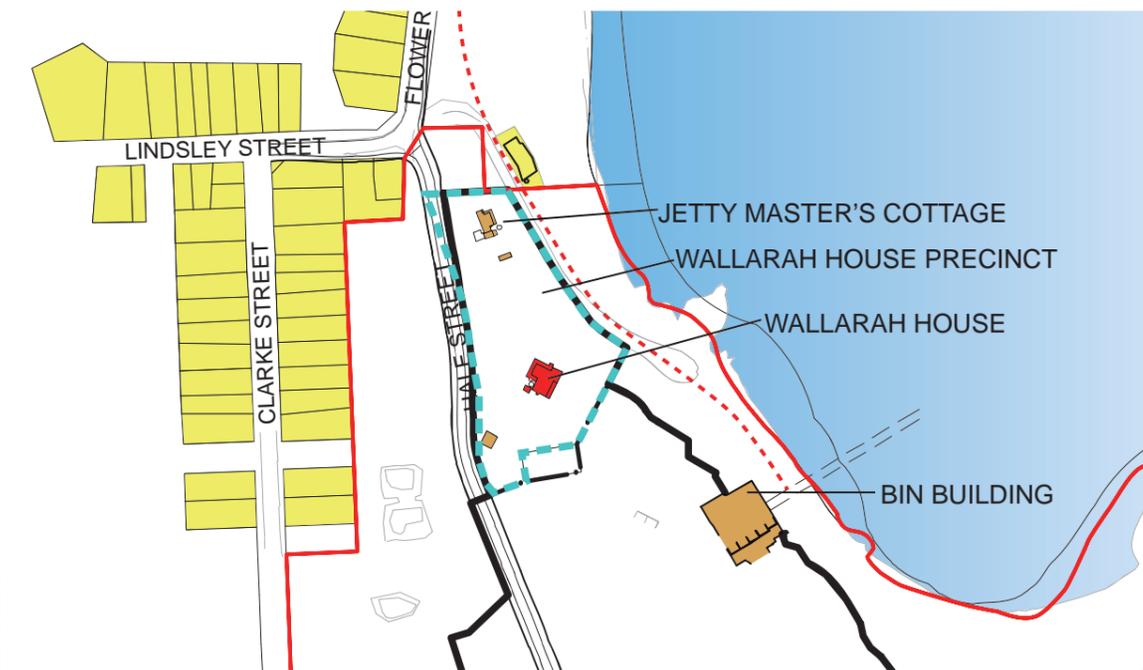


Figure 3.11.3. Site Plan indicating heritage items in red.

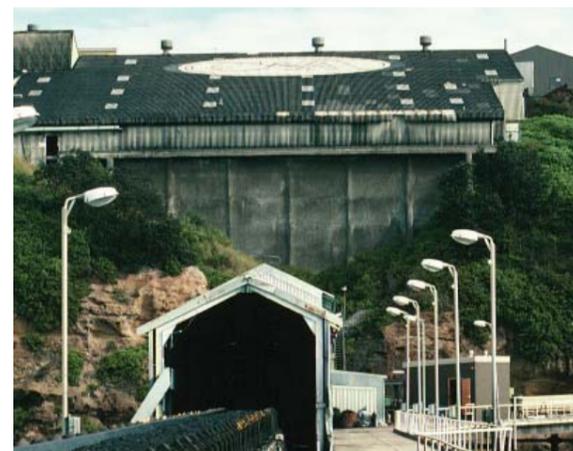


Figure 3.11.4. Bin Building viewed from the Jetty.



Figure 3.11.5. The Jetty, Bin Building and Wallarah House viewed from the beach.



### 3.12 Community Facilities

The Moonee Hamlets community facilities proposed in this plan are:

#### Open Space and Recreation

Adjacent to the existing village a significant portion of land will be given over to public open space. The portion of land East of the existing Clarke Street housing will be set aside as open space to provide a curtilage for the existing historic village and enable permeability between the existing residential settlement and the Catherine Hill Bay Beach. In addition the coastal foreshore, a sea cliff reserve and a headland park as indicated within the Concept Plan area have also been handed over to public use to enable ease of access to elevated vistas of the coast.

An open space network will be provided within The Moonee Hamlets Concept Plan. These spaces range from a Village Green to neighbourhood parks.

The Village Green is sized to enable informal Community activities.

Clearly defined access to Moonee Beach is provided from the hamlets and the Village Green via pedestrian/cycle paths located along the bushland corridors and the perimeter road located within the Asset Protection Zone (APZ).

The paths link in with existing bush trails on the headland and the proposed Coastal Walk to create an accessible pedestrian recreational network for the enjoyment of local residents and visitors

The APZ perimeter road connect with the internal road network, enabling pedestrian and bicycle connectivity throughout the Village Hamlets, including walkable access to the Village Centre.

Item	Description
1	Village Green
2	Bin Terrace
3	Playing Field
4	Village Park
5	Tennis Courts
6	Community Building
7	Swimming Pool
8	Coastal Walk
9	Headland Reserve
10	Hamlet Commons
11	Managed Bush Corridors
12	Bush Walks

