

# LEOPOLD LAND CAPABILITY AND BAY ACCESS REPORT

JULY 2015

Prepared by Spiire for City of Greater Geelong





**This report has been prepared by the office of Spiire**

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### **Acknowledgements and Recognition**

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## Contents

|      |  |    |
|------|--|----|
| 1    | Executive Summary  | 3  |
| 2    | Introduction   | 6  |
| 3    | Methodology  | 7  |
| 4    | Study Area   | 8  |
| 4.1  | Description of the Study Area                              | 9  |
| 4.2  | Planning Controls  | 25 |
| 4.3  | Planning Approvals History                                 | 28 |
| 4.4  | History of the Area  | 28 |
| 5    | Context  | 32 |
| 5.1  | Study Area and the Bellarine Peninsula                     | 32 |
| 5.2  | Strategic Policy Context                                   | 34 |
| 5.3  | Access to Community Infrastructure                         | 43 |
| 5.4  | Access to the Bay  | 43 |
| 5.5  | Conclusions from Policy Analysis                           | 46 |
| 6    | Issues, Assets and Constraints                             | 48 |
| 6.1  | Overall Constraints  | 48 |
| 6.2  | Technical Considerations and Potentially Developable Areas | 50 |
| 6.3  | Flora and Fauna  | 52 |
| 6.4  | Seagrass   | 53 |
| 6.5  | Cultural Heritage  | 54 |
| 6.6  | Soil Conditions  | 55 |
| 6.7  | Drainage   | 57 |
| 6.8  | Flood Mapping  | 59 |
| 6.9  | Traffic and Access   | 64 |
| 6.10 | Community Infrastructure Provision                         | 73 |
| 7    | Community Consultation                                     | 79 |
| 8    | Development in the Study Area                              | 80 |
| 8.1  | Development Options  | 80 |
| 8.2  | Principles for Development                                 | 85 |
| 8.3  | Further Investigation Requirements                         | 96 |
| 8.4  | Development Costings                                       | 96 |

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|     |                     |     |
|-----|---------------------|-----|
| 9   | Bay Access Options  | 99  |
| 9.1 | Passive Bay Access  | 99  |
| 9.2 | Physical Bay Access | 100 |

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|    |                 |     |
|----|-----------------|-----|
| 10 | Conclusions     | 101 |
| 11 | Recommendations | 102 |

## **Appendices**

Appendix 1 – Traffic Volumes

Appendix 2 – Community Consultation Outcomes

Appendix 3 – State and Local Planning Policy Context

Appendix 4 – Development Contribution Assessment

Appendix 5 – Technical Considerations that Underpin the Estimate of Developable Land Extent

## 1 Executive Summary

The Leopold Land Capability and Bay Access Report (“the Report”) was commissioned by the City of Greater Geelong. The Report investigates whether land to the west and north of Leopold’s settlement boundary is capable of accommodating urban development. The Report also investigates the potential to provide public access to the Bay, both in the form of physical access, such as a boat ramp, and passive access, such as a park near the foreshore.

The Report is intended to inform the next review of the Leopold Structure Plan, anticipated for 2017/2018. The review will include a focus on land supply which will inform the future growth of the township. If a need for additional land supply is identified, Council would need to consider where new growth is best located. Council policy restricting development to within coastal settlement boundaries, or within the Leopold settlement boundary, would need to be revised for urban development outside the settlement boundary to be acceptable. Current state and local policy does not encourage urban development or bay access in this location.

The commissioning of the Report was a recommendation from the Leopold Structure Plan 2013, and follows continual pressure on Council from landowners and the wider community for development and bay access.

The following steps were undertaken in the preparation of the Report:

- Existing conditions were profiled.
- The current policy context was reviewed.
- Opportunities and constraints for future development were identified.
- Landowner and agency views were sought.
- Potential development scenarios, including advantages and disadvantages of each, were considered.
- Key considerations and principles for any future development were determined.
- High level development costings associated with a preferred development scenario were prepared.
- Potential options to provide public access to the Bay were considered.
- Conclusions and recommendations were outlined.

The key conclusions of the Report are outlined below.

### **Bay Access**

Public access to the foreshore is difficult to achieve without some form of enabling development.

Physical access to the Bay via a boat ramp is not appropriate in this location. A combination of significant environmental constraints, cost, and no identified need for such a facility in this location makes it an unviable proposition.

Access to the foreshore is also not appropriate. There is little to no beach access within the Study Area. Any public open space providing foreshore access would need to be located on land behind the high tide mark. This land is privately held, with a significant portion of land in proximity to the foreshore affected by projected sea level rise.

Passive bay access, in the form of an area of public open space or a linear trail network, is considered the most appropriate form of access to the Bay at this location. Given all the land is in private ownership and connectivity to the existing township of Leopold is poor, the provision of any such access should be provided as part of any development of the area.

### **Development Potential**

Subject to further technical investigations, some land within the Study Area has the potential to be developed. However, the Study Area is constrained by anticipated future sea level rise; existing development levels including dispersed rural dwellings and caravan parks; flooding and drainage issues; characteristics of Corio Bay itself including seagrass meadow and low tide levels; traffic barriers and access issues (including to community infrastructure).

Significant drainage constraints impact development of the Study Area. Year 2100 sea level rise and storm surge levels impact the extent of development in the lower floodplain environment closer to Corio Bay. Much of the land is required for drainage and flooding purposes and would need significant upgrade should development proceed within the Study Area.

The Study Area is bisected by Portarlington Road, a dual lane divided road. Access to development within the Study Area would require intersection upgrades on Portarlington Road. In addition to providing for vehicular access, such upgrades would provide the opportunity to integrate pedestrian and cycle connections to the Study Area from the existing Leopold township.

The extension of existing reticulated services can provide for development within the Study Area.

Development within the Study Area can be undertaken in various forms. However, if development is to proceed, a holistic approach should be adopted that considers and addresses all known constraints in the Study Area including the provision of suitable access to the Bay. Development could facilitate the provision of a passive bay access opportunity. Development within the Study Area would also be required to consider density, access, infrastructure provision, urban design and environmental management.

Should the Leopold settlement boundary be extended to incorporate the Study Area, detailed studies would be required to support a rezoning application to demonstrate that development would address the identified requirements for the area. Development feasibility studies and clear understanding of staging and delivery of critical infrastructure to support development within the Study Area would need to be demonstrated.

Spiire recommends the following actions by Council:

#### **Leopold Structure Plan review**

- Review the Leopold Structure Plan in 2017/2018 as currently planned with a particular focus on land supply analysis and, if necessary, potential growth opportunities in the broader area.
- Use the findings of this Report to inform the Structure Plan review in terms of suitability of land for urban development.
- Use the findings of this Report to inform the Structure Plan review in terms of provision of public Bay access through urban development.
- Incorporate the findings of this Report into the Structure Plan through new Directions for land use and development for the Study Area, if necessary.
- Investigate the need for additional open space facilities in the Leopold area as part of Council's municipal wide Open Space Strategy.

### **Rezoning/Development Requirements**

- Adopt a holistic approach for the whole Study Area to ensure all known constraints are addressed.
- Provide the strategic justification and the necessary technical information (as outlined in section 8.3 of this report) to ensure a logical and sustainable development is achieved.
- Link development with the provision of passive bay access.
- Consider the application of relevant zone and overlay controls to achieve desired land use and development outcomes.

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## 2 Introduction

The City of Greater Geelong has commissioned this project, Leopold Land Capability and Bay Access. The project follows adoption of the Leopold Structure Plan in 2013, which includes a direction to investigate options to provide public access to the Bay and a Council recommendation to undertake a broad land capability analysis of rural land in a defined Study Area around Leopold.

The project investigates where urban development could be directed in any future structure plan review and assists in providing direction in relation to realising public access to the Bay. Having determined that Council is unable to achieve Bay access via land acquisition, the City's objective is essentially to explore if it would be possible to provide access to the Bay if land were developed north of Portarlington Road.

The findings of the Report will be used by Council to inform a future review of the Leopold Structure Plan.

For Council to support urban development in the Study Area, a significant policy change would be required. The Structure Plan is the appropriate tool to test the findings of this Report and also, against other relevant planning policy of land use matters particularly in relation to future growth and direction of a township.

Any proposal to rezone or develop land within the Study Area would be initiated by a third party and could only be considered in conjunction with the review or amendment to the existing Leopold Structure Plan.

Findings in relation to bay access will be used to inform how access can be achieved through urban development, if it were to be acceptable under a new policy regime.

The aims of the project are to:

- Examine opportunities and constraints within the Study Area.
- Offer high level advice on the potential for land to be developed.
- Provide direction on issues to be addressed by project proponents as part of any development proposal.
- Investigate options into bay access.

In particular, the project will provide direction on:

- The extent of potential development areas in the Study Area.
- What type of development is feasible if Council amended existing planning policies on tourism in rural areas or settlement policy for Leopold.
- Whether public access to the Bay is achievable.
- What form public access to the Bay would take; physical, passive, or both.
- How public access to the Bay could be delivered, including funding and maintenance considerations.

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### **3 Methodology**

This Report has undertaken a range of investigations to provide direction to Council about the capability of the land within the Study Area for urban development and the provision of Bay access.

Initial investigations of the Study Area were undertaken to determine the site context and constraints including planning ordinances and policy; existing site features; determination of existing road and servicing access; existing drainage issues; and current or proposed planning approvals.

Following the determination of the site context and constraints, discussions and further investigations were undertaken to assist in identifying existing Bay access and community infrastructure in the wider area. These discussions were also used to confirm preferred government (Local and State) positions on developing the area and providing Bay access in some form.

Further details regarding the provision of services and in particular, drainage infrastructure and treatments, in line with Government requirements were determined. This included the identification of the 2100 coastline based on the anticipated rise in sea levels in the Bay.

A draft position paper including constraints plans was subsequently provided to Council in December 2014 for consideration and comment. In finalising the Report for Council, further detailed investigations have been undertaken. This included 'groundtruthing' of the initial findings at a landowner session in Leopold (mid-February 2015) and further discussions with key service agencies and Government representatives.

#### 4 Study Area

The 342ha Study Area is shown in Figure 1. Land immediately proximate to the identified Study Area is also considered in this project.

The Study Area includes two distinct areas:

- **Northern section:** includes land to the north of Portarlington Road between Clifton Avenue and Grand Scenic Drive.
- **Southern section:** includes land to the south of Portarlington Road and north of the Bellarine Highway between Clifton Avenue and Melaluka Road.

The Study Area's northern boundary is the edge of the Corio Bay. Titles adjoining the Bay extend to the high tide mark. The eastern boundary of the Study Area is formed by Grand Scenic Drive and the western boundary by Clifton Avenue. The southern boundary of the Study Area is staggered being partly the Portarlington Road and partly the Bellarine Highway.



Figure 1 - Study Area (Source: NearMap)

#### 4.1 Description of the Study Area

Land within the Study Area is used for a variety of land uses including caravan parks, the Leopold Shopping Centre, rural residential development, agriculture (grazing and cropping) and a nursery. The majority of the land has been cleared for agricultural purposes. Most existing vegetation is predominantly located along site boundaries.

The topography of the Study Area displays two distinct forms; being lower flat floodplain in the western area that rises to the east at approximately 5% to a high point at approximately RL45m at the corner of Portarlinton Road and Grand Scenic Drive. All land, excluding a small area at the southern boundary grades to Corio Bay. Essentially, the area is flat.

Designated waterways No. 33-35 run through the Study Area from south to north discharging to the Bay. The watercourse in the catchment begins south of Portarlinton Road, between Clifton Avenue and Melaluka Road. This represents a historical drainage line which has been partly formalised into constructed channels, eventually draining to a natural depression/swamp in the north of the Study Area, then out to the Bay.

Historically, stormwater from the waterway discharged to an informal marsh area set back from the Bay edge. This area was subject to continual wetting and drying to various extents due to seasonal rainfall and climate conditions. Within the broader catchment there are a number of farm dams, constructed retarding basins, open drains and other constructed waterbodies. An open drain constructed in the 1970's runs north from Portarlinton Road to the Bay, following the un-made road reserve of Moss Road. Further description of the historical and existing conditions of the site pertaining to drainage can be found in Section 6.7.1.

Land ownership in the Study Area is essentially in line with the distribution of titles (approximately 30 parties). A title distribution plan is included at Figure 2.



**Figure 2 - Leopold Study Area title distribution**

To undertake the project, the Study Area was divided into four Precincts, as shown in Figure 3.

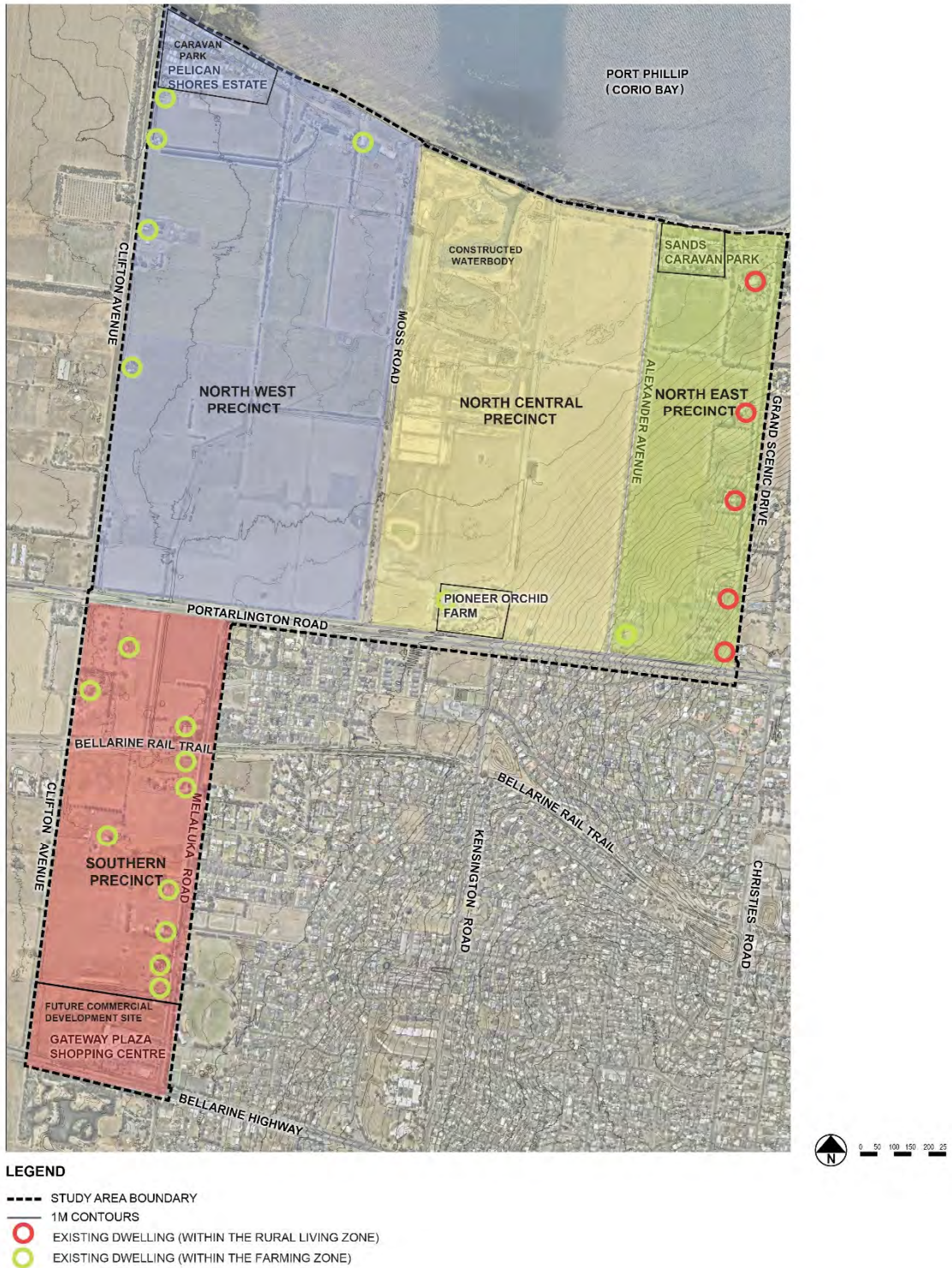


Figure 3 - Study Area Precincts

### North West Precinct

The North West Precinct comprises land between Clifton Avenue to the west and the Moss Road alignment to the east. Clifton Avenue extends to the foreshore. There is no public land along the foreshore. The foreshore is characterised by ground cover vegetation and significant levels of sea grass and sea weed.

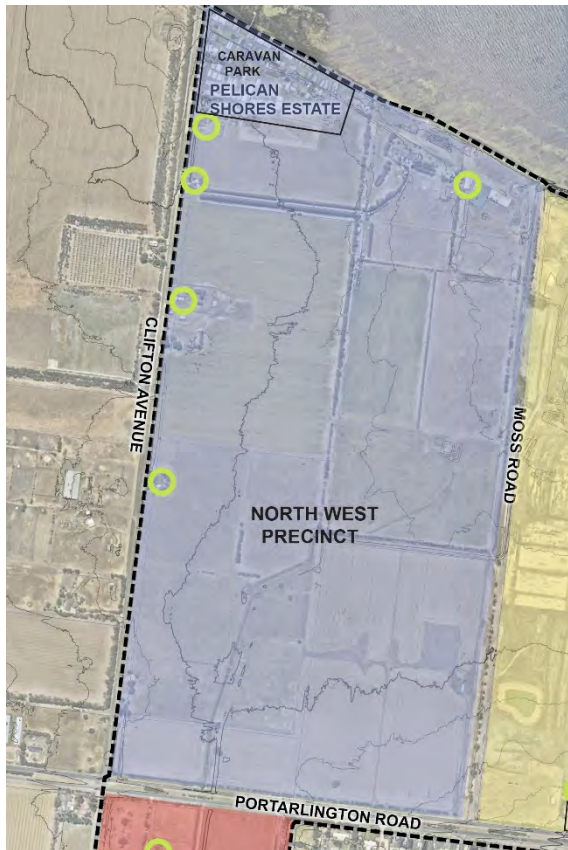


Figure 4 – North West Precinct



Figure 5 – Vegetation and sea weed located along the foreshore at the end of Clifton Avenue



Figure 6 – Clifton Avenue looking south



Figure 7 – Agricultural land along Clifton Avenue



Figure 8 – Agricultural land along Clifton Avenue

The North West Precinct comprises large lots predominantly used for agriculture (grazing). Lots are accessed via Clifton Avenue, with two lots accessed via Portarlington Road. Five dwellings are located within the Precinct with all but one dwelling directly accessed from Clifton Avenue (the other is accessed via Austin Street, which is perpendicular to the northern end of Clifton Avenue).



**Figure 9 – Dwellings located along Clifton Avenue**

The Pelican Shores Estate caravan park is accessed from Clifton Avenue and has direct frontage to the foreshore. Pelican Shores is essentially a gated retirement village with a range of moveable homes and shared recreation facilities including a boat ramp and jetty.



Figure 10 – Pelican Shores Caravan Park



Figure 11 – Land at the end of Clifton Avenue and looking east along the Pelican Shores frontage showing caravan park jetty

## North Central Precinct

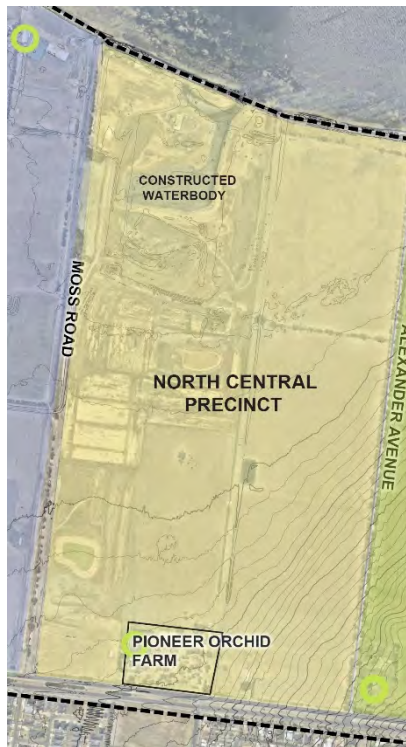


Figure 12 – North Central Precinct

The North Central Precinct comprises land between Moss Road to the west and Alexander Avenue to the east. Alexander Avenue extends to the foreshore. There is no public land along the foreshore.

This Precinct comprises large lots, which are predominantly used for agriculture (grazing).

A constructed waterbody is a major feature of this Precinct. Moss Road is being built by a private landowner and will provide access to this property and constructed waterbody.

The Pioneer Orchid Farm is located on Portarlington Road. There is a single residential dwelling located on the property.



Figure 13 – Agricultural land along Alexander Avenue



Figure 14 – Pioneer Orchid Farm



Figure 15 – From Portarlinton Road: agricultural land in foreground with constructed water body in background

### North East Precinct



Figure 16 – North East Precinct

The North East Precinct comprises land between Alexander Avenue to the west and Grand Scenic Drive to the east.

Land accessed from Alexander Avenue comprises a large lot used for agriculture (grazing).



Figure 17 – Alexander Avenue

The Sands Caravan Park is also located off Alexander Avenue with direct frontage to the foreshore. A private boating area associated with the caravan park is provided at the foreshore. Significant amounts of seagrass and seaweed are present on the foreshore.



Figure 18 – Land at Alexander Avenue looking east to Sands Caravan Park



Figure 19 – Sands Caravan Park boat holding area



Figure 20 – Sands Caravan Park

Grand Scenic Drive is characterised by rural living lots with five dwellings accessed from this road. No public access to the foreshore is provided from Grand Scenic Drive.



Figure 21 – Grand Scenic Drive



Figure 22 – Dwelling located along Grand Scenic Drive



Figure 23 – Dwelling located along Grand Scenic Drive



Figure 24 – Dwelling located along Grand Scenic Drive



Figure 25 – No public access to the foreshore is provided from Grand Scenic Drive

#### 4.1.1 Southern Precinct

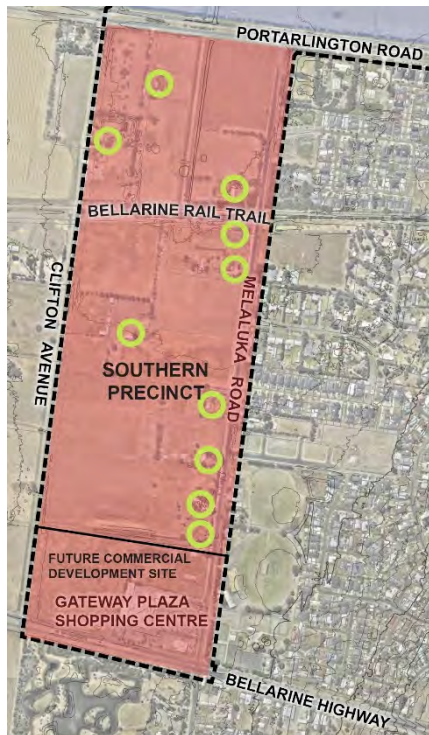


Figure 26 – Southern Precinct

Land in the Southern Precinct is bisected by the Bellarine Rail Trail, which impacts drainage and inundation.

Land fronting the Bellarine Highway is located within the Commercial 1 Zone and is identified as the Leopold Sub Regional Shopping Centre. This site is partially developed and further commercial development is anticipated in the future.

The remainder of the Southern Precinct is relatively undeveloped, apart from a number of dwellings on larger lots. These dwellings gain access from Melaluka Road.

Compared to the other Precinct's within the Study Area, the Southern Precinct has a more urban aesthetic due to its location at the edge of the Leopold township.



Figure 27 – Melaluka Road



Figure 28 – Bellarine Rail Trail from Melaluka Road



Figure 29 – Leopold Shopping Plaza located at the Bellarine Highway



Figure 30 – Dwelling located along Melaluka Road



Figure 31 – Dwelling located along Melaluka Road



Figure 32 – Undeveloped land along Melaluka Road

## 4.2 Planning Controls

The Study Area is mostly within the Farming Zone (FZ) with the exception of the Activity Centre on the southern boundary, which is within the Commercial 1 Zone (C1Z), and a strip of lots along the eastern boundary (Grand Scenic Drive) which are within the Rural Living Zone (RLZ). Figure 33 shows the zoning controls applying in the Study Area.



Figure 33 – Zoning Map

The purpose of the Farming Zone is to protect and promote farming and agriculture. It is often the default zone for rural land. The Farming Zone is utilised on the Bellarine to define non-urban and generally agricultural breaks between the townships (Clause 21.14).

The purpose of the Rural Living Zone (RLZ) is to provide for residential use in a rural environment and to enhance the values of the area by encouraging use and development based on comprehensive and sustainable land management practices and infrastructure provision. Agriculture is also permitted in this zone, only where such a land use does not adversely affect the amenity of surrounding land uses. The discreet Leopold North RLZ comprises approximately 20 lots, half of which are within the Study Area. It is one of three rural residential areas near Leopold and provides for larger lot sizes generally in excess of 2 hectares.

The core purpose of the Commercial 1 Zone is to create vibrant mixed use commercial centres for retail, office, business, entertainment and community uses.

Figures 34 and 35 show the extent of planning overlays in the Study Area. A Development Plan Overlay (DPO30) applies to the Activity Centre commercial area fronting the Bellarine Highway. A Heritage Overlay (HO1561) (Figure 35) applies to the Rail Trail running east west through the southern portion of the site.



Figure 34 – Development Plan Overlay



**Figure 35 – Heritage Overlay**

There is no overlay that relates to flooding within the Study Area, however, much of the area is prone to flooding. Some of the flood prone areas are designated under the Building Regulations 2006.

### 4.3 Planning Approvals History

A number of planning approvals have been obtained within the Study Area since 2000, including:

| Address   | Approval Type  |
|---|--|
| 711-729 Portarlington Road  | Enforcement for major earthworks, Permits for a shed, caravan park, place of assembly for Leopold Angling Club |
| 282-300 Clifton Avenue (Pelican Shores)                               | Moveable dwellings, communal facilities, boardwalk, retaining walls, dwelling extensions                       |
| 621-639 Bellarine Highway (Gateway Plaza –Sub-Regional Retail Centre) | Buildings and works and signage for shopping centre, rezoning, subdivision                                     |
| 22-30 Austin Street   | Additional dwellings, two lot subdivision  |
| 631-709 Portarlington Road  | Transmission towers  |
| 92-110 Clifton Avenue   | Garage buildings and works   |
| Bellarine Rail Trail  | Minor utility, native vegetation removal, sealing of rail trail  |
| 2-40 Melaluka Road  | Dwelling and Signage   |
| 42-50 Melaluka Road   | Removal of native vegetation   |
| 212-260 Clifton Avenue  | Enforcement  |
| 126-128 Melaluka Road   | Promotion sign   |
| 92-100 Melaluka Road  | Dam extension  |
| 642-650 Portarlington Road  | Advertising sign, building and works   |
| 132-140 Alexander Avenue (Sands Caravan Park)                         | Buildings and Works – caravan additions, amenities   |

Land at 711-729 Portarlington Road has experienced significant earth moving and ground disturbance to construct a waterbody adjacent to the foreshore. The constructed waterbody was created without planning approval. The works may have contributed to changing the rate of flow or the discharge point of water across the boundary of the property and the removal of approximately 2 hectares of native vegetation. Enforcement proceedings relating to the works were heard at VCAT in 2005 and 2006. VCAT ordered remediation works to restore indigenous flora and fauna habitat, create ecologically healthy and functioning wetland and estuarine ecosystems, maintenance of good water quality, treatment and storage of surface water and to ensure adjoining properties are unaffected by increases in overland flows. These works included narrowing the opening of the constructed waterway to Corio Bay to no more than a drainage channel. In addition to the waterbody, various permits have been granted for the use of the land for a caravan park, with the latest approval occurring in early 2015.

Other key sites for planning approval in the Study Area are the two existing caravan parks (Pelican Shores and the Sands) and Gateway Plaza located on the Bellarine Highway.

### 4.4 History of the Area

The history of the Study Area is one typical of rural land on the Bellarine Peninsula, with the land used for a variety of agricultural activities in the past including potato growing, cropping and low levels of grazing. The history of potato growing in this area may have included the use of dieldrin and DDT.

Historical aerial photography below provides an indication of historical uses of the Study Area. When compared to the current aerial imagery, the 1947 and 1975 photos when show urban development has occurred at a greater rate in the later part of the 20<sup>th</sup> Century. The existing swamp is clearly identifiable in the early aerials as is the Bellarine rail line. The two caravan parks have been present since the 1970's.



Figure 36 – 1947 North West & Central Precincts



Figure 37 – 1947 North Central & East Precincts



Figure 38 – 1947 South and North Central Precincts

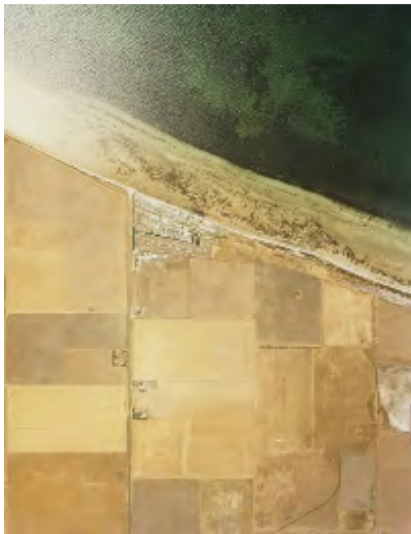


Figure 39 – 1975 North West Precinct



Figure 40 – 1975 North Central and North East Precincts



Figure 41 – 1975 North Central and North East Precincts (Alexander Avenue bisecting precincts)



Figure 42 – 1975 North Central and South (showing rail line through the middle)



Figure 43 – 1975 South Area (south of rail line)

In recent years, agricultural land uses have become less intensive in the Study Area. Parts of the Study Area are now used for rural residential development or caravan park style living without the agricultural component.

Bay access in the Study Area appears to have been undertaken on an ad-hoc and private use basis with individuals constructing boat ramps and other infrastructure along the foreshore. This is consistent with other coastal areas where there is no crown land along the foreshore.

## 5 Context

### 5.1 Study Area and the Bellarine Peninsula

The Study Area is located to the immediate north and west of the Leopold settlement boundary. Portarlington Road, a four-lane divided road providing access between Geelong and Portarlington, runs along the northern edge of the settlement boundary.



Figure 44 – Leopold township and current settlement boundary

Leopold acts as a gateway to the Bellarine Peninsula from Geelong. There is a rural and industrial land use break between the urban areas of Geelong and Leopold.

Leopold is a town of approximately 10,000 people (ABS Census 2011) located ten kilometres east of central Geelong. The town has developed to the north and south of the Bellarine Highway and is described in the Leopold Structure Plan (2011) as “a distinct urban community located on a hillside bounded by Lake Connewarre to the south, drainage basin, wetlands and shopping centre to the west, Port Phillip Bay to the north and farmland to the east.” Leopold is considered to be an affordable place to live on the Bellarine Peninsula and has a mostly permanent population.

The urban area of Leopold is designated by the settlement boundary, which generally has Melaluka Road as its western boundary and Portarlington Road as its northern boundary. The western settlement boundary has been set at Melaluka Road due to the increased difficulty in achieving a drainage outfall for more intensive development downstream of Melaluka Road.

Leopold is one of the designated urban growth areas for the Bellarine Peninsula. Growth in Leopold is generally occurring to the south of the Bellarine Highway, with recent estate developments along Melaluka Road and growth areas identified in the southeast of the town. According to the Leopold Structure Plan (2011), there was approximately 23 years of current lot supply in Leopold, however, this lot supply is noted as being subject to natural and artificial constraints. These constraints include low lying, flat land with poor natural drainage and environmental values.



