

# **Barwon River interface with the Armstrong Creek Growth Area**

## **Background Issues and Opportunities Discussion Paper**



**August 2014**

This discussion paper is in a draft and not a final issued form. The contents of the discussion paper including any opinions, conclusions and or recommendations have been developed in close consultation with the City of Greater Geelong Growth Area Team for discussion purposes only and must not be relied upon in any way or imply or attribute actions, costs, outcomes or obligations on any listed agency. TBLD reserves the right, at any time with or without notice to amend, modify or retract any part or all of the document including any opinions, conclusions or recommendations contained within.



## **THOMPSON BERRILL LANDSCAPE DESIGN P/L**

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# Glossary

Abbreviation	Definition in this Discussion Paper
AAV	Aboriginal Affairs Victoria
ARI	Annual Recurrence Interval (1% = 1% chance of flooding in any given year)
BW	Barwon Water
CaLP Act	Catchment and Land Protection Act (1994)
CCMA	Corangamite Catchment Management Authority
CFA	Country Fire Authority
CHMP	Cultural Heritage Management Plan
dbh	Diameter of a tree measured at breast height
DEPI	Department of Environment and Primary Industries
DTPLI	Department of Transport, Planning and Local Infrastructure
FDE	Federal Department of Environment
ENG	City of Greater Geelong Engineering Unit
ENV	City of Greater Geelong Environment Unit
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESO	Environment Significance Overlay
EVC	Ecological Vegetation Class
FFG Act	Flora and Fauna Guarantee Act 1988
UGAT	City of Greater Geelong Urban Growth Area Team
HO	Heritage Overlay
LSIO	Land Subject to Inundation Overlay
OHS	Occupational Health and Safety
PAO	Public Acquisition Overlay
PCRZ	Public Conservation and Resource Zone
PPRZ	Public Park and Recreation Zone
PUZ	Public Use Zone
PV	Parks Victoria
RAP	Registered Aboriginal Party
REC	City of Greater Geelong Recreation and Open Space Unit
CoGG	City of Greater Geelong
RZ	Residential Zone
SWMS	Safe Works Method Statement
VHR	Victoria Heritage Register
WMO	Wildfire Management Overlay
WONS	Weeds of National Significance
WSUD	Water Sensitive Urban Design

# Executive Summary

The project is being coordinated by City of Greater Geelong Urban Growth Area Planning Team and a Project Control Group comprising representatives from key Council Departments. The discussion paper has been informed by workshops with existing landholders/developers and agency stakeholders including Parks Victoria, Corangamite CMA, Barwon Water, VicRoads, VicTrack, Department of Environment and Primary Industries and Department of Transport Planning and Local Infrastructure (Formerly known as Department of Planning and Community Development).

The discussion paper seeks to build on the overall strategic vision for the floodplain corridor outlined in the Barwon River Parklands Strategy and Armstrong Creek Urban Growth Area Precinct Structure Planning. The objective is to establish a strategic framework to respond to issues and opportunities associated with the approx 770 hectare interface of the Barwon River and floodplain adjoining the urban growth zone across the Armstrong Creek Urban Growth Area.

The flood prone private land along Barwon River at the interface with the Armstrong Creek Development area comprises 62 private titles. This land is outside the Urban Growth Area and the legal mechanism or need for the transfer of private land to the State Government or Council has not yet been determined. Implementation priorities for protection and enhancement of environmental values and establishment of public recreational access and facilities therefore need to remain flexible and will be guided by the pace of development and access to funding.

## Key opportunities

- Establishment of sustainable development and recreational buffer zones to the Lake Connewarre State Game Reserve and Ramsar area.
- Protection of natural processes and restoration of indigenous vegetation within the natural floodplain of the Barwon River to enhance biodiversity and habitat values.
- Design of stormwater drainage systems and wetlands from future development precincts to ensure no impact on existing water quality, wetland flora and habitat values. These systems and additional land within the floodplain of the Barwon River can also provide flexibility and opportunity to maintain, protect and where possible enhance the habitat and biodiversity balance under threat from climate change and predicted sea level rise.
- Review the Lake Connewarre Ramsar boundary and the Barwon River Environmental Significance Overlay (ESO2) to more closely align with the environmental values found in Hospital Swamp and floodplain along the Barwon River including proposed wetlands. The boundary may also be adjusted to reflect any potential changes in land management relating to expansion of the Lake Connewarre management area.
- Review land use controls, zones, overlays and policy position regarding the land situated between the Armstrong Creek growth area and the Barwon River / Lake Connewarre Complex to determine its most appropriate and sustainable medium to long term land use;

considering its fragmented ownership and location to significant State, National and International environmental assets.

- Protection and interpretation of cultural heritage values and sites associated with the Wathaurung and the early history and development of Geelong.
- Continuing liaison with the Wathaurung during development of open space areas along the Barwon River and Armstrong Creek to further investigate opportunities for interpretation of cultural heritage values, where appropriate, to increase public awareness, education and understanding.
- Provision of public access to and along the Barwon River and staged development of active and passive recreational facilities for the residents of the greater Geelong region and new communities in the Armstrong Creek urban growth area.
- Extension and connection of the Barwon River Trail providing an off road shared pedestrian and cycle trail link between Geelong and new development areas at Armstrong Creek. Prioritise access to, or transfer of land to enable progressive establishment of the Barwon River Trail south from Belmont Common/Gundog Lane. This is aimed at connecting Armstrong Creek to the existing off road trail network along the Barwon River through to central Geelong.
- Establishment of a secondary network of unsealed and informal walking tracks into the parklands and along the Barwon River. These could eventually form a series of looped trails with connections to bird hides and key viewing and fishing points.
- Provision of recreational water access to the Barwon River and potential development of canoe/kayak links between Geelong and Barwon Heads.
- Development of a visitor interpretation centre with facilities aimed at increasing public awareness, understanding and appreciation of the environmental, cultural heritage values and historical development and management of the reserve. The visitor centre could also provide access to car parking, public toilets and picnic, BBQ and play facilities along a key tourism route.
- Development of practical visitor management arrangements to protect existing high value habitat areas and public safety during duck season.
- Liaison and development of partnerships with landholders now to improve land management practices where possible ahead of hand over of land to Council.

Key actions may include:

- Fencing stock out of the banks of the Barwon River.
- Fencing and protection of any areas of identified native vegetation.
- Monitor rabbit and fox numbers across the floodplain and development interface and undertake coordinated control programs.

For details on overall opportunities refer to Section 8.

## Key issues

- Despite its status as one of the largest, most picturesque and important wetland systems in Victoria, with environmental values of National and International significance visitation levels to Lake Connewarre are low. There is a general lack of awareness that the area exists, even amongst people who live in Geelong or have visited the region many times.

- Lake Connewarre State Game Reserve provides critical habitat for rare and threatened water bird and wetland species and is used for duck hunting between March and June subject to favourable seasonal conditions. Increasing public access to the area via the Barwon River and from new urban development areas at Armstrong Creek may threaten environmental values and increase risks to public safety.
- Management responsibilities and arrangements for existing and potential future areas of public land have yet to be determined.
- The mechanism and timing for the potential transfer of private land to the State Government or Council has not yet been determined.
- There is no provision within the respective Armstrong Creek Precinct Development Contribution Plans for funding of new recreational assets such as the Barwon River Trail.
- The existing Environmental Significance Overlay and boundary of the Lake Connewarre State Game Reserve do not accurately reflect the potential future environmental values of the study area.
- There is limited public access to the Barwon River from new development areas at Armstrong Creek.
- The significant proportion of the floodplain has been cleared of vegetation in the past and is currently managed as farmland that has contributed to the establishment and spread of environmental weeds and feral animals such as rabbits and foxes.
- Costs for restoration of indigenous floodplain vegetation and ongoing management will be substantial to achieve long term sustainable outcomes.

For details on overall issues refer to Section 8.

## **Marshall Precinct Priorities**

### **High Priority**

- Extend the Barwon River Trail off road from Belmont Common at Gundog Lane to Horseshoe Bend Road including provision of a new pedestrian/cycle bridge across Waurm Ponds Creek east of the railway line.
- Confirm land management responsibilities for existing areas of public and private land.
- Liaise with landholders to commence weed control and revegetation along the Barwon River.
- Review safety at the Woolscour Lane level crossing and Railway Bridge.
- Map and assess the biodiversity values for the properties within the study area to ensure protection and assist land management planning.

### **Medium Priority**

- Formalise existing public car parking and access to the Barwon River at Horseshoe Bend Road and provide a fishing canoe/launching platform.
- As part of upgrades to Barwon Heads Road retain and improve pedestrian and cyclist access to existing open space along Waurm Ponds Creek.

### **Long Term Opportunities**

- Continue environmental restoration of the Barwon River and Waurm Ponds Creek floodplain areas to enhance biodiversity values and habitat values.
- Targeted acquisition of land for public purposes and environmental management.

For further details on issues and opportunities associated with the Marshall Precinct refer to



Photo 1 - Marshall Precinct view north-east from Horseshoe Bend Road to Geelong Racecourse  
Source: Parks Victoria July 2010

## North East Industrial Precinct Priorities

### High Priority

- Restore safe public access along the Barwon River under the Ovoid Sewer Aqueduct.
- Finalise detailed design of stormwater outfalls from new development areas to maximize biodiversity values and ensure accommodation is provided for future maintenance and public access along the Barwon River.
- Liaise with landholders to commence weed control and staged revegetation along the Barwon River and to provide screening on the escarpment to new development areas.
- Map and assess the biodiversity values for the properties within the study area to ensure protection and assist land management planning.

### Medium Priority

- Investigate provision of public access to the river east of the Ovoid Sewer Aqueduct via the existing Barwon Water pipeline easement.
- As development proceeds review grazing lease options for areas away from the river until funding is available to commence further stages of floodplain revegetation.

### Long Term Opportunities

- Extend the Barwon River Trail along the river east from Horseshoe Bend Road around to Jendes Lane.

- Ensure provision of pedestrian/cycle access across the Barwon River as part of future extension of the East-West Link Road.
- Remove all grazing from the floodplain and revegetate to enhance biodiversity and habitat values.

For further details on issues and opportunities associated with the North East Industrial Precinct refer to Section 9.2.



Photo 2 - North East Industrial Precinct view north east from Kings Lane to the Ovoid Sewer Aqueduct  
 Source: Parks Victoria July 2010

## Horseshoe Bend Precinct Priorities

### High Priority

- Establish proposed large water quality treatment wetlands within the floodplain at Sparrovale and Cold Winds properties to ensure protection and enhancement of habitat values at Lake Connewarre and Hospital Swamps.
- Confirm land and asset management responsibilities for the proposed wetlands and any new assets and areas of public land.
- Liaise with landholders to commence weed control and revegetation along the Barwon River.
- Strengthen boundary fencing to prevent illegal vehicle access and secure interface between leased grazing land and areas of environmental significance.
- Map and assess the biodiversity values for the properties within the study area to ensure protection and assist land management planning.

### Medium Priority

- Review maintenance vehicle access requirement for electricity transmission line towers and existing and new drainage assets to investigate potential for establishment of an informal network of public walking access tracks around the wetlands and across to selected areas along the Barwon River.
- Establish a visitor node with small public car park with views over the wetlands and connection to walking tracks.
- Review long term grazing lease options for areas away from the river until funding is available to commence further stages of floodplain revegetation.

### Long Term Opportunities

- Extend the Barwon River Trail from regional active open space recreational areas in Armstrong Creek East around the proposed Sparrovale Farm wetlands and back to the existing public road reserve at Brearleys Lane improving pedestrian/cycle links back to Geelong.
- Continue staged removal of grazing from the floodplain as funding for revegetation and active management to enhance biodiversity and habitat values becomes available.
- Promote eco tourism and wetland nature walks as environmental values improve while maintaining buffers to sensitive nationally significant bird habitat areas.