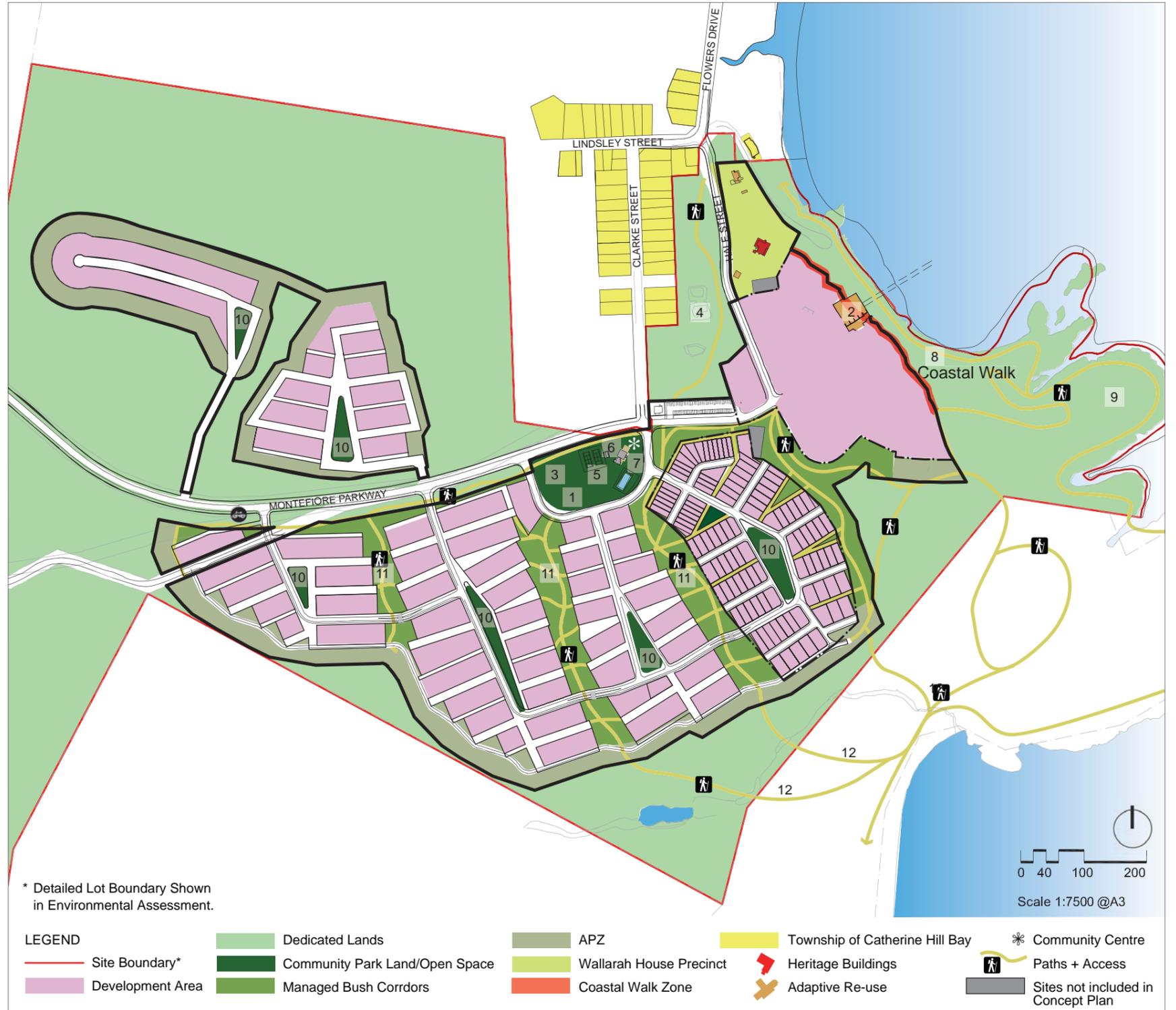


Figure 3.12.1. The Moonee Hamlets Community Facilities.

**Village Centre**

A maximum of 750 m<sup>2</sup> of retail space will be established on the main access road to Hamlet 1. It will consist of neighbourhood shops grouped about a main thoroughfare to provide for the daily requirements for the local residents and visitors.

**Existing Facilities**

The Moonee Hamlets will underpin the existing community facilities located in Catherine Hill Bay, including the surf club and hotel. The Hamlets may also increase the patronage of the existing bus service that may increase the frequency of service to the Catherine Hill Bay as a whole.



Figure 3.12.2. Portion of Concept Plan site West of Hale Street to be dedicated to public open space.



Figure 3.12.3. Existing Surf Club.



Figure 3.12.4. Portion of Concept Plan site coastal foreshore to be dedicated to public open space.



Figure 3.12.5. Proposed character of Village Centre open space.

### 3.13 Environmental Sustainability

In May 1992 the principles of ecologically sustainable development were agreed by the Australian and Commonwealth and State Governments through the Intergovernmental Agreement on the Environment. The development of new communities in this Concept Plan has been guided by these principles of ecologically sustainable development. Some of the ways in which these principles have been addressed follow:

#### 1. The precautionary principle

The precautionary principle stipulates that if there are threats of serious environmental damage that the lack of scientific certainty should not be used as a reason for postponement of action to address these threats.

Whilst there are no serious environmental threats on the sites covered by this Concept Plan there is a danger that, with its future unresolved, the intact vegetation areas of Catherine Hill Bay might have become fragmented and degraded through permissible land uses. Under the Concept Plan these areas will be dedicated to the National Park estate, managed for conservation, and protected in perpetuity.

#### 2. Intergenerational equity

This principle seeks to ensure that the present generation meets its needs in a manner that does not compromise the ability of future generations to meet their needs. According to the State Government's Lower Hunter Regional Strategy the Lower Hunter Region needs to find room for 115,000 homes in the next 25 years. The Moonee Hamlets site is a brownfield site that will allow 600 of these dwellings to be accommodated without disturbance of new areas of vegetation. This reuse of land that has had past development use will minimise green field sites that will need to be subjected to urbanization elsewhere in the region and will protect those areas for future generations.

The dedication of 310ha for national parks including areas of lake and coastal foreshore will also protect these areas to ensure that they remain available, in current condition or better, for the enjoyment of future generations.

### 3. Conservation of biodiversity and ecological integrity

The conservation of biodiversity and ecological integrity should be fundamental factors in decision making. This Concept Plan not only ensures that there is a significant conservation offset to a minimal development impact, it also takes a whole series of best practice measures to secure the ecological integrity of the site.

Within the area to be developed, wherever possible, natural vegetation will be restored on the site in such a way that it can have a relationship with other remnant bushland augmenting habitat for native fauna. The landscape plan encourages trees throughout the site and the community has been designed to ensure that landscaping can be dominant providing shade as well as a green backdrop. Green corridors within the area to be developed will provide a network of open space totalling around 19ha.

Stormwater will be carefully managed to match pre-development flows and quality and will be recycled on the site. Homes will be built to be energy and water efficient complying with BASIX standards as a minimum and the provision of facilities within walking distance as well as the design of the community will encourage reduced car usage. Materials will be selected to minimise local and global environmental impacts as well as to serve an aesthetic function. The development will provide reticulated sewerage to all dwellings including the existing community which currently has no access to sewer.

#### 4. The valuation principle

That improved valuation; pricing and incentive mechanisms should be promoted. The conservation measures integrated into this development will be reflected in pricing. All residents will participate in a community title scheme giving a direct financial incentive in the ongoing sustainable management of the site.

### Specific ESD Initiatives

The following ESD opportunities and initiatives are intended to be implemented:

- The street pattern is to maximise solar access.
- Priority in planning is weighed to pedestrian and cycle permeability and public transport.
- All major destinations, such as the Village Centre and Village Green are located with easy access to a bus route.
- A comprehensive pedestrian/cycleway network provides safe and convenient and attractive links between facilities.
- Deciduous trees and shrubs are proposed to the North of internal and external living spaces to maximise solar and light availability in winter.
- The North and East orientation and slope provides access to sea breezes.
- The street pattern provides breeze (and view) corridors to inner areas of the site, maximising opportunities for natural ventilation.
- The proposed built form controls are formulated to ensure a minimum three hours solar access every day of the year to the main living areas of the house.
- The high landscape to building ratio will increase filtration and reduce stormwater runoff.
- An extensive portion of existing spoiled area will be revegetated in native species.
- Hardstand areas, roads and other impervious surfaces are minimised by adapting AMCOR minimum road/shareway standards.

### Infrastructure Services

A third pipe water supply system will be provided in The Moonee Hamlets to supply recycled roof water to all dwellings.