Figure 45 – Northern Bellarine Peninsula

Within the broader area to the west along the Bay, investigations into possible redevelopment opportunities for the former Cheetham Salt Works and Alcoa Plant sites are being undertaken. The transformation of these sites may impact on Bay access or development in the Study Area.



Figure 46 - Salt works and Alcoa land

## 5.2 Strategic Policy Context

Understanding the strategic policy context impacting the Study Area provides guidance on what type of access to the Bay would be feasible and whether residential development may be appropriate.

### 5.2.1 State Planning Policy Framework and G21 Regional Growth Plan

Land use planning guidance is provided by the State Planning Policy Framework of the Greater Geelong Planning Scheme. This guidance relates to the role of the area in the regional context, its coastal context implications and principles for development. In particular, the policy context references the G21 Regional Growth Plan, which is the guiding document for the Geelong Region. This guidance is further discussed below.

The following is a summary of the key objectives and strategies which should be considered when looking at development potential and Bay access options for the Study Area (emphasis added):

- To plan for sustainable coastal development. (Clause 11.05-5)
- Identify a clear settlement boundary around coastal settlements to ensure that growth in coastal areas is planned and **coastal values protected**. (Clause 11.05-5)
- Direct residential and other urban development and infrastructure within defined settlement boundaries of existing settlements that are capable of accommodating growth. (Clause 11.05-5)
- Avoid linear urban sprawl along the coastal edge and ribbon development within rural landscapes and protect areas between settlements for non-urban use. (Clause 11.05-5)
- Avoid development on...low lying coastal areas. (Clause 11.05-5)
- To optimise infrastructure and consolidate growth. (Clause 11.07-1)
- **Support the growth of...Leopold as district town(s)** by building on existing and planned infrastructure and focussing growth along key road and rail networks. (Clause 11.07-1)
- To protect, restore and enhance the region's unique environment. (Clause 11.07-4)
- To allow communities to live, work and participate locally. (Clause 11.07-6)
- Support diversity in the region's economy that builds on its competitive strengths, including tourism and agricultural land resources and economic, social and natural assets. (Clause 11.07-7)
- **To recognise and enhance the value of the coastal areas to the community** and ensure sustainable use of natural coastal resources. (Clause 12.02-1)
- To ensure development conserves, protects and seeks to enhance coastal biodiversity and ecological values. (Clause 12.02-1)
- To encourage suitably located and designed coastal and marine tourism opportunities. (Clause 12.02-4)
- Ensure developments are of an appropriate scale, use and intensity relative to its location and minimises impacts on the surrounding natural visual, environmental and coastal character. (Clause 12.02-4)
- To improve the environmental health of the Bays and their catchments. (Clause 12.02-5)
- Reduce major environmental pressures associated with urban growth and development within catchments of Port Phillip Bay and Western Port by:

- Requiring growth area planning to protect significant natural assets.
- Improving the quality of stormwater entering waterways, particularly that emanating from construction sites and road development. (Clause 12.02-5)
- Protect coastal and foreshore environments and improve public access and recreation facilities around Port Phillip Bay and Western Port by:
  - Requiring coastal planning and management to be consistent with the Victorian Coastal Strategy 2008.
  - Managing privately owned foreshore consistently with the adjoining public land. (Clause 12.02-5)
- To plan for and manage the potential coastal impacts of climate change. (Clause 13.01-1)
- Plan for possible sea level rise of 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and coastal impacts associated with climate change. (Clause 13.01-1)
- For new greenfield development outside of town boundaries, plan for not less than 0.8 metre sea level rise by 2100. (Clause 13.01-1)
- Ensure that land subject to coastal hazards are identified and appropriately managed to ensure that future development is not at risk. (Clause 13.01-1)
- **Avoid development in identified coastal hazard areas** susceptible to inundation (both river and coastal), erosion, landslip/landslide, acid sulphate soils, bushfire and geotechnical risk. (Clause 13.01-1)
- To locate new housing in or close to activity centres and employment corridors and at other strategic redevelopment sites that offer good access to services and transport. (Clause 16.01-2)
- To encourage tourism development to maximise the employment and long-term economic, social and cultural benefits of developing the State as a competitive domestic and international tourist destination. (Clause 17.03-1)

The G21 Regional Growth Plan (RGP) is a reference document to the Greater Geelong Planning Scheme. The RGP notes the area between Geelong and Leopold is one of four key settlement breaks in the region and identifies Leopold as a district town where planned growth is supported to reinforce the town's role.

The G21 Regional Growth Plan provides the following principles for regional growth:

- Optimise infrastructure and consolidate.
- Diversity, knowledge and innovation.
- Unique and connected communities.
- Protect, restore and enhance our unique environment.
- Food, water and energy security.
- Live, work and participate locally.

These principles work with five strategic directions to achieve the G21 Vision. These directions include protecting and enhancing the environment by responding to the challenges of climate change and maintaining and restoring the natural assets as well as creating sustainable settlements by minimising the amount of land used for urban development.

## 5.2.2 Local Policy

Land use and development of the Bellarine Peninsula, including Leopold, is guided by a number of local policy provisions within the Greater Geelong Planning Scheme.

Clause 21.14 – The Bellarine Peninsula characterises the area as a series of contained townships separated by rural and coastal areas. Management of urban growth and the highly valued non-urban breaks are key issues for the Bellarine. The Bellarine is one of the fastest growing areas in the municipality. Protection and enhancement of the rural and coastal environment and the maintenance of the non-urban breaks is one of the key objectives for the Bellarine. These objectives also identify Leopold as one of the hubs of development and service provision (along with Ocean Grove and Drysdale/Clifton Springs).

Specific strategies for Leopold at Clause 21.14 are (emphasis added):

- Support Leopold as a Sub Regional Retail Activity Centre for the Bellarine Peninsula, whilst providing local community, recreational and employment facilities to Leopold’s residents.
- **Ensure the retention of Leopold as an urban island** - supporting urban growth contained to the settlement boundary and preserving the surrounding rural hinterland.
- Support the development of the Ash Road Growth Area and other areas identified for residential development on the Structure Plan map.
- Support increased housing densities around the Sub Regional Retail Activity Centre and neighbourhood shopping strips at Ash Road and Dorothy Street.
- Encourage the northerly expansion of the Sub Regional Retail Activity Centre, ensuring any development integrates with the existing centre and surrounding community facilities, and enhances its appearance and functionality.
- Support the local convenience role of the Ash Road and Dorothy Street neighbourhood shopping centres, whilst restricting any future expansion of these centres.
- Support the development of Council’s Kensington Road Community Hub to provide a wide range of community, health, education and civic services/facilities.
- Encourage the creation of an additional local mixed use centre on the south east corner of Bellarine Highway and Melaluka Road. Any redevelopment of this site could accommodate restaurants, convenience shops, offices and residential development.
- Provide Public Open Space within existing and proposed residential areas to cater for the passive and active recreation needs of the community.
- Provide an improved transport network which includes better traffic movements, pedestrian and cyclist linkages and public transport options.
- Ensure environmentally sensitive areas including Lake Connewarre and Reedy Lake are protected from localised development pressure.
- Investigate opportunities for public access to Port Phillip Bay.

The Structure Plan map for Leopold provides the following directions in relation to the Study Area:

- Protect views and rural landscape features.
- The southern portion is poorly drained, low lying land.
- Support rezoning of land around the shopping centre to facilitate a sub-regional centre.
- Investigate public access to the Bay.



Figure 47 - Leopold Structure Plan

### 5.2.3 Leopold Structure Plan 2011 (Amended January 2013)

The Leopold Structure Plan was prepared in 2011. The Structure Plan provides guidance for the growth and development of the town and was implemented into the Greater Geelong Planning Scheme in 2013 via Amendment C254, which included minor changes. The Structure Plan reiterates the town's status as a designated growth location for the Bellarine. However, it also acknowledges future growth of Leopold is impacted by a number of constraints. The Structure Plan recognises the need for a clear settlement boundary for the town to provide a compact urban form and protect the town's rural setting. The Structure Plan provides the settlement boundary for Leopold (reflected in Figure 47) and notes residential development outside this boundary is unlikely to be supported.

Council prepared the Leopold Structure Plan to guide development in the township and surrounding area. The Structure Plan included a direction to investigate options to provide public access to the Bay. Subsequently, Council looked at three options to provide access to the Bay including 1) the acquisition of land for a walking trail and other facilities including a boat ramp; 2) as part of a private development proposal; and 3) undertaking this project, a land capability assessment, to guide direction of the settlement in any future structure plan review to assist in realising public access to the Bay.

The Amendment C254 Panel Report provides a number of comments of relevance to this project including:

- The Panel found that at the present time there is sufficient land within the township to develop facilities and residential housing to meet the needs of Leopold into the future.
- The Panel thought that Melaluka Road holds the key to the future of the centre of old and new Leopold. In the Panel's view, extending the centre to the west over Clifton Avenue will dilute the prospects of that happening.
- The Panel did not support any development north of Portarlington Road.
- The Panel did not support any notation on the plan identifying that the land be the subject of further investigation as it sees no merit in developing this area for urban or tourist related purposes.
- The Panel considered the area to the north of Portarlington Road as a farming precinct within which Council is prepared to contemplate a variety of non-urban uses. The Panel noted Portarlington Road forms a very distinctive boundary to the north of Leopold and should be retained.

### 5.2.4 Planning Practice Notes and Ministerial Directions

The following Planning Practice Notes are relevant to this project:

- PN53: Managing coastal hazards and the coastal impacts of climate change.
- Ministerial Direction 13 – Managing coastal hazards and the coastal impacts of climate change.
- PN36: Implementing a coastal settlement boundary.
- PN39: Using the integrated water management provisions of Clause 56 – Residential Subdivision.

Practice Notes provide guidance on how to respond to particular issues. These are sometimes also supported by Ministerial Directions.

Practice Note 53 provides guidance on managing coastal hazards (wildfires, inundation, acid sulphate soils, erosion) as well as assessing coastal hazard risk and planning for development in coastal areas. It also indicates climate change is likely to increase the frequency, intensity and extent of coastal hazards. Possible sea level rise of not less than 0.8 metres by 2100 is to be planned for and considered when assessing applications for land use and development. The Practice Note also

provides guidance on strategic planning for coastal areas and rezoning for urban purposes. In particular, it directs development in these areas to be sited and designed in a way that does not unnecessarily expose future communities and assets to coastal hazard risk. This may be achieved by avoiding future development in areas which are likely to be impacted. Preparation of a coastal hazard vulnerability assessment for the coastline is encouraged to guide strategic planning decisions.

Ministerial Direction 13 – Managing Coastal Hazards and the Coastal Impacts of Climate Change also applies and requires: consideration of the current and future risks and impacts associated with projected sea level rise; evaluation of the potential risks and presentation of an outcome that avoids or minimises exposing future development to projected coastal hazards; and consideration of the views of relevant floodplain managers and DEWLP.

Practice Note 36 encourages the use of coastal settlement boundaries to define the allowable extent of urban use and development. The use of a coastal settlement boundary prevents ribbon development along the coast and maintains a non-urban break between towns; safeguards coastal landscapes; encourages more compact and efficient settlements and reduces land use conflict. The Practice Note provides guidance on determining the extent of coastal settlements which includes identifying the desired future vision for a settlement; its role and function within the region; areas with susceptibility to coastal hazards; constraints on development such as topography, environmental or landscape significance, rural land use activity and native vegetation; and supply and demand of land.

Practice Note 39 relates to the integrated water management provisions of Clause 56 – Residential Subdivisions. In particular, it relates to Clause 56.07 which aims to integrate the use of all water resources, conserve the supply and reduce the use of potable water, use alternatives where potable water quality is not required and use best practice water sensitive design techniques to manage the quality of stormwater run-off. Practice Note 39 provides further information on the requirements of Clause 56.07 and identifies the authorities involved in ensuring these are met in new subdivisions. Should development occur within the Study Area these requirements would need to be met. This is particularly important given the existing constraints to drainage that have been identified.

### **5.2.5 Victorian Coastal Strategy 2014**

The Victorian Coastal Strategy 2014 (VCS) guides land use and development which may impact on Victoria's coastline. The VCS envisions a healthy coast, appreciated by all, now and in the future by protecting its significant environmental and cultural features, providing clear directions for future use and ensuring the sustainable use of natural coastal resources and ensuring suitable development. The VCS defines the coast as encompassing coastal, estuarine and marine environments on both public and private land including the marine environment, foreshores (or coastal Crown land up to 200m from the high water mark), coastal hinterland, catchments and the atmosphere. The significant coastal frontage of the Study Area makes the VCS an important document.

The VCS 2014 identifies five key issues facing Victoria's coast, being: managing population growth, adapting to a changing climate, managing coastal land and infrastructure, valuing the natural environment and integrating marine planning. To effectively deal with these key issues the VCS requires planning and decision making on the coast to be consistent with the hierarchy of principles, as follows:

|                                    |   |
|------------------------------------|---|
| <b>VALUE<br/>&amp;<br/>PROTECT</b> | <b>1 ENSURE THE PROTECTION OF SIGNIFICANT ENVIRONMENTAL AND CULTURAL VALUES</b>   |
|                                    | The starting point is recognising and protecting what we value on the coast, based on identification and sound understanding of coastal and marine features and processes, vulnerabilities and risks  |
| <b>PLAN<br/>&amp;<br/>ACT</b>      | <b>2 UNDERTAKE INTEGRATED PLANNING AND PROVIDE CLEAR DIRECTION FOR THE FUTURE</b>   |
|                                    | This highlights the importance of having integrated policies, plans and strategies that respond to the major issues affecting coastal and marine environments, provide clear direction for protection, management and sustainable development, and involve coastal stakeholders and the broader community |
| <b>USE<br/>&amp;<br/>ENJOY</b>     | <b>3 ENSURE THE SUSTAINABLE USE OF NATURAL COASTAL RESOURCES</b>  |
|                                    | This emphasises that natural coastal resources are a limited and valuable public resource, and if developed or used, this should be done wisely and deliver proven net community and public benefit for current and future generations  |
|                                    | Only when the above principles have been considered and addressed:  |
|                                    | <b>4 ENSURE DEVELOPMENT ON THE COAST IS LOCATED WITHIN EXISTING, MODIFIED AND RESILIENT ENVIRONMENTS WHERE THE DEMAND FOR DEVELOPMENT IS EVIDENT AND ANY IMPACTS CAN BE MANAGED SUSTAINABLY</b>   |
|                                    | This aims to ensure that development on and adjacent to the coast is of high quality design, sensitively sited, suitable and sustainable over the longer term. Development on coastal Crown land must have a demonstrated need to be located on the coast and a demonstrated public benefit.              |

**Figure 48 - Principles in the Victorian Coastal Strategy 2014**

Desired outcomes and policy guidance arising from these four principles includes:

- The environmental value of coastal resources is recognised and appreciated, and their protection is paramount.
- Access and use in onshore environments are well managed, with appropriate tools such as disturbance buffers, to ensure protection of threatened plants and animals.
- The quality and quantity of water entering wetlands, estuaries and marine waters is improved on a priority basis through:
  - Improved wastewater and stormwater treatment and re-use, with a focus on urban growth areas in coastal catchments.
  - Promotion of changes in land use and farming practices to reduce the impact of catchment discharges which have adverse effects on the health of coastal and marine ecosystems.
  - Better understanding the volume of flow and the quality required to sustain ecologically functioning wetlands, estuaries and marine environments.
- Development within sand dunes and low lying coastal areas is avoided.
- New development, reuse and redevelopment avoids areas subject to coastal hazards, does not interfere with natural coastal processes, and accommodates biodiversity connectivity and adaptation.
- Coastal settlements support the protection and enhancement of environmental, social and cultural and economic values of the coast.

- Non-urban breaks are maintained between coastal settlements to preserve the character of the coastline and coastal settlements.
- Settlement planning directs growth to areas suitable for accommodating sustainable growth.
- Local communities value our natural coastal and marine landscapes, flora and fauna.
- New buildings and infrastructure exhibit excellence in siting and design that integrates with the coastal landscape and setting, while also avoiding environmental impacts.
- The carrying capacity of coastal locations designated for use and development determines the level of visitor and tourist services provided in that location.
- Communities access the coast in ways that minimise risks to public safety and protect coastal and marine environments.
- Community-based clubs (e.g. lifesaving clubs, sailing clubs) are supported in their use of the coast in ways that minimise environmental impacts, are within an appropriate spatial footprint, and provide coastal access and use for the broader community.
- A sustainable network of facilities for recreational boating and water-based activity is developed, responding to use and safety considerations, carrying capacity of coastal locations, coastal processes, and the environment.
- A balance is achieved between environmental values, general access to the coast, and access for boating and water-based activities.

### 5.2.6 Other Reports

Other reports of relevance to this project include:

- Bellarine Peninsula Strategic Plan (2006-2016).
- Corio Bay Coastal Action Plan (2005).
- Open Space Networks (2001).
- Bellarine Peninsula and Leisure Needs Study (2005).
- Boating Coastal Action Plan (2007).
- Environmental Management Strategy (2014-2017).

Key directions from these documents in relation to land use and development includes:

- Retaining the Farming Zone outside the settlement boundary to preserve the urban/rural break and landscape setting. (Bellarine Peninsula Strategic Plan)
- Restriction of urban development to existing urban boundaries and identified growth areas as defined by the Greater Geelong Planning Scheme. (Corio Bay Action Plan)
- Restrict further development of the coastline for rural living, caravan/holiday parks or intensive recreation facilities. (Corio Bay Action Plan)
- Built form within this precinct should be minimised to protect the rural landscape viewed both from the water and land. (Corio Bay Action Plan)
- Coasts and Marine objectives must consider:
  - Climate change and outcomes of Geelong and Queenscliff Local Hazard Assessment project.
  - Protection of areas of national significance.
  - Protection of indigenous sites.

- Managing, litter, transport and other usage impacts.
- International best practice and establishment of benchmarks.
- Resolution of edge effects from management. (Environmental Management Strategy)

The Corio Bay Coastal Action Plan also deals specifically with the Leopold Curlewis Area. Figure 49 provides a Precinct map for this area. Detail in the Action Plan regarding this Precinct includes:

- The area provides an important marine environment for aquaculture.
- Issues due to: rural living development impacting the coast through septic tank seepage and illegal jetties; coastal erosion and problems with illegal measures for beach renourishment; growth and decline cycle of seagrass beds; limited access to the coast due to private ownership to the high water mark; and the need to manage unauthorised private boat launching, erosion protection, access infrastructure, and beach nourishment works.
- Objectives including:
  - To protect the coastline from further inappropriate development.
  - To prevent illegal beach renourishment from recurring.
  - To protect the seagrass ecosystem and shallow rocky reef on the southern shoreline of the Geelong Arm.
  - To improve the environmental performance of existing development adjacent to the coast.
  - To protect features of geological significance.
  - To remove illegal structures from the coastline.
- Strategic directions including:
  - Support existing policies and directions of the Greater Geelong Planning Scheme to restrict further development of the coastline for rural living, caravan/holiday parks or intensive recreation facilities.
  - Identify where illegal beach renourishment is occurring and act to prevent its recurrence; this could involve both public education and enforcement of relevant statutory controls.
  - Allow coastal sediment processes to occur without interference.
  - No further urban or rural residential subdivision is to be promoted in the Precinct.
- Design guidelines requiring:
  - Built form within this Precinct should be minimised to protect the rural landscape viewed both from the water and land.
  - Dwellings and other structures in this Precinct should be low profile and sit within the topography of the land as detailed in the Victorian Design and Siting Guidelines for the Coast (1998).
- Implementation actions including:
  - Liaise with management of caravan parks to achieve continuous improvement in environmental management. This includes increased setbacks, primary dune rehabilitation and improved sewage management.
  - Wherever possible promote opportunities to either regain public ownership or public access along the foreshore.

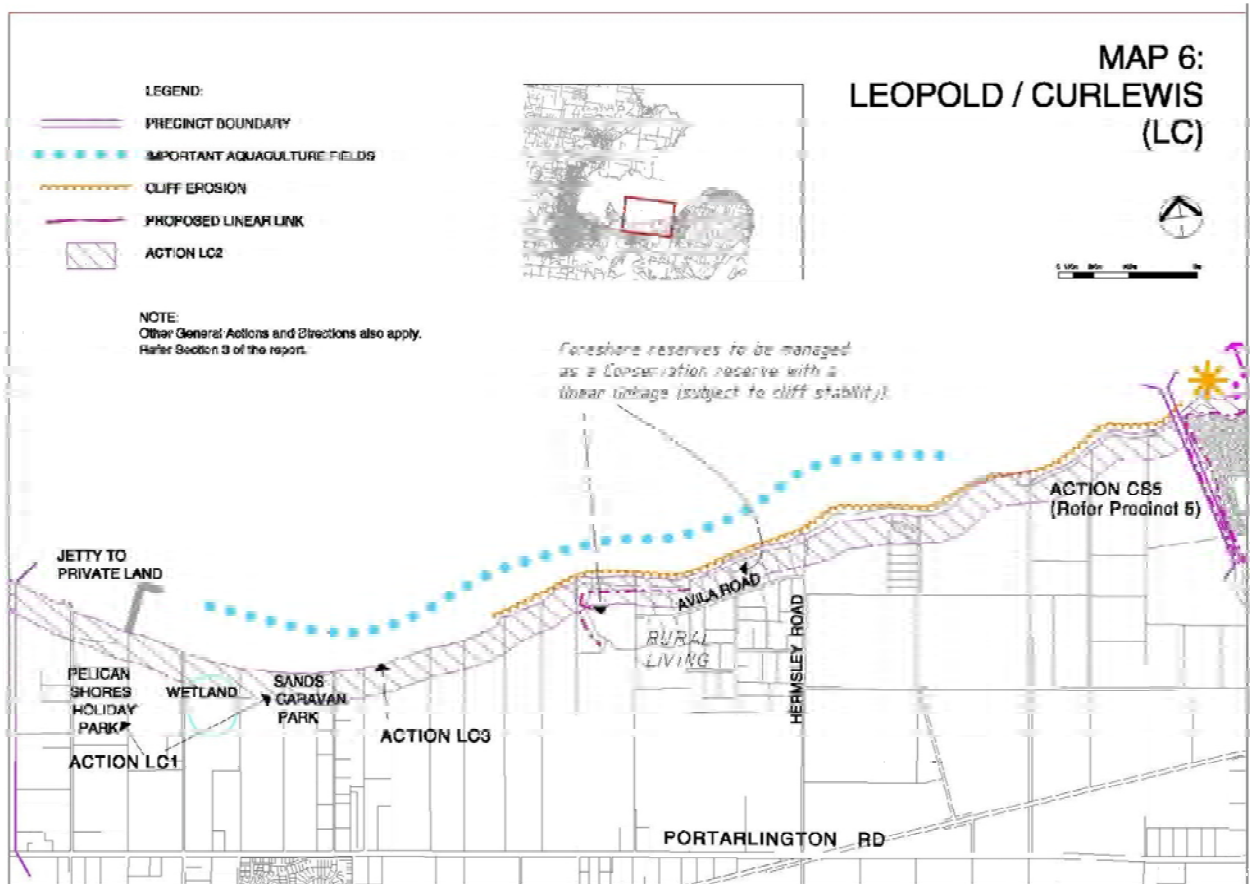


Figure 49 - Corio Bay Coastal Action Plan - Precinct 6 Leopold / Curlewis

### 5.3 Access to Community Infrastructure

Community infrastructure including open space is available within the township of Leopold. No infrastructure is available within the Study Area. Access to these services and facilities for those currently residing within the Study Area is limited due to a lack of public transport services and lack of direct pedestrian access. The capacity of some of the existing services in Leopold is also limited. Further discussion regarding community infrastructure provision and access is provided in Section 6.10 of this report.

### 5.4 Access to the Bay

The issue of access to the Bay relates to two access parameters: 1) Physical access into the Bay using boats and access to the foreshore; 2) Passive access to the Bay through visual/indirect enjoyment of the foreshore area. Community expectations regarding access to the Bay are likely to have been influenced by consistent discussion of investigating opportunities in the structure planning process and consistent discussion by a landowner of a leisure park concept with would provide public access to the Bay.

Currently there is no public access to the Bay and its foreshore within the Study Area, due to land titles extending to the high tide line. Whilst three roads in the Study Area extend to the Bay, no public land is available from which the community can access the foreshore or immediate area.

Lack of public land in foreshore areas is not unique to Leopold. It is common in rural areas across Victoria with 4% of the State's coastline in private hands. In these situations, it is difficult for the public

to access the foreshore directly and expensive for Councils or State Governments to acquire land to provide such access.

### 5.4.1 Existing Physical Access

In a regional context, physical access into the Bay by boat has been reviewed to determine the need for additional access opportunities at Leopold.

The ‘Asset Sheet for Boating Facilities,’ (2013) undertaken by the Central Coastal Board, identifies the current boating facilities provided for each region of Port Phillip Bay, including the Bellarine Peninsula. The Boating Facility Sheet ranks each facility on the Boating Service Levels Index (BSLI). This index is formed through a number of factors including the facility condition, adequacy of car parking, safety and ease of land access, safety and ease of water access, infrastructure/facilities and current environmental impacts. Each facility is rated, based off its index, ranging from poor (barely functional) to excellent (well designed and functional).

In relation to the Study Area, there are two local boat ramp facilities, the Sands Caravan Park (2M) and the Pelican Shores Caravan Park (2L), located within close proximity. These facilities are rated as ‘poor’ and ‘average’ (functional but not in good condition) respectively.

A multipurpose and district level boating facility is provided at the Clifton Springs Boat Harbour (2K). This facility is described as average on the BSLI index. This facility is due to be expanded to double in size, providing a two lane ramp which will allow four boats to be launched at once and parking for over 80 vehicles. Dredging is regularly required around this boat ramp to maintain access to the Bay for boats.

As illustrated on the boating facilities map, numerous other boating facilities are provided along the Bellarine Peninsula, ranging from local, district and regional level facilities. The St Leonards Yacht and Motor Squadron (2B) is the only facility on the Bellarine Peninsula that is described as ‘good’ (functional and in good condition) on the BSLI index.

Within the Geelong area, a number of boating facilities are also provided. The district level boat ramp located at Limeburners Point is the closest facility to the Study Area located within the Geelong region. This facility is described as ‘good’ on the BSLI index.

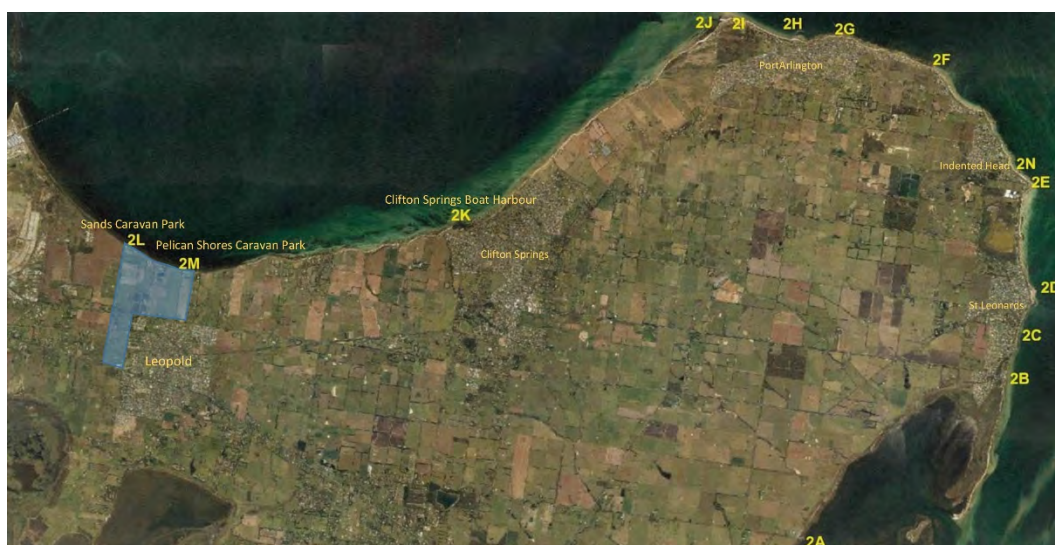


Figure 50 – Boating facilities locations

In addition to the facilities identified above for boating, the Portarlington Harbour is identified for a significant upgrade. Council has partnered with the State Government to develop a business case for the Harbour. This will provide a much needed enhancement of the existing marine infrastructure at Portarlington, which currently comprises the pier, breakwater and a limited number of berths, as well as the creation of local employment and the enhancement of the leisure activities and tourism opportunities in this area of the Bellarine Peninsula. This enhanced facility will be located approximately 20 kilometres from the Study Area. The development of the facility is guided by a Master Plan prepared by Parks Victoria in 2009 and an implementation plan is currently being prepared by Council and the Department of Economic Development, Jobs, Transport and Resources. The Master Plan shows the facility will include up to 45 commercial berths and 100 recreational berths.

#### 5.4.2 Strategy Intent for Bay Access

A number of strategic studies and reports provide policy direction on providing access to the Bay in this context and location. The direction is summarised below with corresponding commentary regarding the impact on Bay access provision in Leopold.

- Increase the availability of suitable publically owned foreshore land to the public for recreational use. (Corio Bay Coastal Action Plan)
- Given titles within the Study Area extend to the high tide mark it is difficult for Council to secure foreshore land without the acquisition of land through development (cash) contributions or Public Open Space provisions. There are better suited locations along the Corio Bay foreshore where Council would be able to provide areas for recreational uses. This includes areas with crown land along the foreshore with fewer environmental constraints.
- Improved quality of boating facilities at key existing sites and rationalisation as appropriate. (Corio Bay Coastal Action Plan and Bellarine Peninsula and Leisure Needs Study)
  - This direction relates to improving quality at existing sites around the Peninsula rather than providing additional facilities in places where there are no existing public boating facilities such as at Leopold. Council has shown priority for improving boating facilities in other locations including at Clifton Springs (doubling of boat ramp and parking capacity) and Portarlington Safe Harbour.
- Within the Corio Bay area there is a strong desire to promote greater public access to the foreshore areas of the Bay for recreation use. This, however, needs to be balanced with equally strong desires to protect areas of conservation significance, regenerate natural coastal environments and promote the economic activity of the Geelong Port. (Corio Bay Coastal Action Plan)
  - The Leopold foreshore and immediate coastal area has been identified as being home to a significant sea grass meadow. As such, the need to conserve this meadow and allow its continued regeneration should be considered and balanced with the desire to provide greater public access to the foreshore in a physical manner. Other parts of the Corio Bay may be more appropriate to provide greater access to the Bay for recreation use (boats and the like).
- Community desire to maintain and improve, where possible, public access to foreshore and marine environments. (Corio Bay Coastal Action Plan)
  - Leopold's community has expressed a desire for access to the Bay, if possible. This desire has been supported by commitments by Council to investigate the possibility of providing access as part of the broader structure planning processes.
- Where possible, public access to the foreshore is to be promoted other than in areas occupied by port or industrial related activities, unstable cliff areas or areas of environmental significance. (Corio Bay Action Plan)

- As noted above, the Leopold foreshore comprises a significant sea grass meadow which may restrict the provision of public, physical access into the Bay within the Study Area.
- Recognises the need for managed access to areas of sensitivity, such as the northern shoreline of the Bellarine Peninsula between Point Henry and Clifton Springs. (Open Space Networks)
  - This direction supports the provision of access (in a managed way) to the shoreline in the vicinity of the Study Area. However, as noted previously other opportunities between Point Henry and Clifton Springs may be more appropriate locations to provide access.
- Develop sub-regional Linear and Linkage routes to Lake Connewarre in the south, Corio Bay in the north and the Barwon River in the south-west. (Open Space Networks)
  - This particular direction is not specifically relevant to the project but identifies alternative priorities for public recreation opportunities within the Municipality.
- Recommends that the existing limited access to the northern shoreline of the Peninsula between Point Henry and Clifton Springs (including north of Leopold) be maintained to protect this area because of its environmental significance and the potential location of culturally significant sites. (Open Space Networks)
  - This direction supports restriction of access to the foreshore in the vicinity of the Study Area due to its environmental significance (sea grass meadows).
- Wherever possible, promote opportunities to either regain public ownership or public access along the foreshore. (Bellarine Peninsula Recreation and Leisure Needs Study and Corio Bay Coastal Action Plan)
  - Efforts to regain access in locations where there is currently none such as within the Study Area are to be encouraged where possible.
- There is a demand for safe harbour developments and overnight berths at strategic locations around the Bays as well as demand for casual berthing infrastructure and regimes at key locations and destinations across the region. (Boating Coastal Action Plan)
  - The Portarlington Safe Harbour will address this demand. Portarlington also represents a key destination with the proximity of tourist facilities including beaches, wineries and major events such as the muscle and Celtic festivals. Leopold is not considered a key tourist location/destination.