For further details on issues and opportunities associated with the Horseshoe Bend Precinct refer to Section 9.3.



Photo 3 - Sparrovale and Cold Winds Properties view east from Sparrovale Road  
Source: Parks Victoria July 2010

## Armstrong Creek East Precinct Priorities

### High Priority

- Ensure protection of sensitive saltmarsh areas at Hospital Swamps through establishment of new levees and diversion channels.

- Coordinate design of stormwater treatment systems for Armstrong Creek East Precinct with large water quality treatment wetlands proposed within the floodplain at Sparrovale and Cold Winds properties to maximise integrated efficiency and environmental benefit.
- Confirm land and asset management responsibilities for the proposed wetlands and any new assets and areas of public land.
- Liaise with landholders to commence weed control and revegetation along the Barwon River.
- Strengthen boundary fencing to prevent illegal vehicle access and secure interface between leased grazing land and areas of environmental significance.
- Map and assess the biodiversity values for the properties within the study area to ensure protection and assist land management planning.

### Medium Priority

- Establish pedestrian/cycle link from Armstrong Creek to Tait's Point.
- Review long term grazing lease options for areas away from the river and areas not required for development of regional recreation until funding is available to commence further stages of floodplain revegetation.

### Long Term Opportunities

- Promote eco tourism and wetland nature walks and investigate establishment of a DEPI/Park Victoria Visitor Centre to attract and provide facilities for tourists visiting Bellarine Peninsula and Great Ocean Road.
- Extend the Barwon River Trail from regional recreational areas at Armstrong Creek along Groves Road and back around the proposed Sparrovale Farm wetlands to the road reserve at Brearleys Lane improving off road pedestrian/cycle links back to Geelong.
- Continue staged removal of grazing from the floodplain as funding for revegetation and active management to enhance biodiversity and habitat values becomes available.

For further details on issues and opportunities associated with the Armstrong Creek East Precinct refer to Section 9.4.



Photo 4 - Armstrong Creek outfall to Hospital Swamps view north from Lake Road  
 Source: Parks Victoria July 2010

# 1. Introduction

## 1.1 Project Brief

The objective for this draft paper is to commence discussion on a strategic framework to respond to issues and opportunities associated with the future interface of the Barwon River and floodplain adjoining the urban growth zone at Armstrong Creek. Key topics addressed in the preliminary discussion paper include future land management, protection and management of cultural heritage, environmental protection/restoration, integration/management of drainage and water quality treatment assets, interface to new development areas, and provision and staged development of public recreational access and facilities as required to meet the needs of the future population of Geelong. The draft discussion paper is the first step in developing a practical and achievable master plan to guide the staged future development in this significant area.

The project is being coordinated by City of Greater Geelong Urban Growth Area Planning Team and a Project Control Group comprising representatives from key Council Departments and Parks Victoria. The discussion paper will seek to build on the overall strategic vision for this new open space corridor outlined in the Barwon River Parklands Strategy and completed Armstrong Creek Urban Growth Area Precinct Planning. The later development of the discussion paper will be informed by workshops to be held with existing landholders, developers and agency stakeholders including Parks Victoria, Corangamite CMA, Barwon Water, VicRoads, VicTrack, Department of Environment and Primary Industries and Department of Planning and Community Development.

Opportunities to be considered in the discussion paper include:

- Protection and restoration of waterway conservation values along the Barwon River including consideration of safety, flooding and environmental impacts of increasing use.
- Establishment and management buffer zones associated with the Lake Connewarre State Game Reserve and Ramsar area to protect and enhance biodiversity and habitat values.
- Protection and possible interpretation of cultural heritage values.
- Provision of future public access and staged development of active and passive recreational facilities including;
  - Provision of a continuous off road shared trail link along the Barwon River linking Armstrong Creek to Gundog Lane-Belmont Common and the existing Barwon River Trail network in Geelong.
  - Future trail links from Armstrong Creek to Taits Point.
  - Access and links to existing and future open space corridors within the Armstrong Creek development area.
  - Internal walking paths and loops with links to Barwon River access points and to key seating/viewing/interpretation areas.
  - Potential pedestrian/cycle bridge link across the Barwon River.

- Consideration of provision for other facilities including picnic areas, playgrounds, public toilets public seating and fishing/canoe platforms as appropriate.
- Potential future requirements for active recreation to complement existing planned facilities in the Armstrong Creek development area.
- Direction regarding any new or revised planning policies and/or controls.
- Known and proposed capital works.
- Address interface and connectivity issues with future pieces of significant infrastructure such as the future ring road extension through Armstrong Creek North East Industrial Precinct to avoid issues such as pedestrian network dissection.
- Expand on environmental opportunities e.g. maintaining and or creating wildlife corridors, enhanced connectivity and improvements to habitat quality, while ensuring width is of sufficient size and width to sustain biodiversity.
- Vehicle control requirements to secure the site and to provide maintenance access.
- Design and management of the interface between the future Armstrong Creek Urban Growth areas and the Barwon River Floodplain.
- Priorities for control of weeds and enhancement of indigenous vegetation communities.

## 1.2 Study Area

The study area extends along the south side of the Barwon River from Gundog Lane on the east side of the Geelong/Warrnambool Railway Line and includes existing Council managed open space areas on the southern side of Waurn Ponds Creek. The southern boundary of the site is at Baenchs Lane - Hospital Swamps.

The eastern boundary of the site is formed by the Barwon River and the Lake Connewarre State Game Reserve. The western boundary of the study area is formed by the urban growth area development interface to new Armstrong Creek Precincts at Marshall, North East Industrial Precinct (Keystone Business Park), Horseshoe Bend and Armstrong Creek East (Warralilly).

The new open space and total study area is approximately 770 hectares. Refer Figure 1.

# 2. Armstrong Creek Urban Growth Area

## 2.1 Framework Plan

The Armstrong Creek Urban Growth Area provides the principal urban growth area for the City of Greater Geelong and the broader Geelong Region. The Armstrong Creek Urban Growth Area is anticipated to provide housing for 54,000 people and employment for 22,000 people in industries and local businesses.

Strategic Planning for the area aims to protect from development the high landscape and conservation values of the Barwon River and associated floodplain that form the study area. Areas protected will include:

- Areas designated flood prone.
- Roads with significant vegetation.
- Areas of environmental sensitivity, in particular those containing significant vegetation.

Planning for provision of local and regional open space will include:

- A network of recreational walking and cycling trails across the entire growth area through provision of linear open space corridors along the Barwon River, Armstrong Creek and Waurn Ponds Creek, vegetated rural roads and other new routes that provide direct links to activity centres, schools and major parks.
- Two regional sports facilities consisting of multi-purpose sports reserves one of which will be located close to Barwon Heads Road adjoining planned open space along the Barwon River.
- A supporting network of local parks of at least 0.5ha throughout the residential area.

## 2.2 Environmental Significance Overlay

Land along the Barwon River and through the Lake Connewarre system is covered by an Environmental Significance Overlay (ESO2) that extends upstream to former Gundog Lane (now Gun Dog Lane) along the western and southern banks of the Barwon River through the study area.

- The site includes wetlands of regional, state, national and international significance.

- The site forms part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site and is listed under the Convention on Wetlands (Ramsar, Iran, 1971).
- The wetlands provide important habitat for migratory birds, waterfowl and endangered species and sustain significant proportions of the Australian populations of these species. They are also remnants of wetland types that were once much more extensive in the Geelong region and elsewhere in Victoria, contain a high diversity of plant and animal species and conserve the genetic diversity of particular species.
- The site is habitat for species listed under an international agreement for the conservation of plants or animals, eg. the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention).
- The site is part of or is nominated for inclusion in the East Asian-Australasian Shorebird Site Network.
- The site is habitat for threatened animal species and threatened communities listed in the *Fauna and Flora Guarantee Act 1988*.
- The site contains habitat that is an extension of, or which provides a buffer to, wetland communities identified above.

The environmental objectives to be achieved under the ESO include:

- To maintain the ecological character (the sum of the biological, physical and chemical components of the wetland ecosystem, and their interactions which maintain the wetland and its products, functions and attributes) of Ramsar wetlands.
- To protect natural resources and maintain ecological processes and genetic diversity.
- To protect and ensure the long-term future of terrestrial and aquatic habitat for native plants and animals, including shorebird feeding areas and roosts and species and communities listed under the *Fauna and Flora Guarantee Act 1988*.
- To encourage ecological restoration, regeneration and revegetation with indigenous species within the site and in adjoining areas.
- To maintain the function of the wetland or habitat area as part of the broader natural system, including maintenance of natural flows and flooding regimes.
- To prevent further loss of wetland habitat.
- To manage the site in order to maintain and/or improve its value as a conservation site for native plants and animals.
- To protect water quality and prevent water pollution in watercourses, water bodies, wetlands and groundwater.
- To protect cultural (including aboriginal and non-aboriginal heritage) values.
- To protect visual amenity.

## **2.3 Precinct Structure Plans**

North Industrial Precinct Structure Plan (adopted 2010)

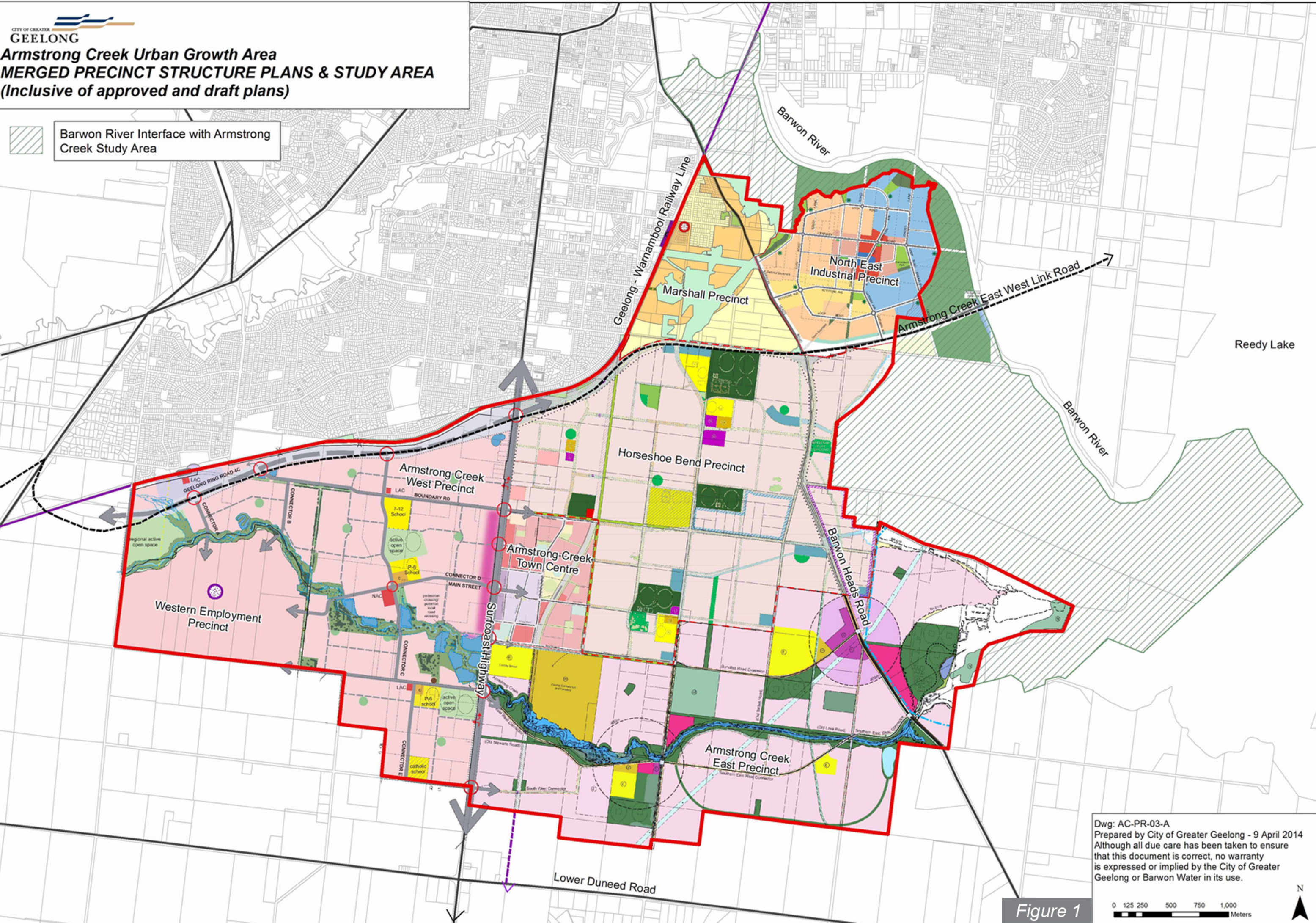
Armstrong Creek East Precinct Structure Plan (adopted 2010)