### 3.14 Remediation

An Environmental Site Assessment has been undertaken. Phase 1 and Phase 2 studies have identified likely contamination areas and assessed these for actual contamination.

The only potential contaminant found on the site was hydrocarbons that, on the basis of chemical analysis, were determined to be coal fines in sedimentation dams. Future removal of concrete slabs in the coal washery area may require further assessment.

Hazardous materials have been removed and demolition/removal of mine infrastructure continues.

The site will be remediated as necessary to residential standards and verified by certification.



Figure 3.14.1. Aerial view of former coal workings in Catherine Hill Bay.

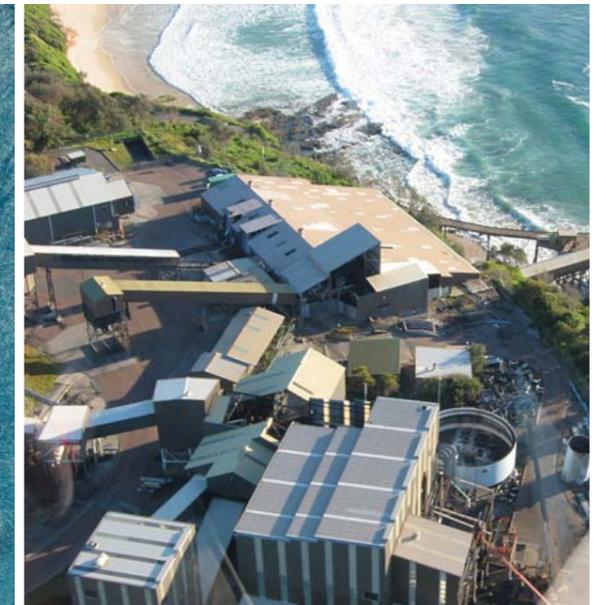


Figure 3.14.2. Aerial view of former coal workings on Catherine Hill Bay headland.



Figure 3.14.3. (left) View looking South over Moonee Colliery coal dump.



Figure 3.14.4. (middle) View looking South over Moonee Colliery road infrastructure.



Figure 3.14.5. (right) View looking South over Moonee Colliery coal dump.



Figure 3.14.6. Former coal workings on top of headland.

### 3.15 Development Staging

The project staging is intended to provide the construction of Hamlet 2 followed by Hamlets 1 and 3. This will set the feel and character of the community at the outset and allow the community to grow in an orderly manner as demand occurs.

Implementation will occur as follows:

#### Stage 1 – Civil Works, Landscaping and Buffer Zones

Establish the buffer zone with the existing village, develop the primary infrastructure for the Village Centre Hamlet and Hamlets 2 through 5 South of Montefiore Parkway. The APZ will be established to protect the site and the bush corridors and major master community green spaces will be established. The Coastal Walk and other walking trails will also be included. Significant areas of existing landscape to remain will be rehabilitated as appropriate.

#### Stage 2 – Hamlet 2

Hamlet 2 will be established including the residential areas and the Hamlet Common. Links from the hamlet to the surrounding bushlands will be made. 108 dwellings will be provided. No commercial space is included in this precinct.

#### Stage 3 – Hamlet 1 and Hamlet 3

Establish the Village Centre with its primary public spaces such as the Bin Terrace and links to the Coastal Walk and Headland Reserve. 69 dwellings will be provided including 4 dwellings in an adaptive reuse of the Bin Building along with up to 750 m<sup>2</sup> of retail space.

Hamlet 3 will be established including the residential areas and the Hamlet Common. Links from the hamlet to the surrounding bushlands will be made and the local road system will connect to that of Hamlet 2 across the bush corridor to the East and to the Village Green loop road to the North. The exact number of dwellings is still to be confirmed, but will not exceed 83. No commercial space is included in this precinct.

#### Stage 4 – Hamlet 4

Hamlet 4 will be established including the residential areas and the Hamlet Common. Links from the hamlet to the surrounding bushlands will be made and the local road system will connect to that of Hamlet 3 across the bush corridor to the East and to Montefiore Parkway to the North. The exact number of dwellings is still to be confirmed, but will not exceed 144. No commercial space is included in this precinct.