## 5.5 Conclusions from Policy Analysis

The physical context in which the Study Area is located and the policy context in which land use and development decisions will need to be made are outlined in the previous pages. In summary, the key directions this context provides are as follows:

- Leopold township's settlement boundary directs development to areas south of Portarlington Road and east of Melaluka Road to maximise access to services. This includes provision of growth areas to the south-east of Leopold.
- Policy requires protection of urban breaks between Geelong and the Bellarine townships including the rural areas around Leopold.
- Development of land in the broader area needs to be considered in the context of overall land supply.
- Development of low lying coastal areas and areas subject to coastal hazards is to be avoided.
- Coastal climate change impacts are to be considered including planning for a 0.8m rise in sea level by 2100.
- Environmentally significant coastal areas are to be conserved and the health of the Bay enhanced.

- Development is to be appropriate to the location's context including rural landscapes and be sustainable with limited impacts on water quality and quantity as well as natural coastal processes.
- Public access and recreation facilities around the Bay are to be improved and access options for Leopold residents are to be investigated as a means of enhancing the value of coastal areas to the community.
- Development around the sub-regional retail activity centre in the Southern Precinct of the Study Area including increased housing density is encouraged. Melaluka Road could be a key focus for future development of Leopold.
- Boating facilities should be provided via a sustainable network based on the carrying capacity of coastal locations and environmental significance. Existing facilities in the Bellarine Peninsula provide for the needs of the community for physical access into the Bay.
- A balance between providing coastal access and environmental protection is required.
- Further development of the coastline for caravan parks and intensive recreation facilities is to be restricted.
- Access to services, particularly community facilities and open space in Leopold is limited and would be stretched by further growth outside the existing settlement boundary.

This policy summary leads Spiire to the following conclusions regarding development and Bay access within the Study Area:

- Current policy does not support extensions to the existing development extent of Leopold, particularly north of Portarlinton Road. Portarlinton Road forms a distinctive northern boundary for the township.
- Bay access opportunities are desirable yet must be appropriately located to maximise benefits to the community. Bay access opportunities must also consider the environmental significance of the location. Leopold's foreshore is not considered to be an ideal location given these factors.
- Development in the Southern Precinct is encouraged in preference to development north of Portarlinton Road.
- Development of the Study Area would need to be considered in the context of overall land supply in the wider area and densities should be consistent with those in the Leopold township to maximise resource efficiencies.
- Development in the Study Area would need to be located away from the anticipated 2100 coast line and would have to include appropriate drainage measures to minimise impacts on water quality.
- Development in the Study Area would need to be relatively self-sufficient in the provision of open space that is unencumbered.

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## **6 Issues, Assets and Constraints**

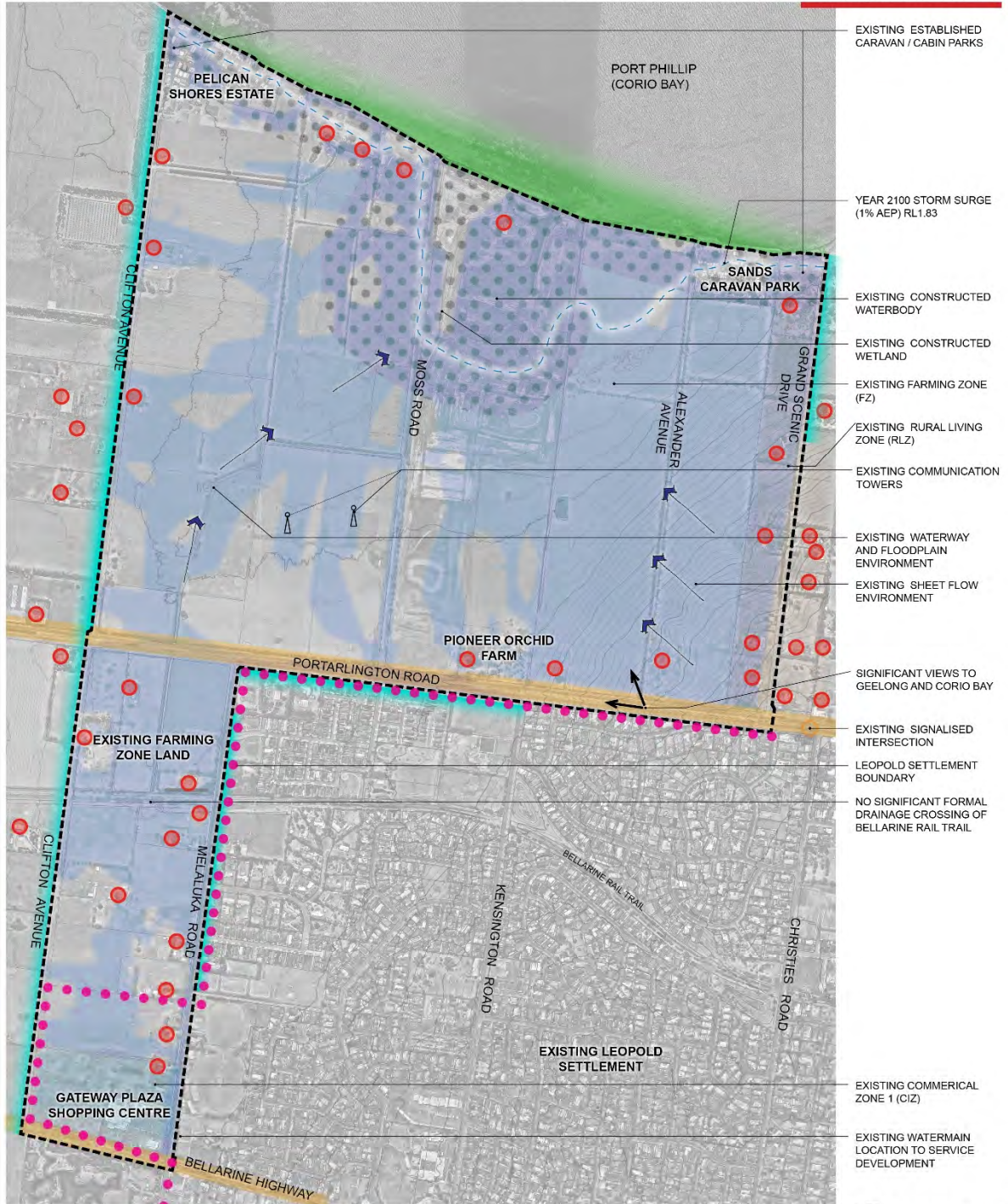
This section of the report analyses the key issues, assets and constraints that impact the Study Area and provides commentary on how they affect considerations for future development and land capability.

### **6.1 Overall Constraints**

An overall constraints plan (Figure 51) has been prepared, which identifies the relevant factors that affect land capability in the Study Area. Figure 51 shows the Study Area is constrained by a number of matters including:

- Anticipated future sea level rise.
- Existing development levels including dispersed rural dwellings and caravan parks.
- Flooding and drainage issues.
- Characteristics of Corio Bay itself including seagrass meadow and tide levels.
- Traffic barriers and access issues.

## LEOPOLD NORTH LAND CAPABILITY & BAY ACCESS - CONSTRAINTS



### LEGEND

- STUDY AREA BOUNDARY
- 1M CONTOURS
- FLOW DIRECTION
- EXTERNAL STORMWATER AND FLOOD WATER
- EXISTING SEA GRASS MEADOW
- CULTURAL HERITAGE SIGNIFICANCE
- LEOPOLD SETTLEMENT BOUNDARY
- EXISTING 1% AEP FLOOD EXTENT
- EXISTING BUILDINGS
- MAJOR ROAD

### STUDY AREA TYPICAL CONSTRAINTS

- EXISTING FLORA AND FAUNA
- EXISTING AGRICULTURE
- PUBLIC TRANSPORTATION
- ACCESS AND DISTANCE TO SHOPPING CENTRES
- LEOPOLD SETTLEMENT BOUNDARY
- EXISTING FLOODING
- SEA LEVEL RISE
- SEGREGATION OF PORTARLINGTON ROAD
- EXISTING TIDAL PROCESSES
- CROWN OWNERSHIP
- BATHYMETRY (UNDERWATER TOPOGRAPHY)
- EXISTING SEA GRASS MEADOW
- CULTURAL HERITAGE SIGNIFICANCE

- RECREATIONAL USE
- ACCESSIBILITY
- EXISTING VIEWS
- FLOOD WATER OVERTOPS PORTARLINGTON ROAD
- TRAFFIC SPEED AND TRAFFIC VOLUMES ON MAJOR ROADS



Figure 51 - Constraints Map

## 6.2 Technical Considerations and Potentially Developable Areas

Fundamental to any development within the Study Area is the capability of the land to be developed based on identified technical constraints.

Estimating the extent of potentially developable land is an iterative process of assessing the constraints to development and determining by what means the constraints can be appropriately managed within a development scenario. The technical constraints that have formed the basis of estimating the extent of potentially developable land are summarised below and the methods by which these constraints can be managed is discussed further in Sections 6.3 to 6.10.3.

Appendix 5 discusses the assumptions made for each technical consideration in establishing an estimated developable area.

| Ref. | Technical Consideration                      |
|------|--|
| 1    | Flora and Fauna                              |
| 2    | Seagrass                                     |
| 3    | Cultural Heritage                            |
| 4    | Soil Conditions                              |
| 5    | Sea Level Rise (SLR)                         |
| 6    | Flooding within Study Area                   |
| 7    | Local Drainage within the Study Area         |
| 8    | Water Quality and Retardation                |
| 9    | Setting the Lowest Development Contour       |
| 10   | Flooding and Drainage Outside the Study Area |
| 11   | Staging and Infrastructure Delivery          |
| 12   | Traffic Access                               |
| 13   | Provision of Reticulated Services            |
| 14   | Provision of Community Infrastructure        |

**Table 1: Technical Considerations to Estimating Developable Land Extent**

Figure 52 identifies the potentially developable areas within the Study Area as a consequence of analysing the known technical constraints. This has resulted in the identification of two potentially developable areas:

- Land north of Portarlinton Road – 96 hectares
- Land south of Portarlinton Road – 42 hectares

Extending development towards the year 2100 coast line, north of the identified 'Potentially Developable Area', is expected to require significant design and engineering works to mitigate the constraints to developing in this lower lying land. Works to facilitate development in this area will largely be required to facilitate serviceable drainage and flood management measures. Filling of the land and/or provision of surface drainage networks may allow for development to extend beyond the identified 'Potentially Developable Area'. However, this has only been considered as a 'Possible Additional Developable Area' and not been considered further due to the expected significant works to achieve a serviceable development.

## LEOPOLD NORTH - POTENTIALLY DEVELOPABLE AREAS

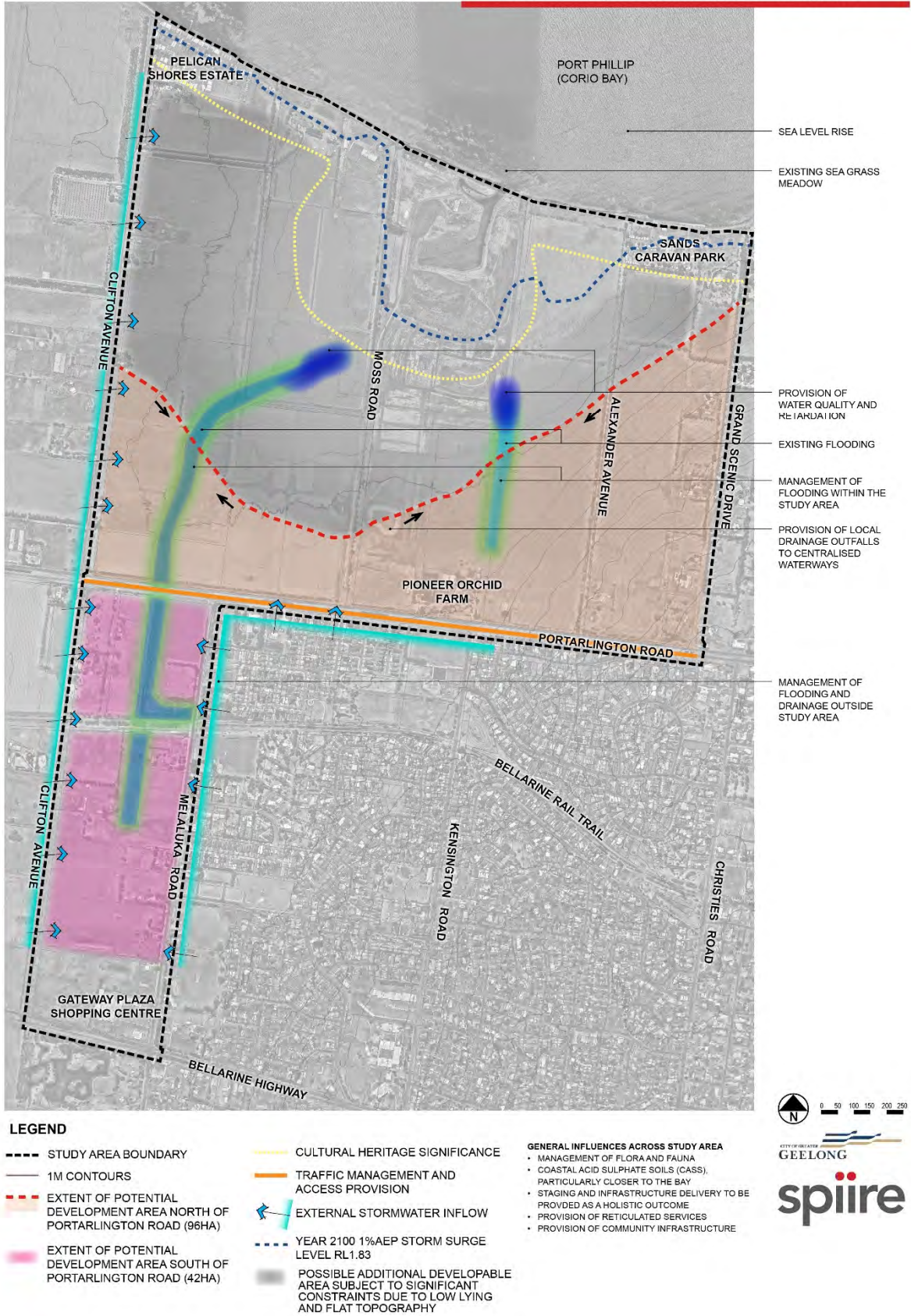


Figure 52 - Potentially Developable Areas

Based on the estimated extent of developable area, the following sections further discuss the key constraints and opportunities for the Study Area focussed on the following:

- Flora and Fauna.
- Seagrass.
- Cultural Heritage.
- Soil Conditions.
- Drainage, including management of stormwater and flooding and Coastal processes.
- Access and Transport.
- Reticulated services.
- Community infrastructure.
- Access to the Bay.

### 6.3 Flora and Fauna

The Study Area, whilst largely cleared of vegetation, still contains flora and fauna which needs to be considered when looking at development and Bay access potential. Any flora and fauna constraints on the Study Area are likely to be limited and should not inhibit development. Therefore, Flora and Fauna has been considered at a desktop level only.

Ecological Vegetation Classes are present in the Study Area, with EVC 13.1 Plains Woodland and Forests – Freely Draining evident in dispersed areas through the site. EVC 5.2 Lower Slopes or Hills Woodlands - Grassy is also evident to the immediate east of the Study Area. Whilst these EVCs are present there is very limited tree cover throughout the Study Area, with the exception of windrows along some of the roads including Alexander Avenue.



Figure 53 - Ecological Vegetation Groups (2005)

The Study Area is within Location Type A (low) in terms of vegetation significance and risk.

In addition to flora and fauna on land within the Study Area, State mapping data indicates there is significant coastal vegetation along the Bay edge. Furthermore, there is a saline wetland within the area and there is potential for frog habitat along the existing drainage lines.

#### **Flora & Fauna Conclusions**

*Should land in the Study Area require further clearing, it is likely a flora and fauna assessment and native vegetation analysis will be needed to ensure vegetation is appropriately considered. It is unlikely that flora or fauna will inhibit development of the Study Area.*

#### **6.4 Seagrass**

A high quality seagrass meadow is located directly off shore from the Study Area. Figure 54 below shows Seagrass distribution in the Bay in 2000. Seagrasses are aquatic angiosperms and meadows are typically found in water depths of 2 to 12 metres due to sunlight intensity. They colonise mud, silt and sand and assist in stabilising sediment making them important for water quality, aquatic lifecycles and preventing coastal erosion.

A report by Blake and Ball in 2001 on Seagrass Mapping of Port Phillip Bay highlights the presence of seagrass mainly in the southern half of the Bay, including around Corio Bay and the Geelong Arm in which the Study Area is located. Specifically, the 2001 report noted the highest seagrass leaf biomass was between Clifton Springs and Point Henry and in particular, to the west of the Seabrae Caravan Park (now known as Pelican Shores). The Sands Caravan Park, located near the eastern edge of the Study Area, was a specific case study in the 2001 report which concluded *“the site forms part of an almost continuous band of seagrass on the southern shores of the Geelong Arm that typically extends from Point Richards to Stingaree Bay.”*

Threats to Seagrass in Victoria are identified in the ‘Marine and Freshwater Institute Report Np. 39 – Seagrass Mapping of Port Phillip Bay’ (2001) and arise from population pressures in the coastal zone coupled with climate change impacts. These factors lead to:

- Greater sediment and nutrient loads entering nearshore systems.
- Mechanical damage from commercial (e.g. dredging, commercial fishing techniques) and recreational (e.g. propeller scaring, anchor damage, trampling) activities.
- Alterations of hydrodynamic regimes (e.g. regulation of freshwater flows, alteration of nearshore circulation by built structures and modification of bathymetry).

#### **Seagrass Conclusions**

Consideration of the impact of any works proposed on the seagrass will be required. *Coastal Management Act Consent* may be required.

The construction of infrastructure to service development in the Study Area or to provide physical access into the Bay (jetty/boat ramp) would need to be designed to minimise impacts on the seagrass.



Figure 54 - Seagrass Distribution 2000 (Source: Seagrass Mapping of Port Phillip Bay, Blake & Ball 2001)

## 6.5 Cultural Heritage

The Study Area's location on the edge of Corio Bay and the existence of natural waterways means the coastal edge and low lying central area are areas of Aboriginal Cultural Heritage Sensitivity (See Figure 55). Whilst this area is listed as sensitive, it is evident significant disturbance has already occurred, particularly in the creation of the constructed waterbody.

### Cultural Heritage Conclusions

Should full scale development and subdivision be sought in the Study Area, a Cultural Heritage Management Plan would likely be required to deal with the potential for aboriginal artefacts within the more sensitive areas around the foreshore and waterbodies.



Figure 55 – Cultural Heritage Sensitivity

## 6.6 Soil Conditions

The Study Area is identified as a hot spot for Coastal Acid Sulphate Soils (CAS Soils) according to State Government mapping, which may impact the scale and type of development that could occur in the area. CAS Soils have one or more layers of soil that: contain metal sulphides, or contain metal sulphides and, because of partial oxidation of the metal sulphides, also contain sulphate, and are acidic; or are acidic and contain sulphate due to the complete oxidation of the metal sulphides to sulphuric acid.

Figure 56 identifies land within the Central Precinct of Victoria’s coast line which has “Made” or “Prospective” CAS Soils. Prospective Land is land that has the potential to contain Coastal Acid Sulphate Soils as indicated by geomorphology. Made Land is land that has been modified by human agency. Here, the geomorphic features that indicate the potential to contain Coastal Acid Sulphate Soil, no longer exist. Assessment of potential depends on information such as geology maps or soil maps that pre-dates modification. Land within the Study Area is shown to include both Prospective and Made land in the context of CAS Soils; this is shown in Figure 57.

CAS Soils may impact on development of coastal lands. The Victorian Government in its 2010 report *Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulphate Soils* identifies best practice management strategies for CAS Soils as follows:

- The first priority being to avoid disturbance of CAS Soils at all sites, followed by:
- Minimise disturbance.
- Prevent oxidation.
- Treat to reduce or neutralise acidity.
- Offsite reuse or disposal.

### Soils Conclusions

Given the potential presence of CAS Soils, further investigation would be required to support any strategic land use change or development in the Study Area.

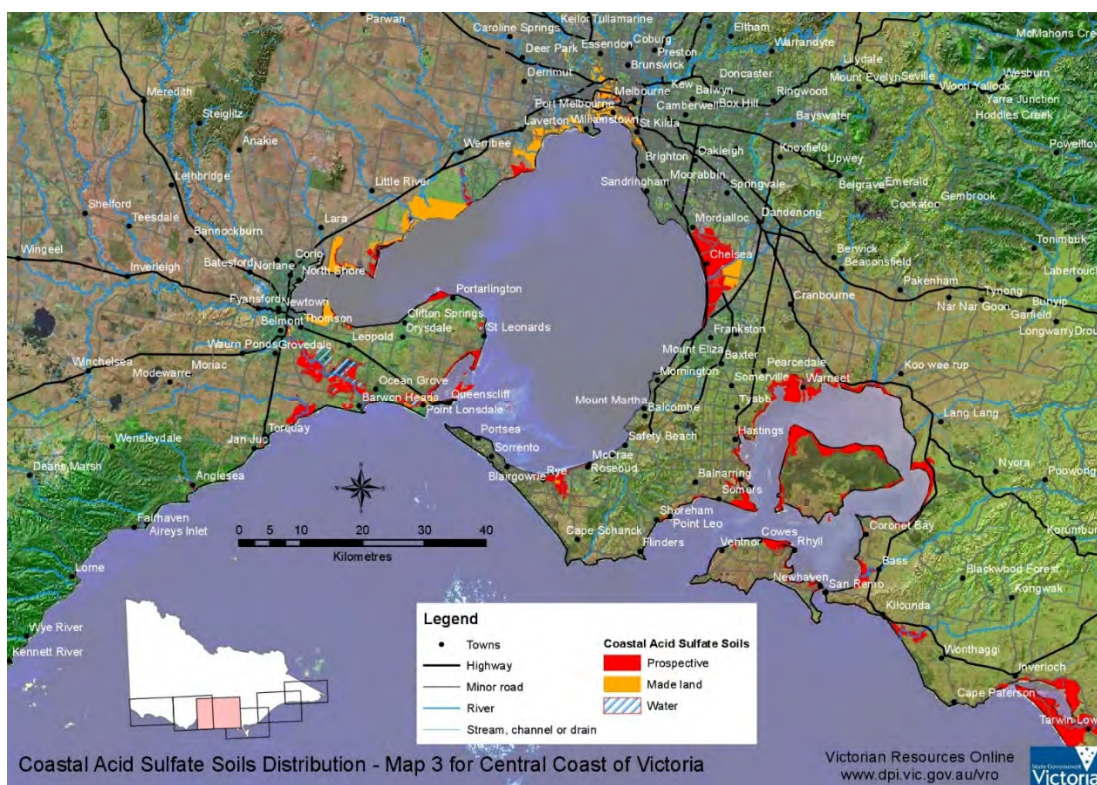


Figure 56 – Coastal Acid Sulphate Soils Distribution (Central Precinct)



Figure 57 – Central Acid Sulphate Soils Distribution with approximate location of Study Area

## 6.7 Drainage

Drainage and flooding is a major issue within the Study Area. An initial assessment of the current drainage and flooding regime with consideration of year 2100 sea level rise and critical storm surge levels has been assessed for the Study Area. This identified that part of the Study Area is impacted by year 2100 sea level rise and storm surge levels (Figure 52) resulting in development potential being limited to areas outside these impacts.

The existing drainage infrastructure in the Study Area plays an important role in stormwater management for part of the existing residential and rural areas of Leopold. Development within the Study Area would require significant drainage upgrades to manage stormwater quality, peak flows, floodwater and the existing drainage and floodwater from the surrounding catchment.

Figure 60 – Drainage Opportunities and Constraints Map identifies the major drainage and flooding opportunities and constraints associated with the Study Area.

### 6.7.1 Historical and Existing Conditions

Figure 58 provides an overview of the existing drainage conditions. When read in conjunction with the aerial images provided in Section 4.4, this gives context to the historical conditions of the Study Area.

The Study Area is approximately 342 ha and lies within a catchment of approximately 1100 ha, extending from the Bellarine Highway in the south to the outlet at Corio Bay in the north. The catchment can be generally characterised as:

- Open, agricultural land with some man-made defined drainage channels in the north and west, and little (to no) provision of reticulated drainage infrastructure to convey stormwater.
- Urbanised in the south eastern portion, corresponding to the existing township of Leopold, where Council has existing drainage assets. The existing drainage system can be described as a 'pre-1980 drainage system' with underground drainage of limited capacity (lower order minor storms) and a lack of clear overland flow paths for surcharge or excess flow.

Grades in the catchment range from approximately 6% in the upper reaches of the catchment and 0.2% in the low lying land north of Portarlington Road.



**Figure 58 – Existing drainage conditions**

Figure 58 identifies the existing drainage conditions for the Study Area in context with the overall catchment.

A naturally occurring depression (historical swamp) exists immediately upstream of Corio Bay. This is a historical natural depression, which is defined by the feature lines “swamp”, and within that “lake”, in the VicMap data set. A large portion of the catchment drains into this depression before discharging to the Bay. The constructed waterbody impinges into this depression and provides direct connection from the depression to the Bay. Adjacent to the depression is a constructed wetland with a constructed causeway in the south east corner that controls the overflow of water into the depression. Though not originally a naturally occurring waterbody, this wetland has intrinsic value as a habitat for aquatic ecology and birdlife. It is believed the wetland discharges to the Bay via an open drain in the North West corner during low flows, and over the constructed causeway during larger rain events. Further, the levels in the historical depression are believed to have been altered, and the overall depression area reduced through filling. This is possibly as a result of the construction of wetland and waterbody and the disposal of fill.

The open drain that runs down the Moss Road alignment from Portarlington Road (referred to as “Moss Road Drain”) discharges to Corio Bay via the wetland; running in to the wetland at the south western corner and out in the north west.

Approximately 350m upstream of the wetland, the Moss Road Drain is met by another drain from the west (referred to as “Main Valley Drain”). This drain follows the designated watercourse alignment north of Portarlington Road then heads east through a constructed drain. Main Valley Drain follows the main valley of the catchment, albeit broad and relatively gentle in grade – approximately 1 in 300 – from the upstream culverts under Portarlington Road towards the Bay.

The Main Valley Drain sits in a floodplain environment that plays a critical role in management of peak stormwater flows. During peak storm events, the broad floodplain allows for stormwater to overtop the channelised drainage corridors and be conveyed to the Bay. The floodplain also provides for floodplain storage of the flood water that would need to be maintained as part of any change in land use.

The catchment south of Portarlington Road slopes in a general North West direction. Portarlington Road and the Bellarine Rail Trail present a barrier to flows draining north. Portarlington Road is a dual carriageway road with two lanes in each direction, with a grassed swale between the two carriageways. There are a number of culverts underneath Portarlington Road. An open channel between Clifton Avenue and Melaluka Road conveys flows to Portarlington Road to meet the existing Main Valley Drain to the north. Upstream of this channel on the south side of the Bellarine Rail Trail flows are impeded by the Rail Trail embankment. As such, an informal retardation basin is formed upstream of the Rail Trail.

Further east, stormwater from the upstream residential area is piped under Portarlington Road at Kensington Road which discharges into an open drain (referred to as “East Drain”) approximately 1 km upstream of the Bay.

Existing drainage infrastructure present in the drainage catchment includes the following:

- Drainage pipes from existing residential development discharging to the drainage channel within the Study Area south of Portarlington Road.
- Major roadway: Portarlington Road, approximate width 35 m.
- Open channels:
  - ‘Main Valley’, beginning downstream of the Bellarine Rail Trail between Melaluka Rd and Clifton Avenue, under Portarlington Road, across open farm land and joining the Moss Road open channel through a set of culverts.

- 'Moss Road', begins on the north side of Portarlington Road at the outlet of culverts at the location of Moss Road. Discharges into a wetland adjacent to the natural depression before continuing in channel to the Bay.
- 'East', from the outlet of the drain, from the Kensington Road under Portarlington Road, continuing directly north to discharge at the Bay.
- Crossings under Portarlington Road:
  - 4 x 825 ø mm Between Melaluka Rd and Clifton Av.
  - 1 x 900 ø mm Moss Road.
  - 1 x 1275 ø mm Kensington Road.
- Constructed wetland.
- Weir/causeway feature controlling spill from wetland to natural depression.
- Constructed waterbody.
- Informal retarding basin upstream of Portarlington Road and Bellarine Rail Trail.

## 6.8 Flood Mapping

An existing hydraulic model of the catchment has been provided to Spiire by the City of Greater Geelong.

The model was produced using XPStorm which utilises the 2 dimensional flood modelling package TUFLOW. Terrain was represented using multiple domains of 4 m and 2m cells, with finer resolution through the existing township area to better capture flows through the streets and gutters, and 4m cells representing the terrain through more rural areas. Significant underground drainage elements are included in the model as 1D underground drainage elements.

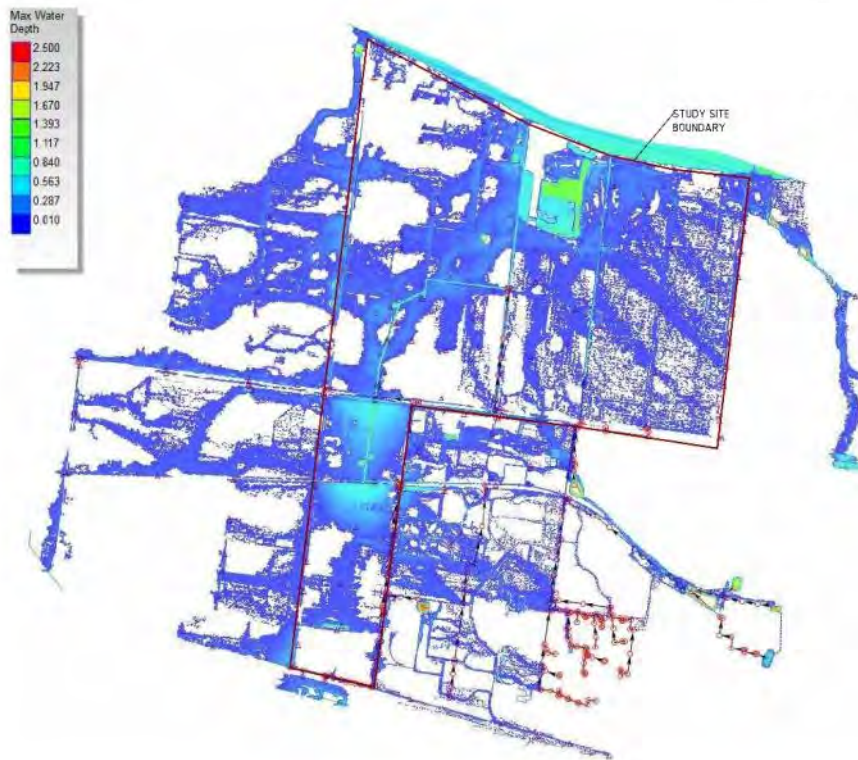
Hydrological analysis of the catchment was undertaken by City of Greater Geelong for the critical 1%AEP (Annual Exceedance Probability) rainfall event for the Main Valley Drain, being the 9 hour duration. This is not necessarily the critical event for the remainder of the catchment.