Horseshoe Bend Precinct Structure Plan (exhibited 2014)

Marshall Precinct Structure Plan (in preparation)

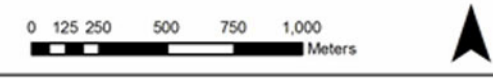
**Armstrong Creek Urban Growth Area  
MERGED PRECINCT STRUCTURE PLANS & STUDY AREA  
(Inclusive of approved and draft plans)**

Barwon River Interface with Armstrong Creek Study Area



Dwg: AC-PR-03-A  
Prepared by City of Greater Geelong - 9 April 2014  
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Figure 1



# RENEW A VISION

## Strategic Directions Plan

A well - connected, diverse and healthy water way parkland, that balances recreation and conservation, and provides for everyday enjoyment of nature, and community liveability and well - being.

### KEY GOALS

An enhanced and resilient open space network that:

- protects the natural environmental and cultural values of the Parklands and the Barwon River.
- protects and enhances environmental values of the river and its floodplain, wetlands and estuary, and connects communities with natural settings.
- is accessible and reflects the needs of a diverse community.
- provides open space for growing communities and future generations.
- provides a diversity of quality recreational opportunities and settings for enjoyment, social connection and wellbeing.
- increase awareness and appreciation of nature and cultural heritage.
- responds and adapts to the challenges of climate change.

### STRATEGIC DIRECTIONS

Consistent with Healthy Parks Healthy People and the G21 Environment Pillar, the key strategic directions for the Barwon River Parklands include:

#### Expanding a connected network

Environmental values at Lake Connewarre and lack of public land in some areas mean development of an off road link between Geelong and Barwon Heads may take many years to achieve. Community consultation completed in 2009 indicated completion of shorter more frequently used looped paths was the highest priority. Projects to expand the trail and open space network include:

- 1 Establish trail links west from Buckley Falls Park to new open space areas at Mt. Brandon including staged development of new recreation facilities and environmental rehabilitation.
- 2 Investigate integration of pedestrian and cycle access across the Barwon River at the Geelong Ring Road bridge.
- 3 Investigate future opportunities to expand open space along the north side of the River enabling completion of an off road trail loop back to Baum Weir and Fyansford Common.
- 4 Improve access to the Barwon River at Pakington Street.
- 5 Investigate improved on and off road trail links from the Barwon River to the existing Bellarine Rail Trail including upgrade of Wal Whiteside Walk.
- 6 Investigate improved links to existing Waurn Ponds Creek Trail.
- 7 Investigate improved on and off road links along the Barwon River at Barwon Heads as part of the Round the Head Trail.

#### Strengthening and promoting features of the Barwon River Parklands

- 8 Investigate opportunities for development of new heritage trails and interpretation for significant sites in new and existing parks and along the Barwon River Trail.
- 9 Promote the Barwon River Parklands and major events on key regional tourism routes.
- 10 Investigate establishment of a Regional Sustainability Education Centre.

#### Strengthening connections with nature

- 15 Improve public access to the Lake Connewarre State Game Reserve at Ash Road, McCorkhell Reserve, Moolap Station Road and Tait's Point through to Hospital Swamps.
- 16 Investigate a canoe/kayak link between Geelong and Barwon Heads.
- 17 Investigate opportunities to undertake floodplain rehabilitation works and improve habitat corridor values and buffers to adjoining future development.
- 18 Develop new boardwalks and signage to protect significant vegetation and habitat areas at Moonah Park while providing walking and fishing access along the Barwon River.

#### Revitalising the existing network

Use the Healthy Parks Healthy People philosophy to provide a new framework within which to revitalise and plan settings, facilities, programs and services. Provide investment to maintain and improve the quality and diversity of the existing network incorporating Environmental Sustainable Design (ESD) and universal access through design principles for new infrastructure and facilities. Implement the statewide Active in Parks Program.

- 19 Continue staged woody weed control at Federick Morton Reserve.
- 20 Develop new nature based playscapes at Barwon Valley Park and Frank Ellis Reserve, Barwon Heads and longer term in new parklands at Mt. Brandon and Armstrong Creek.
- 21 Rehabilitate the Former Geelong Junior Motorcross Site including environmental restoration and provision for community events. Improve links around Belmont Common to complement the new Criterion Track.
- 22 Establish an off road shared trail link from Barrabool Road to the Belmont Common Boat Ramp.
- 23 Investigate improved circuit walking trails and facilities at Ocean Grove Spit.



#### Planning the next wave of regional open space expansion

- 11 Establish new linear open space reserves along the Moorabool River. As development proceeds undertake staged establishment of trail links, recreation facilities and environmental rehabilitation north from Fyansford Common along the Moorabool River through to the existing Ring Road Trail.
- 12 Establish new parkland at the Ovoid Sewer Aqueduct Reserve including restoration of public access along the river and resolution of the future of the aqueduct structure and reserve. Continue environmental rehabilitation and undertake staged development of new circuit walking paths, with improved river access for fishing and canoeing.
- 13 Establish new linear open space reserves along the Barwon River at Armstrong Creek. Undertake staged establishment of trail links, recreation facilities and environmental rehabilitation with links through to Belmont Common along the River.
- 14 As part of long term future planning for a new east-west link road across the Barwon River consider opportunities for integrated pedestrian and cycle access to improve direct links between Armstrong Creek and St. Albans Park-Leopold and a new trail loop back to the Ovoid Sewer Aqueduct reserve along the north bank.

Barwon River  
PARKLANDS

Figure 2

0 1Km 2Km 3Km

# 3. Open Space Context

## 3.1 Existing Plans and Strategies

### 3.1.1 Barwon River Parklands Strategy 2010

In 2006 the State Government committed to establishment of a chain of parklands along the Barwon River from the Ring Road in Geelong to the sea at Barwon Heads by linking existing parks and public land. The various land managers have been co-operatively managing the area through the Barwon River Parklands Steering Committee to provide integrated quality services and management of environmental values, recreational assets and community programs. Consistent with Healthy Parks Healthy People key recommendations outlined in the Barwon River Parklands Strategy relevant to the study area include:

- Establishment of new linear open space reserves along the Barwon River at Armstrong Creek.
- Establishment of a new parkland at the Ovoid Sewer Aqueduct Reserve including restoration of public access along the river,
- Continued environmental rehabilitation and provision of improved access for fishing and canoeing along the Barwon River.
- Staged establishment of trail links, recreation facilities and environmental rehabilitation with links through to Belmont Common.
- Investigate and development of new heritage trails and interpretation of significant sites.
- Promotion of the Barwon River Parklands and major events on key regional tourism routes.
- Investigate a canoe/kayak link on water between Geelong and Barwon Heads.

The cooperative agreements developed between State and Local Government Authorities for development and promotion of the Barwon River Parklands could provide a potential management structure, funding source and implementation model for continued development of future open space along the Barwon River at Armstrong Creek.

Refer Figure 2.

### 3.1.2 Barwon South West Regional Trails Master Plan 2009

The Master Plan was developed in consultation with the 9 local government authorities including City of Greater Geelong, Warrnambool City Council and the Shires of SurfCoast, Colac Otway, Corangamite, Moyne, Glenelg and Southern

Grampians to guide development of existing and proposed regional trails throughout the Barwon South West Region.

The strategy promotes integrated planning and management; experience led trail development; effective and coordinated marketing and promotion; and provides guidance in relation to standards, funding and priorities.

The study area is connected to the Barwon River Trail. Relevant recommendations include:

- Investigate potential to extend the Barwon River Trail south from Gundog Lane to the historic aqueduct area in the short term. (High)
- Upgrade the shared trail link to Waurn Ponds Creek and allow for extension of the trail to Armstrong Creek with the progressive staging of new residential development. (Medium)
- Develop a bike connection between the Barwon River Trail and the Bellarine Rail Trail/Geelong Waterfront. (High-Medium)
- Promote river access and egress points for kayaking and canoeing. (Low)

### **3.1.2 Barwon through Geelong Management Plan 2007**

The management plan provides strategic direction and on ground management recommendations and priorities for Corangamite CMA managed land along the Barwon River from Queens Park Bridge to the lower breakwater. This included the 5ha Crown Land frontage along the Barwon River managed by the CCMA adjoining the Sparrovale Farm property. The plan included extensive community consultation. The key objective of the plan is to:

- Develop and maintain a well connected, diverse and sustainable waterway parkland.
- Maintain the balance between recreation use and conservation principles while protecting and enhancing understanding of the significant environmental and cultural heritage values of the Barwon River through Geelong.
- Protect existing habitat, landscape and environmental diversity along the river and continue to build upon community use, support and pride in the area.

### **3.1.3 Biodiversity Strategy, City of Greater Geelong, 2003**

This Strategy details the context of biodiversity in Geelong, its importance, value and legislative obligations for its protection. The Biodiversity inventory is provided in summary whilst the Strategy itself details the Vision, Mission, Guiding Principles, Commitment and Targets to ensure Biodiversity protection and enhancement. Biodiversity is defined as 'the totality of the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. It is the natural wealth of the earth, which supplies all our food and much of our shelter and raw materials' (COGG, 2003). The Barwon River and Lake Connewarre are located within the Primary biodiversity zone.

Key targets for biodiversity include:

- No further species loss

- Application of net gain concept to areas undergoing redevelopment
- An increase of 20% cover of local indigenous vegetation from 2000 levels by 2010
- Increase in conservation reserves in the primary conservation network by 10% by 2010
- Increase in levels of specialised management and maintenance of conservation reserves
- A coordinated program of ecological burning for fuel reduction by 2005
- Reduction in environmental weeds on council managed conservation reserves by 50% by 2010
- Reduction of noxious weeds on all council reserves by 90% by 2010
- Offset greenhouse emissions by 10% from 2000-levels using revegetation projects.
- Appropriate maintenance and increase of native vegetation on road reserves.

#### **3.1.4 Geelong Wetlands Strategy, City of Greater Geelong-CCMA, 2008**

This strategy details the context of wetlands in the Geelong region, their importance, value and legislative obligations for protection. The study notes that the City of Greater Geelong boasts some of the most important wetlands in Victoria and for some species in Australia. Jerringot Wetlands adjoining the study area on Belmont Common along with the Lake Connewarre Complex downstream of the site are key wetlands identified in the strategy.