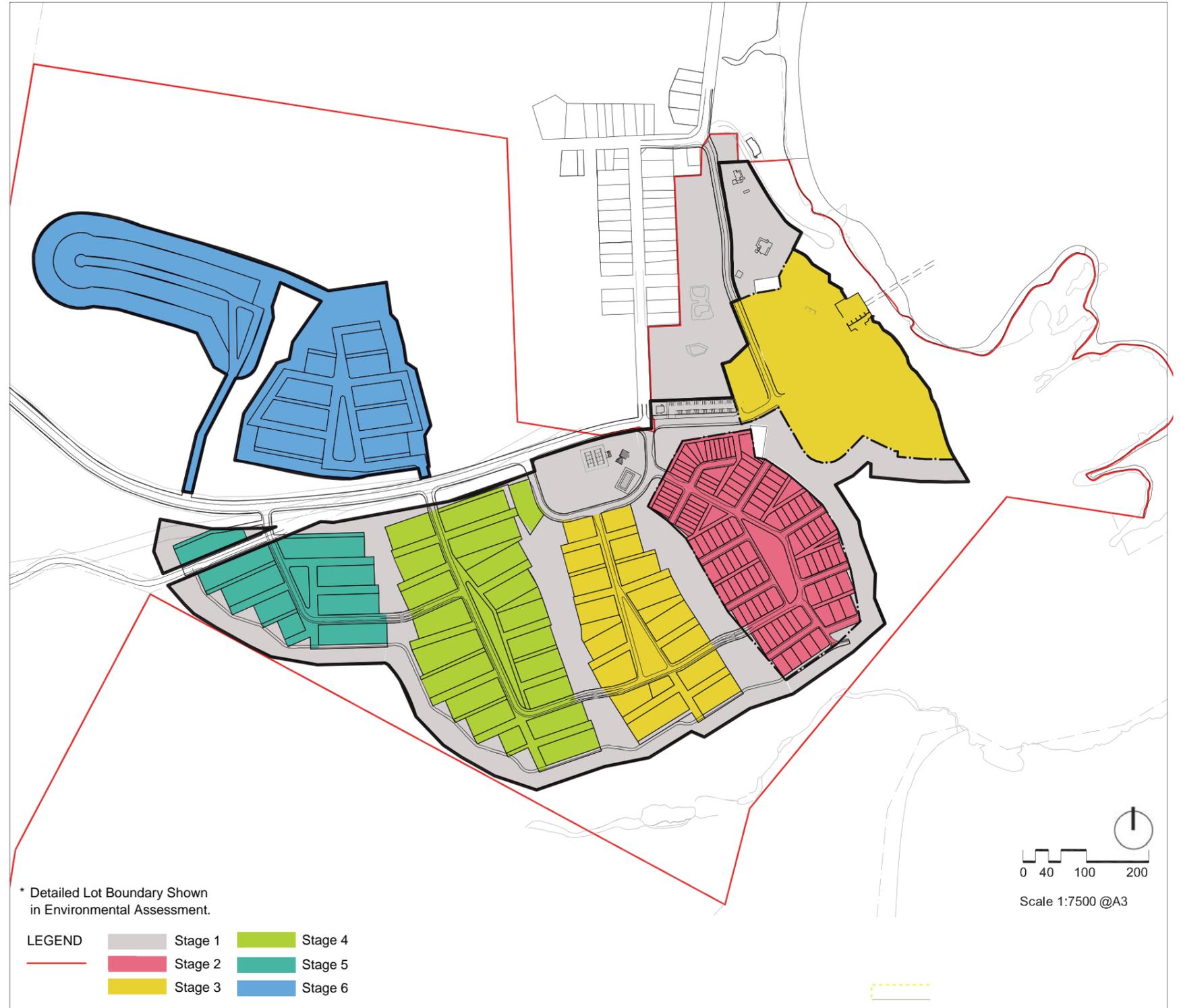


Figure 3.15.1. The Moonee Hamlets Staging Plan.

**Stage 5 – Hamlet 5**

Hamlet 5 will be established including the residential areas and the Hamlet Common. Links from the hamlet to the surrounding bushlands will be made and the local road system will connect to that of Hamlet 4 across the bush corridor to the East and to Montefiore Parkway to the North. The exact number of dwellings is still to be confirmed, but will not exceed 77. No dedicated commercial space is included in this precinct.

**Stage 6 – Hamlets 6 and 7**

Hamlets 6 and 7 will be established and will include the hamlets themselves with their public open spaces and the required APZ for each hamlets. Some access improvements will also be undertaken for secondary access through the bush to the collector roads.

The number of dwellings provided in the final stage of implementation will be controlled (+ or -) to ensure that a maximum of no more than 600 dwellings is provided in the overall development. No dedicated commercial space is included in this precinct.

PRECINCT NAME	STAGE	NUMBER OF DWELLINGS	COMMERCIAL AREA (m <sup>2</sup> )	MAXIMUM RESIDENTIAL FLOOR AREA (m <sup>2</sup> )*
Hamlet 1	2	69	750	20,000
Hamlet 2	2	108		34,000
Hamlet 3	3	83		29,000
Hamlet 4	4	144		50,000
Hamlet 5	5	77		27,000
Hamlet 6	6	71		25,000
Hamlet 7	6	48		17,000
<b>TOTAL</b>		<b>600</b>	<b>750</b>	<b>202,000</b>
<b>Total number of dwellings will not exceed 600.</b>				

\* Floor area excludes garages, driveways and balconies.



# GWANDALAN SUBDIVISION

## 4.0 Gwandalan

### 4.1 Statutory Background

On 6 July 2007 development for urban purposes on the Gwandalan site was declared to be a project to which part 3A of the EPA Act applies. A subdivision of up to 220 lots was described in the declaration.

The Gwandalan proposal is the major part of a strategically significant site first identified for urban development in 1988.

#### Lower Hunter Regional Strategy

The Regional Strategy sets the strategic framework for urban growth in the Lower Hunter region. The Gwandalan site is shown as a proposed urban area in the regional strategy.

#### Draft Central Coast Regional Strategy

The Gwandalan site is identified in the Draft Central Coast Regional Strategy. The site is identified as an existing development precinct.

#### Memorandum of Understanding (MoU)

An MoU has been entered into between the Minister for Planning, the Minister for the Environment and the landowners.

The MoU sets out the process for rezoning of the growth areas, limits the extent of growth areas and establishes an environmental offsets scheme for the site. The offset is the dedication of land on the Wallarah Peninsula by the owners for environmental conservation.

The MoU sets development densities for the site. A density of 12 dwellings per hectare is identified as the site potential.

#### Draft Regional Planning Policy No. 8

In 1988 Draft Regional Environmental Policy No. 8 Wyong Development Areas and Coal Mining identified the land as Development Precinct 1A for future urban development.

#### Wyong Residential Development Strategy

In December 2002 the Wyong Residential Strategy identified the land for 'medium term release'. Under this strategy development of the site was anticipated as 270 dwellings at 12 dwellings per hectare.

#### Draft Wyong Conservation Strategy

The draft Wyong Conservation Strategy August 2003 did not identify the land as for conservation purposes as it was given social and economic priority.

#### State Environmental Planning Policies

A range of State Environmental Planning Policies (SEPP) apply to the sites. These include SEPP 71 Coastal Protection and SEPP Major Projects BASIX. The Gwandalan site is wholly within the NSW Coastal Zone, therefore SEPP 71 Coastal Protection applies. The SEPP requires that a master plan be prepared for residential subdivision over 25 lots and that the master plan be approved by the Minister. The inclusion of the Gwandalan site in the Concept Plan addresses the masterplanning requirements of SEPP 71.

#### Local Environment Plan and Zones

The Wyong LEP 1991 applies to the site.

Under the LEP the site is zoned 7(b) Scenic Protection but this zone is to be amended, consistent with the strategic status of the site, to General Residential. The area subject to the Concept Plan is approximately 18 hectares.

#### Policies and Guidelines

The NSW Coastal Policy applies to all the land. The NSW Coastal Design Guidelines apply to the site.

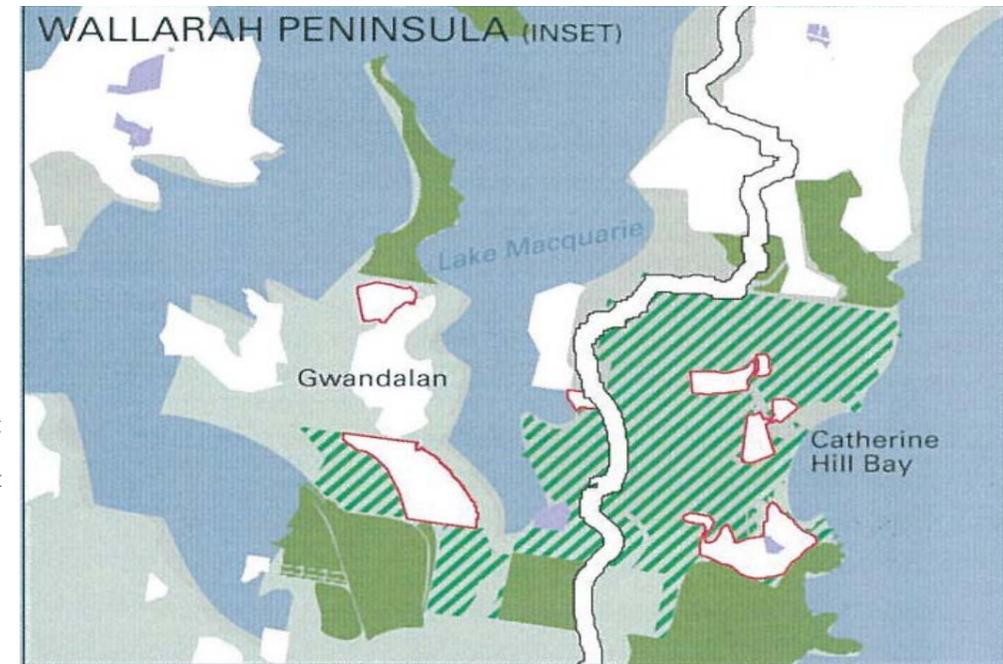


Figure 4.1.1. Lower Hunter Regional Strategy.