The results of the model are shown in Figure 59. This model shows the maximum flooding extent over the catchment during the critical rainfall event and excludes depths less than 10mm.

To the south of Portarlington Road, significant flooding can be seen banking up behind the Bellarine Rail Trail upstream of the open channel between Melaluka Road and Clifton Avenue. Further downstream more extensive ponding can be seen as water builds up and spills over Portarlington Road.

Significant areas of sheet flow can be seen to the north of Portarlington Road; most clearly evident in the flood extent from the eastern boundary to the drowned out constructed waterbody.

From where the "main valley" open channel runs through open paddock and turns west to join the "Moss Road" channel upstream of the wetland, major event flows spill across the floodplain and continue north east towards the low lying land around the constructed waterbody.



**Figure 59 – XPstorm Model Current 1%AEP Flood Extents**

The results of the modelling confirm that flood flows follow the floodplain valley across farmland towards the depression around the constructed waterbody. The formalised “main valley” channel in the floodplain does not have capacity to convey flows in the critical 1%AEP (Annual Exceedance Probability) event.

In-house modelling by City of Greater Geelong has demonstrated the current conditions peak flows in the Main Valley Drain north of Portarlinton Road do not exceed pre-development peak flows and this is likely due to the detention storage within the catchment and diversion drains along Kensington and Moss Roads.

### 6.8.1 Coastal Conditions

The Leopold coastline is on Corio Bay, part of the greater Port Phillip. The Bellarine Peninsula – Corio Bay Local Coastal Hazard Assessment (Cardno, Final Draft 2014) has been undertaken which in part informs the Coastal Conditions summary of this report, and should be present in any future considerations of development scenarios.

The topography of the coastline within the Study Area is such that it will be susceptible to inundation with any rise in current sea levels (Cardno 2014). The main geomorphic processes occurring along the coast adjacent to the Study Area is longshore sediment transport in an easterly direction and over washing and tide-action erosion, corroborating with potential susceptibility to inundation.

## Sea Level Rise

To assess the effect that sea level rise (SLR) will have on the Study Area the reference year of 2100 has been agreed upon by the Corangamite Catchment Management Authority (CCMA) and Council. In accordance with the Clause 13.01-1 of the Greater Geelong Planning Scheme, new greenfield developments must plan for no less than 0.8m SLR for the year 2100. Further to this 0.8m SLR, consideration must be given to the potential hazard of both high tide and storm surge.

## High Tide

The closest tide gauge to the Study Area is Point Richards Channel. The tidal planes data for this gauge has been provided by the Bureau of Meteorology (BOM). This data has been converted into a height in metres to the Australian Height Datum (AHD). The highest astronomical tide level at the Point Richards Channel gauge is 0.553 m. It can be concluded that the estimated highest astronomical tide level in year 2100 is therefore 1.353 m AHD (accounting for the additional 0.8 m SLR).

## Storm Surge

The effect of storm surge has also been considered. The data has been sourced from the Bellarine Peninsula – Corio Bay Local Coastal Hazard Study Assessment (Cardno 2014). The Cardno study assesses the probability and impact of 1% annual exceedance probability (AEP) wave height and storm-tide level occurring concurrently, which produces the 1% AEP storm surge level. Cardno estimate the current 1% AEP storm surge level to be 1.03 m AHD.

Adopting the year 2100 SLR of 0.8 m on top of Cardno's current estimated storm surge level yields a year 2100 1% AEP storm surge level of 1.83 m. This is assumed for the coastline area between Point Henry and Portarlington.

In summary, the key drainage data which needs to be considered in future development of the Study Area is as follows:

- Current highest astronomical tide level – 0.553m AHD.
- Current 1% AEP storm surge level – 1.03m AHD.
- Assuming 0.8m Sea Level Rise (SLR) to year 2100.
- Year 2100 highest astronomical tide level – 1.353m ADH.
- Year 2100 1% AEP storm surge level – 1.83m AHD (to be adopted as the downstream constraint for achieving a drainage outfall.).

### 6.8.2 Challenges

The interface between drainage infrastructure and the sensitive environment of the Bay presents many challenges. Some of these challenges which effect outlet works and configurations in the Bay are as follows:

- Sedimentation of open drain, due to:
  - Increased generation of sediment in the developed catchment.
  - Velocity of discharge too low.
  - Coastal processes blocking discharge to the Bay.
- Erosion within the drain along the embankment, and at the drain/shoreline interface, due to:

- Wave and tidal erosion.
- Longshore net sediment erosion.
- Disturbance of Coastal Acid Sulphate Soils (CASS) in the augmentation of the existing channel, installation of pipes and headwalls, or any other works.
- Construction of groynes.
- Bathymetric analysis to determine appropriate location and form of outlet structure.
- Risk to the public, such as swimmers and boats.
- Longshore sediment transport (to the east, Cardno 2014) at the beach face and further out in the Bay.
- Seagrass community:
  - Threat to seagrass community if fresh water flows are too large or frequent.
  - Impacts to seagrass community through disturbance/construction.

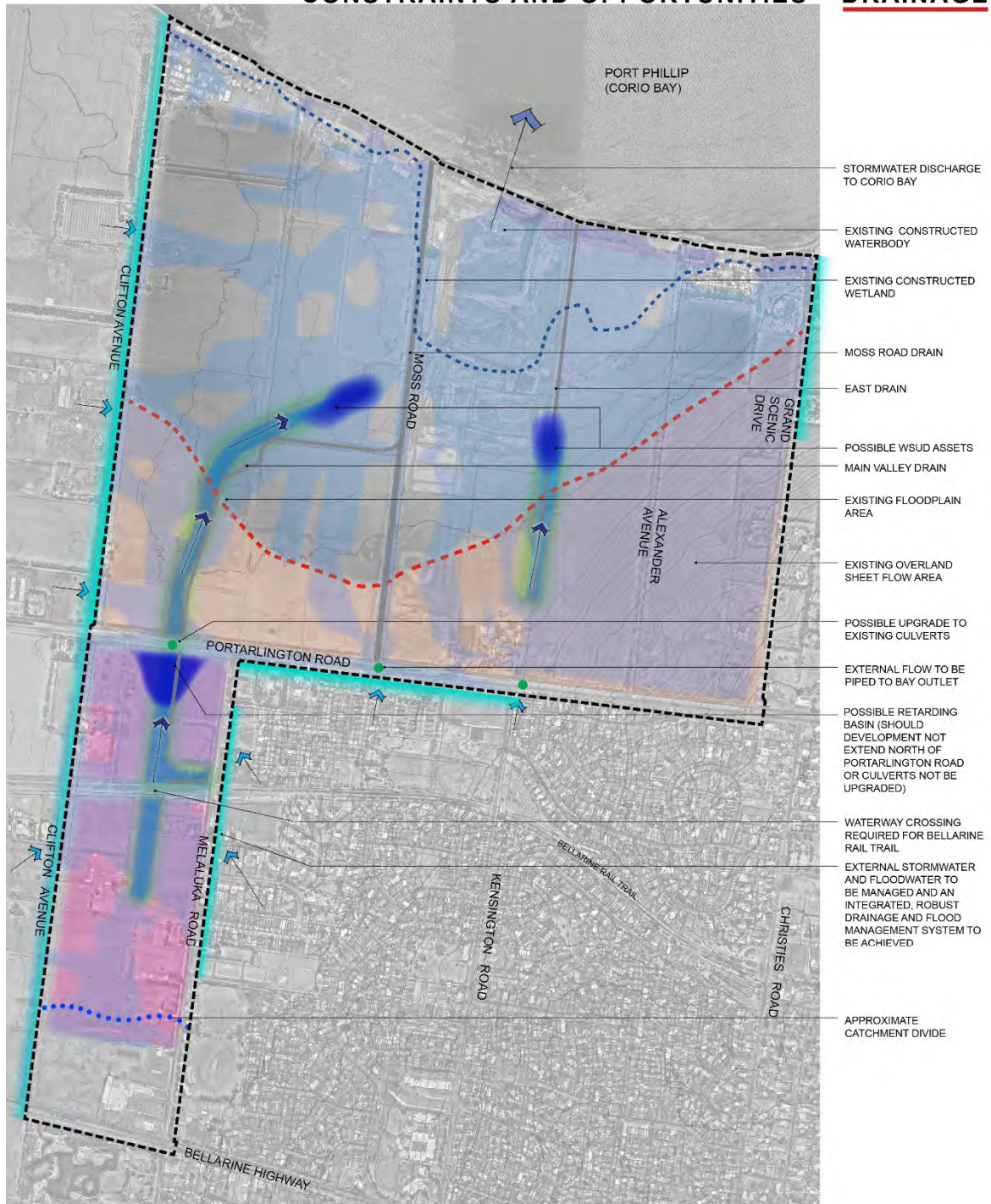
#### **Drainage Conclusions**

Sea level rise is one of the key considerations in determining development potential of the Study Area. Current forecasting indicates the shoreline is likely to be further inland than the present situation. This will particularly impact land within the North Central Precinct (including around the constructed waterbody).

Another key consideration is the lack of appropriate drainage infrastructure in the Study Area and surrounding drainage catchment to deal effectively with current flows. In particular the areas upstream of Portarlington Road and the Bellarine Rail Trail are inherently flood prone due to the topography and possible contributing flows from east of Melaluka Road and west of Clifton Avenue.

Difficulties may arise in providing appropriate drainage to service increased development in the Study Area due to the existing environmental constraints including tide levels and the need to minimise impacts from drainage outfalls on the seagrass meadow located in the immediate Bay area.

## CONSTRAINTS AND OPPORTUNITIES – DRAINAGE



**LEGEND**

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>--- STUDY AREA BOUNDARY</li> <li>— 1M CONTOURS</li> <li>--- POTENTIAL DEVELOPABLE AREA (NORTH APPROX 96HA)</li> <li>--- POTENTIAL DEVELOPABLE AREA (SOUTH APPROX 42HA)</li> <li>--- POSSIBLE ADDITIONAL DEVELOPABLE AREA SUBJECT TO SIGNIFICANT CONSTRAINTS DUE TO LOW LYING AND FLAT TOPOGRAPHY</li> </ul> | <ul style="list-style-type: none"> <li>■ POSSIBLE CONSTRUCTED WATERWAY (INDICATIVELY 45-60M WIDE)</li> <li>■ WSUD FEATURE (NWL2.15)</li> <li>■ EXISTING 1% AEP FLOOD EXTENT</li> <li>■ EXTERNAL STORMWATER AND FLOODING TO BE MANAGED</li> <li>● EXISTING DRAINAGE UNDER PORTARLINGTON RD</li> </ul> | <ul style="list-style-type: none"> <li>--- YEAR 2100 STORM SURGE (1% AEP) RL1.83</li> <li>— EXISTING OPEN CHANNEL</li> <li>➔ FLOW DIRECTION</li> <li>➔ EXTERNAL STORMWATER INFLOW LOCATIONS</li> </ul> |
|--|--|--|

**Figure 60 – Drainage Opportunities and Constraints Map**

## 6.9 Traffic and Access

The existing access arrangements within the Study Area have been assessed to determine their status and potential capacity to deal with additional development and Bay access arrangements in the future. Discussion of potential changes required to existing access arrangements is also provided to guide decision making regarding possible future connections should development be considered in the Study Area.

The assessment has indicated access in the Study Area is currently limited due to the rural nature of the existing road networks and the barrier created by Portarlington Road. However, improvements to the road network can be made to enable better access into and out of the Study Area. Melaluka Road and Kensington Road are considered to be the key connections into Leopold which should be maximised. Figure 62 provides a plan based assessment of current access arrangements.

### 6.9.1 Connectivity

#### Clifton Avenue

Clifton Avenue provides continuity from south to north and Bay access adjacent to the Pelican Shores Estate at the northern end of the road. Although there is a median opening in Portarlington Road, with indented right turn lanes, anecdotal reports indicate that residents from the Pelican Shores Estate are experiencing difficulty entering Portarlington Road in a westerly direction during peak periods. Clifton Avenue to the south of Portarlington Road is a low standard gravel formation. This section of the road abuts low-lying land that is better serviced via Melaluka Road.

Upgrading of this intersection is considered a low priority. It is suggested that ultimate closure of the median opening to create left-in left-out restrictions for both minor approaches and redirection of westbound traffic to conduct a U-turn at Melaluka Road may be a better option.

#### Melaluka Road

Melaluka Road services residential development to the east, rural lots to the west and the Leopold Shopping Centre to the south where its intersection with the Bellarine Highway is signalised. There is potential for further urban development on a restricted width of non-flood-prone land to the west of Melaluka Road and hence additional traffic generation. The intersection with Portarlington Road currently has a median opening that includes indented right turn/U-turn lanes. The ultimate signalisation of this and the Kensington Road intersections would result in a logical 800m spacing of signal installations along the Portarlington Road route.

Although much of the land to the north is flood-prone, there is potential for the extension of this road to the north as part of a local access function, but not as Bay access.

#### Moss Road/No 711-729 Portarlington Road

Moss Road is a local access road that services an isolated pocket of residential development to the south of Portarlington Road. There is no median opening for this road and access to Portarlington Road is restricted to left-in and left-out movements only. It will not serve a collector road function in the future, it is located midway between Melaluka Road and Kensington Road, and its upgrading for signalisation in the future is considered inappropriate.

Directly adjacent to Moss Road is the access to No 711/729 Portarlinton Road. This access is also restricted to left-in and left-out movements, requiring the conduct of a U turn at Kensington Road for westbound trips. Apart from providing direct access to the future caravan park development, this access does not offer a convenient means of accessing broader development or Bay access to the north of Portarlinton Road as it skirts the flood-prone contour. It is not favoured for upgrading as a public access route to the north.

### **Kensington Road**

Kensington Road is a north-south collector road through the centre of Leopold. Leopold Primary School is located at the southern end where it intersects with Bellarine Highway at a signalised intersection. It extends further south as Ferguson Road into newly developing residential areas.

At the north end it currently terminates at Portarlinton Road at a T-junction with a median opening fitted with indented right turn/U turn lanes. SIDRA assessments of the operation of the northern intersection, based on traffic count data in Kensington Road at the rail trail crossing, indicate that the intersection is currently at capacity during peak periods. It is expected that much of Geelong oriented traffic cuts through to/from Christies Road via Highland Way to use the existing signals for workable access to Portarlinton Road. It is expected that signalisation of Kensington Road at Portarlinton Road will become a priority in the near future to reduce the traffic impacts on Highland Way and the capacity of the existing Christies Road signals.

A signalised intersection at Kensington Road is seen as the optimum location for access to the potential developable land north of Portarlinton Road. This route can be extended to also provide access to the approved caravan park at 711-729 Moss Road and provide Bay access by linking across to Alexander Avenue. Ultimately a loop through land further east, crossing Grand Scenic Drive and reconnecting with Portarlinton Road opposite Christies Road, is considered an option worthy of further investigation. This would allow the current T-junctions of Alexander Avenue and Grand Scenic Drive with Portarlinton Road to be closed.

Kensington Road is considered to be a key access route through Leopold, offer optimum connectivity to the area north of Portarlinton Road and is located on the logical desire line between the developed areas of Leopold and the nearest opportunity for Bay access to the north.

### **Alexander Avenue**

Alexander Avenue is a sealed local access road that provides access to one residential dwelling, Sands Caravan Park and the Bay. It is provided with a median opening and right/U turn facilities at its intersection with Portarlinton Road.

Located 330m east of Kensington Road, this road is not considered to be positioned at a suitable location in the network to develop as a principal access route into the Northern Precinct. If the Kensington Road intersection is signalised and its alignment extended to the north, it is suggested that the Alexander Avenue connection with Portarlinton Road be closed.

### **Grand Scenic Drive**

Grand Scenic Drive provides access into a rural living area comprising some 14 two hectare lots. It is an unsealed road with the reserve appearing to extend to the foreshore but closed by a locked gate at the last property access. Its connection to Portarlington Road is restricted to left-in left-out movements and, being located 140m west of the Christies Road traffic signals, the intersection is not suitable for upgrading.

There are opportunities to construct a connecting link between Alexander Avenue and Grand Scenic Drive to connect to Portarlington Road at the Christies Road signals, albeit being reliant on acquisition of a new reservation through some of the vacant rural living lots and the demolition of a large shed directly opposite Christies Road intersection. It is suggested this link be investigated further as part of the development of a comprehensive access road network north of Portarlington Road, if development is supported.

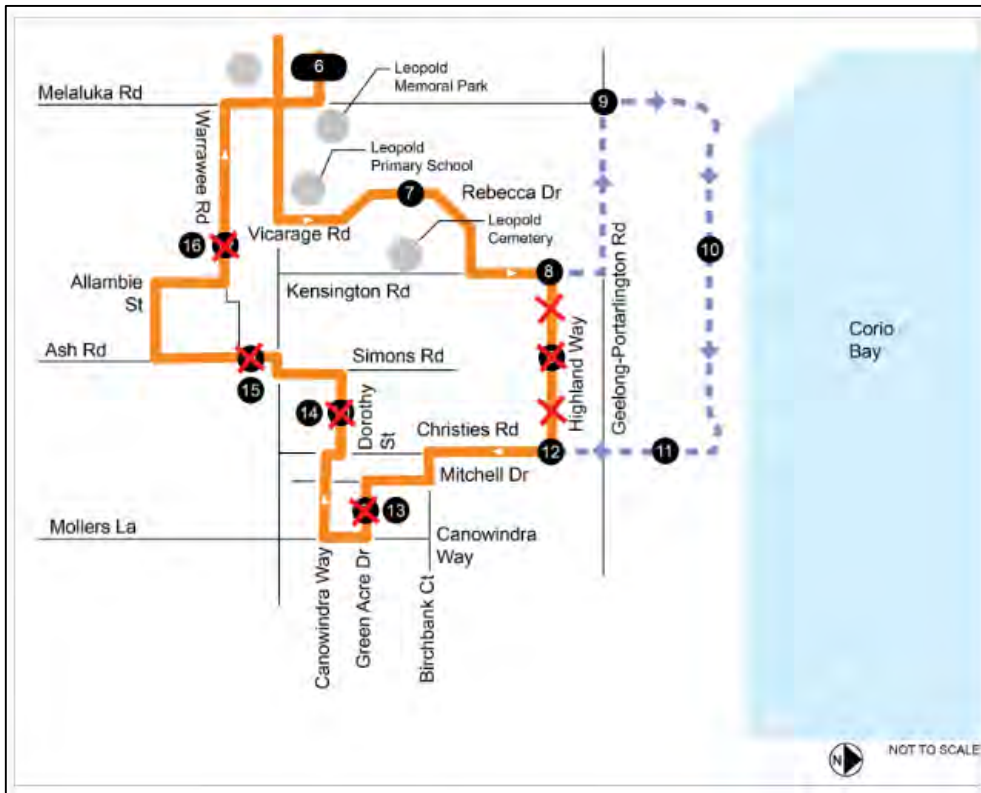
### **Mountjoy Road**

Mountjoy Road is a short unsealed cul-de-sac, 80m east of Christies Road, providing access to some rural living lots of varying sizes. Its 500m length does not extend to the foreshore and it is not considered suitable for further development as part of an access road network to the north of Portarlington Road.

## **6.9.2 The Barrier of Portarlington Road**

Portarlington Road creates a barrier for residents of the Study Area to access existing community facilities and infrastructure within the township area of Leopold. It also makes it difficult to provide public transport services. The Panel reviewing the Leopold Structure Plan and its implementation into the Greater Geelong Planning Scheme identified Portarlington Road as a distinct and formidable boundary between the urban area of Leopold to the south and the farming area to the north and that it forms a physical disconnect and barrier to a connection to the Bay. The Panel concluded the settlement boundary of Leopold has long been defined by Portarlington Road and the land to the north falls away from the town and physically displaced from Leopold's growth areas. However, the Panel did not consider that Portarlington Road was an impediment to development to the north per se but that traffic management would be required to ensure accessibility and functionality. Thus, the idea that Portarlington Road is a barrier can be revisited by reflecting the road in an urban form, rather than the current high speed road. Traffic signals at intersections will slow traffic and provide safe access of pedestrians and vehicles between the north and south sides of Portarlington Road.

The existing local public transport network could be augmented to include development north of Portarlington Road, this would involve the relocation of one existing stop, and the creation of approximately four new stops. This may require one additional bus services so as to minimise the effect on existing timetables and bus users. This is shown below in Figure 61.



**Figure 61 – Potential Bus Route**

Access for pedestrians and bicycles into and through the Study Area is also presently constrained in part due to the barrier presented by Portarlington Road and due to the lack of east-west connections. Bicycle traffic in the Study Area however is catered for to some extent via the Bellarine Rail Trail which runs east-west through the Southern Precinct; opportunities to link into this connection should be explored.

**Traffic Conclusions**

Portarlington Road acts as a significant barrier between the Northern and Southern Precincts. The Northern Precinct comprises predominantly rural type roads which would not cater for increased development levels. Access within and around the Study Area is difficult with no east-west connections and little ability to maximise key north-south connections to the Leopold township. The existing road network currently experiences capacity constraints with Portarlington Road acting as a barrier to accessing the township of Leopold itself.

## CONSTRAINTS AND OPPORTUNITIES – TRAFFIC AND ACCESS

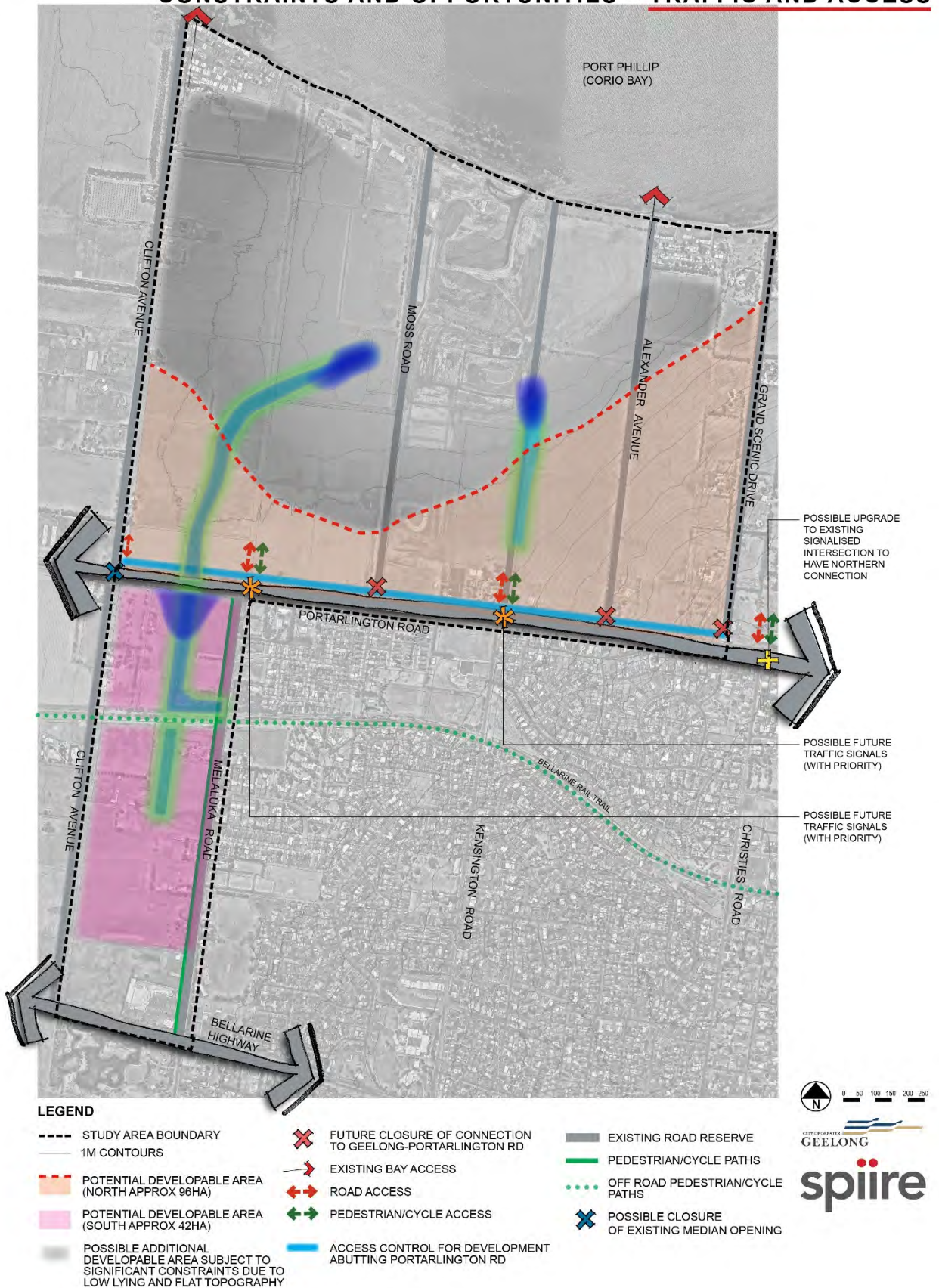


Figure 62 – Traffic and Access map

### 6.9.3 Physical Servicing

An initial assessment on the availability of service infrastructure to land within the Study Area has been undertaken. The assessment is high level only and has not been exhaustive as the ultimate service requirements will be dictated by land use, area of potential development and yield.

A brief summary of service infrastructure availability and potential connection requirements in the Study Area is provided in Figure 63.

### 6.9.4 Potable Water

Barwon Water is the responsible authority for the provision of potable water supply in the area.

The water supply for the Leopold Township operates on both a high level (above 40m contour) and low level supply system. The Study Area in this case would be supplied from the low level system.

Leopold's water supply is provided from the West Barwon/Pettaval system via two trunk water transfer pipelines. One being a 600mm diameter Bellarine Transfer pipeline which traverses the southern area of Leopold just north of the "Estuary" residential development, and the other being the older transfer pipeline (approx. 450mm diameter) located along the Bellarine Highway.

There is little capacity within the existing reticulation network in the north of Leopold to facilitate direct connection of large scale development to existing mains in the area. As such, a connection to the transfer main in Bellarine Highway would most likely be required to facilitate residential development in the Study Area. The size of this interconnector pipeline is yet to be determined but could be in the order of a 300mm diameter pipe.

Under the guidelines of the Essential Services Commission, infrastructure determined to be "shared assets" are funded by the water authority. Barwon Water's policy is that water infrastructure 225mm in diameter or greater are considered shared assets.

It is likely that the major infrastructure required to develop this area, such as a 300mm connecting main, would fall into the shared asset category. Barwon Water has no allocation for capital investment in this area within their current water plan and as such major infrastructure funding will depend on the timing of the works. For instance if development occurs sooner than the next water plan, then the major infrastructure would likely be funded by the developer, or bring forward charges applied, or Barwon Water may negotiate supplementary new customer contributions with the development proponent.

The provision of reticulated water infrastructure within any development would be provided by the developer as required as development progresses. This 'internal' reticulated water supply is reliant on the connection to the existing trunk water mains discussed above as such the timing of a 300mm connecting main is critical.

### 6.9.5 Recycled Water

Barwon Water is the responsible authority for the provision of recycled water supply in the area. There are currently no plans for the provision of a reticulated recycled water supply within Leopold.

### 6.9.6 Sewer Infrastructure

Barwon Water is the responsible authority for the provision of sewerage reticulation in the area.

Leopold is serviced by the Leopold No. 1 sewer pump station, located to the west of Melaluka Road, adjacent to the Bellarine Rail Trail. This pump station was upgraded in 2010, and has ample capacity to cater for the future growth of Leopold up to 2040 given current growth projections. It is unlikely that development within the Study Area will trigger upgrades to this facility.

The area west of Melaluka Road and south of Portarlinton Road may potentially be serviced through the provision of gravity sewer reticulation connected to the No. 1 pump station.

The area north of Portarlinton Road, if developed, would ultimately be serviced via gravity reticulation services that would connect to a new sewerage pump station in the lowest part of the development. A pressure rising main from this pump station would connect to the Leopold No. 1 pump station adjacent to the Bellarine Rail Trail.

Under the guidelines of the Essential Services Commission, infrastructure determined to be 'shared assets' are funded by the water authority. Barwon Waters's policy is that sewerage infrastructure 300mm in diameter or greater are considered shared assets.

It is likely that the major infrastructure required to develop this area, such as trunk sewers and pump stations, would fall into the shared asset category. Barwon Water have no allocation for capital investment in this area within their current water plan and as such major infrastructure funding will depend on the timing of the works. I.e. if development occurs sooner than the next water plan, then the major infrastructure would likely be funded by the developer, or bring forward charges applied, or Barwon Water may negotiate supplementary new customer contributions with the development proponent.

The provision of reticulated sewerage infrastructure to service residential development would be funded by the development proponent.

### 6.9.7 Electricity Supply

Powercor is the responsible authority for the provision of electricity supply in the area.

There are high and low voltage assets located in the northern area of Leopold adjacent to Portarlinton Road. 66kVa overhead power lines are located on the north side of Portarlinton Road. On the south side of Portarlinton Road there is both high and low voltage underground assets with the existing residential development areas.

Ultimately, the servicing requirements of development in the Study Area will be dictated by the land use. However, Powercor indicate that there is capacity in the system for initial development in the area with minimal upgrade to existing infrastructure subject to the size of development.

Typically, a residential development would be required to provide a substation kiosk per 100 residential lots of development. Should the land use proposed be other than residential then load requirements of the land use would be reviewed to determine system capacity and requirements.

Residential development would be required to be provided with an underground supply network in line with current industry standards and practice.

The provision of electrical supply to residential development is funded by the development proponent, who may be reimbursed by high voltage and customer rebates based on financial return models undertaken by Powercor.

### 6.9.8 Gas Supply

SP Ausnet is the responsible authority for the provision of natural gas supply in the area.

There are high pressure assets located on both the north and south side of Portarlington Road and in Melaluka Road that may be connected to for supply of gas to development in the area.

The ultimate loading requirement and determination of whether additional infrastructure upgrades may be required will be determined by the load requirement projections.

SP Ausnet are undertaking upgrades across the wider Geelong region and anticipate that servicing of this area, should it be developed, will not present any issues.

The provision of reticulated gas networks associated with residential development are currently funded in part by the authority, through the provision of the pipework and the development proponent who provides the trenches for the infrastructure.

### 6.9.9 Telecommunications

NBN Co. is the responsible authority for the provision of telecommunication networks associated with residential developments greater than 100 lots in the area.

NBN Co. current policy is to provide fibre to the home for larger developments free of charge, with the developer providing pit and pipe infrastructure as part of the residential development. NBN services are connected to Estuary estate south of the Bellarine Highway, and are currently planned for a smaller development on Melaluka Road north of the Bellarine Highway.

Development of the Study Area may be supplied with fibre optic telecommunication technology where it meets the policy requirement of NBN Co. It is anticipated that development of this area would meet these requirements, and that the development proponent would be required to provide pit and pipe infrastructure at their cost and that cable haul would be undertaken by NBN Co.

#### **Servicing Conclusions**

Development of the Study Area may occur through extension of existing service infrastructure, or capital investment (typically at the cost of the development proponent) in infrastructure that will connect into existing facilitates. There is no constraint to development in this area based on utility servicing.