Key objectives outlined in the strategy include:

- Wetland protection through the planning scheme
- Integration of wetland protection into Urban Sustainable Development Proposals
- Wetland protection and enhancement through land and water management
- Partnerships with wetland managers
- Wetland education and awareness
- Wetland definition, assessment and monitoring

#### **3.1.5 Sustainable Communities Infrastructure Development Guidelines, City of Greater Geelong, 2010**

This document has been prepared to facilitate the development of sustainable communities through planning, design and construction of infrastructure in the City of Greater Geelong. The guidelines and associated design notes outline the required standards for the provision, upgrade and redevelopment of existing and new infrastructure in open space. Design and construction of new infrastructure for the Barwon River Parklands at Armstrong Creek will be completed in accordance with these infrastructure design guidelines and design notes.

## **3.2 Existing Adjoining Open Space**

### **3.2.1 Belmont Common/South Barwon Reserve**

South Barwon is an active sporting reserve on Crown Land located south of Gundog Lane within the larger Belmont Common Reserve. It has expansive open space used for a variety of active recreational activities managed by CoGG Recreation and Open Space Unit. The reserve has a BMX track, a mix of turf and hard wickets, four pavilions, and three lots of public toilets. The following clubs and groups use these facilities Alexander Thomson Cricket Club, Geelong Obedience Dog Club Inc, Marshall Cricket Club, South Barwon Cricket Club and Target Rifle Geelong.

The reserve is connected to the existing Barwon River Trail and Waurm Ponds Creek trail network which extends west to Grovedale.

### **3.2.2 Geelong and District Riding Club (Woolscour Lane/Waurm Ponds Creek)**

Located on the south bank of Waurm Ponds Creek the Crown Land Reserve features a mown grass jumps area, lunging area and car parking. The riding club ceased operation in 2013 however the site continues to be managed and maintained by CoGG Recreation and Open Space Unit.

### **3.2.3 North bank areas around the Ovoid Aqueduct (Leather Street)**

The 60ha area of floodplain surrounding the Ovoid Aqueduct, located between Tucker Street and Boundary Road on the north bank of the Barwon River opposite the North East Industrial is owned by Barwon Water. The 30-50m wide Barwon River frontage is Crown Land managed by Corangamite CMA.

The Barwon River Parklands Strategy recommended that this area could become a public park, providing an opportunity to protect and enhance areas of remnant vegetation and natural floodplain with walking access along the Barwon River for fishing, canoeing and views of the Aqueduct. The area could also provide improved access to and along the Barwon River for local residents within the Whittington, St Albans Park and Breakwater areas. The development of a park could only occur following resolution of the future management of the historic Aqueduct and public access will remain restricted until this issue is resolved.

Assessment completed by GHD for Barwon Water in 2009 concluded that the Aqueduct cannot be reused or cost effectively restored for use as a pedestrian cycle connection across the Barwon River.

### **3.2.4 Lake Connewarre State Game Reserve**

The reserve is managed by Parks Victoria and forms the eastern boundary of the Barwon River Parklands study area and is Crown Land managed by Parks Victoria. There is currently limited public access to the reserve from the west and the adjoining land use is predominantly rural.

The Lake Connewarre State Game Reserve is part of the Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar Area. This is one of eleven wetlands of international significance in Victoria listed under the International Convention on Wetlands (Ramsar, Iran 1971). The Reserve hosts recreational hunting

activities and is part of the duck season which extends from March to June depending on seasonal conditions.

Key considerations for the interface to the Lake Connewarre State Game Reserve include:

- Maintenance of a riparian and wetland parkland buffer between the reserve and any new urban development precincts.
- Control/visitor management to protect existing high value habitat areas within wetlands and along the Barwon River frontage.
- Control/management of other recreational access into the State Game Reserve during duck season.
- Design of stormwater drainage systems from future development precincts to ensure no impact on existing water quality, wetland flora and habitat values. Where possible new wetlands are to be incorporated into the reserve to maximise potential habitat value.
- Connection of existing visitor nodes via extension of the Barwon River Trail.

The public access visitor areas of Lake Connewarre State Game Reserve within proximity to Armstrong Creek include:

#### Taits Point

This is currently the main viewing and interpretation point for the reserve on the southern shoreline. There is a boat ramp, car park and elevated picnic/viewing areas overlooking Lake Connewarre and Hospital Swamps. Access is only via car along Staceys Road from Barwon Heads Road.

#### Baenchs Lane

There is an informal grass car park which provides access Hospital Swamps for bird watchers and hunters during duck season. There are no other facilities and the area is difficult to access in wet conditions.

# 4. Cultural Heritage

## 4.1 Indigenous Heritage

The Wathaurung Aboriginal Corporation is the Registered Aboriginal Party (RAP) under the Aboriginal Heritage Act 2006. The *Wada wurrung* is the Aboriginal language group that occupied the Geelong area at the time of contact. Their language boundary extended from the Otway Ranges in the west to the Werribee River in the east and incorporated the Bellarine Peninsula and Geelong.

The Barwon River corridor is of cultural and archaeological significance and the majority of the Barwon River floodplain area is located within a mandatory trigger area requiring preparation of a Cultural Heritage Management Plan.

The riverine floodplain and wetland environments along the Barwon River in the study area would have provided an abundance of food and resources to Aboriginal people. The river and wetland environment supported the "greatest concentrations of Aboriginal people in Victoria", providing both fresh water and the "richest food environments" with Aboriginal people often camping close to the banks.

There have been various desktop, standard and complex assessments undertaken as part of the completed Armstrong Creek PSP's and ongoing liaison with Aboriginal Affairs Victoria and traditional owners.

The AAV registry search indicates that there are 39 registered archaeological sites within approximately a 5 kilometers radius of the study area.

- The majority of these sites take the form of stone artifact scatters, mostly low in density and ranging from single isolated pieces to multiple finds.
- The stone artifacts were discovered as surface finds during surveys and in buried or subsurface deposits during subsurface testing.
- None of these sites were in situ and none are considered to be significant in scientific terms.

## 4.2 Ovoid Sewer Aqueduct

The Aqueduct was constructed over the Barwon River in 1913-15 as part of the first sewerage scheme to serve Geelong. The 756m long Aqueduct is registered by Heritage Victoria (VHR H895) and has a Heritage Overlay (HO56) in the Geelong Planning Scheme. Since its decommissioning in 1992, there have been a number of engineering studies into the condition of the Aqueduct and options for its repair, as well as a number of repair trials undertaken on the structure. These have resulted in costs estimates to repair the Aqueduct of up to almost \$60 million with no guarantee of long term sustainability and structural integrity.

There has been no access onto, or under the Aqueduct on either land or water for many years due to safety concerns. Engineering reports from the time of decommissioning in the 1990's suggested it was difficult to predict when the Aqueduct would collapse. Advice to Barwon Water at the time suggested the collapse could occur at any time and over twenty years on it is assumed that the risk of collapse has only increased. The structure remains fenced off on all sides with no access permitted by any person inside the security fence line. There are also floating booms maintained on the Barwon River upstream and downstream of the structure by Barwon Water to restrict on water access under the structure.

The prohibitive costs of repair and lack of available funding for the structure and on-going management and repairs have resulted in a situation where the Aqueduct slowly deteriorates while continuing to restrict access along the Barwon River. As part of the Barwon River Parklands Project, a study was commissioned to assess the potential use of the Aqueduct as a pedestrian/cyclist river crossing. The report, undertaken by GHD, and completed in August 2009, confirmed that restoration of the structure for this purpose was not practical using current technologies.

### **4.3 Other Historical Heritage**

Other sites of significance include former tanneries and historic residential properties along Tannery Road and the Sparrovale Farm Complex. Specific sites directly adjoining the Barwon River floodplain area include:

- Greenbanks Homestead, a residential property overlooking the Barwon River at the northern end of Jendes Lane.
- Australian Tannery Ruins, former tannery site at the end of Jendes Lane.

These sites are generally protected under the Heritage Act 1995 with specific permit conditions for each site.

# 5. Biodiversity

## 5.1 Regional Context

The Barwon River and Waurm Ponds Creek are of moderate to high habitat value through the study area. They are home to several rare and threatened fish species including Australian Grayling, Yarra Pygmy Perch and Australian Mudfish. The dense cover of reeds and variable cover of floating and submerged aquatic vegetation provides moderate to high value habitat for frogs including potentially the Growling Grass Frog and water birds including White faced Heron, Pacific Black Duck and other common open country birds.

Existing drainage lines and low lying areas in adjoining grazing land provide low to moderate habitat value supporting wetland dependant species such as Dusky Moorhen, Purple Swamp hen and where ungrazed and featuring dense vegetation potentially rare Crakes and Rails. There is habitat for frogs including Common Froglet and Spotted Marsh Frog as well as locally common reptiles such as Lowland Copperhead.

Lake Connewarre, which also includes Reedy Lake, sections of Hospital Swamps and the Lower Barwon River through the Armstrong Creek area, is the largest area of remnant indigenous vegetation on the Bellarine Peninsula. The large, shallow, estuarine lagoon is linked to the sea at Barwon Heads by the mangrove-fringed channel of the Lower Barwon River. The combination of dry climate, estuarine influence and large area has contributed to the development of diverse, species-rich salt marsh and sub-saline marsh vegetation.

Lake Connewarre and the lower reaches of the Barwon River form a critical part of the Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar Site. This is one of eleven wetlands of international significance in Victoria listed under the Convention on Wetlands (Ramsar, Iran 1971). The Ramsar values associated with the reserves listing as a wetland of international significance include:

- 6 threatened species that are directly supported by the wetlands.
- Supports a number of critical life stages including large numbers of migratory shorebirds, moulting of large numbers of waterfowl, breeding of 49 species of waterbird; and a drought refuge for waterbird and fish species.
- Annually supports more than 40,000 water birds
- Regularly supports more than one percent of the relevant populations of 15 species of water birds
- Provides an important feeding and nursery areas for a number of fish species.

Lake Connewarre has been considered to be a significant waterbird breeding site and feeding ground, supporting large numbers of migratory waders and waterfowl as well as numerous resident species. 149 avian species have been recorded in

the reserve which regularly supports 10,000 ducks and swans and 1% of the Australian population of the Chestnut Teal.

Straw-necked Ibis and Yellow-billed Spoonbills utilise breeding sites in the area and extensive stands of saltmarsh provide critical habitat for the endangered Orange-bellied Parrot in winter. The lower reaches of the Barwon River attract flocks which commonly include Greenshank, Eastern Golden Plover, Curlew Sandpiper and Red-necked Stint.

Large numbers of Black Swans congregate for most of the year, while Pelicans, Caspian Terns and three species of cormorant can be found feeding on open water. During the winter, Coot gather in unusually large numbers and the lake itself has extensive seagrass meadows which provide important spawning and nursery sites for fish.

Lands along the Barwon River and through the Lake Connewarre system are covered by an Environmental Significance Overlay (ESO2) that extends through to Gundog Lane along the western and southern banks of the Barwon River through the study area.

Most of the land surrounding and adjacent to Lake Connewarre and the Barwon River is freehold land which has been cleared for agricultural purposes. Removal of grazing and agriculture, control and eradication of listed weeds, protection of sensitive saltmarsh and saline areas and establishment of additional freshwater wetlands as planned will enhance this area of National and International conservation significance.

# 6. Flooding and Drainage

## 6.1 Flooding

The Barwon River Parklands study area is located outside the Armstrong Creek Urban Growth Zone and entirely within the Q100 (100yr) or 1% Annual Recurrence Interval (ARI) flood level for the Barwon River. The major controls on the floodplain are Geelong-Warrnambool Railway line embankment and the natural choke just east of Jendes Lane – Boundary Road at Greenbanks.