Figure 4.1.2. Draft Central Coast Regional Strategy.

## 4.2 Site Analysis

### Existing Development

The site is approximately 18 hectares in area and forms part of a larger lot.

The whole of the Kanangra Street frontage is screen fenced. Large areas of the site have been cleared for access, paddocks, an orchard and landscaping.

The area around the highest part of the site was a former gravel quarry.

East of the school and on the site boundary are developed residential lots.

On the sites northern boundary is the Point Wolstoncroft Recreation Camp. This is part of the Lake Macquarie State Conservation Area.

### Topography and Drainage

The site is a bowl shaped 'valley' contained by two small ridges near the north and south boundaries.

The site drains in an easterly direction through a series of artificial dams and ponds towards Lake Macquarie. The site has a number of very small catchments and no permanent natural drainage lines.

There is no riparian vegetation on the site.

Significant alteration of drainage has resulted from the construction of dams and ponds. Drainage channels have been created on the lower areas of the site. Uncontrolled drainage from the adjoining school site is creating an erosion scour.



Figure 4.2.1. Gwandalan Site Analysis.

### Vegetation/Habitat

Approximately 70% of the site remains under native vegetation.

The site is part of remnant open forest surrounding the shores of Lake Macquarie comprising Narrabeen Snappy Gum Forest and Narrabeen Coastal Peppermint – Apple Forest (Bell 2002)

The dominant trees include mature specimens of Native Apple (*Angophora costata*) Red Bloodwood (*Corymbia gummifera*), Brown stringybark (*Eucalyptus capitellata*), Northern Scribbly Gum (*Eucalyptus racemosa*), Sydney Peppermint (*Eucalyptus piperita*) and Forest She-Oak (*Allocasuarina torulosa*). The understorey is relatively open, the result of former grazing and improvement activities undertaken by previous owner/occupants of the Gwandalan property.

Because of the former clearing activities, a large portion of the site contains re-growth vegetation. The existing stand of trees are generally in a poor condition, with a large portion of the vegetation affected by termites or lightning strike. The majority of the larger, older trees are in a senescent state.

A number of copses of better quality trees have been identified with the assistance of an arborist and will be retained as the nucleus of two open space lots in the proposed subdivision.

### Climate and Orientation

The site is open to summer North easterly breezes across the lake. Sloping generally to the East it is protected from colder southerly and westerly winds.

The shape of the site is conducive to a North-South grid pattern of streets that provides for subdivision lots with good solar orientation.

### Adjoining Land Use

To the East is a private residence and Lake Macquarie. Residential development and the school adjoins the southern boundary.

The land to the North is owned by NPWS but is operated as a recreation camp by the NSW Department of Sport and Recreation.

To the South is the Gwandalan Public School which addresses Kanangra Drive. The school drains to the subject site and has created a small erosion channel.

Adjoining the school to the South is a service station.

There are views into the site from Lake Macquarie but other than this, views into and across the site are limited. The site does not form a major part of any local views.

### Archaeology

The proposed development area has no Aboriginal archaeological values. An archaeological survey of the site has identified a midden on an eroding section of the Lake Macquarie foreshore. The midden is outside the Concept Plan area and thus will not be affected by the proposed development.



Figure 4.2.2. View of existing landscape at Gwandalan.

### 4.3 Site Planning Objectives

The main objective is to achieve a density of 12 dwellings per hectare in accordance with the Wyong Residential Development Strategy and the Ministerial MoU.

In realising this objective, considerations include:

- Recognition of the site parameters and condition Consistency with the existing urban form of Gwandalan;
- A hierarchy of streets including a bus route and, internal streets which are sized and landscaped to reflect residential amenity including walking and cycling;
- Provision of high quality residential amenity;
- Addressing relevant constraints; and
- Provision of adequate services.

The Interim Report of the Independent Hearing and Assessment Panel identified that the previous proposal should be refined and the proposed site subdivision should be redesigned.

In accordance with the Panel requirements, additional open space areas have been included to promote subdivision amenity.