## CONSTRAINTS AND OPPORTUNITIES – RETICULATED SERVICING

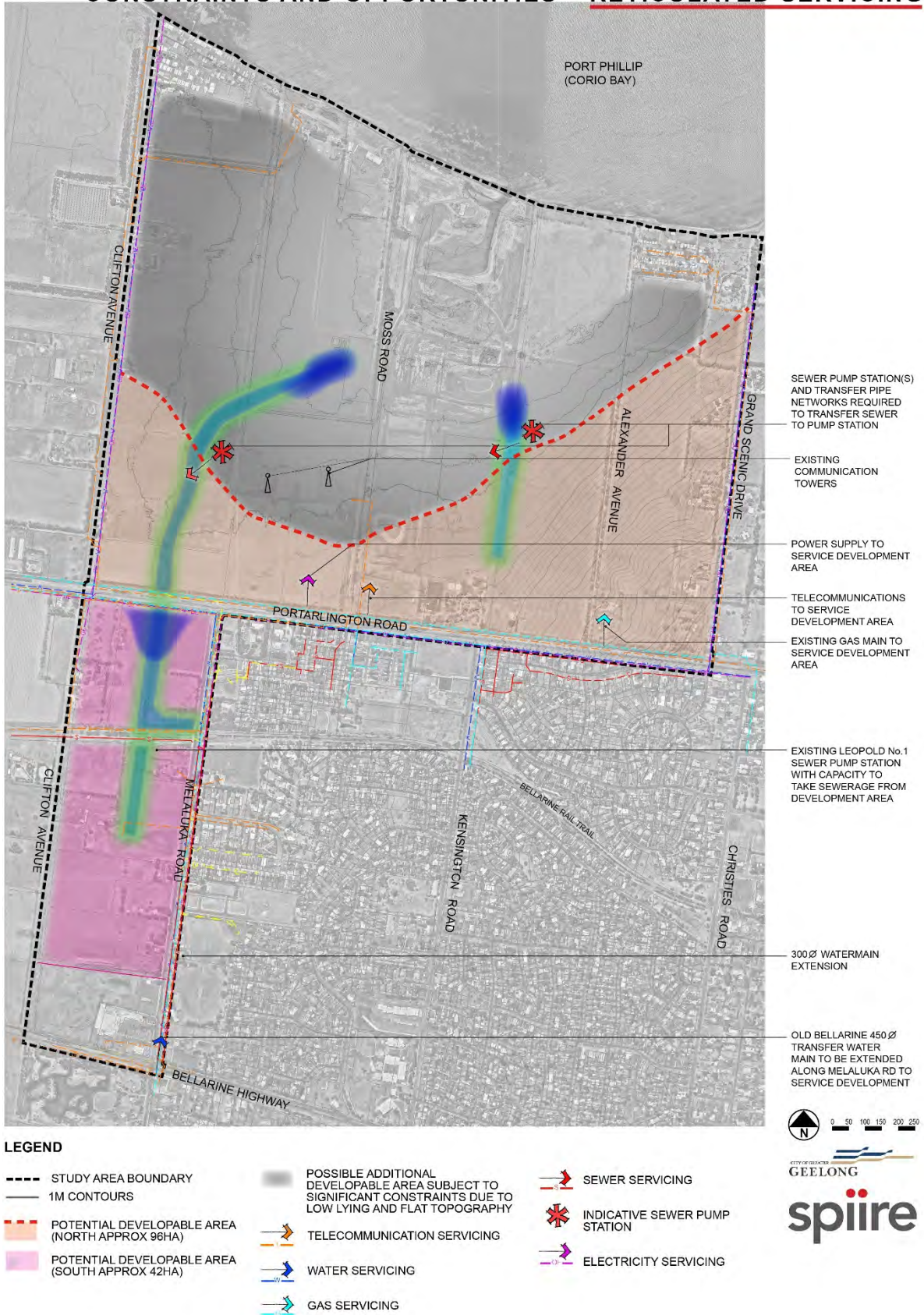


Figure 63 – Reticulated Servicing Map

## 6.10 Community Infrastructure Provision

Community infrastructure is an integral part of creating sustainable communities. Current services and facilities available to the Leopold community including Public Open Space areas are outlined in this section. The capacity and location of these facilities will impact potential requirements for additional facilities and Public Open Space areas should development of the Study Area be sought.

### 6.10.1 Community Infrastructure Access

Figure 64 provides a plan of existing community infrastructure and open space areas within Leopold.

#### Services and Facilities

Existing services in Leopold include a primary school, aged care facilities, a variety of open space opportunities and three commercial areas. Physical access to services in Leopold is challenging as the township is bisected by the Bellarine Highway. Most community based infrastructure is located proximate to the Bellarine Highway rather than Portarlington Road.

In developing the Leopold Structure Plan, Council identified a shortfall in both kinder and childcare placements, with only 2 kindergartens and 1 childcare facility serving an estimated population of around 9,500 at the 2011 Census, of which, 7% are in the 0-4 age group. Stage 1 of the Leopold Community Hub opened in March 2015, and will provide an integrated children's centre to accommodate identified early years growth in Leopold and surrounding areas. Stage 2 of the community hub project caters for broader community infrastructure needs including a library and youth space. These facilities have been planned to respond to anticipated growth in the existing township and approved development areas. The development of the community hub will be vital to providing adequate early childhood services including an additional kindergarten room. An additional primary school may also be required if the growth in the early years age bracket continues in Leopold.

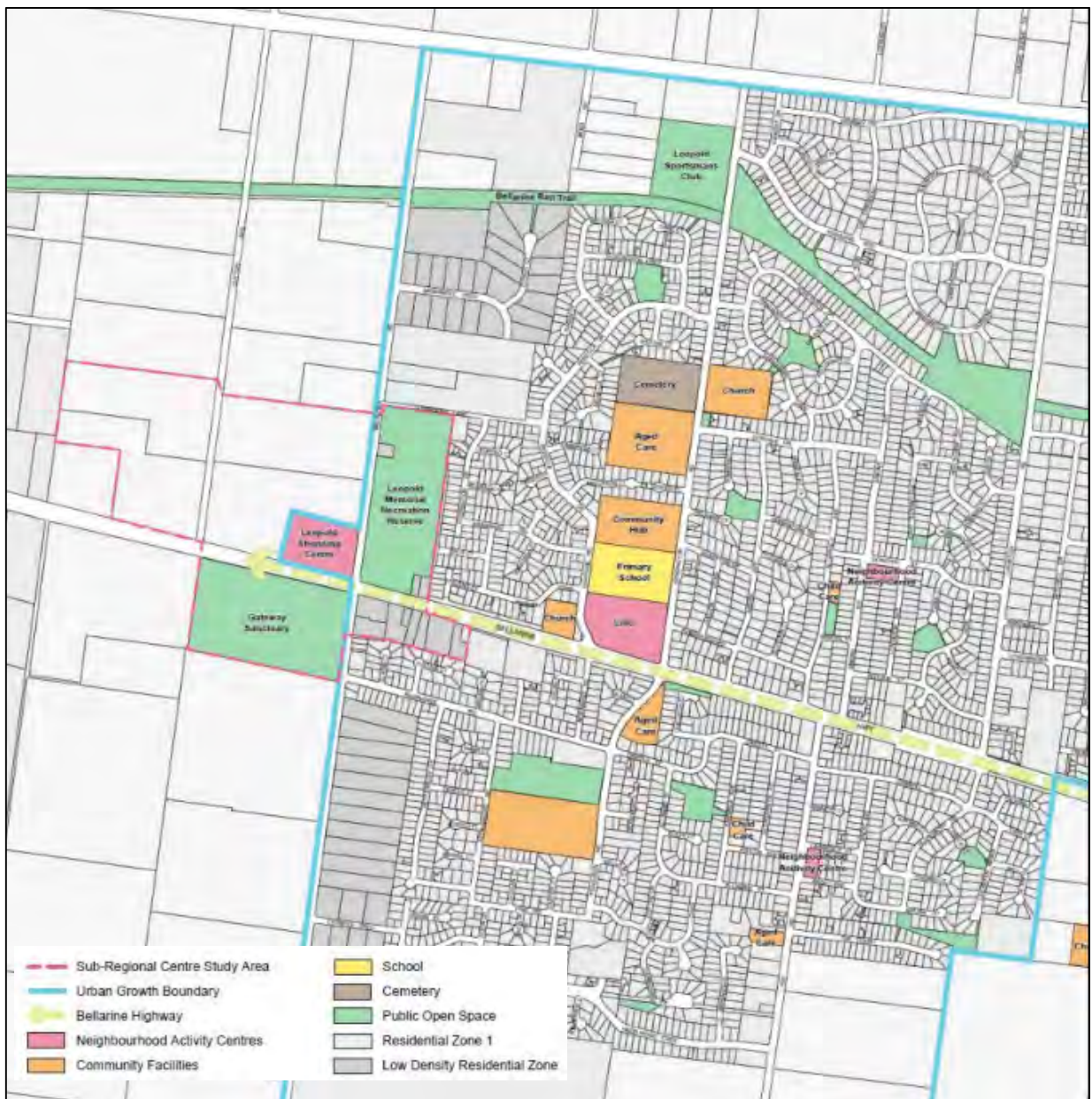
Council forecasts a neighbourhood house will be needed in the near future as will additional aged care facilities. Capacity of the existing community facilities has been determined to cater to the currently projected growth in the Leopold Structure Plan. Additional growth of the Study Area, particularly if it were to be greater than 50 dwellings, would exceed the capacity of the existing community facilities and would therefore need to provide for community infrastructure such as a multi-purpose space, dedicated youth space, additional primary capacity and increased library space. This is likely to require provision of additional land or development contributions for community infrastructure improvements. Careful planning and consideration will be required to determine if community infrastructure would need to be provided on the northern side of Portarlington Road or if it would be best to address the needs through additional capacity in the existing township. The key consideration in this planning will be the issue of access and the barrier created by Portarlington Road.

#### Public Open Space

Public Open Space is only available within the township area (within the settlement boundary) and access to these spaces from the northern portion of the Study Area is hampered by Portarlington Road. The existing major Public Open Space facilities in Leopold are generally located along Melaluka Road and Kensington Road. Further neighbourhood level facilities are dispersed within the settlement area.

Council's recreation planners are currently reviewing the Open Space Strategy for the municipality to update the current 2001 report. Whilst this review is still underway, the following comments from Council officers have been provided in relation to the Leopold Study Area:

- Any future development north of Portarlinton Road would need to be self-sufficient in local passive open space (1ha parks within 400m walking distance of 95% of residents).
- Any development west of Melaluka Road would need to include provision of local passive open space. There is currently very little available within walking distance in the established or establishing areas east of Melaluka Road.
- The projected 2021 population of 12,616 in the Leopold Structure Plan (based on an average growth scenario) will see the town's supply of active open space (two reserves) at capacity.
- Provision ratios suggest a two-court indoor recreation centre is required for the projected population. Any population growth beyond the 2021 projection will require additional provision of both active open space reserve/s and an indoor recreation centre.
- Public Open Space that is deemed necessary to service the community (as detailed above) should not be located on land potentially subject to sea level rise or coastal hazard; this is in line with Planning Practice Note 53. Thus land in the Study Area provided for Public Open Space should be unencumbered. Additional land that is encumbered by drainage functions could serve a useful pedestrian/cycle connectivity role.



**Figure 64 – Community Infrastructure (Source: Leopold Sub-Regional Activity Centre Master Plan – Background Report, Beca Pty Ltd, 2011)**

### 6.10.2 Current Infrastructure Issues

Providing appropriate levels of community infrastructure needs to be considered when investigating additional growth and development opportunities. This needs to be looked at both in terms of existing and potential capacity and locational distribution.

Current capacity analysis for existing community infrastructure in Leopold, including library, early years and community hub facilities and services, indicates there is limited capacity to cater for significant additional growth in the catchment (i.e. growth above 50 dwellings). The existing facilities and upgrades within Leopold are designed to cater for anticipated current growth. Therefore, should additional growth outside of current projections be sought the provision of additional community infrastructure would be required.

The inaccessibility of the area north of Portarlington Road is a key concern. Due to a lack of public transport connections in the area and Portarlington Road, Council's Community Development Unit recommend against encouraging aged care or retirement village uses in the Study Area based on the location of services distant to the Study Area. The concern regarding access to facilities in Leopold for those north of Portarlington Road was reiterated by the Panel considering the Leopold Structure Plan (Amendment C254) which noted the difficulty of access created by the barrier of Portarlington Road.

Should development of the Study Area to the north occur, Council has indicated the area would need a degree of self-sufficiency in the provision of community infrastructure particularly given the sprawling nature of Leopold township and the barrier created by Portarlington Road. This is likely to include the provision of passive open space and community facilities (either in the Study Area or provision of funding for upgrades to existing infrastructure).

Council officers have raised concerns about the disconnected community which might eventuate should development be placed north of Portarlington Road, which creates significant physical barriers to community integration and access to services and facilities.

#### **Community Infrastructure Conclusions**

There is currently no community infrastructure within the Study Area and residents must cross the barrier of Portarlington Road to access services and facilities within Leopold. A lack of public transport connections exacerbates this issue. Development of the Study Area would need to be designed in such a way that access to existing facilities is improved and that provides a degree of self-sufficiency particularly with respect to Public Open Space provision.

### 6.10.3 Bay Access Position

The key considerations for Bay Access and its provision are: its environmental impact; the need for public access; and its cost.

Bay access can be divided into two distinct forms, being:

- Physical access into the Bay generally via boat and access to the foreshore; and
- Passive enjoyment of the immediate surrounding area.

#### Physical Access into the Bay

Due to the low tide levels of Corio Bay along the northern shore of the Bellarine Peninsula, it is incredibly difficult to provide access to the Bay in the form of boat or even shore access. These low tide levels have created sand banks not far off shore. This means boating facilities such as ramps either require constant dredging or can only be utilised during high tide, as is the case for the private boat ramps at the two caravan parks in the Study Area.

The primary challenge is getting boats into the Bay easily and without damaging the sensitive foreshore environment or the boats. These circumstances mean any boat or fishing facility, be it a ramp or a jetty, would require construction of rock groins to provide protection. Both Council Officers and DELWP staff have indicated a boat ramp is either not needed due to existing facilities in the broader area and not desirable due to maintenance costs or environmental impacts. In particular, DELWP is concerned about the impact of both Bay access and development including drainage runoff on the high quality seagrass meadows located to the immediate north of the Study Area.

The cost burden to Council from providing access to the Bay in the physical sense would be significant. It would require an initial capital outlay to provide the publicly owned assets and land (land could be provided as part of Public Open Space or development contributions). The long term costs of maintaining such a facility including safety, maintaining adequate levels of access for boats in particular and providing for general maintenance may be significant. Provision of new Council assets would need to be carefully considered and planned. The further complication for providing publically owned access to the Bay and foreshore in the Study Area is that the ownership arrangements to the high tide mark combined with likely future coastline at 2100 (subject to Sea Level Rise) may make these private landholdings difficult to support for development. This essentially means there would be no or limited mechanisms to acquire land along the existing shore as Public Open Space or the like. Council officers responsible for coastal infrastructure would therefore be hesitant to provide physical access to the Bay in this location.

It is unlikely that the constructed waterbody at 711-729 Portarlington Road provides a long-term viable option for access to the Bay. The waterbody is situated below the 1.95m RL contour line, and is therefore largely susceptible to coastal hazards, including sea level rise and storm surge.

The provision of Bay access via publicly accessible privately owned assets could be explored as an option. This may need to be considered given the Study Area's existing conditions and lack of public land along the foreshore but could only be considered where appropriate environmental measures were put in place.

DELWP indicated any change to provide physical access into the Bay at Leopold would require Coastal Management Act Consent.

### **Passive Enjoyment and Foreshore Access**

The coastal interface of the Study Area is not conducive to Bay access in the form of walking tracks along the foreshore or jetty infrastructure. This is due to the significant levels of sea grass and seaweed along the shore line which prohibit walking and other forms of access. Thus, this area of the Bellarine Peninsula with the lower amenity level of the foreshore affords little benefit from providing direct Bay access.

Passive Bay access at a short distance from the edge of the coast is potentially the only possibility for access to the Bay within the Study Area. This may be in the form of walking or cycle paths and park areas overlooking the Bay.

The need to locate access away from coastal hazards such as sea level rise and Council's requirement for Public Open Space areas to be predominantly unencumbered also indicates a form of passive Bay access may be more appropriate. This would need to be located behind the anticipated future coastline which is based on 2100 sea level rise projections.

#### **Bay Access Conclusions**

Bay access within the Study Area would be best provided as a passive access option rather than the provision of physical access into the Bay.

Physical access in the form of a boat ramp or jetty would be inappropriate in this location due to the environmental sensitivity of the area (seagrass meadow, low lying coast line and tidal conditions) and the lack of public land along the foreshore. Further, other locations along the northern foreshore of the Bellarine Peninsula where there is existing public land and infrastructure provide adequate boating facilities and in some cases improvements to these facilities are already planned.

Passive access would be a more appropriate way to provide access to the Bay for the local community and would be more consistent with Government preferences and policy to balance environmental protection with providing access to the coastline. Passive access could be provided in the form of a park or linear trail connection which would provide views to the Bay. Options would be dependent on funding which would be best secured by development of the Study Area and the leverage of development contributions or open space provision requirements. Passive access would only be capable if the Study Area was developed holistically as creating a useable connection would require open space contributions across multiple titles.

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## 7 Community Consultation

A community consultation workshop was undertaken with landowners within the Study Area on the 18<sup>th</sup> of February 2015 at the Leopold Sportsmans Club. Approximately 50 landowners were in attendance in addition to representatives from Spiire and the City of Greater Geelong. A summary of the feedback received at the workshop is provided in an Appendix 2 to this report.

The workshop was used to convey the initial findings of the analysis undertaken by Spiire. An overview of the policy, Bay access, drainage, servicing, traffic and environmental opportunities and constraints of the Study Area were presented to the community for discussion. Feedback on the relevance and level of impact these constraints and opportunities had on the Study Area was sought. Generally, landowners agreed with the identified constraints and opportunities for the area.

The main discussion points of the evening surrounded the potential for Bay access (and what form this could take) and what development options are suitable for the Study Area.

In relation to Bay access, there was general agreement that while there are benefits in providing active Bay access, this would be difficult to achieve. Constraints raised relating to active Bay access included that there is currently no public access (as the area is all privately owned land), the quality of the foreshore and water and environmental constraints (including the presence of sea grass and wildlife and the shallowness of the Bay in this area). Forms of passive Bay access, such as a walking trail, linear park or the continuation of the rail trail, were seen as more viable options.

In relation to the development potential, concerns were raised over the constraints of the Study Area. In particular, the flooding/drainage constraints were discussed which raised questions about the ability of the site be developed. Whilst some people saw the potential in the development of the land (the ability to provide Bay access and services), many people did not want to see development in this area at all; rather there was a preference to maintain the current rural lifestyle, amenity and appearance of the area.

Notwithstanding this, if the Study Area were to be developed, there was a consensus that the land to the south of Portarlinton Road is the most appropriate location for development due to its proximate location to existing Leopold and existing services. In relation to the north of Portarlinton Road, generally landowners considered that low density/rural living development would be most appropriate for this area rather than a more urban scale of development.

## 8 Development in the Study Area

To enable urban development of land within the Study Area, a significant shift in existing planning policy and controls would be required. However, the purpose of this project is to determine if land in the Study Area can be developed from a land capability perspective and whether or not development could facilitate the provision of some form of access to the Bay.

### 8.1 Development Options

Potential development options have been considered using the potentially developable areas identified in Figure 57. This series of development scenarios is not an exhaustive list of potential development outcomes for the Study Area. However, they generally capture the broad extent and type of development that is considered likely in the Study Area.

Development options for the Leopold Study Area are varied but essentially drill down to the following:

- **Option 1:** No development or Bay access within the Study Area.
- **Option 2:** No development with provision of Bay access.
- **Option 3:** Development south of Portarlington Road with no Bay access.
- **Option 4:** Development south of Portarlington Road and part of the area north of Portarlington Road with Bay access.
- **Option 5:** Development of the Potentially Developable Areas with Bay access.

This options testing exercise has considered residential land use as the most likely form of urban development within Study Area. Whilst there are other types of urban development that could be developed, the ability to deliver some form of Bay access would be best achieved through urban development of this nature.

#### 8.1.1 Option 1: No Development or Bay Access

Option 1 would essentially mean no change from the existing degree of development in the Study Area and no provision of public Bay access. This option would be consistent with the current policy position regarding the protection of environmentally significant areas along the Corio Bay foreshore and containment of urban development within the defined settlement boundary. It would also be consistent with Council's focus on increasing capacity at existing Bay access locations on the Bellarine Peninsula. However, Option 1 would not respond to community desire to provide access to the Bay in some form within the vicinity of Leopold.

- **Advantages:** Consistent with existing policy. Protects the environmental significance of the foreshore and coastal area.
- **Disadvantages:** Does not respond to community desire for Bay access in this area.

#### 8.1.2 Option 2: No Development with Bay Access

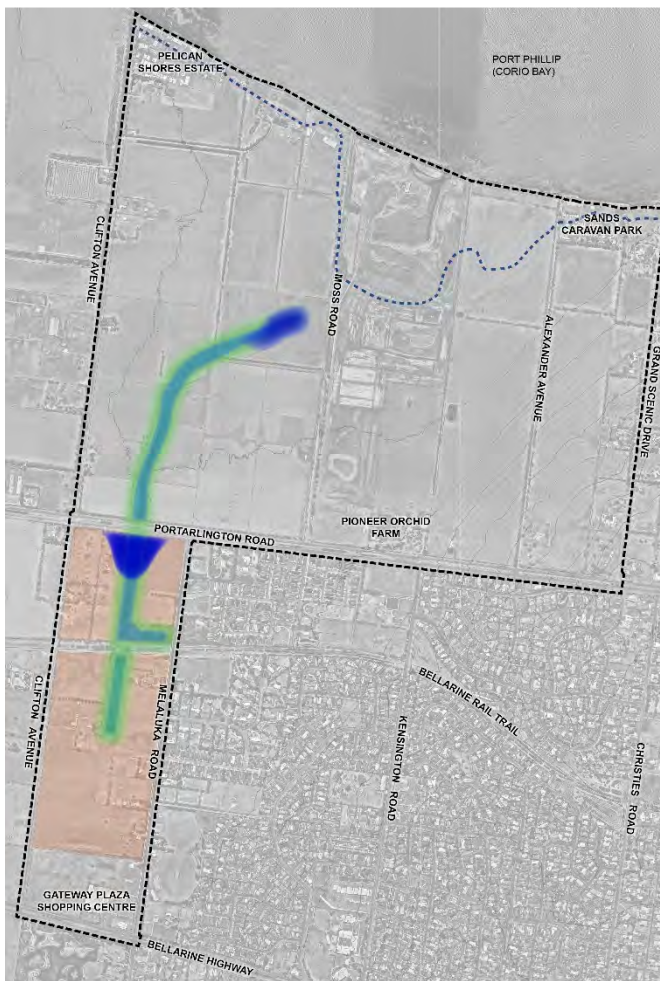
Providing Bay access in some form (passive or physical access) wholly at Council's cost forms Option 2. This Option would not require a change in policy direction regarding development to the north of Portarlington Road. Bay access could be provided by Council purchasing land either along the existing

foreshore or further back in line with the future foreshore extent for a passive recreation park overlooking the Bay. Council could also purchase land adjoining the coast at the end of one of the existing roads in the Study Area.

Option 2 would require funds for the purchase of land, construction of facilities as well as maintenance funds. Funding sources for Option 2 would be limited. This option was considered by Council previously and was rejected.

- **Advantages:** Provides Bay access in some form.
- **Disadvantages:** Significantly expensive option for Council and likely to be a low priority given the limited amenity of the foreshore environment, existing Bay access infrastructure in the broader area and the remoteness of the access from the existing community.

### 8.1.3 Option 3: Development South of Portarlinton Road with no Bay Access



**Figure 65: Development Extent South of Portarlinton Road with no Bay Access**

Option 3 provides the most logical extension of residential development for Leopold. It allows for development within the Southern Precinct of the Study Area, which is essentially the land to the south of Portarlinton Road between Melaluka Road and Clifton Avenue. Given development in Leopold is currently restricted to and exists along the eastern side of Melaluka Road and the activity centre is

located along the Bellarine Highway frontage of this area, further development in the Precinct would have easy access to the existing services.

Option 3 would allow for additional growth of the township but would be subject to significant costs to deal with the drainage constraints of this swampy low lying area and also downstream constraints. Drainage requirements are likely to restrict much of this area from significant development. Option 3 whilst providing for development in an appropriate location would not facilitate the provision of Bay access due to its location south of Portarlington Road and the inability to leverage enough funds through development contributions to purchase land for Bay access.

- **Advantages:** Provides for the logical westerly extension of the Leopold township.
- **Disadvantages:** Does not provide Bay access in any form and drainage requirements would make development inefficient and potentially unfeasible.

#### 8.1.4 Option 4: Development South of Portarlington Road and Part of Area North of Portarlington Road with Bay Access



Figure 66: Development South of Portarlington Road and Part of Area North of Portarlington Road with Bay Access

Development extent would be restricted to the Southern Precinct and the north eastern and north central areas of the Northern Precinct. This extent is based on the logical extension of key road connections (Melaluka Road and Kensington Road) and the ability to provide a centrally located park or trail link as part of Public Open Space contributions.

Community desire for Bay access may be satisfied. However, the level of development would be limited and would provide a small area for passive Bay access. This may be inadequate for the community and not cost effective to manage or maintain.

Conventional residential development of part of the area, leaving the existing rural living area in place, could potentially create conflicts regarding expectations and would alter the landscape and views towards the Bay from Portarlinton Road.

- **Advantages:** Development would be of level to provide a passive open space area as a form of Bay access in the Study Area.
- **Disadvantages:** Potential land use conflicts with existing rural living area in the east of the Study Area. The small scale of passive Bay access provision may be inadequate and create cost inefficiencies. The location of the passive Bay access would be at a distance from the foreshore.

### 8.1.5 Option 5: Development of the Potentially Developable Areas with Bay Access



Figure 67: Development of the Potentially Developable Areas with Bay Access

Options 5 considers the development of both potentially developable areas and the provision of passive Bay access.

The higher development yield in Option 5 would mean a larger area of Public Open Space could be provided for passive Bay access. By adopting Option 5, additional access can be provided through to the east (Christies Road) which would improve connections into Leopold to the south. Existing rural living land along Grand Scenic Drive would be able to transform to a more urban density thus reducing the likelihood of land use conflict between future and existing development in the Study Area.

- **Advantages:** Provides for a large area of Public Open Space for passive Bay access and maximises access possibilities and connections back into Leopold.
- **Disadvantages:** Development of the potentially developable areas would significantly alter the rural character of the Study Area and management costs of maintaining access may be a burden on Council for limited benefit to the community. As with Option 4, views to the Bay and the rural landscape would be significantly altered.

### 8.1.6 Staging of Development

Any development within the Study Area must consider the ultimate development of the overall Study Area. Key to understanding and achieving an overall development scenario for the Study Area is having the necessary engagement from all landowners.

Site specific developments are unlikely to be acceptable to the relevant Authorities if such development does not consider the necessary external works to facilitate future development and satisfy requirements for managing all offsite impacts.

A particular challenge in providing staged infrastructure will be managing drainage and flooding within and external to the Study Area. The provision of a satisfactory local drainage network will likely require deepening of the existing drainage corridors to provide necessary outfall conditions for the development area and any deepening would need to be undertaken downstream to ensure an adequate drainage system. Infrastructure upgrades to facilitate catchment wide solutions would be required with any development and the location of initial stages of development would need to consider any works necessary to integrate with ultimate infrastructure assets. Such considerations would also need to be factored into development feasibility.

#### Preferred Development Option

This Study has found that development, in some form, of the Study Area is possible. The preferred scenario is **Option 5 – Development of the Potentially Developable Areas with Bay Access**. This is the only option that is likely to result in any community benefit, with the provision of Bay access, Public Open Space and improved connections across Portarlington Road. Whilst development may be possible, this Study does not consider whether development of the Study Area is desirable. Should development of the area be considered desirable, the principles for development outlined below should be addressed.

## 8.2 Principles for Development

The development of the Study Area under any of the above options would need to be guided by a range of development principles. These relate to issues such as density, access, infrastructure provision, sustainable layouts, environmental management, drainage and flooding. Many of these principles are common for residential and urban development throughout Victoria and would be guided by the Greater Geelong Planning Scheme.

### 8.2.1 Density

Council policy currently discourages the creation of additional rural residential development areas. Densities consistent with the Rural Living Zone (RLZ) and Low Density Residential Zone (LDRZ) would not be supported in the Study Area. Furthermore, application of the RLZ and LDRZ in this area is discouraged by the Greater Geelong Planning Scheme. Policy currently directs development to townships which allows for the retention of non-urban breaks between the existing settlements. Even if the RLZ and LDRZ were to be supported, it would not result in a scale of development appropriate to funding necessary community outcomes or provide a community benefit. Given the above, it is considered that a standard residential density is more appropriate.

Density within new growth areas is typically required to accommodate a minimum of 15 dwellings per hectare or more. Given the semi-rural nature of Leopold and the location and character of the Study Area to the north of the township, the standard density is not considered appropriate. A lower density is therefore considered to be more appropriate for urban development in the Study Area.

The densities will differ greatly in the Northern and Southern Precincts. The Southern Precinct, with excellent access to services, transport and the activity centre, can support a higher density. The Northern Precinct, given its direct interface with existing rural living development, and probably the need/desire to provide for canopy trees and enhance/protect views across to the bay, a lower density is more appropriate. For the purposes of this report, a yield of 12 dwellings / ha has been applied for Option 5.

### 8.2.2 Access

Infrastructure requirements for access to and around the Study Area are summarised below.

#### Clifton Avenue

This road accesses potential developable land north of Portarlington Road. Its current standard is considered adequate to service the rural properties along this length and Pelican Shores at its northern end. A further upgrade is considered unnecessary. Consideration should be given to closure of the median opening for right turn exit movements from Clifton Avenue, if a crash history develops at the intersection.

It is considered that access to developable land along this road to the south of Portarlington Road is more appropriately oriented towards Melaluka Road.

### **Melaluka Road**

This road will increase in significance as traffic generation increases from the remaining developable land along its length. It will be required to function as a stand-alone access into the western segment of Leopold as connectivity between this route and Kensington Road is poor. As such it is envisaged that ultimately the intersection with Portarlington Road will require signalisation to cater for future access requirements from the developing areas of Leopold to the south.

It does not currently provide ready access to developable land to the north. However, its northern extension should be considered. Council have also suggested a pedestrian/cycle crossing to the north should be provided at this intersection. This could be in the form of the extension of the Bellarine Rail Trail which would benefit the area.

### **Moss Road/No 711-729**

Moss Road intersection should not be upgraded to provide connectivity across the Portarlington Road median or to access land to the north. It is not suitably located to perform such an access function and the signalisation, which would need to accompany such an upgrade, is considered inappropriate.

The access to No 711-729 can remain as a restricted (left-in/left-out) driveway (with a sealed bell-mouth) as an interim driveway into the approved caravan park. Should adjacent land be rezoned and further developed, alternative access from the internal road network is considered a more appropriate arrangement, at which time the driveway connection to Portarlington Road can be closed.

Although the unused road reservation adjacent to the driveway to No 711-729 could offer Bay access if the current drainage channel were piped and a carriageway were constructed for the 1.4km length, connectivity with Leopold south of Portarlington Road is poor and the development of this link is not supported.

### **Kensington Road**

Development of this intersection to provide access into new residential areas to the north of Portarlington Road will require the installation of traffic signals. It is expected that such an installation would be similar to the current signals at Christies Road, although configured for a cross intersection, as Kensington Road is expected to serve a comparable collector/distributor road function.