Assessment of flooding (overbank flow) on the Barwon River for the Horseshoe Bend Precinct by Neil Craigie indicates:

- All land within the study area below 3.0m AHD and subject to inundation in the Q100 or 1% ARI flood event.
- Estimated annual overbank flow frequencies of approximately 3 events per year however the frequency of over bank flow events over the last 10 years has been well below the long term average.
- The total annual duration of overbank flow events into Reedy Lake and Hospital Swamps has been estimated as 10 days historically. Overbank flow events are strongly concentrated over the months of July through to October however exceptions can occur such as January 2011.
- Historically low flow events (i.e. where there is no overbank flow events for more than 365 days) occur on average once every 5 years.
- The height of natural banks separating Lake Connewarre and Hospital Swamps are approximately 0.5m AHD. These banks are overtopped on average once per year to a depth of greater than 0.1m creating significant inundation of these wetlands.

The water level in the Barwon River is artificially controlled by the lower breakwater (barrage) and there has been significant historical manipulation of the floodplain, especially at Sparrovale Farm. Flood levels below the Q10 (10% ARI level) are controlled by a series of constructed levees and outlet structures operated by the existing private landowner.

The proposed Armstrong Creek development will also generate significant stormwater runoffs and some areas are also subject to Land Subject to Inundation Overlays (LSIO) in relation to flooding after local rainfall events even when there is no flooding on the Barwon River.

The design and siting for new infrastructure such as paths, bridges and other facilities within the Barwon River Parklands must consider the impacts of flooding on public safety, and the durability and sustainability of new facilities.

Key principles to be considered for development of infrastructure may include:

- Barwon River Trail to be located above Q10 (10% ARI) flood level where possible.

- Where the Barwon River Trail or other shared trail pedestrian/cycle links are located below Q10, consider the following:
  - Use of concrete for increased durability.
  - Installation of flood risk warning signage and use of passive down-outs or other access control measures where depth x flow velocity ratios during flood events exceed 0.35.
- Unsealed maintenance and informal walking tracks will be subject to more frequent inundation especially where located closer to the Barwon River. These tracks will require additional maintenance and potentially risk/warning signage regarding potential hazards in use of these tracks during and after flood events may be required.
- Bridges and culverts used for pedestrian and cycle access across drainage outfalls and overland flow paths are to generally achieve Q10 protection. Required bridges across Waurm Ponds Creek and Armstrong Creek are to be located downstream of existing road/rail bridge structures and design and deck levels will need to be confirmed with the CCMA to ensure no impacts on upstream flood levels. These areas are also more likely to be subject to higher velocities.
- Use of solid or chain mesh fencing perpendicular to flood flow is not preferred as it is more likely to require maintenance or be damaged/pushed over due to build-up of debris in a flood event. This may present some challenges for localised control of rabbits.
- Use of cut to fill balance to slightly lift path levels can be considered where there is no overall fill in the floodplain i.e. built-up areas of path are offset by excavation/cut to lower adjoining areas. This type of works may also increase biodiversity values through creation of additional ephemeral wetland areas but will be subject to design review and CHMP approval.
- Establishment of expensive assets i.e. public toilets and other facilities such as BBQs that can be damaged and/or cause environmental or safety concerns after flooding, are not recommended.

## 6.2 Drainage

### 6.2.1 North East Industrial Precinct

There will be eight stormwater outfalls from the North East Industrial Precinct that will connect through the proposed open space area to the Barwon River.

The design for these includes a Q100 pipe for each sub catchment to the edge of the urban growth zone boundary outfalling to a rock energy dissipater. Connection to the Barwon River is then made via a series of constructed straight shallow linear open table drains which will bisect the new Barwon River Parklands area.

There is no requirement for overland flow paths through the development area.

### **6.2.2 Armstrong Creek East Precinct**

Armstrong Creek will form the main stormwater outfall from the East Precinct. A series of new water quality treatment wetlands and retarding basins are being developed on the creek upstream of Barwon Heads Road to provide best practice pre treatment of stormwater prior to discharge into Hospital Swamps. These wetlands and creek rehabilitation works will also enhance habitat values and corridor links to inland bio sites at Stewarts Reserve, Charelemont and the Cemetery Land.

A key requirement for drainage management is the protection of Hospital Swamps. Detailed assessment of both the Armstrong Creek East and Horseshoe Bend precinct drainage schemes by Neil Craigie identified opportunities for cost effective diversion of flows from Armstrong Creek East into the proposed Horseshoe Bend precinct wetlands at Sparrovale Farm. This is aimed at maintaining the saline character of wetlands at Hospital Swamps.

There is also potential for establishment of a large stormwater harvesting system adjoining proposed active open space on the east side of Barwon Heads Road.

### **6.2.3 Horseshoe Bend Precinct**

Large new (300+ hectares) wetlands are proposed for the naturally low-lying areas of "Sparrovale" and "Cold Winds" Farms to treat stormwater run-off from urban development in the Horseshoe Bend Precinct. There will be two main inlets constructed into the wetland along low lying natural gully forms. These inlets will be joined together at the north east corner of Harriott Road before discharging into the main wetland.

The existing low lying land of Sparrovale and Cold Winds Farms is ideally suited to the establishment of these wetlands and existing flood protection bunds and outlet regulators to the Barwon River will be modified/augmented and maintained to form two large shallow fresh water wetlands.

These wetlands and the new levee system will also protect areas of natural saline saltmarsh vegetation and the saline character of Hospital Swamps and provide a significant addition to habitat values of the Barwon River corridor and the Lake Connewarre State Game Reserve and Ramsar area.

The wetlands will be designed for ultimate development however their connection to the Barwon River floodplain means they will operate after flooding as soon as the new levee system and regulators are established.

### **6.2.4 Marshall PSP**

There is no stormwater management strategy for the Marshall Precinct as yet. Opportunities for integration have been identified in the Horseshoe Bend PSP and these may assist in increasing the developable area and consolidating water quality treatment areas adjoining the Barwon River and Lake Connewarre Ramsar area to maximize wetland sustainability and habitat values.

# 7. Recreation

## 7.1 Recreational Trails

### 7.1.1 Barwon River Trail

The Barwon River Trail will form the key access and spine of visitor use into the new parkland area. The extension of the Barwon River trail south along the river into the new open space at Armstrong Creek will improve two way recreational access. Armstrong Creek residents will be able to access the existing Barwon River Trail network (20km+) with safe off road access back into central Geelong and improved links the Waurm Ponds Creek Trail and the Bellarine Rail Trail. Existing Geelong residents will also have access to the largest piece of new public open space in the area and eventually improved access through to Barwon Heads, Armstrong Creek and the southern areas of the Bellarine Peninsula.

Key design criteria for establishment of the path will include:

- Provide safe access for all ages and abilities.
- Complete the strategic shared trail link to connect neighboring communities.
- Link and complete loops providing circuits of both walking and cycling of varying distance and experience for both locals and visitors.
- Minimise impacts on ecological and cultural heritage values through careful selection of trail routes and sustainable design of infrastructure.
- Be developed in accordance with best practice and to meet and the requirements of *AS1428 Access and Mobility Standards*.

### 7.1.2 Secondary Paths and Maintenance Access

The existing unsealed roads and vehicle tracks used by landowners as part of existing farm management will form the basis for future maintenance vehicle access network. This network could also form an excellent secondary walking trail network for public access to the Barwon River and a series of loops and circuits around new wetlands and larger space areas.

## 7.2 Active Recreation

### 7.2.1 General

There is no land based active recreation or sporting use planned within the study area. New regional active open space will be established within the Armstrong Creek East Precinct east of Barwon Heads Road. Other active open space will

be provided for within the Urban Growth Area as indicated in each Precinct Structure Plan.

### **7.2.2 Water Sports**

Geelong Water Ski Club currently has almost exclusive use of the Barwon River between Boundary Road and Coppards Road. The club is located at the end of Wilsons Road on the east bank and has a private boat ramp.

The Barwon River Parklands Strategy and South West Regional Trails Strategies recommend investigation for establishment of a canoe/kayak link between Geelong and Barwon Heads. As Armstrong Creek develops and water-skiing and other uses of the Barwon River including fishing and canoeing increase, the potential for conflicts with the water-skiing use may also increase.

The Barwon River is used for canoeing and kayaking however the restriction to access under the Aqueduct and the drop at the lower breakwater limit use. Lake Connewarre is also difficult to negotiate with shallow tidal conditions suited to only the most experienced of users.

### **7.3.3 Duck Season**

The duck hunting season opens in March and closes in June. The duck season is held at Lake Connewarre State Game Reserve and on other crown land areas across Victoria subject to a review of environmental conditions by DEPI.

The most popular day for hunting is opening day where the shooting start is set at a controlled time. For the remainder of the season, duck hunting is permitted from half an hour before rise to half an hour after sunset. Hunting from a boat on waterways (such as rivers, creeks, streams and channels) is permitted under power, up to a speed of five knots. On the lake you are not permitted to hunt duck from a motor boat if the motor is running, whether in gear or not.

Hunters are required to use non-toxic shot. The use of lead shot for duck hunting is prohibited throughout Victoria. This includes duck hunting on all wetlands, waterways and dry lands on public land. There are some exemptions for private land and historical use of lead shot may be an issue in some areas.

Duck hunting is also permitted on private land with permission of the leaseholder, licensee or land owner/manager respectively. Wetlands may be closed to hunting at certain times to protect concentrations of rare or threatened species or colonies of breeding water birds. Non-game species are occasionally shot when mistakenly identified, or when flying among game birds. There is a total ban on the take of threatened species. To avoid shooting non-game species, hunters must:

- identify the target as a game species
- make sure the bird is within effective shooting skills distance
- single out a bird and do not fire into flocks (this may injure other birds including non-game species).

Unless dispatching a downed bird with a clear line of fire regulations do not permit hunters to fire at birds on the water, as ricocheting shot could injure non-game birds or other hunters.

During duck season there are periods where 'unauthorised' people are restricted from entering specified hunting areas to minimise risks to public safety outcomes. The key area extends out 25 meters from the water's edge and only applies for late evening and early morning. At all other times, 'unauthorised' people are able to freely move about the reserve and can enter the water between 10am until two hours before sunset. Similar provisions have been in place since 1993.