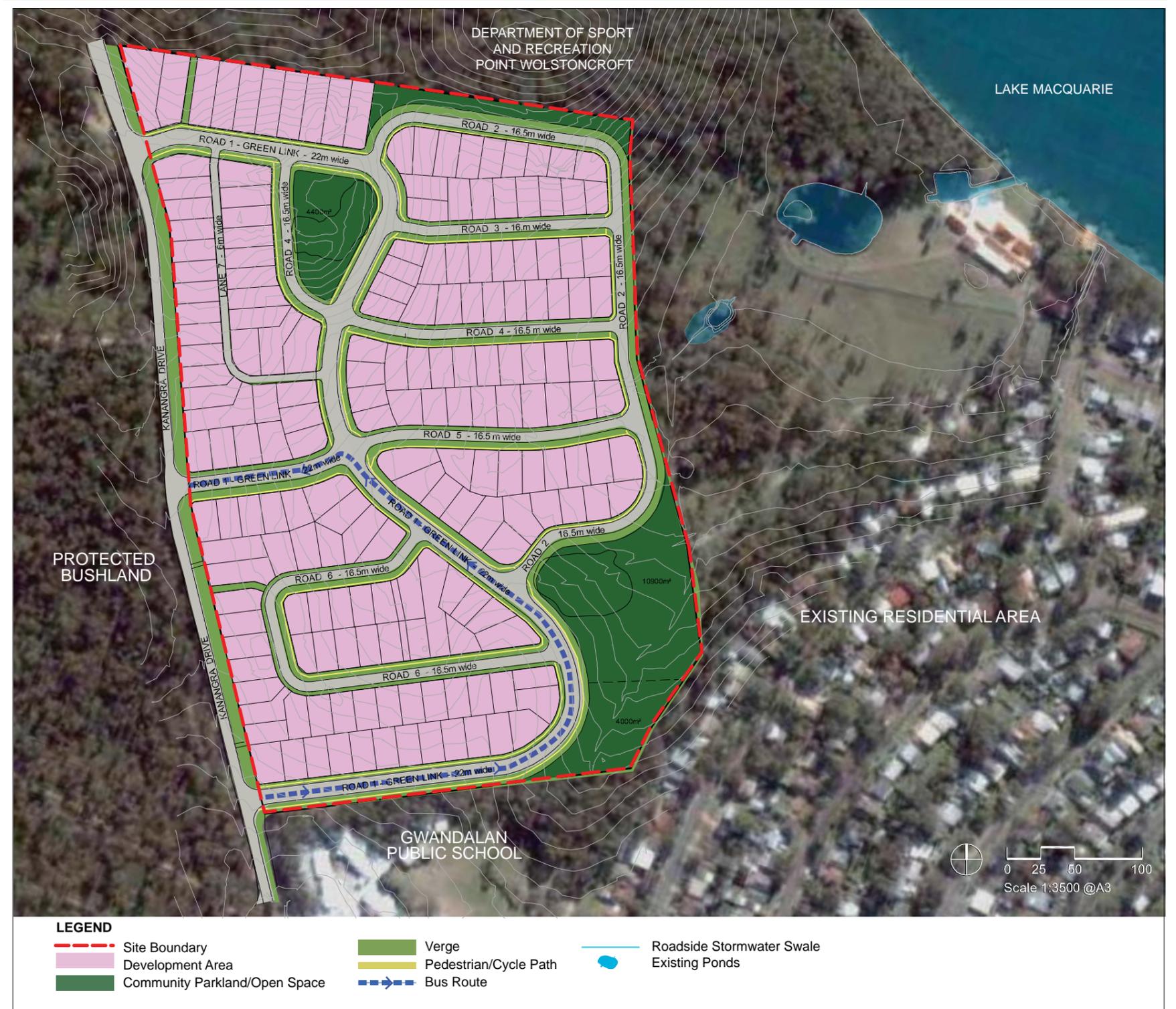


Figure 4.3.1. Gwandalan Master Plan.

#### 4.4 Access, Parking and Circulation

The street network will be configured to reflect the site contours and existing Gwandalan street network.

The primary access will be off Kanangra Drive.

Masson Wilson Twiney has made an assessment of the traffic generating potential of the subdivision. Appropriate traffic management measures have been recommended.

Bus routes and access streets have been designed to Wyong Council subdivision standards.

Public transport is addressed by provision of a bus route.

Pedestrian and cycle movement has been facilitated by the links to the existing Gwandalan network along Kanangra Drive.

Footpaths will be provided to all new streets.



Figure 4.4.1. Gwandalan Access, Parking and Circulation Plan.

#### 4.5 Land Use Principles

The site is for residential subdivision.

Principles applied in the subdivision design are:

- quality design integrated with existing Gwandalan subdivision ordered design allowing varied housing designs;
- encouragement of a local community of interest;
- protection of the environment and environmental sustainability;
- creation of two public open spaces around better quality trees connected by a landscaped verge or "Green Link";
- minimising environmental impact;
- use of WSUD principles in stormwater design;
- protection of the water quality of Lake Macquarie;
- water and energy efficiency;
- maximisation of solar lot access;
- use of rainwater tanks;
- housing choice; and
- variation in lot sizes to achieve a mix of housing designs and opportunities; and
- all roads to be dedicated to Council

#### Biodiversity and Protection of Habitat

Major environmental offsets have already been negotiated with the Minister for the Environment through dedication of 310 hectares of high conservation value bushland including substantial areas of foreshore land on Crangan Bay, Lake Macquarie in the Wyong Shire.

Details of the offsets are provided in the Environmental Assessment.

#### Waste Minimisation

Subdivision construction will be in accordance with the principles of waste minimisation.



Figure 4.5.1. Gwandalan Land Use Principles Plan.

## 4.6 Landscape and Open Space

### Landscape Vision

The proposed subdivision will house a residential community set amongst the tall native Scribbly Gums, Peppermint and Native Apple trees. As many trees as possible will be retained on existing lots, roadside settings, parklands and perimeter buffer zones to create a distinctive 'Gwandalan' character and integrate the development with the surrounding dry *sclerophyll* bushland.

Key landscape features of the development will include the following:

- Retention of two groups of better quality trees to form the nucleus of two open spaces, one to the North and one to the South of the site adjacent to the school grounds
- A 'Green Link' along the primary circulation route linking the two open spaces to provide a continuous canopy and habitat corridor.
- A safe and permeable public domain enhanced with a continuous framework of indigenous trees.
- Informal open space along all local streets formed by landscaped verges up to six metres wide.
- Native landscape buffers to Kanangra Drive, Gwandalan Public School and Point Wolstoncroft Sport and Recreation Centre.
- ESD and WSUD initiatives in managing run-off and water polishing (bioretention swales to perimeter road).
- A bushfire management plan incorporating 'managed' zones and retained canopy species.

### Landscape Proposal

The proposed subdivision incorporates 187 lots with two open spaces located on the higher land to the north west and south east of the site. Public and environmental amenity will be enhanced by the retention of existing trees in the open spaces as well as the creation of wide landscaped verges to facilitate passive recreation and meeting places for the community.

The landscape principles for the site will be as follows:

- Create a landscape setting that will enhance the development and integrate with the bushland setting.
- Retain as many trees as possible in the open spaces, buffer zones, streetscapes and proposed lots.
- Retain a project arborist to review and advise on the protection and safety of existing trees.
- Create a contiguous, safe and permeable public domain.
- Avoid 'formal' landscapes to maintain the relaxed 'bushland' character.



### Legend

- |                     |                    |
|---------------------|--------------------|
| 1 Road 1 Green Link | 7 Lane 7           |
| 2 Road 2            | 8 Kanangra Drive   |
| 3 Road 3            | 9 Planted Swale    |
| 4 Road 4            | 10 Screen Planting |
| 5 Road 5            |                    |
| 6 Road 6            |                    |

Figure 4.6.1. Gwandalan Landscape Masterplan.

- Use indigenous species throughout the public domain areas to link the development with the adjacent woodland and open space surrounds.
- Public and private landscape areas will meet with Wyong Council's landscapes standards and controls.

**North-West Open Space**

This open space at the knoll and former quarry site will be an informal passive recreation focus for the community. The group of better quality trees at the edge of the park will be retained and reinforced with similar species. The open space will be turfed and enhanced with seating areas.

**South East Open Space**

This open space located near the slopes of the former orchard incorporates a stand of better quality trees. The open space will be enhanced with new tree planting and seating areas.

**Green Link**

The "Green Link" is the landscaped roadway that forms the primary circulation through the centre of the site. The "Green Link" will incorporate bioretention drainage swales along its landscaped verges. Existing trees will be retained within the verges where possible and enhanced with additional indigenous trees to form a continuous canopy and wildlife corridor through the site.

**Perimeter Street**

The perimeter street will be lined with informal copses of indigenous trees and incorporate a drainage bioretention swale on its outer edge. The 'inside' verges and footpath zone will be planted with low native shrubs and trees and grassed with non invasive species such as buffalo turf to create a shaded environment for pedestrians.