Although lot yield is yet to be determined for the Northern Precinct, it is expected that the Kensington Road extension would comply with the relevant standards set out in Table 2 of Council's Infrastructure Design Manual (IDM), namely an 11.0m carriageway in a 24m reservation with parking on both sides and shared paths along both sides to service pedestrian and cyclist travel, both locally generated and as an access route for this category of users from Leopold to the Bay. Appropriate provision should be included in the signal design for cyclists.

### **Alexander Avenue and Grand Scenic Drive**

As for Moss Road, these intersections should not be upgraded to provide connectivity across the Portarlington Road for general access to land to the north. They are not suitably located to perform such collector/distributor road function. Any signalisation of the intersections that would need to accompany such an elevated road function, is considered inappropriate. Ultimately it is envisaged that an internal road network would provide alternative connectivity to Portarlington Road that would

enable the median openings at Alexander Avenue and Grand Scenic Drive to be closed and both roads truncated at the northern border of Portarlington Road.

## **Other Considerations**

### **Lot Access**

As is the case for the denser residential developments in Leopold along the south side of Portarlington Road, VicRoads has indicated that no direct access will be permitted to individual lots resulting from further residential development along the north side of Portarlington Road.

This would require any future residential development to:

- Provide lot orientation to the north to access the estates' internal street systems. This is the case for the majority of developments along the south side of Portarlington Road but the resultant rear fences facing the arterial road are no longer favoured by Council; or
- Include construction of contiguous service roads along the Portarlington Road boundary to collect traffic from individual access driveways. This arrangement is preferred by Council but allows direct pedestrian and cyclist access onto the high-speed Portarlington Road carriageway, with respect to which VicRoads has raised safety concerns. If this development orientation is adopted, it may need to be accompanied by the provision of a form of barrier along the outer separator that denies pedestrian and cyclist access to the arterial road through carriageway.

## **Cycle/Shared Path Network**

### **Bicycle Links**

The only off-road bicycle route in Leopold is the Bellarine Rail Trail, which extends from Queenscliff through Leopold and terminates at Geelong Showgrounds. On-road bicycle paths are provided, primarily for commuter use, along the Bellarine Highway (by way of sealed shoulders), Portarlington Road (by way of sealed shoulders), Christies Road (by way of sealed parking lanes for the majority of its length) and Kensington Road (by way of sealed parking lanes along its full length).

Portarlington Road is a significant training route for recreational cyclists; carrying a high volume of cyclists generally travelling at high speeds.

The Geelong Cycling Strategy has identified the following works to improve cycling in the Leopold Precinct:

- Upgrade the Christies on-road cycle lanes to provide dedicated 1.5m marked and signed lanes as a medium priority.
- Install 1.5m wide on-road cycle lanes along Melaluka Road as a medium-low priority.

This strategy should be augmented to include bicycle lanes along Kensington Road, extending into any new development to the north. Other options for bicycle connects are to augment the Bellarine Rail Trail either by providing a connection along the west side of Melaluka Road (a continuation of the recently-constructed shared path to the south); or by providing a connection along the waterway reserve that extends north and south of the rail trail mid-way through the western area (although it would need to divert to Melaluka Rd to cross the highway).

### **Pedestrian Links**

Apart from normal footpath construction along subdivision streets throughout Leopold, there are no strategic pedestrian routes that facilitate pedestrian travel to key destinations. The draft Leopold Strategic Footpath Network Report identified the Bellarine Highway, and in particular the signalised intersection with Melaluka Road, as unfriendly to pedestrian use. There is currently no connectivity to areas north of Portarlinton Road.

### **Northern Expansion**

If residential development north of Portarlinton Road proceeds, then Portarlinton Road will present a barrier for pedestrian and cycle access, similar to that currently formed by the Bellarine Highway. To overcome such isolating effects, it will be critical that northern residential expansion is accompanied by an integrated design that provides:

Improved pedestrian and cycle connectivity by including appropriate facilities and phasing of existing signals at Christies Road and future signals at Kensington Road.

High standard links between these crossing points and key destinations (school, shops, bus stops, sporting facilities etc.) along Christies Road, Kensington Road and Melaluka Road.

High profile connections between the rail trail and Bay access points, again using Kensington Road and Christies Road and their extension to the north of Portarlinton Road.

#### **8.2.3 Servicing Requirements**

The development of the northern area of Leopold may occur through the extension of existing service infrastructure, or capital investment (typically at the cost of the development proponent) in infrastructure that will connect into existing facilities. There is no constraint to development in this area based on utility servicing.

Servicing should be provided in line with the requirements of the various authorities and the Greater Geelong Planning Scheme.

#### **8.2.4 Drainage and Flooding Control Requirements**

Any development will require extensive modelling of flooding and demonstration of other key drainage management principles such as stormwater quality management.

Water Sensitive Urban Design (WSUD) is a concept that aims to reduce the pollutant loads in stormwater from development areas prior to its entering waterways. This is done by implementing one or a number of treatment measures within the catchment prior to stormwater discharge to an identified downstream area.

The aims of WSUD are outlined below:

- Protect natural waterways within urban development.
- Protect water quality of natural waterways through removal of pollutants at proximity to the source.
- Reduce stormwater quantity and frequency of flows.
- Integrate stormwater treatments with the surrounding landscape.
- Treat rainwater locally as it flows to reduce the requirement for large infrastructure ventures downstream.
- Add value while reducing development costs and the overall cost of drainage infrastructure.

Pursuant to Clause 56.07 of the Victorian Planning Provisions (VPP) developers are required to provide WSUD measures to best practice standards.

Development with respect to drainage must adhere to the requirements of the City of Greater Geelong and the Corangamite Catchment Management Authority. A flood impact investigation report together with a drainage report should be prepared by prospective Developers. This will require the Developer to engage consultants appropriately qualified in disciplines such as engineering, urban development, hydraulics, hydrology, and flood modelling and mitigation. Any proposed development must demonstrate no off site impacts, or demonstrate impacts are suitably mitigated.

In addition to catering for the drainage demands and requirements of development in the Study Area, prospective developers must allow for the mitigation of existing drainage issues within the greater catchment. Development should proceed considering the entire catchment rather than isolated parcels of land.

In summary, the key drainage data which needs to be considered in future development of the Study Area is as follows:

- Current highest astronomical tide level – 0.553m AHD.
- Current 1% AEP storm surge level – 1.05m AHD.
- Assuming 0.8m Sea Level Rise (SLR) to year 2100.
- Year 2100 highest astronomical tide level – 1.353m ADH.
- Year 2100 1% AEP storm surge level – 1.83m AHD (to be adopted as the downstream constraint for achieving a drainage outfall).

This data highlights that the storm surge level is the critical design level for determining Bay access, land capability and developable area within the Study Area.

## Proposed Holistic Development Scenario – Drainage and Flooding Issues

Development within the Study Area can be undertaken in various forms. However, it is considered that segmented development should not be considered and if development is to proceed, a holistic approach is adopted that considers an integrated approach to drainage and flooding.

Previously identified as 'Option 5', development of the Study Area is shown to include all land considered 'potentially suitable for development'. The extent to which the development can extend is largely governed by the year 2100 storm surge level of 1.83 m, and the provision of minor and major drainage and flood management systems.

The proposed holistic development of the areas identified in 'Option 5' has been based on utilising the existing topography of the Study Area. Further options may consider piping and retarding flows at alternative locations to reduce the footprint of waterways, adding fill to increase developable area, and surface drainage to reduce the depth of pipe networks.

Development is shown to incorporate stormwater treatment at the downstream extent of all development. The treatment is to be suitably sized to meet best practice water quality objectives for the proposed development area. It has been assumed that any contributing external flows will be treated to best practice prior to entering the Study Area. The total stormwater treatment footprint is estimated at four hectares.

Freeboard of 300 mm has been added to the downstream boundary level of 1.83 to set the normal water level of 2.13 m of the WSUD treatment. The 'lowest development contour' estimates the extent of land that can be reasonably drained to drainage corridors, and downstream water quality / retardation assets, through conventional gravity drainage system without the need for significant filling. This results in an extent of development to be assumed at the 4.5 m contour (2.13 + average pipe diameter + pipe cover and minor losses) at the interface with the proposed drainage corridors. As development extends away from the drainage corridors, the development limit increases in elevation to allow for drainage outfalls to the drainage corridors.

The Option 5 scenario design has flows conveyed from external southern catchments via existing culverts under Portarlington Rd. The culverts between Melaluka Rd and Clifton Ave will require upgrading with development of the Study Area south of Portarlington Road, between Melaluka Rd and Clifton Ave. The development of the area south of Portarlington Road must consider all external stormwater flows and the provision of a serviceable local drainage network within any development area.

An upgrade of culverts under Portarlington Road is to allow for 1%AEP flows upstream of Portarlington Road to be conveyed across the road via the culverts.

Flows are conveyed through the Main Valley Drain from the upgraded culverts on Portarlington Road to the WSUD feature via a constructed waterway. This waterway continues upstream and decreases in width where, south of the rail trail, it provides a drainage outfall for existing residential area to the east. A crossing of the rail trail is required to provide drainage servicing to areas south of the rail trail.

A waterway has also been proposed for the connection from the existing culverts under Kensington Road to the WSUD feature. The external catchment crossing Portarlington Road at Moss Road will be conveyed to the WSUD feature and ultimate catchment outlet via a pipe.

The two major constructed waterways conveying flows from Portarlington Road to the WSUD feature have been sized (45-60 metres) to convey the peak 1% AEP flows from the external catchments. The channel is only a portion of the overall waterway corridor width, which has been sized in accordance with Melbourne Water Waterway Corridor Guidelines to make necessary allowance for maintenance and recreational trails. The location of the channels has been determined based on existing topography. The constructed waterways must be designed to maintain floodplain storage in

accordance with CCMA's criteria. The constructed waterways are likely to be extremely flat due to the existing topography and need to provide suitable local drainage servicing to any proposed development area without the need for excessive filling of the land. The limited grade of the constructed waterways should be considered in detailed design to manage issues such as sediment deposition.

The proposed holistic development scenario has been based on utilising the existing topography of the Study Area. Further options may consider piping and retarding flows at alternative locations to reduce the footprint of waterways, adding fill to increase developable area, and surface drainage to reduce the depth of pipe networks. Discharge to the Bay should consider the sensitive environment of the receiving waters, including the sea grass community, changing geomorphology of the beach front, erosion potential of the coast line, extended shallow waters out in the Bay and appropriate distance from the coast to discharge. Construction of the waterways will require significant rework of the existing culverts and potentially a bridge crossing for the Rail Trail to allow flow to drain more freely.

Council and CCMA have specific requirements and expectation relating to the management of stormwater in a developed setting. In addition to managing the water quality requirements, the flood management system is to be provided to ensure that there is no adverse impact to surrounding properties.

In particular, it is important that the opportunity remains for Council to have the ability to implement a more robust drainage system for existing lots that are subject to existing flood risk. This is particularly important for existing dwellings on Melaluka Road.

| Tidal planes for Corio Bay (No1 Pt Richards Chan) |        |       |              |              |              |              |              |               |               |               |       |        |
|---|--------|-------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|-------|--------|
| Name  | Number | Ratio | HAT          | MHWS         | MHWN         | MSL          | AHD          | MLWN          | MLWS          | ISLW          | TGZ   | LAT    |
| Port Welshpool Pier                               | 60590  | 0.427 | 2.962        | 2.543        | 2.176        | 1.591        | 1.510        | 1.006         | 0.639         | 0.233         |       | -0.039 |
| Western Port (Stony Point)                        | 60710  | 0.337 | 3.326        | 2.868        | 2.421        | 1.752        | 1.890        | 1.083         | 0.636         | 0.260         | 0.090 | 0.053  |
| Port Phillip Heads (Pt.Lonsdale)                  | 60730  | 0.435 | 1.849        | 1.531        | 1.274        | 0.958        | 0.950        | 0.642         | 0.385         | 0.135         | 0.090 | 0.029  |
| Lorne   | 60790  | 0.438 | 2.778        | 2.308        | 1.912        | 1.495        | 1.423        | 1.078         | 0.682         | 0.326         |       | 0.119  |
| Name  | Number | Ratio | HAT          | MHHW         | MLHW         | MSL          | AHD          | MHLW          | MLLW          | ISLW          | TGZ   | LAT    |
| Lakes Entrance (Outer)                            | 60571  | 0.680 | 1.434        | 1.227        | 0.796        | 0.766        | 0.757        | 0.736         | 0.305         | 0.234         | 0.21  | 0.013  |
| West Channel Pile                                 | 6072a  | 0.649 | 0.951        | 0.911        | 0.579        | 0.537        | 0.524        | 0.496         | 0.163         | 0.114         |       | 0.061  |
| Hovell Pile                                       | 6072b  | 0.659 | 1.054        | 1.006        | 0.676        | 0.638        | 0.524        | 0.600         | 0.270         | 0.222         |       | 0.160  |
| Queenscliff                                       | 6074a  | 0.588 | 1.129        | 1.109        | 0.720        | 0.656        | 0.625        | 0.592         | 0.203         | 0.132         |       | 0.007  |
| Geelong   | 60770  | 0.508 | 1.210        | 1.100        | 0.758        | 0.658        | 0.580        | 0.558         | 0.216         | 0.151         |       | -0.099 |
| Corio Bay(No1 Pt Richards Chan)                   | 6077b  | 0.562 | 1.077        | 1.011        | 0.663        | 0.587        | 0.524        | 0.511         | 0.163         | 0.103         |       | 0.056  |
| Melbourne (Williamstown)                          | 60780  | 0.574 | 1.043        | 0.999        | 0.665        | 0.596        | 0.524        | 0.527         | 0.193         | 0.138         |       | 0.105  |
| Portland  | 61410  | 1.161 | 1.350        | 1.105        | 0.848        | 0.665        | 0.597        | 0.482         | 0.225         | 0.086         | 0.090 | 0.026  |
| <b>Subtract AHD (0.524)</b>                       |        |       | <b>0.553</b> | <b>0.487</b> | <b>0.139</b> | <b>0.063</b> | <b>0.000</b> | <b>-0.019</b> | <b>-0.361</b> | <b>-0.421</b> |       |        |

Sea level rise for year 2100 0.8  
 add 800mm 1.353 Year 2100 high tide level  
 plus 500mm freeboard 1.853 Adopt as wetland NWL

Storm Surge Level for SLR of 800mm 1.830 Storm tide level

KEY to measurement acronyms

Diurnal tidal planes

[Print](#) [Email](#)

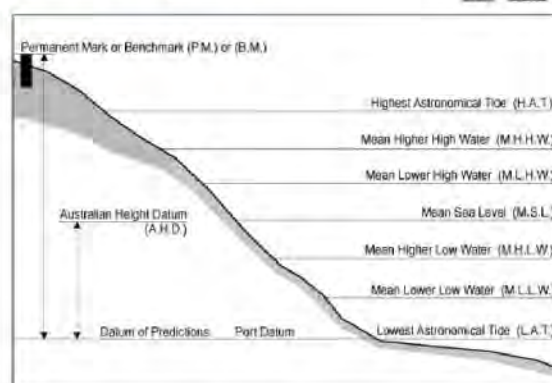
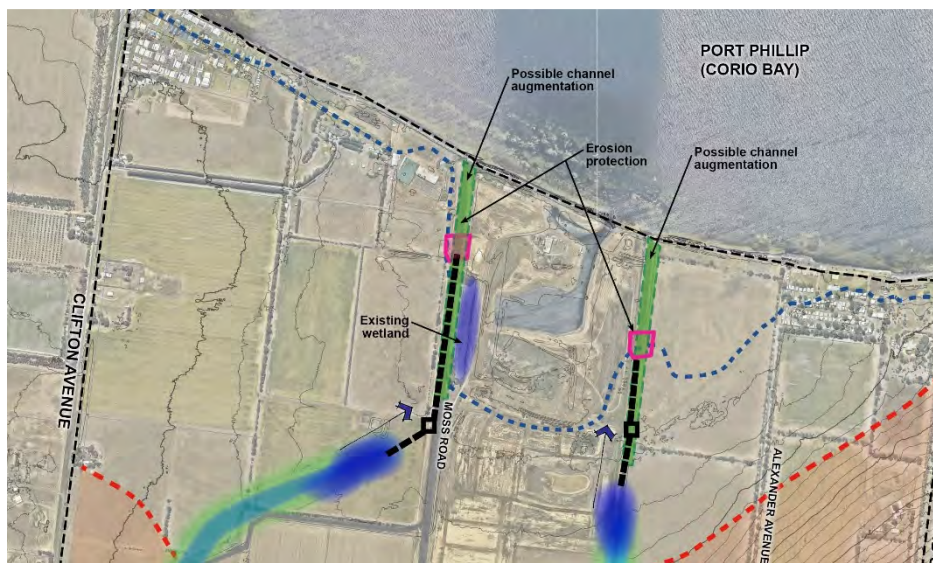


Figure 68 – BOM tidal data for Leopold area

### Stormwater Outlet to Port Phillip (Corio Bay) Configuration

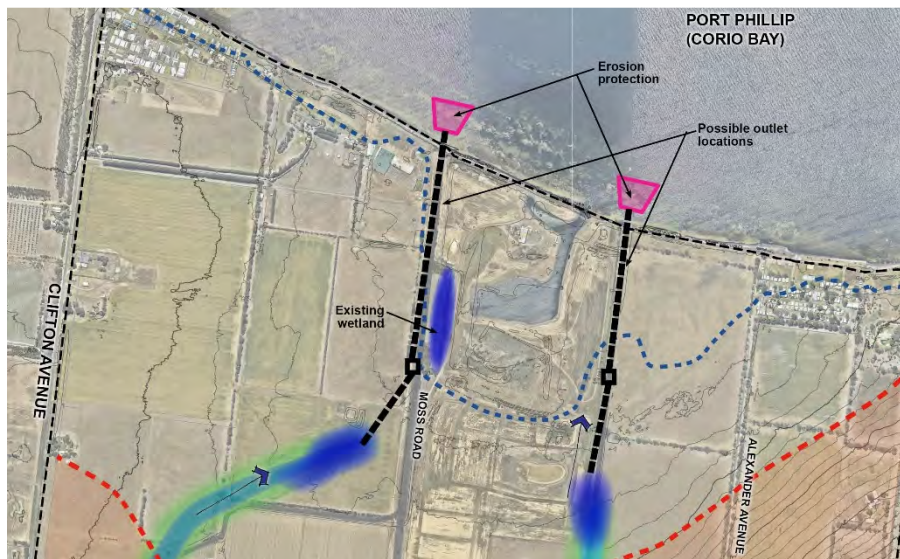
The additional volume of stormwater generated by increased development within the Study Area, particularly the area identified in the Option 5 Development Scenario, will require review of the current outlet(s) to the receiving waters of Port Phillip (Corio Bay). Any increases in stormwater flows or volume discharging to the Bay, and the design of stormwater infrastructure, should consider the sensitive character of the intertidal and marine environment.

Three possible outlet configurations, in the context of the proposed drainage and WSUD elements of the Option 5 Development Scenario, are presented below. These outlet arrangements consider the basic infrastructure and works required, and note any special considerations or challenges that may affect the feasibility for each option (Configurations A, B and C).



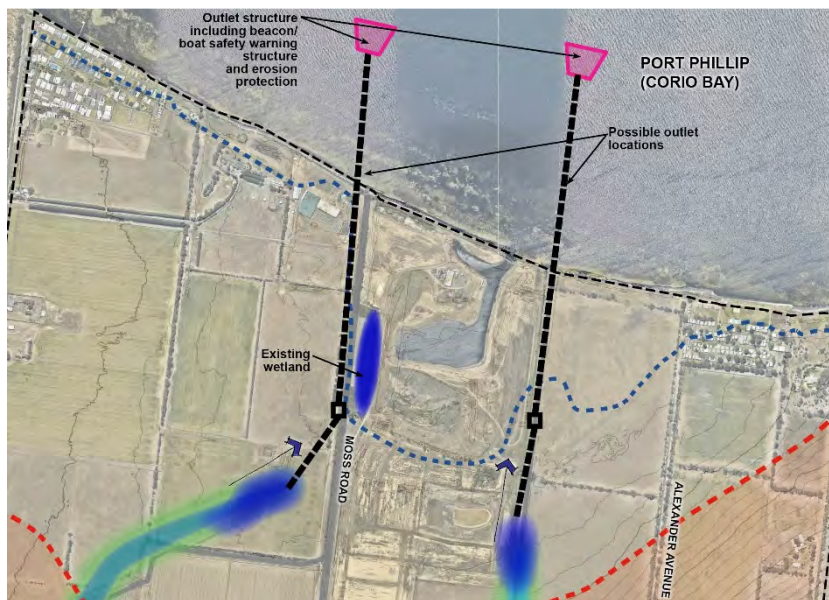
**Figure 69 – Configuration A: Discharge via open channel, possible augmentation**

Configuration A identifies a short pipe stub which will deliver flows from the wetlands into the existing open drain, with an end wall and some erosion protection at the outlet of the pipe. The existing open drain may require some additional augmentation/reshaping to convey flows, pending any required retardation. Retardation may require further land take and loss of developable land upstream of the WSUD assets. The height of the proposed bund along the northern face of the proposed wetland may have to be raised.



**Figure 70 – Configuration B: Short pipe into intertidal zone**

Configuration B requires flows to be conveyed to the intertidal zone via a pipe discharging to the intertidal zone / near Bay environment. This configuration may require an allowance for an overflow weir, possibly utilising the existing open drain. Erosion control measures for the inter-tidal zone will also be required under Configuration B.



**Figure 71 – Configuration C: Long pipe beyond intertidal zone**

Configuration C comprises discharge piped beyond the shallow inter-tidal zone out to the Bay. The outlet will require erosion protection. The pipe required by Configuration C could be laid with or without an accompanying groyne structure.

### 8.2.5 Provision of Public Open Space and Community Infrastructure

Any development of land within the Study Area for urban purposes will need to provide appropriate Public Open Space and community infrastructure (either in the form of facilities or contributions for upgrades to existing facilities). The following principles for the provision of this infrastructure should be considered.

Public Open Space should be provided in line with Clause 52.01 of the Greater Geelong Planning Scheme. This requires the subdivision of land zoned for residential purposes for 10 or more lots to provide 10% of the land area for Public Open Space. This provision is to provide for a range of parks to ensure it is self-sufficient in local passive open space (1ha parks within 400m walking distance of 95% of residents). This is particularly important for land to the north of Portarlington Road which may suffer from disconnection from the existing township. The land to the west of Melaluka Road would also need passive open space areas due to the limited availability of such spaces in the western part of Leopold. These Public Open Spaces are required to be on unencumbered land. However, additional encumbered land areas may be used to add to this provision to improve connectivity and access to the Bay.

Community infrastructure will also need to be provided to cater to development within the Study Area. This would best be provided as development contributions to fund additional capacity or improvements to existing facilities in Leopold. This may include:

- Active open space reserves.
- Two-court indoor recreation centre.
- Expansion of the neighbourhood house and child care facilities.
- Possible expansion of the primary school or provision of an additional primary school.

### 8.2.6 Indicative Land Budgets

Using the assumption that development within the Study will largely comprise residential land uses and the identified potential development areas as part of Option 5, a possible land budget would be as follows:

|   |                 |
|---|-----------------|
| Total Estimated Developable Area                              | 138 hectares    |
| Drainage Reserve Encumbered Area                              | 6.7 hectares    |
| 10% Active and Passive Open Space                             | 13.1 hectares   |
| Net Developable Area  | 118.2 hectares  |
| Number of dwellings<br>(based on 12 dwellings per hectare)    | 1,418 dwellings |
| Number of residents<br>(average household size of 2.6 people) | 3,687 people    |

The above land budget and likely households and population from the development of such a large area would facilitate the need to provide appropriate levels of community infrastructure either within the area itself or as improvements to existing services within the existing Leopold township.

The figures identified above are high level and do not allow for detailed design which may alter the projected population and dwelling numbers.

### 8.3 Further Investigation Requirements

Discussions with DELWP planning representatives indicate a need to consider growth and development in or around Leopold in the context of wider changes and needs of the Municipality and the Bellarine Peninsula. DELWP has suggested any mooted future development within the Study Area would need to be considered in conjunction with potential land use changes at the nearby Cheetham Salt Works and Alcoa sites. These two sites are likely to be transformed over time, potentially into mixed use or residential development, and may be more appropriate locations for development or for the provision of bay access in some form.

Should further development be sought within the Study Area following a change in planning policy, additional investigations will be required to be undertaken by a development proponent to support any proposal. These include:

- Flood risk report.
- Drainage report.
- Servicing strategy.
- Cultural heritage assessment (CHMP may also be required).
- Flora and Fauna assessment.
- DCP or Section 173 Agreement.
- Coastal consents for infrastructure outlets.
- Traffic impact reports.
- Geotechnical assessments.
- Contamination assessments.
- Coastal Acid Sulphate Soil Assessment.
- Community Infrastructure assessment.

Consent under the Coastal Management Act 1995 is required for use or development of coastal Crown land by any party, including committees of management and municipal councils. Coastal Crown land is generally all Crown land within 200m of the high tide mark and the seabed of Victorian coastal waters. As such any development or infrastructure provision which requires changes or discharge into the Bay within the Study Area will require such a consent.

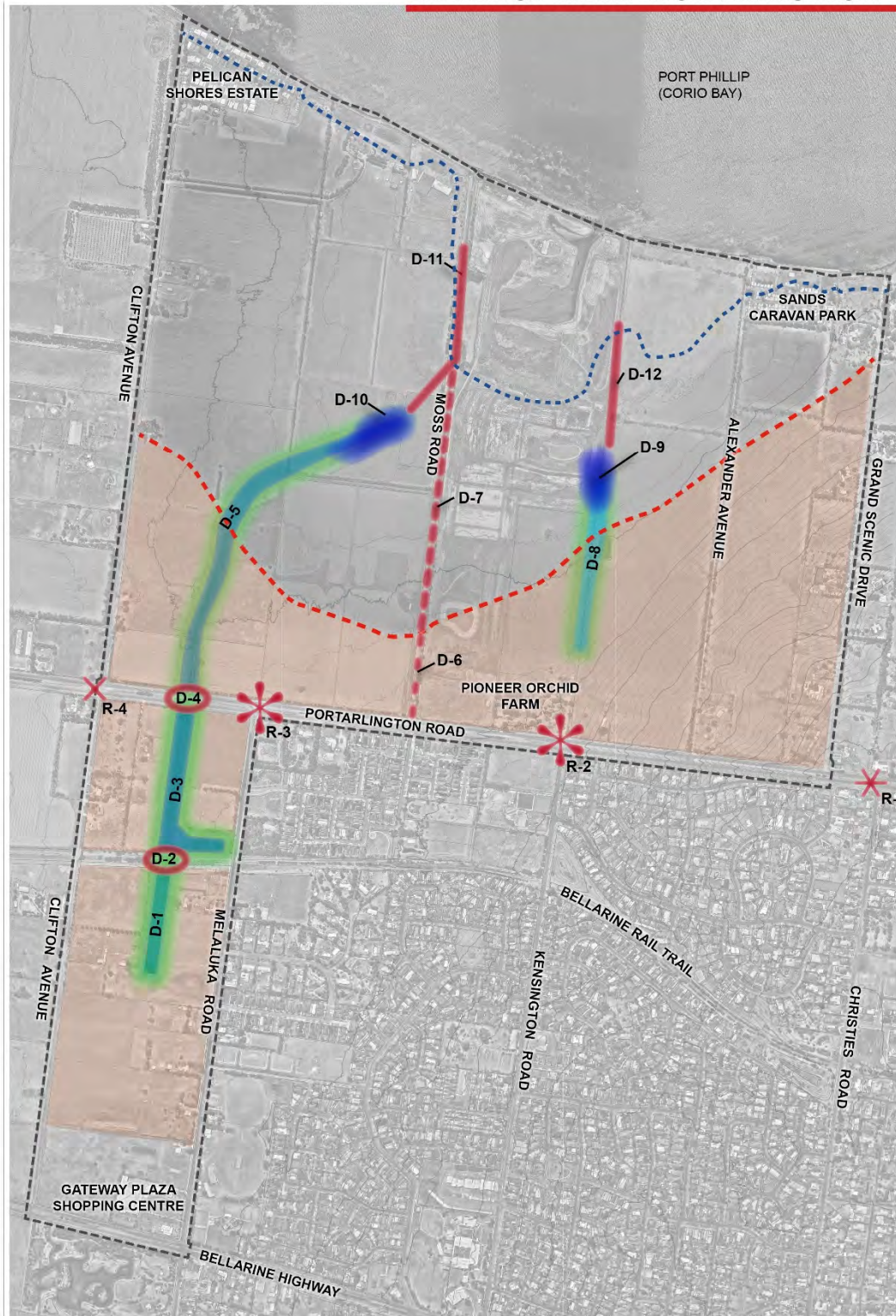
The following is required to be assessed when a consent application is considered:

- The Victorian Coastal Strategy.
- Any Coastal Action Plan applying to the land.
- Any relevant coastal recommendation.
- The purpose for which the land was reserved under the Crown Land (Reserves) Act 1978.

### 8.4 Development Costings

To ensure a coordinated and serviced development as per Option 5, a number of infrastructure items would be required. These infrastructure items are shown on Figure 72 and summarised in Appendix 4 with the associated indicative capital construction and land cost. The staging/timing of key infrastructure will be fundamental to achieving the development potential identified in Option 5.

**DEVELOPMENT CONTRIBUTION PLAN ITEMS**



**LEGEND**

- STUDY AREA BOUNDARY
- 1M CONTOURS
- - - POTENTIAL DEVELOPABLE AREA

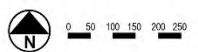


Figure 72: Indicative Development Contribution Plan Items

These costings are representative of what is considered necessary at this point in time to support the development of the identified areas of land in the Study Area. They provide an indication of costings only and do not represent a comprehensive analysis of the requirements or ultimate position of Council.

Shared contributions to particular items can occur where a nexus can be demonstrated between the development and other parties. Such an example may be the upgrading of intersections on Portarlinton Road; where an intersection upgrade is necessary for development and is also identified as necessary regardless of the development occurring.

Based on a holistic development scenario as per Option 5, the infrastructure items have been assumed for consideration into a Development Contributions Plan (DCP). A DCP would be secured through the rezoning of the land and the application of a Development Contributions Plan Overlay (DCPO). The DCP would levy contributions for the provision of works, services and facilities before development can commence and identify developer and Authority delivered infrastructure.

Should planning permits be issued for development within the Study Area without a DCP in place, an agreement pursuant to Section 173 of the Planning and Environment Act, 1987, should be required that clearly details the delivery expectation of infrastructure between the developer and Authority.

Based on the preliminary assessment of DCP items and costings, a total contribution per developable hectare is assumed at \$501,226. This is based on global assumptions and the residential development of land considered capable based on the constraint mapping of 'Option 5', whereby all land 'capable' for development is considered.

This is considered as a high contribution rate when compared to other DCP's for similar developments.

The following aspects would be critical to progressing a DCP for the Study Area:

- Clearly identifying the community infrastructure provision required as a result of development;
- Preparation of an Infrastructure Plan inclusive of functional infrastructure designs included in the DCP;
- Quantity Surveying of the infrastructure items included in the DCP based on the functional designs.

## 9 Bay Access Options

Bay access can comprise either physical access into the Bay or passive access overlooking the Bay. As previously noted, State Government, Council officer and Spiire positions on providing access to the Bay do not support physical access options in this location. Based on this understanding, Bay access options from a passive perspective are discussed below.