## **7.3 Passive Recreation**

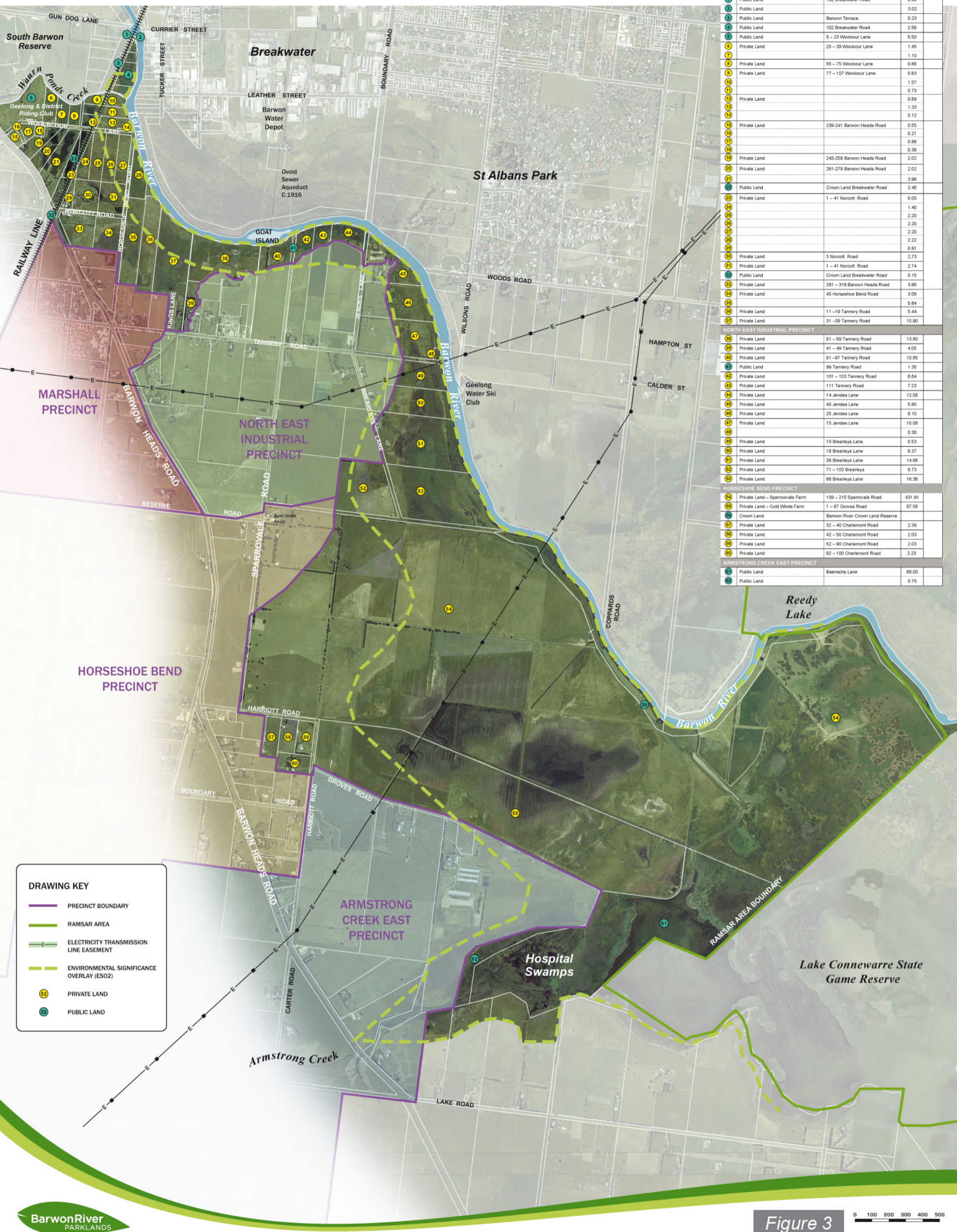
### **7.3.1 Fishing**

There is existing access to the Barwon River for fishing at Horseshoe Bend Road. There is no public access to the existing Crown Land reserve along the Barwon River at Sparrovale (managed by the CCMA and leased to G.Perkins) however local angling clubs and VR Fish have previously expressed interest in obtaining access for fishing in this area.

Establishment of increased public access to the Barwon River floodplain will increase public access and use of the river for fishing.

### **7.3.2 Bush Walking / Bird Watching / Nature Appreciation**

These activities are expected to become a key attractor for visitors to the area. The parklands will provide public access to one of the most significant bird habitat areas in Victoria and an area of National and International significance. An opportunity to escape from the urban environment will also be a key attraction for many visitors.

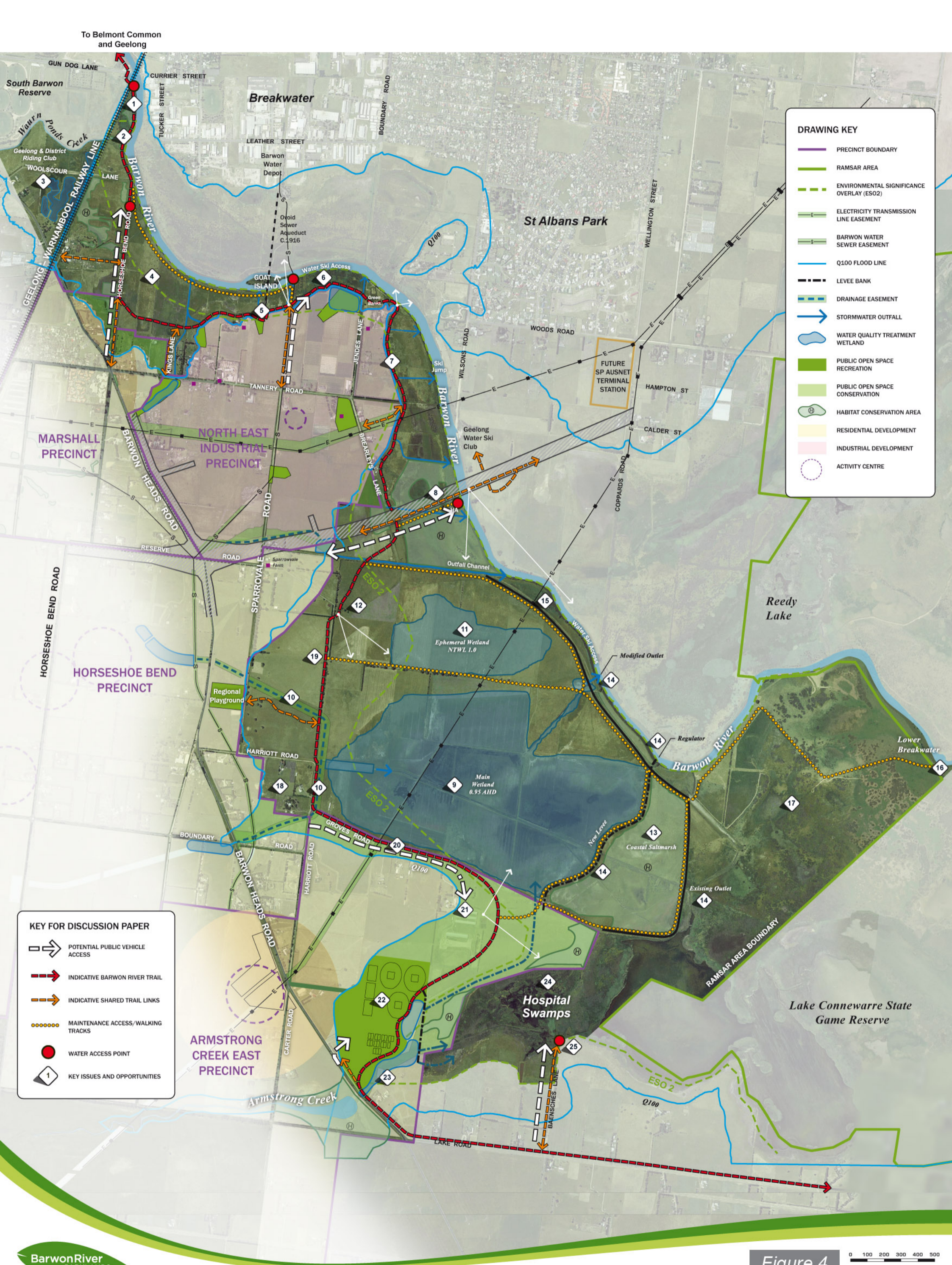


Plan No.	Land Owner	Address	Total Area (ha)	BRP Area (ha)
<b>MARSHALL PRECINCT</b>				
1	Public Land	122 Breakwater Road	0.09	
2	Public Land	Barwon Terrace	0.23	
3	Public Land	102 Breakwater Road	2.56	
4	Public Land	5 - 23 Woolcour Lane	5.50	
5	Private Land	25 - 39 Woolcour Lane	1.45	
6	Private Land		1.10	
7	Private Land	55 - 75 Woolcour Lane	0.86	
8	Private Land	77 - 107 Woolcour Lane	0.83	
9			1.57	
10			0.73	
11	Private Land		0.89	
12			1.33	
13			0.12	
14			0.55	
15	Private Land	239-241 Barwon Heads Road	0.55	
16			0.21	
17			0.88	
18			0.38	
19	Private Land	243-259 Barwon Heads Road	2.02	
20	Private Land	261-279 Barwon Heads Road	2.02	
21			3.98	
22	Public Land	Crown Land Breakwater Road	2.40	
23	Private Land	1 - 41 Norcott Road	0.05	
24			1.40	
25			2.20	
26			2.20	
27			2.22	
28			0.81	
29	Private Land	3 Norcott Road	2.73	
30	Private Land	1 - 41 Norcott Road	2.74	
31	Public Land	Crown Land Breakwater Road	0.15	
32	Private Land	281 - 319 Barwon Heads Road	3.96	
33	Private Land	45 Horseshoe Bend Road	3.06	
34			5.64	
35	Private Land	11 - 19 Tannery Road	5.44	
36	Private Land	31 - 39 Tannery Road	10.90	
<b>NORTH EAST INDUSTRIAL PRECINCT</b>				
37	Private Land	81 - 89 Tannery Road	13.80	
38	Private Land	41 - 49 Tannery Road	4.05	
39	Private Land	91 - 97 Tannery Road	10.85	
40	Public Land	99 Tannery Road	1.30	
41	Private Land	101 - 103 Tannery Road	6.84	
42	Private Land	111 Tannery Road	7.23	
43	Private Land	14 Jendes Lane	12.56	
44	Private Land	40 Jendes Lane	5.60	
45	Private Land	25 Jendes Lane	8.10	
46	Private Land	15 Jendes Lane	10.06	
47			0.30	
48	Private Land	10 Brearleys Lane	0.53	
49	Private Land	18 Brearleys Lane	6.37	
50	Private Land	36 Brearleys Lane	14.68	
51	Private Land	71 - 103 Brearleys	9.73	
52	Private Land	66 Brearleys Lane	16.36	
<b>HORSESHOE BEND PRECINCT</b>				
53	Private Land - Sparrowvale Farm	109 - 215 Sparrowvale Road	431.91	
54	Private Land - Cold Winds Farm	1 - 87 Groves Road	67.56	
55	Crown Land	Barwon River Crown Land Reserve		
56	Private Land	32 - 40 Charlemont Road	2.39	
57	Private Land	42 - 50 Charlemont Road	2.03	
58	Private Land	52 - 90 Charlemont Road	2.03	
59	Private Land	92 - 100 Charlemont Road	2.23	
<b>ARMSTRONG CREEK EAST PRECINCT</b>				
60	Public Land	Beemschs Lane	68.00	
61	Public Land		5.75	

**DRAWING KEY**

- PRECINCT BOUNDARY
- RAMSAR AREA
- ELECTRICITY TRANSMISSION LINE EASEMENT
- ENVIRONMENTAL SIGNIFICANCE OVERLAY (ES02)
- PRIVATE LAND
- PUBLIC LAND

Figure 3 0 100 200 300 400 500



**DRAWING KEY**

- PRECINCT BOUNDARY
- RAMSAR AREA
- - - ENVIRONMENTAL SIGNIFICANCE OVERLAY (ESO2)
- ELECTRICITY TRANSMISSION LINE EASEMENT
- BARWON WATER SEWER EASEMENT
- Q100 FLOOD LINE
- - - LEVEE BANK
- - - DRAINAGE EASEMENT
- STORMWATER OUTFALL
- WATER QUALITY TREATMENT WETLAND
- PUBLIC OPEN SPACE RECREATION
- PUBLIC OPEN SPACE CONSERVATION
- HABITAT CONSERVATION AREA
- RESIDENTIAL DEVELOPMENT
- INDUSTRIAL DEVELOPMENT
- ACTIVITY CENTRE

**KEY FOR DISCUSSION PAPER**

- POTENTIAL PUBLIC VEHICLE ACCESS
- - - INDICATIVE BARWON RIVER TRAIL
- - - INDICATIVE SHARED TRAIL LINKS
- MAINTENANCE ACCESS/WALKING TRACKS
- WATER ACCESS POINT
- 1 KEY ISSUES AND OPPORTUNITIES

BarwonRiver  
PARKLANDS

CITY OF GREATER  
**GEELONG**

**Figure 4** 0 100 200 300 400 500

**OPPORTUNITIES AND CONSTRAINTS PLAN  
BARWON RIVER PARKLANDS (ARMSTRONG CREEK)**

**DRAFT**  
DATE: AUGUST 2014  
DWG No. BRAC-01

# 8. Draft Overall Issues and Opportunities

The following issues and opportunities apply across all areas of the Barwon River Parklands. Refer to Section 9 for precinct specific issues and opportunities.