**Local Streets**

Local streets will have a distinctive informal character created by wide landscaped verges containing existing and planted native trees. The verges will alternate from 3 to 6 metre width on each side of the street and traffic calming measures will accompany each changeover junction.

Driveways to house lots will be located to allow more street tree planting and greater landscape continuity of the 'landscape verges'. Each local street will be distinguished by a different palette of native street trees and appropriate flowering trees (refer to Planting Palette).

**Private Domain**

The subdivision lots will feature landscaping that will integrate with the landscaped verges. Existing trees will be retained where possible on each lot, subject to safety and arboricultural advice.

An appropriate tree palette has been prepared for the residential allotments, incorporating native trees with small exotic and deciduous trees for solar access.

**Landscape Management Plan**

A Landscape Management Plan will be prepared for the development, addressing the retention of existing trees, bushfire and ongoing maintenance of the natural and built open spaces.

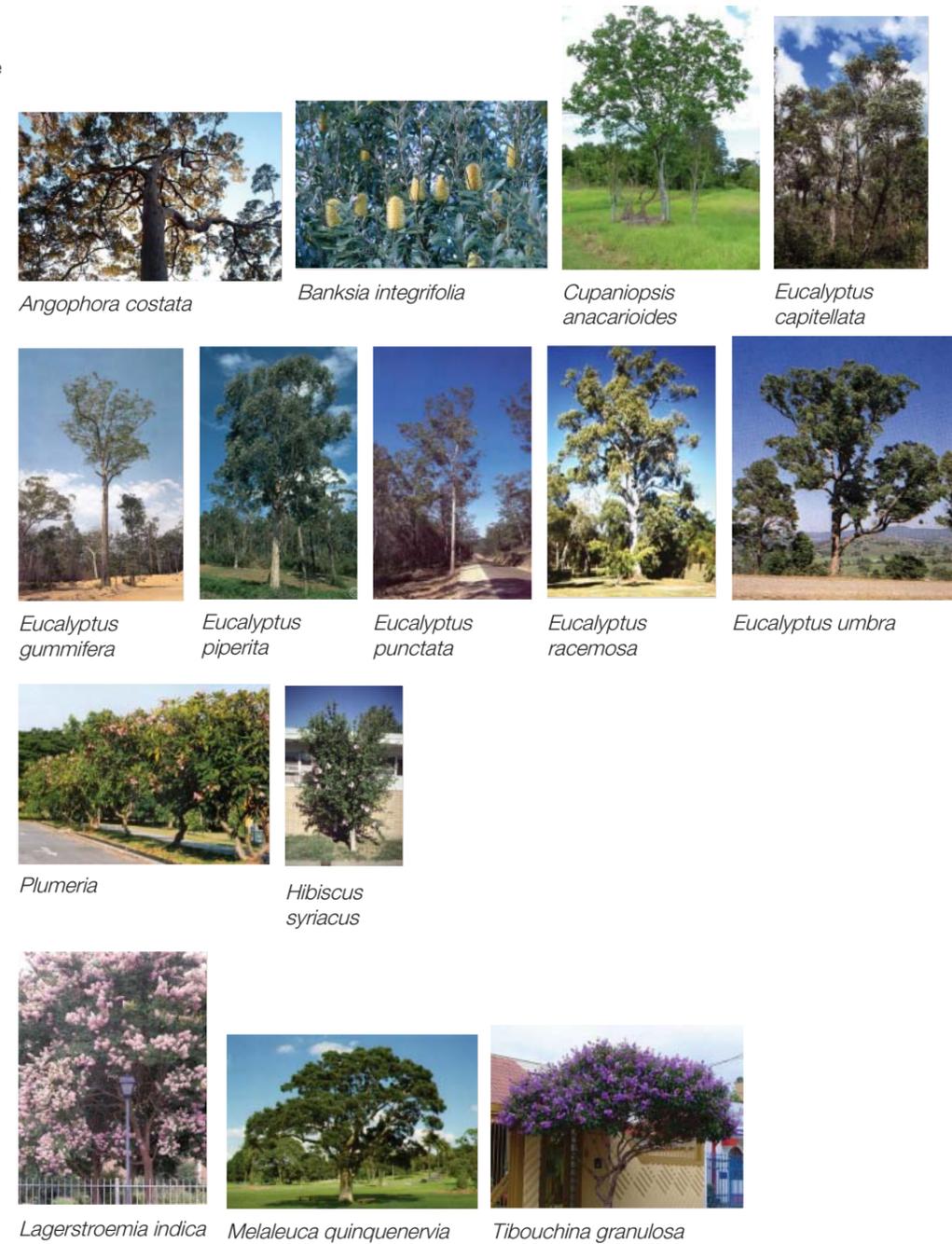
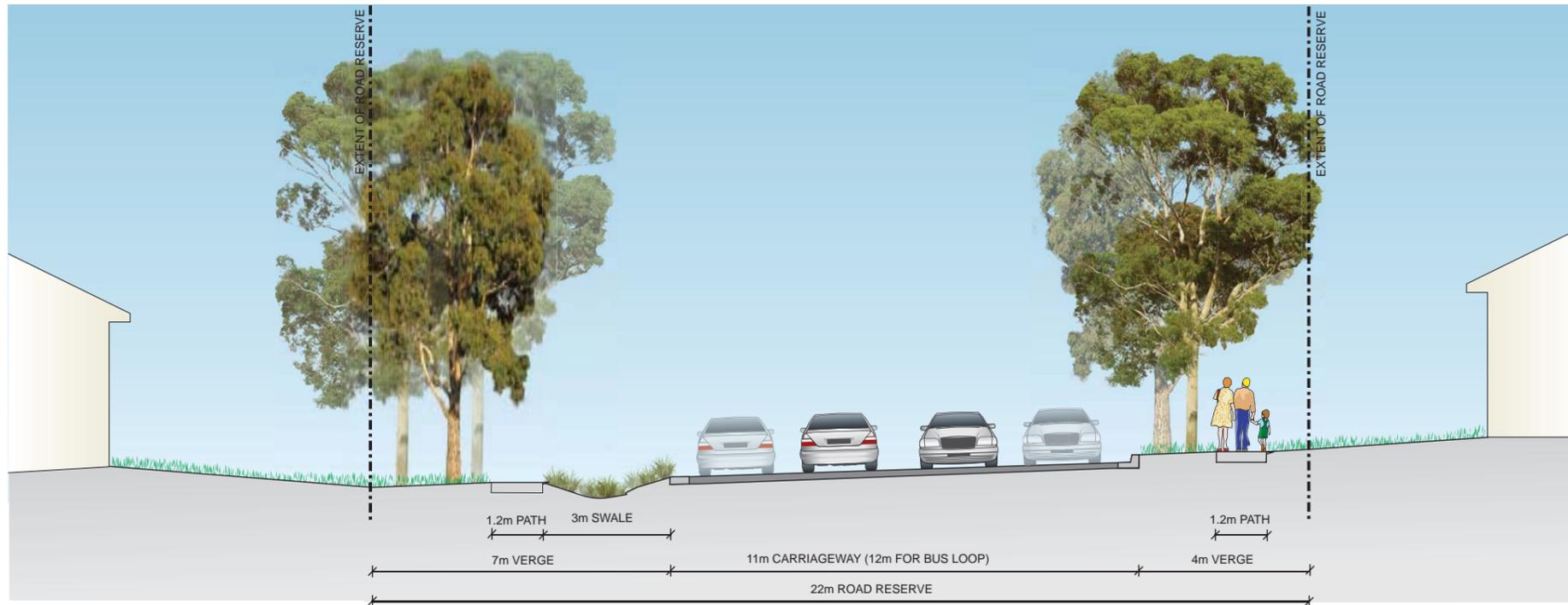
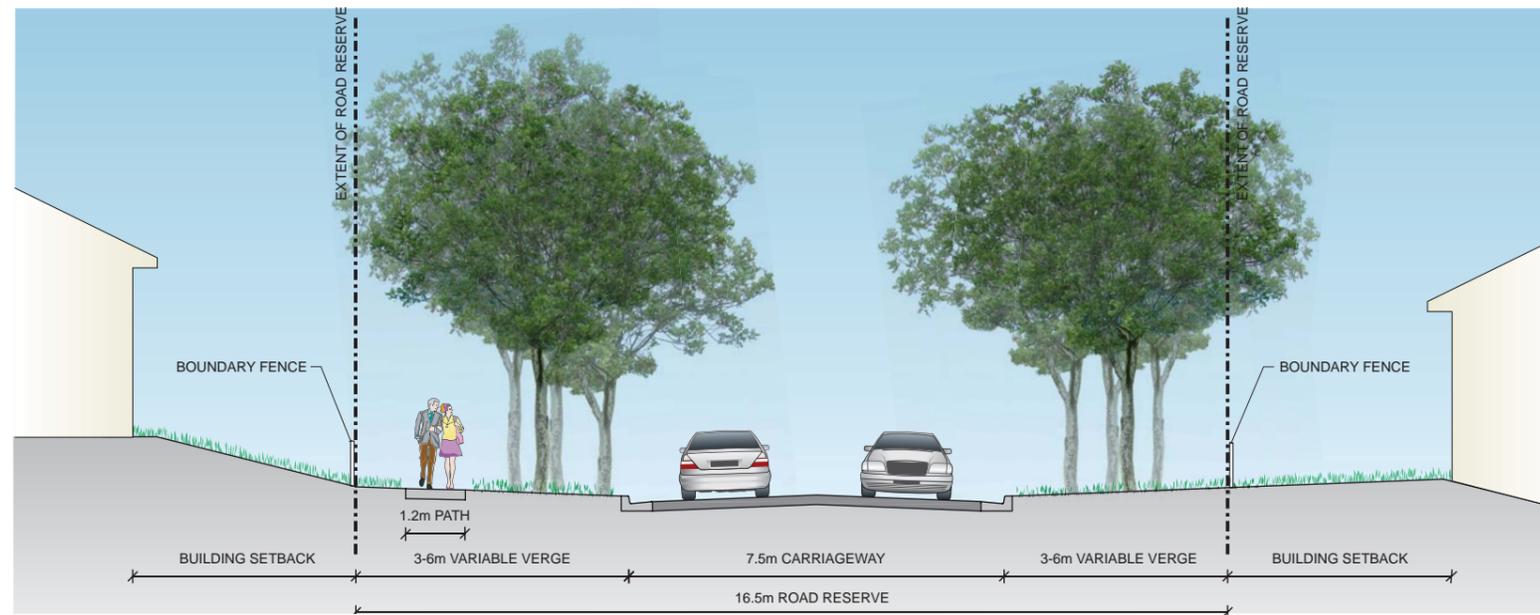