### 9.1 Passive Bay Access

Passive Bay access essentially means providing a space for the community to have enjoyment of the Bay at a distance. As such, access would comprise viewing the Bay from within a passive recreation space. This may be from within a Public Open Space area or a series of walking/bike paths set back from the foreshore.

Access could be provided with or without development of the Study Area. However, without development, Bay access would require a considerable financial outlay from Council for both acquiring private land from multiple landowners, delivering the physical passive open space, providing access to the passive open space and ongoing maintenance.

Passive Bay access and the location of any facility would need to consider the following:

- Provision of core component to be on unencumbered land due to Council management preferences and the requirements of Planning Practice Note 53. Therefore, a park area needs to be set back from the foreshore behind the 2100 coastline and not affected by the 1% AEP.
- Only paths can be within encumbered land (i.e. land subject to flooding or coastal inundation). These path areas can be used to augment a large passive open space area or path network but where they are deemed to be encumbered (subject to flooding/sea level rise) they should not be the only form of Bay access.
- Acknowledgement that there is a lack of ability to access the foreshore directly due to existing developments (private landownership) combined with the future coastline extent and physical characteristics of the foreshore with significant levels of seagrass litter.
- Community preference is for a linear park, which provides views and walking paths parallel to the foreshore.
- A park or other Public Open Space area would be best located centrally to the Study Area where it can benefit from potential access changes and crossings of Portarlington Road at Melaluka Road and Kensington Road.
- The size and final location/configuration of any passive Public Open Space area would be dependent on the degree and extent of development in the Study Area. The provision of the land would need to be in line with Council's Public Open Space requirements set out in Clause 52.01 of the Greater Geelong Planning Scheme.
- Considerations of the cost burden on Council in providing (acquiring and providing access to) and maintaining a large passive open space option for Bay access are required over and above the provision of land as part of Public Open Space contributions arising from development of the Study Area.
- Linkages to this passive space from the Bellarine Rail Trail should be sought where possible.

Provision of passive Bay access in the Study Area can be provided should urban development occur following a change in planning policy for the region. Allowing development of the Study Area is a way of leveraging development contributions in the form of Public Open Space areas or cash for open space to provide for passive Bay access. However, the benefit of providing only a passive Bay access may not be outweighed by the consequences of allowing development to the immediate north and west of Leopold township.

Passive Bay access could take many forms including:

- Walking or cycle trails set back from the foreshore and possibly linking to the existing Bellarine Rail Trail.
- Linear park area located along the anticipated 2100 coastline to provide passive enjoyment of the Bay including ample views.
- Provision of a large centrally located park area for community use and enjoyment of views of the Bay and foreshore within the Study Area. The park could serve either a passive or active open space role within Council's open space hierarchy.

Passive Bay access may not be ideal or achievable in the Study Area due to the same reasons as the provision of physical Bay access (land ownership patterns, environmental conditions, maintenance costs). Another consideration which may prevent passive Bay access from being achievable in the Study Area is the distance such a facility would need to be from the current foreshore location in order for the area to be unencumbered land.

## 9.2 Physical Bay Access

Physical access is not achievable in the Study Area due to the following:

- Land ownership patterns in the Study Area mean private land extends to the high tide mark and there is no public land along the foreshore.
- Environmental conditions including the significant seagrass meadow near the foreshore, low tide levels, sea level rise and lack of sand along the foreshore which hampers access to this space.
- The costs involved in maintaining any infrastructure required to provide physical Bay access would be high and are likely to include regular dredging of channels to provide boat access to a ramp or jetty and maintenance of the facility itself. Periodical dredging and maintenance costs will be the responsibility of Council unless the facility is privately operated.

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## 10 Conclusions

This Report has undertaken a high level review of the capability for land north and west of the current Leopold settlement boundary (the Study Area) to accommodate urban development. Also considered is the ability for bay access to be achieved, in terms of access type and delivery mechanism.

The findings of this Report will be used to inform the next review of the Leopold Structure Plan.

This Report has undertaken a high level assessment of the major constraints and direct technical influences affecting the Study Area. This assisted with the identification of potentially developable areas north and south of Portarlinton Road.

The internal layout of development within the Study Area has not been considered in detail. Consequently, it is not possible to understand the necessary concessions required to suitably allow for and mitigate direct influences from the surrounding land. Such concessions are likely to impact the form of development and require increased development infrastructure to suitably mitigate the issues.

A high level development contribution assessment has been undertaken and identifies that significant development infrastructure is required to facilitate overall development within the Study Area. These estimates do not include the likely significant development costings within specific development areas to provide the necessary internal infrastructure required to manage the site constraints.

Guidance on the necessary future technical investigations and reporting required to manage the constraints has also been considered.

The suitability and necessity of various forms of Bay access has been assessed to inform the type of Bay access that could be considered suitable should development proceed within the Study Area.

Investigations into land capability and Bay access in the Study Area have led to the following conclusions:

### Bay Access

- Physical access into the Bay itself within the Study Area (i.e. beach foreshore areas and boat access ramp infrastructure) is not desirable or appropriate in this location due to environmental constraints including seagrass meadow and existing low tide levels. Furthermore, physical access infrastructure is expensive to provide and maintain and Council priorities are to improve existing facilities in alternative locations along the northern edge of the Bellarine Peninsula.
- The lack of public land along the foreshore in this area prevents Bay access for the community from being easily provided by Council. Any Bay access will need to be provided through the purchase of land or associated with land development.
- Passive Bay access would be more appropriate than physical access into the Bay itself as it would balance the need to protect the foreshore's environmental significance and the desire to capitalise on the amenity of the Bay for the Leopold community.

## Development Potential

- Subject to further technical investigation, some land within the Study Area has the potential to be developed. However, there are significant constraints to development due to drainage requirements and coastal hazards.
- Development of the Study Area would require significant drainage infrastructure and extensions to the existing servicing and road networks to prevent an isolated community from being developed.
- Development should be guided by a number of principles to ensure it reflects the existing character of the area itself and of Leopold township. This includes the need to provide a level of self-sufficiency to development of the Study Area to counteract the issue of capacity in Leopold and the significant barrier to connectivity that is Portarlington Road.
- Development of the Study Area (based on the 2100 coastline) is considered to be the most efficient development option and would provide for passive Bay access through development contributions.

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## 11 Recommendations

Spiire recommends the following actions by Council:

### Leopold Structure Plan review

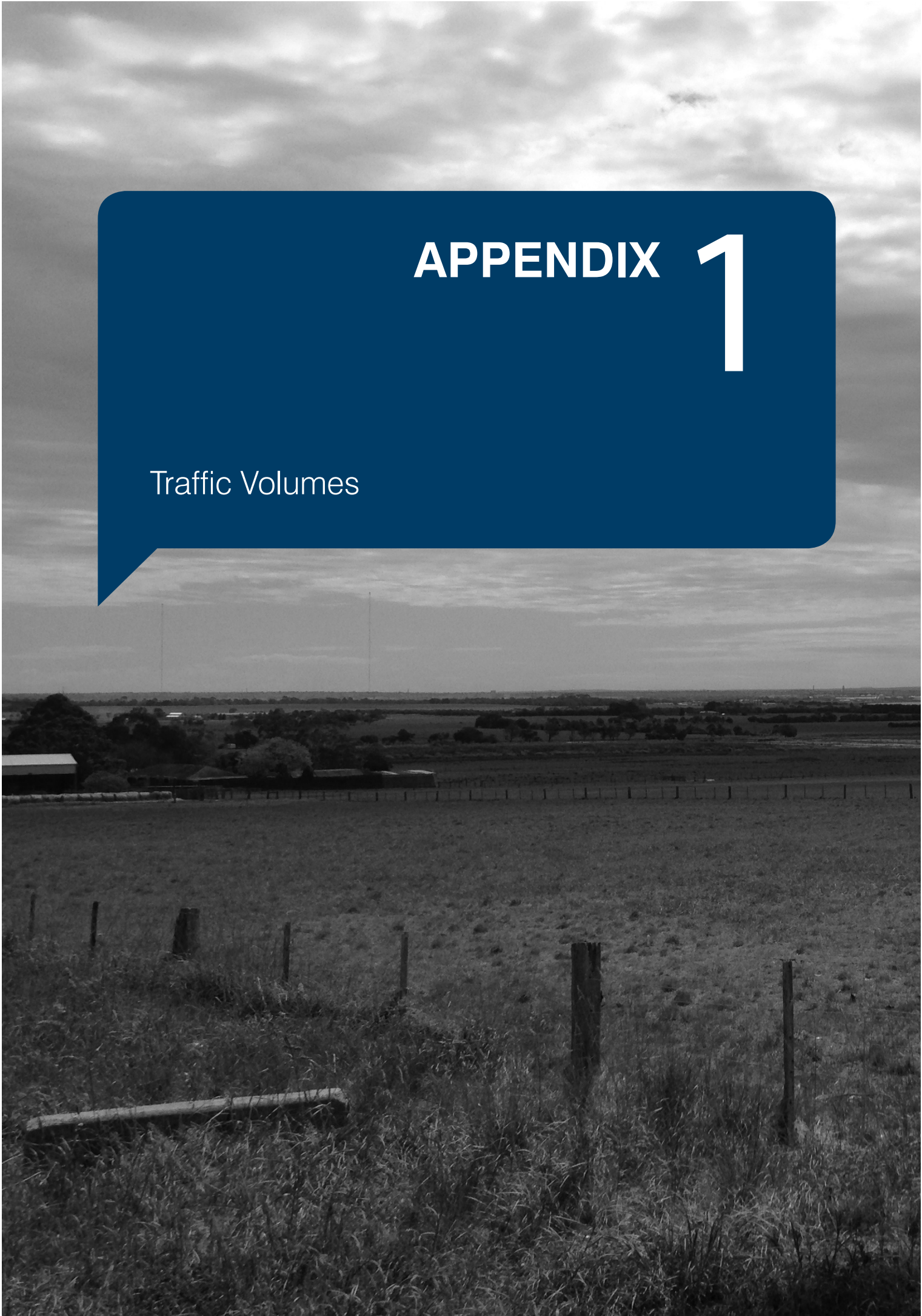
- Review the Leopold Structure Plan in 2017/2018 as currently planned with a particular focus on land supply analysis and, if necessary, potential growth opportunities in the broader area.
- Use the findings of this Report to inform the Structure Plan review in terms of suitability of land for urban development.
- Use the findings of this Report to inform the Structure Plan review in terms of provision of public Bay access through urban development.
- Incorporate the findings of this Report into the Structure Plan through new Directions for land use and development for the Study Area, if necessary.
- As part of the Structure Plan review, consider implementing new strategies in Clause 21.14 Bellarine Peninsula of the Greater Geelong Planning Scheme to give effect to the Structure Plan review.
- Investigate the need for additional open space facilities in the Leopold area as part of Council's municipal wide Open Space Strategy.

### Rezoning/Development Requirements

- Adopt a holistic approach for the whole Study Area to ensure all known constraints are addressed.
- Provide the strategic justification and the necessary technical information (as outlined in section 8.3 of this report) to ensure a logical and sustainable development is achieved.
- Link development with the provision of passive Bay access.
- Consider the application of relevant zone and overlay controls to achieve desired land use and development outcomes.

# APPENDIX 1

Traffic Volumes



Current traffic volumes for the Study Area have been assessed to assist in determining likely impacts for future development from an access and road provision perspective. These figures are detailed below.

Table 1: Geelong Portarlington Road (Source: Figures 3 & 4 in draft Geelong Growth Area Modelling report by AECOM dated 21 Feb 2014)

| Direction | Location               | 2011 Base Volumes | 2031 Predicted Volumes |
|-----------|------------------------|-------------------|------------------------|
| Westbound | west of Melaluka Rd    | 10,900vpd         | 14,900vpd              |
|           | west of Kensington Rd  | 10,800vpd         | 14,900vpd              |
|           | west of Christies Road | 10,200vpd         | 14,900vpd              |
|           | east of Christies Road | 9,200vpd          | 12,600vpd              |
| Eastbound | west of Melaluka Rd    | 10,400vpd         | 14,100vpd              |
|           | west of Kensington Rd  | 10,400vpd         | 14,300vpd              |
|           | west of Christies Road | 10,400vpd         | 13,200vpd              |
|           | east of Christies Road | 9,800vpd          | 12,300vpd              |

Table 2: Current traffic at Portarlington Road and Christies Road (Source: VicRoads SCATS data for 17/10/2014)

| Direction | Weekday Total | AM Peak              | PM Peak              |
|-----------|---------------|----------------------|----------------------|
| Westbound | 12,174vpd     | 1,603vph (8:00-9:00) | 725vph (3:00-4:00)   |
| Eastbound | 11,815vpd     | 576vph (8:00-9:00)   | 1,612vph (5:00-6:00) |

Table 3: Local Road Volumes (Source: City of Greater Geelong Traffic Counts)

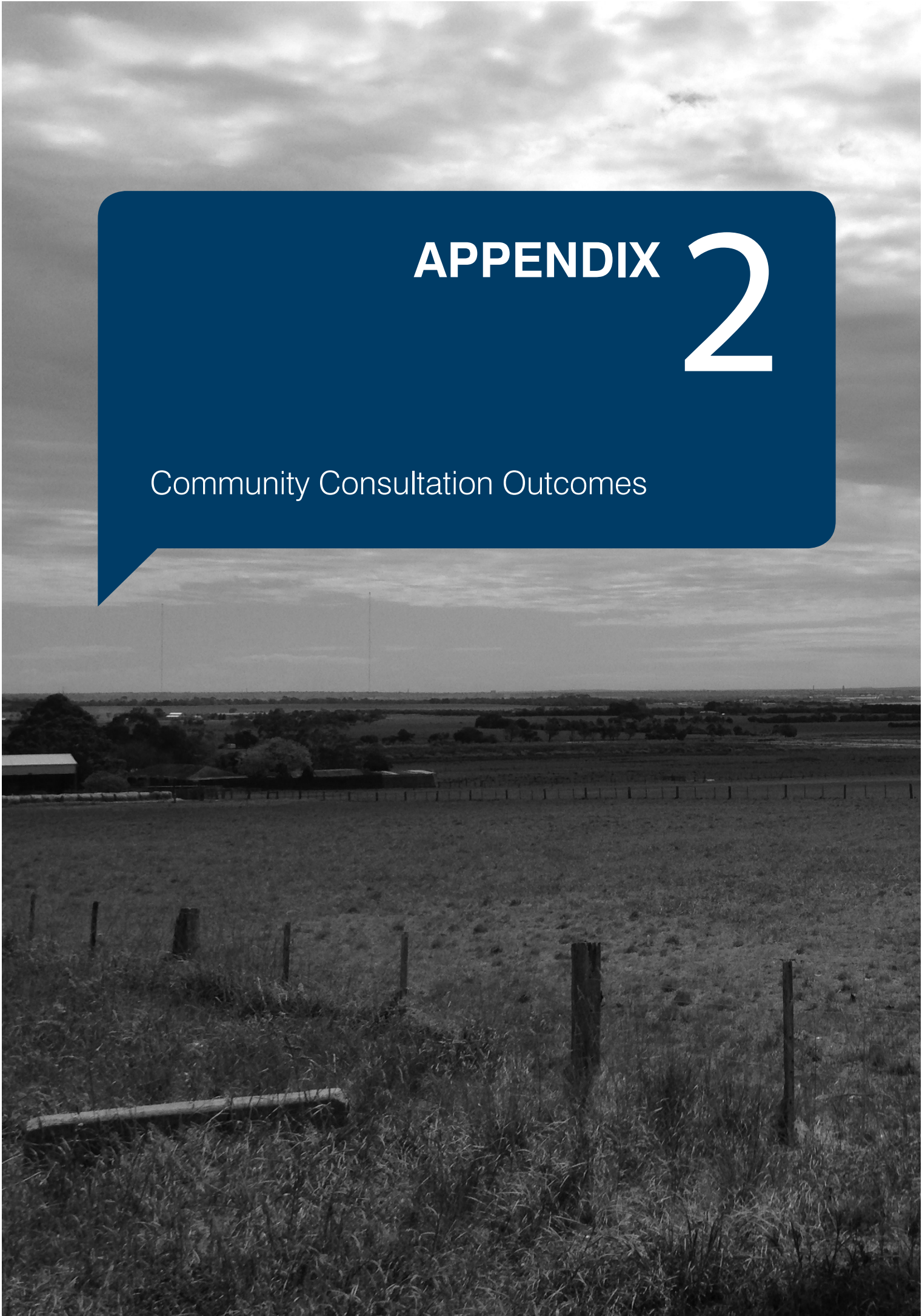
| Road          | Location              | Date     | Weekday  | AM Peak   | PM Peak   |
|---------------|-----------------------|----------|----------|-----------|-----------|
|               |                       |          | Total    | 8:00-9:00 | 5:00-6:00 |
| Kensington Rd | North of Highland Way | Aug 2010 | 3,567vpd | 353vph    | 352vph    |
| Melaluka Rd   | At Rail Trail         | Dec 2013 | 3,833vpd | 254vph    | 346vph    |

Table 4: Side Road Cross-section and Access Control at Intersections with Portarlington Road

| <b>Road</b>        | <b>Side Road Cross-section</b>              | <b>Access Conditions</b>      |
|--------------------|---|-------------------------------|
| Clifton Avenue     | 6.0m seal to north; 5.0m gravel to south    | Median opening + R turn lanes |
| Melaluka Road      | 7.0m seal (2 x 3.5m traffic lanes)          | Median opening + R turn lanes |
| Moss Road/No 711   | 7.5m bk to south; 4.0m track to north       | L in/L out, no median opening |
| Kensington Road    | 11m bk (2 x 3.2m traffic lanes + parking)   | Median opening + R turn lanes |
| Alexander Avenue   | 5.6m seal to north                          | Median opening + R turn lanes |
| Grand Scenic Drive | 5.6m seal to north                          | L in/L out, no median opening |
| Christies Road     | 11.6m bk (2 x 3.1m traffic lanes + parking) | Traffic signals               |
| Mountjoy Road      | 4.0m gravel to north                        | L in/L out, no median opening |

# APPENDIX 2

Community Consultation Outcomes



Community consultation undertaken in February 2015 included discussions around seven tables and sought feedback on two key questions:

Constraints and Opportunities confirmation.

Development and Bay Access options.

The results of these table discussions are summarised below.

| Table 1 | Opportunities/Constraints   | Development/Bay Access Options  |
|---------|---|---|
|         | Foreshore has been neglected by CoGG  | Provide full access and clean up beach. "If you are going to do it, do it properly."                |
|         | How will significant Indigenous Artefacts Areas be protected (from sewerage/water/drainage stations/systems (for future investigations) | South of Portarlinton Road: focus retail in existing centre, more intensive development near shops. |
|         | Developers have been in CoGG ear?   | Need to upgrade access point for boat access, public or private ramp ok.                            |
|         | Services for people north of Port Rd have not changed for 30-40yrs  | Walking tracks and bike paths separated from arterial road.   |
|         | Native plants present   | Development: larger lots (semi-rural, take advantage of view), conventional densities.              |
|         | The Bay has poor water quality  | Development: former Golf Course, Geelong Flower Farm  |
|         | Do downstream ratepayers benefit from development?  | No high density, apartments.  |
|         | Poor quality drainage water   |   |
|         | Poor access to Portarlinton Road from Clifton Avenue  |   |
|         | South of Portarlinton Road: low lying flood area, untreated sewer down drainage, swampland like Warralilly (rates, rates, rates)        |   |
|         | Issue: access to highway from Grand Scenic Drive  |   |
|         | Bird habitat  |   |
|         | Who pay for sealing Grand Scenic Drive? (it is now gravel)  |   |
|         | Concern about walking track behind and through Grand Scenic Drive – properties?   |   |

| Table 2 | Opportunities/Constraints   | Development/Bay Access Options  |
|---------|---|---|
|         | Flora and fauna along coast   | Access to the Bay demand is questionable.   |
|         | No beach (seaweed)  | Access to the Bay is still one dimensional  |
|         | There are no east-west roads and connections north of Portarlinton Road | Passive Bay access along edge   |
|         | Bay access will be difficult  | Bay access opportunity – jetty?   |
|         | Drainage flow issues  | Desire for coastal road   |
|         | Pointless to have access to the Bay: swampy                             | Want to see people use the foreshore: fishing, cycling, boating                   |
|         | Shallowness of the Bay: is it possible to launch a boat?                | Elevated park location: passive, running tracks, playground, botanic gardens      |
|         | Access to Grand Scenic Drive is difficult.                              | Grand Scenic Drive: potential change by first of all protect RLZ, interface to be |

|  |  |   |
|--|--|---|
|  |  | buffered if all the rest of the land is developed or changes to RLZ, don't want to see road cutting through this area, no gas |
|  | Aesthetic of the hill/view down is important   | Road improvements needed  |
|  | With water inland from the coast – great opportunities to have nice views/water access | Pedestrian tunnel access under Portarlington Road   |
|  | Community infrastructure isn't keeping up with growth                                  | Residential/retirement village options  |
|  | Leopold is running out of land   | Development: preference for larger lots (1 acre), also preference for smaller lots.   |
|  | SPS overflows  | Development is not desired, Bay access is.  |
|  | Melaluka/Portarlington Road: road connection is difficult.                             | Corner of Clifton and Portarlington Road: local access road could provide development: closer to services.                    |
|  |  | North of Portarlington Road: urban development potential, commercial can expand.  |

| Table 3 | Opportunities/Constraints   | Development/Bay Access Options  |
|---------|---|---|
|         | Traffic signalisation supported.  | Support Bay access: boat ramp, walking  |
|         | Melaluka Road/Portarlington Road: traffic issues, signalisation supported/roundabout? | Along foreshore: café, boat ramp, walking paths, jetty, sailing club, boardwalk.  |
|         | Support idea: Bellarine Bike path diverted through north of Portarlington Road        | South of Portarlington Road: retirement village, subdivision (ability): limited options to development, rezone to residential |
|         |   | Along Portarlington Road: support residential   |
|         |   | Extend Bellarine Rail Trail   |
|         |   | Rural living/low density housing in southern part of the land north of Portarlington Road.                                    |

| Table 4 | Opportunities/Constraints  | Development/Bay Access Options  |
|---------|--|---|
|         | Alternative drain options?   | Along coast: park/picnic area   |
|         | Wetland connections?   | Corner of Grand Scenic Drive and coast: good park location, why is this closed off? |
|         | South of Partarlington Road: can this drainage link work? Explore non-open drains, been down that path | Grand Scenic Drive to Marina: walkable area   |
|         | Corner of Bellarine Highway/Melaluka Road: hazardous intersection (no slip lanes)                      | Marina: most appropriate place to provide access (public)                           |
|         | Corner of Portarlington/Melaluka: roundabout or traffic lights?  | There is a need for a boat ramp   |
|         | Existing drainage is not well maintained   | Have rail trail connection  |
|         | Do Moss Road and Clifton Avenue have public access?  | Opposite Grand Scenic Drive: lower density (5 acres?)                               |
|         | Where to put public access?  | No compulsory acquisition   |
|         | Boat access?   | Moss Road: why is this not used?  |
|         | Do not support compulsory acquisition  | Central: green space, rural/non-urban   |
|         | Shallow water for a boat ramp  | Alcoa land: is this a better opportunity: potential contamination                   |

|  |   |   |
|--|---|---|
|  | There is significant intertidal zone              | Corner of Clifton and Portarlington: crossing points  |
|  | Safety/traffic connectivity of Portarlington Road | South of Portarlington: consolidate this area, keep 'heart' of Leopold here, no open drains |
|  | Bay access: passive/non-urban access              |   |
|  | No public access to beach                         |   |
|  | End of Grand Scenic Drive: homemade boat ramp     |   |

| Table 5 | Opportunities/Constraints  | Development/Bay Access Options   |
|---------|--|--|
|         | Water is too shallow   | Why need Bay access here when clean access is provided close by?                               |
|         | Environmental issues   | Board walk is a good option  |
|         | Consistently covered in seaweed (the ecology of the Bay has changed)           | Passive access: closest to the Bay as possible   |
|         | The quality of the Bay is poor   | How could active access be achieved? Too shallow for active access?                            |
|         | Increased bird life since seaweed/grass present                                | Central area: low area, couldn't support development   |
|         | Passive access over active   | North-west area: development hardest to achieve here (make Public Open Space?)                 |
|         | Where is the space to provide access?  | Bay access will benefit greater community  |
|         | Could we create open space? We need a trade off                                | Development will allow passive Bay access to take place  |
|         | There is no beach/land to access   | Portarlington Road/Clifton Avenue corner area: flooding problems, would prevent development.   |
|         | Bay access should stop at Alexander Avenue                                     | Grand Scenic Drive: the landscape character here shouldn't be changed, no further development. |
|         | Unsuitable land to develop: flooding; why pushing to develop on a flood plain? | Development: low density, low rise: similar size to Grand Scenic Drive                         |
|         | All private own land   | Access to Bay should occur from Clifton Avenue to Alexander Avenue                             |
|         | Road network cannot support development  |  |
|         | Corner of Grand Scenic Drive/Portarlington Road: a lot of caravans entering    |  |
|         | It is a traffic hazard to cross Portarlington Road to get to shops             |  |
|         | South of Portarlington Road: makes sense to develop area as part of the town.  |  |

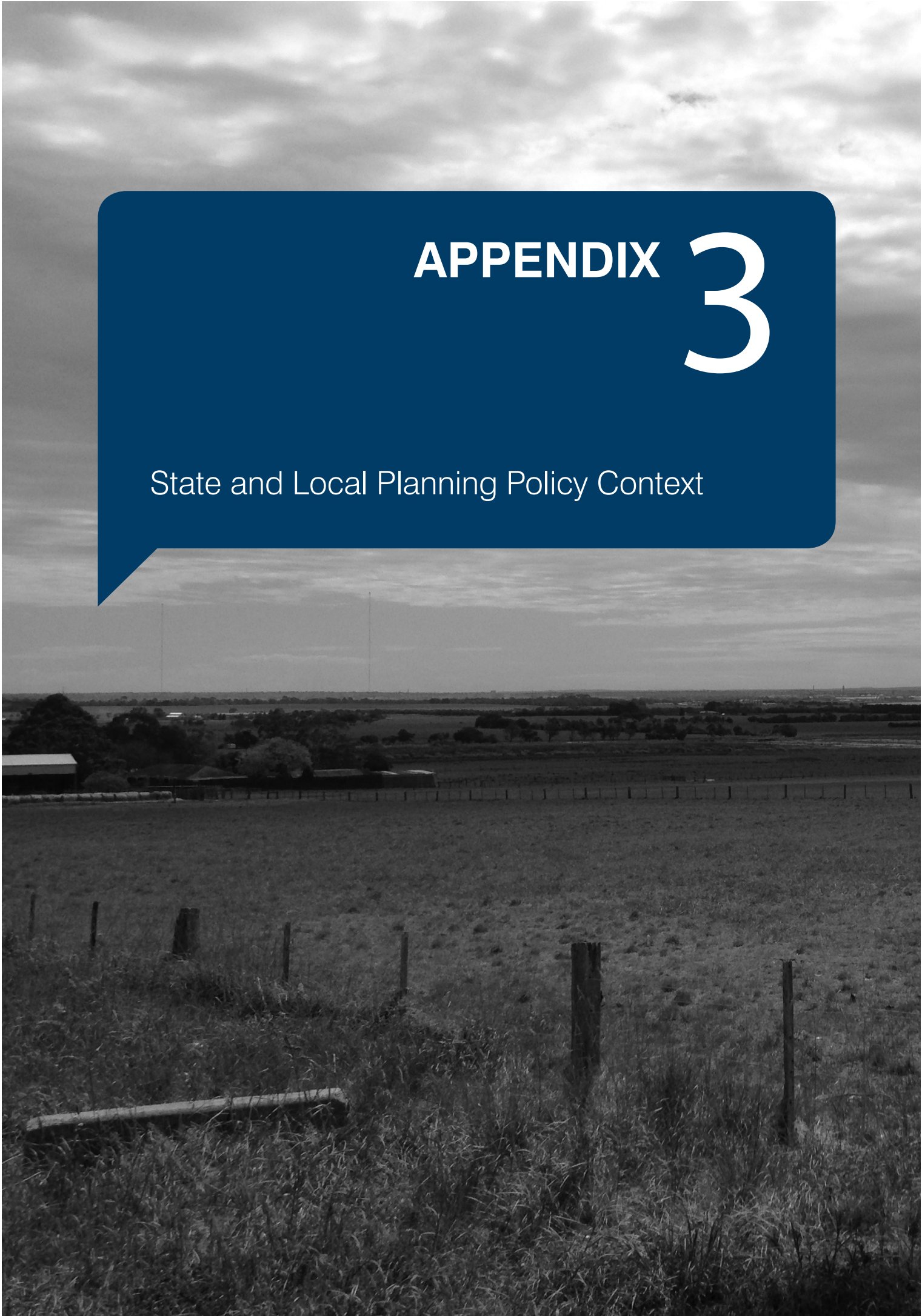
| Table 6 | Opportunities/Constraints                                      | Development/Bay Access Options   |
|---------|--|--|
|         | Flora and fauna environment                                    | No point of Bay access without development of some form                      |
|         | Unsuitable for boat ramps due to northerly winds and sea grass | Retain open farm land  |
|         | Too shallow for access   | Views of Bay and Geelong   |
|         | Difficult to walk along beach as there is sea grass            | Consider extending township boundary east to line up with existing boat ramp |
|         | Birds: Glasswart, Orange Bellied Parrot                        | Signals at Portarlington/Melaluka Road and road through site                 |

|  |  |   |
|--|--|---|
|  | Why exclude land to the west of Clifton Avenue?                                  | Commercial uses fronting Portarlington Road, landscape buffer |
|  | Why exclude land to the east of Grand Scenic Drive?                              | Over-trafficking of beach environment                         |
|  | Proposed works informing future work   |   |
|  | Don't develop low lying flood area. Develop on high level: 0.2ha (1.2acre) level |   |
|  | Uniform town boundary?   |   |
|  | Land south of Portarlington: swamp   |   |

| Table 7 | Opportunities/Constraints   | Development/Bay Access Options  |
|---------|---|---|
|         | Biggest constraint is getting Council to accept the inevitability that this will happen: sooner better than later | Make the foreshore a destination: lots of bike trails, walking tracks, lead to development at the foreshore (kayaking, boardwalk, coffee shops: create a focus), canal development?   |
|         | Constraints: all fairly mundane, easily overcome, no significant issues   | Scattered low density housing to preserve a parkland feel   |
|         |   | Extend boundary east of Grand Scenic Drive: Prime Real Estate: incorporating outstanding sea views on slightly elevated land giving high opportunity for sea views  |
|         |   | North of Portarlington Road: low density housing  |
|         |   | Foreshore: pier for fishing/boating, boat ramp, like canal idea (eg QLD, overseas), parking for cars/boats, boardwalk/coffee shops/restaurants, hydrofoil to Melbourne for regular daily commuters as Leopold lacks employment, incorporate 'fun park' theme, off leash for dogs, open park land. |
|         |   | Connection to rail trail and loop   |
|         |   | South of Portarlington: high density development: easy access to shopping.  |

# APPENDIX 3

State and Local Planning Policy Context



A detailed summary of State and Local Planning Policy content that is of relevance to this project is provided below.

#### **11.05-5 Coastal Settlement**

##### **Objective**

To plan for sustainable coastal development.