No.	Issue	Draft Opportunity	Lead Agency
8.1	<p>The Barwon River floodplain adjoining the Armstrong Creek Urban Growth Area is approximately 770 hectares.</p> <p>There is limited detailed assessment and mapping of flora and fauna values along the Barwon River through the study area.</p> <p>Much of the flood prone farmland that may form the new open space area will require active and ongoing investment in land management to control weeds and to commence the process of environmental rehabilitation. The funding commitment to maintenance across such a large area will be substantial to achieve long term goals.</p>	<p>Securing the land or access to land is the most important step in achieving the long term objectives for environmental protection and enhancement. Having secured the land the process of environmental rehabilitation will need to be achieved within limited Council budgets for open space management and maintenance and may take many years to achieve.</p> <p>Development of a strategic plan to establish environmental management priorities, external funding opportunities for specific projects and a realistic staging process for rehabilitation works will be required.</p> <p>The importance of liaison and development of partnerships with landholders now to improve land management practices where possible ahead of hand over of land to Council cannot be underestimated. Key actions may include:</p> <ul style="list-style-type: none"> <li>• Fencing stock out of the Barwon River. Even if funding is not initially available for revegetation previous experience in this section of the Barwon River floodplain indicates there is a substantial regrowth of native species that within months rather than years following removal of grazing stock.</li> <li>• Fencing and protection of any areas of identified native vegetation. Again removal of grazing in these areas will have a more significant benefit than more expensive revegetation programs.</li> <li>• Identification and eradication of</li> </ul>	<p>CoGG UGAT</p> <p>CoGG Env Unit</p> <p>(DEPI) (CCMA)</p>

No.	Issue	Draft Opportunity	Lead Agency
		<p>noxious weeds listed under the Catchment and Land Protection Act.</p> <ul style="list-style-type: none"> <li>• Integrated programs targeting eradication of feral animals including rabbits and foxes.</li> <li>• Additional resourcing for monitoring of the above as well as enforcement of restrictions on illegal filling in the floodplain, clean up and removal of rubbish and debris.</li> </ul> <p>Implementation of the above could substantially reduce later land management costs and accelerate the environmental rehabilitation of the floodplain in accordance with the principles of the ESO.</p>	
8.2	<p>Despite its status as one of the largest, most picturesque and important wetland systems in Victoria with environmental values of National and International significance visitation levels to Lake Connewarre are low. There is even a general lack of awareness that the area exists, even amongst people who have lived in Geelong for many years. This is primarily due to the lack of a main visitor destination/interpretation/access point. Recent works by Parks Victoria at Tait's Point, Woods Road and Sheepwash Road have significantly improved visitor viewing facilities however there is limited public access, facilities or things to do other than take in the view at these points. Lack of available land, environmental and cultural heritage constraints and limited access to services will continue to restrict further development and visitation levels at these points.</p>	<p>The establishment of the Barwon River Parklands at Armstrong Creek presents a significant long-term opportunity to expand and enhance the biodiversity and habitat values of the Lake Connewarre Reserve Ramsar area. It also presents an opportunity to provide improved public access and visitor facilities leading to increased visitation and awareness of the reserve and its biodiversity conservation and cultural heritage values. The creation of the parklands mean these facilities and access could be provided without compromising the environmental values, legislative and international treaty obligations and existing use of the reserve as a seasonal duck hunting venue.</p> <p>The key elements to be considered in development of the Barwon River floodplain at Armstrong Creek as part of enhancing the environmental, cultural and recreational values of the Lake Connewarre Reserve may include:</p> <ul style="list-style-type: none"> <li>• Design of stormwater drainage systems and wetlands from future development precincts to ensure no impact on existing water quality, wetland flora and habitat values.</li> </ul> <p>These systems and additional land within the floodplain of the Barwon River can also provide flexibility and opportunity to maintain, protect and where possible enhance the habitat and biodiversity balance under threat</p>	<p>CoGG</p> <p>PV</p> <p>CCMA</p> <p>DEPI</p>

No.	Issue	Draft Opportunity	Lead Agency
		<p>from climate change and predicted sea level rise.</p> <ul style="list-style-type: none"> <li>• Extension and connection of the Barwon River Trail providing an off road shared pedestrian and cycle trail link to Geelong and new residential areas at Armstrong Creek.</li> <li>• Establishment of a secondary network of unsealed and informal walking tracks into the parklands and along the Barwon River. These could eventually form a series of looped trails with connections to bird hides and key viewing and fishing points.</li> <li>• Provision of recreational water access to the Barwon River and potential development of canoe/kayak links between Geelong and Barwon Heads.</li> <li>• Development of practical visitor management arrangements to protect existing high value habitat areas and public safety during duck season.</li> <li>• Development of a visitor interpretation centre with facilities aimed at increasing public awareness, understanding and appreciation of the environmental, cultural heritage values and historical development and management of the reserve. The visitor centre could also provide access to car parking, public toilets and picnic, BBQ and play facilities along a key tourism route.</li> </ul>	
8.3	<p>The flood prone private land along Barwon River at the interface with the Armstrong Creek Development area comprises 62 private titles. This land is flood prone and outside the Urban Growth Area but the legal mechanism for the transfer of private land to Council or DEPI has not yet been determined.</p> <p>The staged development process will be guided by the requirements of each Precinct Structure Plan. Status and requirement for each parcel of land can be resolved through the permit approval process for subdivision of each title. It is anticipated that flood prone land will be acquired at no cost through this process.</p> <p>This will mean however that public access and development of recreational assets is</p>	<p>Potential stages for access to, or acquisition of land as required to establish the Barwon River Parklands are shown on Figure 3.</p> <p>The broad principles for acquisition of land can be summarised as follows:</p> <ul style="list-style-type: none"> <li>• Prioritise access to, or transfer of land to enable progressive establishment of the Barwon River Trail south from Belmont Common/Gundog Lane. This is aimed at connecting Armstrong Creek to the existing off road trail network through central Geelong.</li> <li>• Consider use of easements and or lease arrangements to minimise the amount of new public open space under management by Council until required for connection of the next section of trail.</li> </ul>	<p>CoGG UGAT  (DEPI)</p>

No.	Issue	Draft Opportunity	Lead Agency
	<p>completely tied to the staging of development across individual properties. Where landowners are reluctant to develop or are financially unable to do so in the short term this process may not be conducive to cost effective and practical development of a new open space reserve, especially for the Barwon River Trail.</p>	<ul style="list-style-type: none"> <li>• Where parcels of land are acquired or transferred to Council through development but public access cannot be achieved in the entire section as required for establishment of the Barwon River Trail focus on protection of existing areas of native vegetation and improving habitat values along the Barwon River. To minimise land management costs and public risk continue to restrict public access to these areas and retain short term grazing or agistment lease arrangements where practical until sufficient parcels of land have been acquired to enable establishment of the next section of trail.</li> <li>• If there is a substantial delay in a transfer of a critical parcel of land use of a Public Acquisition Overlay may need to be considered however the potential planning and legal issues/opportunities in relation to this type of forced transfer of land will need to be further discussed and are outside the current scope of this initial discussion draft discussion paper.</li> </ul>	
8.4	<p>The Barwon River Parklands will initially contain large areas of grazing land that have little existing environmental value.</p> <p>The strategic importance and long term environmental rehabilitation opportunities associated with these areas cannot be understated however they will have a lower priority in initial management actions and expenditure.</p>	<p>Investigate development of new lease arrangements to enable continued grazing/agistment of areas of the floodplain away from the Barwon River to offset and reduce ongoing land management costs to Council.</p> <p>Development of lease arrangements could consider the following:</p> <ul style="list-style-type: none"> <li>• Use of short term annual leases where future use of the floodplain is required for establishment of the Barwon River Trail and funding is possible within less than 3years. These leases would be best offered to existing landholders or in areas where a longer term lease areas directly adjoin the property.</li> <li>• Use of longer term leases (3 years with options of additional 3 years?) where the Barwon River Trail has already been established and initial environmental protection/rehabilitation works along the river have been started. These leases could benefit from merging of several smaller titles</li> </ul>	<p>CoGG UGAT</p> <p>CoGG Env Unit</p>

No.	Issue	Draft Opportunity	Lead Agency
		<p>to form larger more economically viable parcels of land.</p> <ul style="list-style-type: none"> <li>Lease arrangements would need to state clearly the land management expectations to be placed on the leasee including maintenance of fencing, maximum stocking rates and flood management plan requirements.</li> </ul>	
8.5	<p>The future management arrangements for the Barwon River Parklands at Armstrong Creek have not yet been determined. It is likely, but not certain, that Council will be the receiving authority for new open space associated with the development of the Barwon River Parklands.</p>	<p>If Council is the receiving authority for areas within the floodplain associated with the development of the Barwon River Parklands Council will then also be the land manager.</p> <p>If however the land is transferred as Crown Land (owned by DEPI on behalf of the State Government) then a wider range of land managers or a committee could be appointed to manage some sections or all of the floodplain area.</p> <p>Options may include:</p> <ul style="list-style-type: none"> <li>Extension of the Lake Connewarre area managed by Parks Victoria to include remaining areas of Hospital Swamps and eastern sections of Sparrovale Farm including saline wetlands which could also be incorporated into the Ramsar area.</li> <li>Extension of CCMA management of river frontage to complement their existing management of Barwon River under the Water Act and their committee of management responsibilities for existing Crown Land river frontage areas.</li> <li>CoGG management of all publically accessible land, constructed stormwater wetlands, drainage pipe outfalls/swales and all recreational assets.</li> </ul>	<p>CoGG UGAT</p> <p>DEPI</p> <p>CCMA</p> <p>PV</p>
8.6	<p>The entire Barwon River corridor is of cultural significance to the Wathaurung. Cultural Heritage Management Plans (CHMP) completed for works in the adjoining urban growth zone provide valuable background information to the study area and values however as the parklands lie within a mandatory CHMP trigger zone additional assessment may be required for future development of paths and other facilities which result in ground disturbance</p>	<p>Where possible identify and include future related infrastructure development activities such as paths and fencing in assessment for CHMPs to be prepared for wetland, drainage outfalls and major projects such as the East West Link Road.</p>	<p>CoGG UGAT</p> <p>(AAV) (WAC)</p>

No.	Issue	Draft Opportunity	Lead Agency
	within the future open space areas along the Barwon River.		
8.7	The cultural and archaeological importance of the Barwon River, Armstrong Creek and the Lake Connewarre system may not be widely known amongst new residents and visitors.	Continue liaison with the Wathaurung during development of open space areas along the Barwon River and Armstrong Creek to further investigate opportunities for interpretation of cultural heritage values, where appropriate, to increase public awareness, education and understanding.	CoGG GAT  (WAC)
8.8	The existing Barwon River Environmental Significance Overlay (ESO2) does not reflect the future environmental values and opportunities of the study area.	Review the Barwon River Environmental Significance Overlay (ESO2) to more closely align with detailed mapping and monitoring undertaken as part of development of Precinct Structure Plans for Armstrong Creek.	CoGG UGAT  CoGG Env Unit
8.9	The Lake Connewarre Ramsar boundary does not reflect the future environmental values and opportunities of the study area.	Review the Lake Connewarre Ramsar boundary to more closely align with the bird habitat values found in Hospital Swamp and floodplain land along the Barwon River including proposed wetlands. The boundary may also be adjusted to reflect any potential changes in land management relating to expansion of the Lake Connewarre management area.	PV  DEPI  CoGG GAT  CoGG Env Unit
8.10	<p>There are no existing recreational facilities and limited access to the Barwon River for new residents at Armstrong Creek.</p> <p>New residents and existing river user groups such as anglers, bush walkers, dog walkers and bird watchers will seek access to the Barwon River and open space areas along it once landownership becomes public.</p>	<p>Initial visitors to the floodplain are expected to be engaged in fishing, bush walking, dog walking, nature appreciation and bird watching.</p> <p>Establishment of the Barwon River Trail will be the most important and expensive recreational asset however the provision of access to the river will also be critical.</p> <p>The flood constraints and natural regrowth profile of vegetation will limit views to the Barwon River in many areas and mown banks as maintained upstream in the rowing mile will not be appropriate in this section of the river.</p> <p>Public access to the river will therefore be via a series of nodes focusing on areas which are already disturbed or</p>	CoGG Rec & OS  CoGG Env Unit