Figure 4.6.2. Gwandalan Planting Palette.



Typical Section A-A - 22m Road



Typical Section B-B - 16m Road



Figure 4.6.3. Gwandalan Indicative Street Sections.

### 4.7 Ownership and Subdivision

The subdivision will consist of Torrens Title lots only. The subdivision design is consistent with the existing Gwandalan subdivision pattern (refer to Figure 4.7.1.)

The main drainage control structure will be located on downstream private land. The land owners will manage and maintain that part of the stormwater drainage system on their land.

The subdivision will meet the standards set out in Wyong DCP Chapters 66 and 67 to the extent that they are consistent with achieving the density objective set out in the MoU for the site.

Building controls (not part of this concept) will be to Wyong DCP Chapter 100 Quality Housing.



Figure 4.7.1. Gwandalan Subdivision Context Plan.



Figure 4.7.2. Gwandalan Subdivision Plan.

### 4.8 Service Infrastructure

A 150mm water main runs the full length of Kanangra Drive. Upgrading of the main will be required.

The existing houses on the site are connected to sewer and the line from the Recreation Camp crosses the lower part of the site near the main house.

A sewer pump station is located off Garema Street adjoining the site. Progressive upgrading of the pump station and sewer mains will be required to service the proposed development. Wyong Council has advised that upgrading works in accordance with staged works as identified in DSP 11 will be required.

The aim of the stormwater management is to protect Lake Macquarie and provide opportunities for reuse of water.

Stormwater will be managed with a combination of household water tanks, swales, pollutant traps and detention basins in accordance with WSUD Principles. Water tanks will be located on individual lots, the swale will be located in the road reserve and detention will be provided using dams and ponds on the existing flow path below the development area.

Electricity network infrastructure for the subdivision will need to be established on the site.

Communications infrastructure will also need to be installed.

### 4.9 ESD Principles

ESD principles have been applied to the site as follows:

- Provision has been made for public transport via provision of a bus route.
- The subdivision will be linked to the existing pedestrian and cycle network.
- WSUD principles applied to the stormwater.
- The lot layout has been designed to maximise solar efficiency.



Figure 4.8.1. Gwandalan Stormwater, Sewer and Water Concept Plan.

### 4.10 Development Staging

The subdivision will be approved via a major project application for a single stage project.

The project is intended to proceed in three stages as outlined below:

#### Stage 1

Major civil works including road construction drainage and services.

#### Stages 2 - 3

Land release in the sequence shown in the diagram.

#### Wyong Residential Development Strategy

In December 2002 the Wyong Residential Strategy identified the land for 'medium term release'. Under this strategy development of the site was anticipated as 270 dwellings at 12 dwellings per hectare.

#### Draft Wyong Conservation Strategy

The draft Wyong Conservation Strategy August 2003 did not identify the land as for conservation purposes as it was given social and economic priority.

RELEASE	NO OF LOTS
1	64
2	42
3	81
<b>TOTAL</b>	<b>187</b>



Figure 4.10.1. Plan of Gwandalan Releases.