##### **Strategies**

- Support a network of diverse coastal settlements which provides for a broad range of housing types, economic opportunities and services.
- Encourage urban renewal and redevelopment opportunities within existing settlements to reduce the demand for urban sprawl.
- Identify a clear settlement boundary around coastal settlements to ensure that growth in coastal areas is planned and coastal values protected. Where no settlement boundary is identified, the extent of a settlement is defined by the extent of existing urban zoned land and any land identified on a plan in the planning scheme for future urban settlement.
- Direct residential and other urban development and infrastructure within defined settlement boundaries of existing settlements that are capable of accommodating growth.
- Avoid linear urban sprawl along the coastal edge and ribbon development within rural landscapes and protect areas between settlements for non-urban use.
- Avoid development on ridgelines, primary coastal dune systems and low lying coastal areas.
- Encourage opportunities to restructure old and inappropriate subdivisions to reduce development impacts on the environment.
- Ensure a sustainable water supply, stormwater and sewerage treatment for all development.
- Minimise the quantity and enhance the quality of storm water discharge from new development into the ocean, Bays and estuaries.

#### **11.07 Geelong (G21) Regional Growth**

##### **11.07-1 Planning for growth**

##### **Objective**

- To optimise infrastructure and consolidate growth.

##### **Strategies**

- Maximise capacity and leverage off existing infrastructure and services, particularly near central retail and transport nodes.
- Support the growth of Bannockburn, Colac, Drysdale/Clifton Springs, Lara, Leopold, Ocean Grove and Torquay/Jan Juc as district towns by building on existing and planned infrastructure and focussing growth along key road and rail networks.
- Provide for long term growth options that build on existing infrastructure, including two further investigation areas north and west of Geelong.

### **11.07-3 Connected communities**

#### **Objective**

- To create unique and connected communities.

#### **Strategies**

- Support growth that enhances choice, health and wellbeing, liveability, amenity and diversity and creates a sense of place.
- Create communities with opportunity to participate in arts, culture, sport and recreation, encouraging healthy lifestyles.
- Support key district towns across the region providing services to surrounding areas.
- Maintain a significant settlement break between the region and Melbourne.
- Provide for settlement breaks between towns to maintain their unique identities.
- Require a settlement boundary for all towns.

### **11.07-4 Environmental assets**

#### **Objective**

- To protect, restore and enhance the region's unique environment.

#### **Strategies**

- Protect, restore and enhance the quality of land and marine areas, waterways, biodiversity and soils.
- Maintain and protect the region's natural assets, including the region's parks and reserves.

### **11.07-5 Agricultural productivity**

#### **Objective**

- To secure food, water and energy resources.

#### **Strategies**

- Support new opportunities in farming, fisheries and energy in a changing climate.
- Support a productive, robust and self sustaining region by harnessing existing energy and natural resources while protecting and enhancing farming and natural assets.
- Protect critical agricultural land, energy and earth resources required to support a growing population by focussing development to existing township areas and directing growth to towns which provide rural services.
- Provide environmental and liveability benefits through the efficient and effective delivery of water infrastructure and services.

### **11.07-6 Sustainable communities**

#### **Objective**

- To allow communities to live, work and participate locally.

#### **Strategies**

- Support industries that utilise skills within the region.
- Support increased employment diversity.

- Support new businesses that provide employment and innovation opportunities in identified employment nodes across the region.
- Support key district towns providing key services to surrounding areas.
- Facilitate infill development in Central Geelong and West Fyans and around activity areas within urban Geelong and district towns.

#### **11.07-7 A diversified economy**

##### **Objective**

- To build the region's economy.

##### **Strategies**

- Support diversity in the region's economy that builds on its competitive strengths, including tourism and agricultural land resources and economic, social and natural assets.
- Recognise and develop a national transport and logistics precinct to the north of Geelong, connecting Avalon Airport, Geelong Port and the Geelong Ring Road Employment Precinct.
- Facilitate growth in a range of employment sectors, including health, education and research.
- Facilitate revitalising and strengthening Central Geelong as a regional city.
- Protect and strengthen existing and planned employment areas and plan for new employment nodes.
- Plan for the expansion of industrial employment areas at Colac and Winchelsea.

#### **11.07-8 Transport**

##### **Objective**

- To provide a range of accessible transport choices.

##### **Strategies**

- Improve transport links that strengthen the connections to Melbourne and adjoining regions.
- Support improved transit and access within Geelong and the wider region.

#### **12.02 Coastal Areas**

##### **12.02-1 Protection of coastal areas**

##### **Objective**

To recognise and enhance the value of the coastal areas to the community and ensure sustainable use of natural coastal resources.

##### **Strategies**

- Coordinated land use and planning with the requirements of the Coastal Management Act 1995 to:
- Provide clear direction for the future sustainable use of the coast, including the marine environment, for recreation, conservation, tourism, commerce and similar uses in appropriate areas.
- Protect and maintain areas of environmental significance.
- Identify suitable areas and opportunities for improved facilities.
- Apply the hierarchy of principles for coastal planning and management as set out in the Victorian Coastal Strategy 2008, which are:

- Principle 1: Provide for the protection of significant environmental and cultural values.
- Principle 2: Undertake integrated planning and provide clear direction for the future.
- Principle 3: Ensure the sustainable use of natural coastal resources.
- When the above principles have been considered and addressed:
  - Principle 4: Ensure development on the coast is located within existing modified and resilient environments where the demand for development is evident and the impact can be managed.

#### **12.02-2 Appropriate development of coastal areas**

##### **Objective**

- To ensure development conserves, protects and seeks to enhance coastal biodiversity and ecological values.

##### **Strategies**

- Ensure development is sensitively sited and designed and respects the character of coastal settlements.
- Encourage revegetation of cleared land abutting coastal reserves.
- Maintain the natural drainage patterns, water quality and biodiversity within and adjacent to coastal estuaries, wetlands and waterways.
- Avoid disturbance of coastal acid sulfate soils.
- Protect cultural heritage places, including Aboriginal places, archaeological sites and historic shipwrecks.

#### **12.02-3 Coastal Crown land**

##### **Objective**

- To achieve development that provides an environmental, social and economic balance.

##### **Strategies**

- Ensure that use and development on or adjacent to coastal foreshore Crown land:
- Maintains safe, equitable public access and improves public benefit whilst protecting local environmental and social values.
- Demonstrates need and coastal dependency.
- Is located within a defined activity or recreation node.

#### **12.02-4 Coastal tourism**

##### **Objective**

- To encourage suitably located and designed coastal and marine tourism opportunities.

##### **Strategies**

- Ensure that a diverse range of accommodation options and coastal experience are maintained and provided for and that sites and facilities are accessible to all.
- Ensure tourism developments demonstrate a tourist accommodation need and support a nature based approach within non-urban areas.

- Ensure developments are of an appropriate scale, use and intensity relative to its location and minimises impacts on the surrounding natural visual, environmental and coastal character.

## **12.02-5 Bays**

### **Objective**

- To improve the environmental health of the Bays and their catchments.

### **Strategies**

- Reduce major environmental pressures associated with urban growth and development within catchments of Port Phillip Bay and Western Port by:
  - Requiring growth area planning to protect significant natural assets.
  - Improving the quality of stormwater entering waterways, particularly that emanating from construction sites and road development.
  - Improve waterway management arrangements for the whole of the Port Phillip Bay and Western Port catchments.
  - Protect coastal and foreshore environments and improve public access and recreation facilities around Port Phillip Bay and Western Port by:
    - Requiring coastal planning and management to be consistent with the Victorian Coastal Strategy 2008.
    - Managing privately owned foreshore consistently with the adjoining public land.

## **13.01 Climate Change Impacts**

### **13.01-1 Coastal inundation and erosion**

#### **Objective**

- To plan for and manage the potential coastal impacts of climate change.

#### **Strategies**

- In planning for possible sea level rise, an increase of 0.2 metres over current 1 in 100 year flood levels by 2040 may be used for new development in close proximity to existing development (urban infill).
- Plan for possible sea level rise of 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and coastal impacts associated with climate change.
- Consider the risks associated with climate change in planning and management decision making processes.
- For new greenfield development outside of town boundaries, plan for not less than 0.8 metre sea level rise by 2100.
- Ensure that land subject to coastal hazards are identified and appropriately managed to ensure that future development is not at risk.
- Ensure that development or protective works seeking to respond to coastal hazard risks avoids detrimental impacts on coastal processes.
- Avoid development in identified coastal hazard areas susceptible to inundation (both river and coastal), erosion, landslip/landslide, acid sulfate soils, bushfire and geotechnical risk.

## **16.01-2 Location of Residential Development**

### **Objective**

- To locate new housing in or close to activity centres and employment corridors and at other strategic redevelopment sites that offer good access to services and transport.

### **Strategies**

- Encourage higher density housing development on sites that are well located in relation to activity centres, employment corridors and public transport.
- Ensure an adequate supply of redevelopment opportunities within the established urban area to reduce the pressure for fringe development.
- Facilitate residential development that is cost-effective in infrastructure provision and use, energy efficient, incorporates water efficient design principles and encourages public transport use.
- Identify opportunities for increased residential densities to help consolidate urban areas.

## **17.03 Tourism**

### **17.03-1 Facilitating tourism**

#### **Objective**

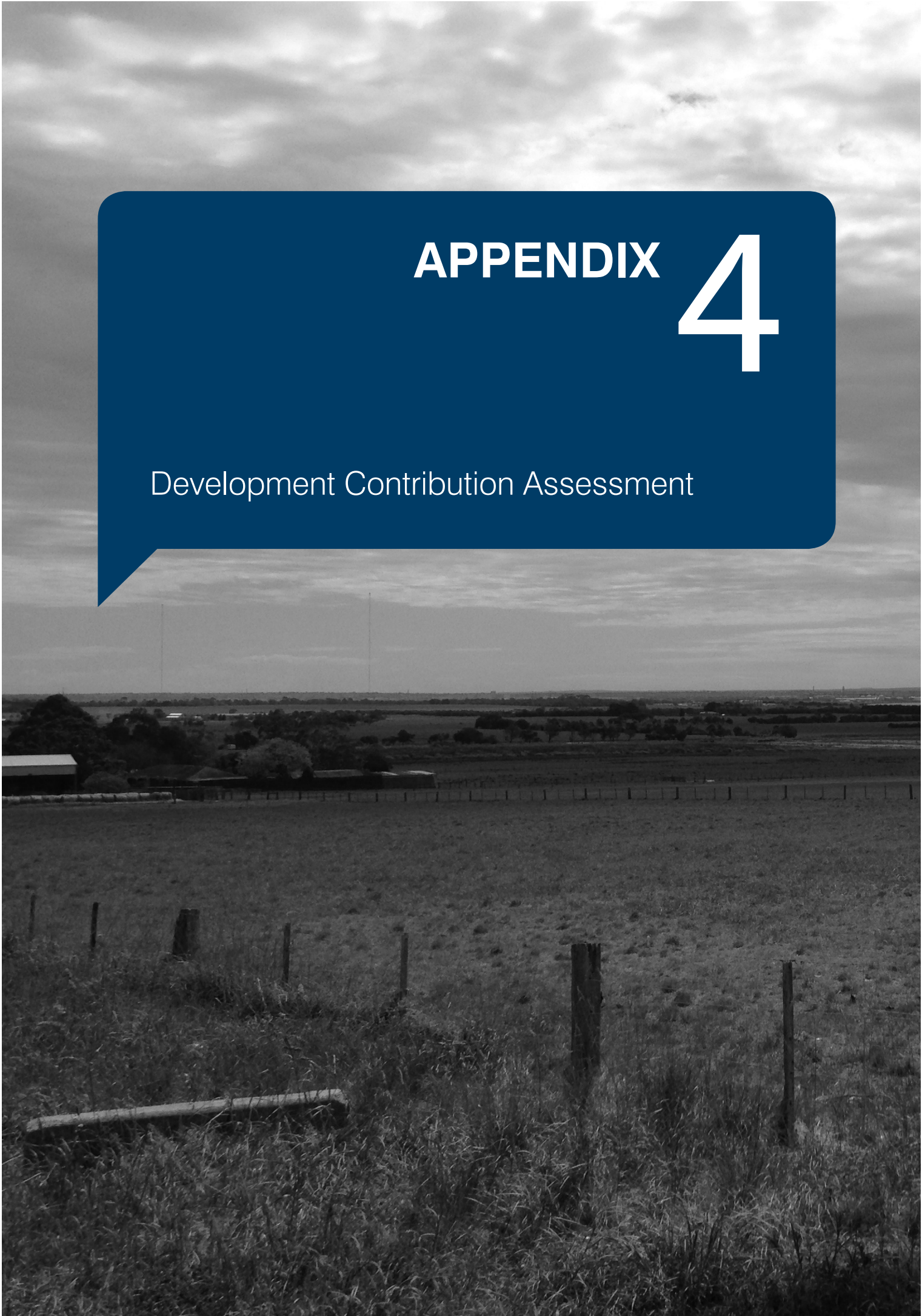
- To encourage tourism development to maximise the employment and long-term economic, social and cultural benefits of developing the State as a competitive domestic and international tourist destination.

#### **Strategies**

- Encourage the development of a range of well-designed and sited tourist facilities, including integrated resorts, motel accommodation and smaller scale operations such as host farm, bed and breakfast and retail opportunities.
- Seek to ensure that tourism facilities have access to suitable transport and be compatible with and build upon the assets and qualities of surrounding urban or rural activities and cultural and natural attractions.

# APPENDIX 4

## Development Contribution Assessment



| <b>Development Contribution Items Summary Table</b>  |
|--|
| <b>Global Assumptions:</b>   |
| Total Estimated Developable Area 138ha   |
| Total Estimated Drainage Reserve Encumbered Area 6.7ha   |
| Active and Passive Open Space (10%) 13.1ha   |
| Total Estimated Net Developable Area 118.2ha   |
| No allowance for bay interface works associated with Coastal environment   |
| No allowance for 'Out of Sequence' works (such as a retarding basin upstream of Portarlington Road). Such works to be funded by individual developers.               |
| Land Prices are assumed at \$450,000 / hectare   |
| WSUD asset sizes refer to a combined wetland water surface footprint; total reserve area assumed to be 150% the wetland treatment surface area (i.e. 3ha per basin)  |
| Assume development density 12lots/ha = 1,418 lots; and occupancy rate 2.6/lot = 3,687 people (3,687 over the 2021 population of 12,616) approximately a 30% increase |
| Existing telecommunications Towers are not considered as part of this estimate.  |
| Active Open Space Allowance of 6% Net Developable Area.  |
| No Allowance for additional Community facilities.  |

| ID                  | Item Summary   | Qty                          | Capital Cost | Cost Assumptions   | Cost Apportionment |
|---------------------|--|------------------------------|--------------|--|--------------------|
| <b>Drainage (D)</b> |  |                              |              |  |                    |
| D-1                 | 45m Wide Waterway upstream of Bellarine rail Trail                 | 290Lm x 45m wide             | \$887,400    | \$3,060/Lm   | 100%               |
| D-2                 | 3No. 900x2100 Culvert upgrade to Bellarine Rail Trail              | 30Lm - 3No. 900x2100 BC      | \$360,000    | \$12,000/Lm  | 100%               |
| D-3                 | 60m Wide Waterway from Bellarine Rail Trail to Portarlington Road  | 520Lm x 60m wide             | \$2,119,000  | \$4,075/Lm   | 100%               |
| D-4                 | 6No. 1350dia culvert upgrade at Portarlington Road.                | 45Lm x 6No. 1350dia culverts | \$1,400,000  | \$5,000 / Lm per pipe + \$25,000 / headwall  | 100%               |
| D-5                 | 60m Wide Waterway from Portarlington Road to downstream WSUD asset | 760Lm x 60m wide             | \$3,097,000  | \$4,075/Lm   | 100%               |
| D-6                 | 2No. 1050dia RCP in Moss Road                                      | 220Lm x 2No. 1050dia RCP     | \$445,200    | \$955 / Lm (x2) - MWC SE Melb Rate, 100%FCR + 4No. Pits (\$5,000 each) + outlet (\$10,000)   | 100%               |
| D-7                 | 2No. 1200dia RCP in Moss Road                                      | 635Lm x 2No. 1200dia RCP     | \$1,556,460  | \$1,198 / Lm (x2) - MWC SE Melb Rate, 100%FCR + 5No. Pits (\$5,000 each) + outlet (\$10,000) | 100%               |
| D-8                 | 50m Wide Waterway from Portarlington Road to downstream WSUD asset | 390Lm x 50m wide             | \$1,326,000  | \$3,400/Lm   | 100%               |

|      |  |                          |             |   |      |
|------|--|--------------------------|-------------|---|------|
| D-9  | 2ha WSUD asset.  | 2ha wetland footprint    | \$3,000,000 | \$1.5million / ha of treatment area   | 100% |
| D-10 | 2ha WSUD asset.  | 2ha wetland footprint    | \$3,000,000 | \$1.5million / ha of treatment area   | 100% |
| D-11 | Outlet to the Bay (assume short connection to existing drainage channel - 1No. 2100dia RCP | 440Lm x 1No. 2100dia RCP | \$1,536,840 | \$3,436 / Lm - MWC SE Melb Rate, 100%FCR + 2No. Pits (\$10,000) + outlet (\$15,000) | 100% |
| D-12 | Outlet to the Bay (assume short connection to existing drainage channel - 1No. 2100dia RCP | 250Lm x 1No. 2100dia RCP | \$884,000   | \$3,436 / Lm - MWC SE Melb Rate, 100%FCR + 2No. Pits (\$10,000) + outlet (\$15,000) | 100% |

| <b>Roads and Intersections (R)</b> |  |  |             |  |      |
|------------------------------------|--|--|-------------|--|------|
| R-1                                | Upgrade of Signalised intersection at Portarlinton Road / Christies Road intersection. | upgrade and conversion to 4way signalised intersection | \$1,562,600 | Adopted from Jetty Road-Wyndham Street Intersection from Jetty Road Urban Growth area DCP (2011) | 100% |
| R-2                                | Signalised intersection at Portarlinton Road / Kensington Road.                        | 4way signalised intersection                           | \$3,955,200 | Adopted from Barwon Heads Road-Connector A Intersection from Horseshoe Bend Precinct DCP (2013)  | 100% |
| R-3                                | Signalised intersection at Portarlinton Road / Melaluka Road                           | 4way signalised intersection                           | \$3,955,200 | Adopted from Barwon Heads Road-Connector A Intersection from Horseshoe Bend Precinct DCP (2013)  | 100% |
| R-4                                | Closure of Existing Median at Portarlinton Road / Clifton Avenue                       | closure of median                                      | \$100,000   | estimate   | 100% |

| <b>Active Open Space (OS)</b> |   |                         |             |                |      |
|-------------------------------|---|-------------------------|-------------|----------------|------|
| OS-1                          | Precinct Active Open space provision (6% NDA) | 7.1ha active open space | \$7,100,000 | adopt \$100/m2 | 100% |

| Community (C) |                                    |               |             |  |  |
|---------------|------------------------------------|---------------|-------------|--|--|
| C-1           | Two-court indoor recreation centre | as identified | \$4,812,395 | Adopted from NAC - Multiple Purpose Stadium (2 courts) from Horseshoe Bend Precinct DCP (2013) | 30% existing single court LINC facility would not meet residential demands should population growth exceed 2021 population of 12,616 as identified in the Structure Plan. Assuming population generation of 5,326ppl - Structure Plan population exceeded by 42% |
| C-2           | Community Infrastructure Levy      | # lots        | \$1,276,236 | \$900 / Lot  | 100%   |

| Land (L) |   |                         |             |   |      |
|----------|---|-------------------------|-------------|---|------|
| L-1      | Land Acquisition for Waterway D-1                   | 1.305ha                 | \$587,250   | \$450,000/ha  | 100% |
| L-2      | Land Acquisition for Waterway D-3                   | 3.12ha                  | \$1,404,000 | \$450,000/ha  | 100% |
| L-3      | Land Acquisition for Waterway D-5                   | 4.56ha                  | \$2,052,000 | \$450,000/ha  | 100% |
| L-4      | Land Acquisition for Waterway D-8                   | 1.95ha                  | \$877,500   | \$450,000/ha  | 100% |
| L-5      | Land Acquisition WSUD asset D-9                     | 3ha reserve area        | \$1,350,000 | \$450,000/ha  | 100% |
| L-5      | Land Acquisition WSUD asset D-10                    | 3ha reserve area        | \$1,350,000 | \$450,000/ha  | 100% |
| L-6      | Land Acquisition for Active Open Space              | 7.1ha active open space | \$3,195,000 | \$450,000/ha  | 100% |
| L-7      | Land Acquisition for Community Services Allocation. |                         | \$171,000   | 3,800m2 assumes as per HBP DCP Prowse cost estimate (2013) and \$450,000/ha | 100% |

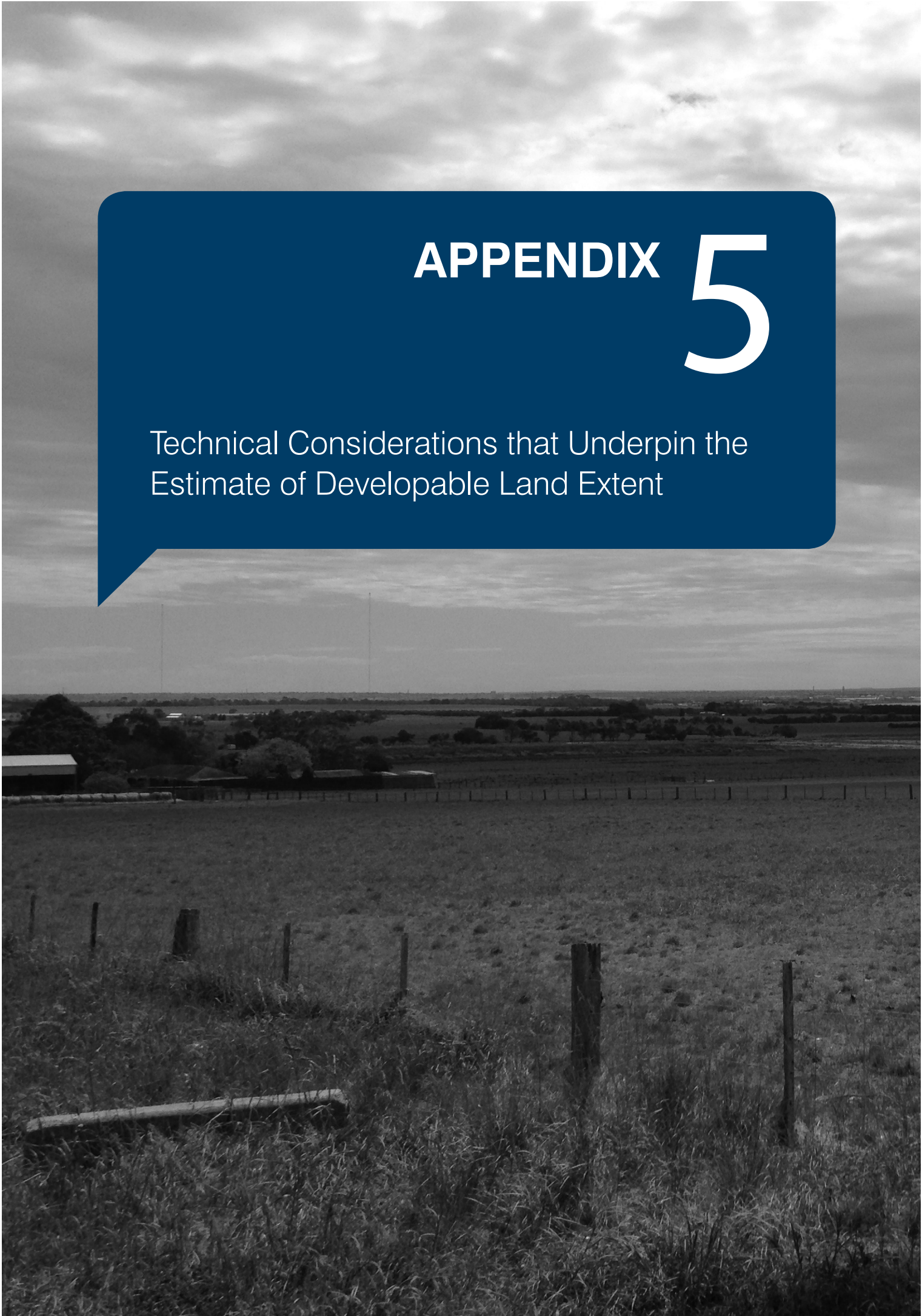
|                                       |                     |
|---------------------------------------|---------------------|
| <b>Sub-Total of Development Costs</b> | <b>\$54,547,776</b> |
|---------------------------------------|---------------------|

| Investigation and Design Fees (ID) |                         |     |             |  |      |
|------------------------------------|-------------------------|-----|-------------|--|------|
| ID-1                               | Professional fees (11%) | 11% | \$6,000,255 |  | 100% |

|  |                     |
|--|---------------------|
| <b>TOTAL</b>                           | <b>\$59,229,911</b> |
| Total 'Developable' Area Estimate (ha) | 138                 |
| Drainage Reserve Encumbered Area (ha)  | 6.7                 |
| Active and Passive Open Space (10%)    | 13.1                |
| Net Development Area (NDA) (ha)        | 118.2               |
| Lot estimate                           | 1418                |
| Contribution per lot                   | \$41,769            |
| <b>Contribution per ha (NDA)</b>       | <b>\$501,226</b>    |

# APPENDIX 5

Technical Considerations that Underpin the Estimate of Developable Land Extent



| Ref. | Technical Consideration | Assumed Acceptable Conditions  | Report Assumption   | Assumed Impact on Developable Land Area  | Future Considerations / Demonstration of Compliance  |
|------|-------------------------|--|---|--|--|
| 1    | On Site Flora and Fauna | Necessary protection and/or offset management of on site vegetation  | On site management can be achieved  | None   | Flora and Fauna investigations including ecology assessments and offset management plans as required.  |
| 2    | Seagrass                | No detrimental impact to the existing seagrass bed identified at the interface with the Bay.   | Runoff management within the development area will suitably protect existing seagrass beds.                                     | None   | Coastal Management Act Consent expected to be required, including detailed studies and reporting on seagrass viability as a result of development.                           |
| 3    | Cultural Heritage       | Approved Cultural Heritage Management Plan (CHMP).   | Cultural Heritage areas of significance can be managed via an approved CHMP.  | None<br>(note – areas of Cultural Heritage sensitivity are outside development due to sea level rise constraint) | Cultural Heritage Management Plan expected to be required.   |
| 4    | Soil Conditions         | All site soil contamination managed, including CASS.   | Any development within contaminated soil can be managed on site.<br>Any development within CASS can be managed.                 | None<br>(note – areas identified as impacted by CASS are outside development area for reasons of sea level rise) | A comprehensive CASS assessment expected to be required.   |
| 5    | Sea Level Rise (SLR)    | No development below the year 2100 1% AEP storm surge level – RL 1.83 and no defensive treatment measures to be implemented to minimize landtake of SLR. | No development below RL 1.83, and no defensive treatments such as earthworks or structures to minimize the landtake of the SLR. | <b>Yes</b><br>All assets required to be above, with freeboard to the year 2100 1%AEP storm surge level.          | SLR set out in Bellarine Peninsula – Corio Bay Local Coastal Hazard Assessment (Cardo, Final Draft 2014). Validation of the SLR and storm surge predictions may be required. |

|   |                                      |  |   |  |  |
|---|--------------------------------------|--|---|--|--|
| 6 | Flooding within Study Area           | Major on site flooding to be managed through existing and constructed waterways and drainage.<br><br>Adequate flood plain storage to be maintained.  | Constructed waterways can provide necessary flood management through developed areas.   | <b>Yes</b><br><br>Land take assumed for constructed waterways.   | A catchment based flood study and flood risk report to outline the existing conditions flooding (and flood plain storage) across the Study Area and demonstrate how any changes to the floodplain can manage flood water and maintain flood plain storage.<br><br>The study must include the existing development east of Melaluka Road. |
| 7 | Local Drainage within the Study Area | Any developable land to be reasonably drained to drainage corridors through conventional gravity drainage systems without the need for significant earthworks.                                       | Constructed waterways (drainage corridors) will provide necessary depth for minor drainage to outfall from adjacent developable area.   | <b>Yes</b><br><br>Development boundary to be at a higher level as development extends away from drainage corridors to allow for drainage to maintain cover and drain to drainage corridor. | A comprehensive drainage report to demonstrate functional design of drainage systems within the developable land.  |
| 8 | Water quality and retardation        | Stormwater runoff from developable area to be treated to meet "Best Practice Environmental Management Guidelines" (BPEMG) and retardation to pre-developed flow rates prior to discharge to the Bay. | Constructed wetlands located downstream of the development area and prior to discharge to the Bay, to treat stormwater to meet the BPEMG's.<br><br>Wetland basin's assumed to provide necessary retardation capacity. | <b>Yes</b><br><br>Land take adopted for the wetland basins.  | A comprehensive drainage report to demonstrate the required water treatment and retardation proposed for any proposed development.   |

|    |  |  |   |   |  |
|----|--|--|---|---|--|
| 9  | Setting the 'Lowest Development Contour'     | To allow for the land that can be reasonably drained to drainage corridors, and downstream water quality / retardation asset, through conventional gravity drainage system without the need for significant filling.   | The lowest Development Contour (north of Portarlinton Road) is estimated typically at RL4.5 and above. The downstream wetland basin is estimated to have a Normal Water Level (NWL). From this NWL of 2.13, the lowest development contour is estimated as RL2.13 + average pipe diameter + pipe cover and minor losses.  | <b>Yes</b><br>No development assumed downstream of RL 4.5 at the interface with the proposed drainage corridor.<br><br>As development extends away from the drainage corridor the development limit increases in elevation to allow for drainage outfall to the drainage corridors. | A comprehensive drainage report to demonstrate functional design of drainage systems.  |
| 10 | Flooding and drainage outside the Study Area | No adverse flooding or drainage impact as a result of development.<br><br>Particularly important for the entire western boundary of the study area and the interface boundary with Melaluka Road where existing drainage limitations are to be rectified to Authority expectations.<br><br>Any drainage augmentation and flood mitigation measures attributable to remedial matters must be assessed and designed into the works constructed through the study area right through to the Bay, at no cost to Council. | Assumed that development of the land identified will make necessary allowance for the mitigation of any adverse impacts.<br><br>(note – this may impact development yield and cost of development given the likely allowance for increased drainage infrastructure requirements such as underground drainage, additional road reserves, or dedicated lower order drainage reserves. | None<br><br>Assumed necessary allowance to be made in the development areas.  | A comprehensive drainage report, including a flood study to demonstrate functional design of drainage/flood mitigation systems so that there are no offsite adverse impacts and necessary allowance for the upgrade of the drainage system east of Melaluka Road has been made in a developed drainage system. |

|    |                                       |  |   |      |   |
|----|---------------------------------------|--|---|------|---|
| 11 | Staging and Infrastructure Delivery   | A holistic infrastructure services plan is developed for the Study Area and necessary agreements made with all landowners.<br><br>The delivery of infrastructure is to be at no cost to Council. | Necessary agreements can be made with all landowners and any 'out-of-sequence' work will be undertaken to Authority expectations. | None | A holistic infrastructure services plan and Development Contributions Plan (DCP) is required. This would require a complete 'functional design' of necessary infrastructure. Any 'out-of-sequence' works would not be covered by a DCP. |
| 12 | Traffic and Access                    | All necessary traffic management and access provision allowed for.   | Required traffic management and access provision can be made.   | None | Detailed traffic and access studies and Authority (including VicRoads and PTV) acceptance of proposed measures.   |
| 13 | Provision of Reticulated Services     | Infrastructure servicing for water, sewer, gas, electricity and telecommunications is suitably available to the development area.  | All services can be made available to the development area.   | None | Authority acceptance of the provision of services to the development area.  |
| 14 | Provision of Community Infrastructure | Community infrastructure to be provided as necessary commensurate to the extent of proposed development.   | All necessary community infrastructure to be provided within the proposed developable area.                                       | None | Comprehensive Community Infrastructure Plan.  |



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