No.	Issue	Draft Opportunity	Lead Agency
		<p>are required for a maintenance purpose. These areas could assist by also providing all ability access to the Barwon River through provision of public vehicle access and some car parking without compromising environmental values.</p> <p>Potential access points may include:</p> <ul style="list-style-type: none"> <li>• Horseshoe Bend Road, existing public access is available now.</li> <li>• Existing Barwon Water easement and boat ramp on the eastern side of the Aqueduct.</li> <li>• Eastern end of Tannery Road (unmade road reserve)</li> <li>• Under or beside the future East-West Link Road bridge (area will be disturbed during construction and maintenance access will continue to be required).</li> </ul> <p>As use and popularity of the site increases additional water access platforms, bird hides and a small picnic area on the Barwon River can also be established at these points.</p> <p>Public access south and downstream of the future East West Link Road bridge is likely to be maintained via informal walking tracks.</p>	
8.11	Uncontrolled trail bike and vehicle access to the site.	<p>Retention and maintenance of vehicle control will be needed at all existing road access points into the floodplain. As with most new public access areas in semi rural locations, it is expected that there will be the usual surge in illegal trail bike and vehicle access once public access is established. These activities have potential to severely impact on both environmental values and public perceptions of land management within the floodplain.</p> <p>Ongoing liaison with adjoining landholders will be required as unfortunately they can also be the source of these activities and enforcement by local laws and Victoria Police is typically a low priority.</p>	CoGG Env Unit
8.12	There has been no fire assessment	In general terms the recruitment and persistence of key species within the	CoGG

No.	Issue	Draft Opportunity	Lead Agency
	completed for the floodplain.	<p>Barwon River floodplain at Armstrong Creek do not require fire to maintain species diversity and ecological health. That is species can regenerate and persist without fire. The main disturbance driver being inundation/flooding.</p> <p>The existing vegetation types found within the floodplain and those expected to regenerate at the site are also difficult to burn under prescribed burn prescriptions due to the lack of fine fuels.</p>	<p>Env Unit</p> <p>CFA PV</p>
8.13	Feral animal numbers including foxes and rabbits are not well known. The mix of private landowners and the staged development process may make implementation of monitoring and control programs difficult.	Monitor rabbit and fox numbers across the floodplain and development interface. Liaise with landholders to undertake coordinated control programs.	<p>DEPI</p> <p>CoGG Env Unit</p>
8.14	<p>As with many open space areas, dog walking is expected to be a popular activity through the Barwon River Parklands. Uncontrolled dogs however have the potential to impact on sensitive bird habitat values and access may need to be restricted in some areas during key breeding, nesting and moulting periods. This can be difficult to enforce especially in remote floodplain areas.</p> <p>Dog walkers are also expected to form a high percentage of initial visitors. Discouraging or restricting their access could potentially reduce the total number of visitors to the site and create additional local law enforcement issues.</p>	<p>Initial site visitation is expected to be low and requirement for adoption of dog on lead or no dog policies are unlikely to be effective or enforced.</p> <p>As use of the floodplain area increases the potential for off lead dog use to impact on other users and environmental values will increase. This will also apply in areas where leased grazing is retained into the longer term and dogs have potential to impact on stock.</p> <p>Investigate provision of controlled dog water access areas in the design of new wetlands at Sparrovale. This may reduce future pressure on more sensitive natural wetland areas and enable more strict enforcement of dog controls in areas closer to the Ramsar Area.</p> <p>An education program regarding the sites environmental values and the disturbance to these values caused by dogs could improve the effectiveness of these on ground initiatives.</p>	<p>CoGG Env Unit</p> <p>CoGG Local Laws</p>
8.15	As the entire site is subject to flooding establishment of public toilets can present maintenance and management difficulties. However if there are no public toilets in the	Installation of public toilets in such a remote and flood prone location is not recommended during initial development of public access to the	<p>CoGG Rec &amp; OS</p> <p>CoGG</p>

No.	Issue	Draft Opportunity	Lead Agency
	<p>area it will limit the amount of time visitors can spend within the floodplain.</p>	<p>Barwon River Parklands.</p> <p>As use of the park increases the need for toilet facilities for longer term visitors will also increase. These needs could be best serviced through establishment of public toilets as part of the future Regional Playground Parkland in the Horseshoe Bend Precinct and with the Active Open Space within the Armstrong Creek East Precinct,</p> <p>Longer term development of a visitor/interpretation centre adjoining the floodplain could also service this requirement.</p>	<p>Eng</p>
<p><b>8.16</b></p>	<p>Lake Connewarre State Game Reserve is used for duck hunting between March and June subject to favorable seasonal conditions.</p> <p>There is currently no public access to Lake Connewarre from the west. Establishment of public access to the Barwon River Parklands via Sparrovale Farm and new urban areas at Armstrong Creek will provide public access right to the boundary and there will also be increasing public access on water along the Barwon River into the State Game Reserve.</p>	<p>The use of Lake Connewarre State Game Reserve for duck hunting during duck season is currently restricted by the limited access points into the reserve. The majority of these access points are in rural locations and more easily controlled.</p> <p>Restriction of access to Lake Connewarre for duck hunting from new open space on the western Armstrong Creek side would assist in maintaining existing management arrangements</p> <p>The level of water use will also need to be monitored. Exclusion of public access would be difficult to enforce along such a large uncontrolled boundary.</p>	<p>CoGG Rec &amp; OS</p> <p>CoGG Eng</p>
<p><b>8.17</b></p>	<p>As urbanisation occurs along the eastern edge of the Armstrong Creek growth area the viability and appropriateness of the Barwon River floodplain remaining Farming Zone would come into question. This area, due to its elongated nature, fragmented ownership, urban interface and flood prone nature, is unlikely to be retained for farming purposed and pressure / questions will be asked regarding the most appropriate land use controls to transition the land from its current state to the best economic, environmental and social benefit of the landowners and community.</p>	<p>Review land use controls, zones, overlays and policy position regarding the land situated between the Armstrong Creek growth area and the Barwon River / Lake Connewarre Complex to determine its most appropriate and sustainable medium to long term land use; considering its fragmented ownership and location to significant State, National and International environmental assets.</p>	<p>CoGG</p>

# 9. Draft Precinct Specific Issues and Opportunities

## 9.1 Marshall Precinct

The Marshall Precinct covers an area of 199ha and is located on the northern boundary of the Armstrong Creek Urban Growth Area. The areas along the Barwon River area are defined by the known floodplains.

As urbanisation occurs along the eastern edge of the Marshall Precinct the viability and appropriateness of the Barwon River floodplain remaining a Farming Zone will need to be reviewed. This area, due to its elongated nature, fragmented ownership, urban interface and flood prone nature is unlikely to be retained for farming purpose. A review of land use controls, zones, overlays and policy position to determine the most appropriate and sustainable medium to long term land use and land use controls to transition the land from its current state to the best economic, environmental and social benefit of the landowners and community will be required.

No.	Issue	Draft Opportunity	Lead Agency
<b>1.</b>	<b>GUNDOG LANE TO HORSESHOE BEND ROAD</b>		
1.1	Establishment of the Barwon River Trail south from Gundog Lane to Horseshoe Bend Road requires transfer of land at No. 77-107 Woolscour Lane. Land north of Waurn Ponds Creek to Gundog Lane is already owned and managed by Council.	Extension of the Barwon River Trail approximately 700m south from Gundog Lane to Horseshoe Bend Road will immediately provide a significant improvement in safety and access for cyclists and pedestrians. This first stage of Barwon River Trail along the river from Belmont Common will link into new development areas at Armstrong Creek via Horseshoe Bend Road bypassing the narrow Waurn Ponds Creek road bridge and railway line level crossing. Key design considerations will include: <ul style="list-style-type: none"> <li>• Use of durable concrete to minimise maintenance, given expected flooding.</li> <li>• Use of a free span bridge over Waurn Ponds Creek to minimise environmental impacts. Refer 2</li> <li>• Formalisation of vehicle control/maintenance access at Gundog Lane and Horseshoe Bend Road (North end).</li> </ul>	CoGG UPGAT  CoGG Rec & OS  CoGG Environ

		Prioritise acquisition of title no's at No. 77 Woolscour Lane (Marshall PSP)	
1.2	Horseshoe Bend Road currently provides vehicular access right to the edge of the Barwon River. The area is a popular fishing spot now and use will significantly increase as development proceeds at Armstrong Creek and the Barwon River Trail is connected through to the area.	Formalise car parking and public recreational access to the Barwon River at Horseshoe Bend Road. Key design considerations include: <ul style="list-style-type: none"> <li>• Alignment for the Barwon River Trail on the river side of the road and car park</li> <li>• Formalisation of car parking and vehicle turn around for larger vehicles.</li> <li>• Pre treatment of car park stormwater run-off to reduce sediment entering the river.</li> <li>• Additional shade and revegetation on the river bank.</li> <li>• Longer term establishment of a formal fishing platform with potential canoe landing subject to resolution of river access along the Barwon River under the Aqueduct.</li> </ul>	CoGG Rec & OS  CoGG Environ
1.3	The low lying areas along the Barwon River upstream of Waurm Ponds Creek are owned by Council but it does not appear that these areas are actively managed. The land is subject to flooding and there are extensive areas of Floodplain Reedbed and Aquatic Herbfields.  The vehicle control into the site from Gundog Lane while popular with anglers is uncontrolled and subject to illegal dumping and other anti social activities.	Review CoGG management responsibilities for this area. The existing areas of native vegetation and proximity to the Barwon River mean the existing Council owned areas will likely be managed by CoGG Environment Unit. This could potentially be extended to proposed new open space areas at No. 77-107 Woolscour Lane and facilities at the end of Horseshoe Bend Road.	CoGG UPGAT  CoGG Rec & OS
<b>2.</b>	<b>WAURN PONDS CREEK</b>		
2.1	Establishment of the Barwon River trail will require a bridge crossing of Waurm Ponds Creek.  There are significant fauna values in Waurm Ponds Creek including habitat for the Growling Grass Frog, Yarra Pygmy Perch and Australian Mudfish.	<ul style="list-style-type: none"> <li>• The Barwon River Trail bridge across Waurm Ponds Creek will need to be installed downstream of the existing railway line to minimise potential impacts on upstream flooding.</li> <li>• Bridge deck level could be set at Q10 with approaches down out at a much lower level on both sides to prevent access to areas with higher flow velocities during flood events - subject to confirmation by CCMA.</li> <li>• The need for additional drainage under the proposed path to retain outflow from the recently installed culverts under the railway line south of Woolscour Lane will also need to be confirmed with feature and level</li> </ul>	CoGG Env Unit  CoGG Eng  (CCMA) (VicRoads)

		<p>survey.</p> <ul style="list-style-type: none"> <li>• Ensure development works associated with areas along Woolscour Lane, Barwon Heads Road and new path and bridge as required to extend the Barwon River Trail to Horseshoe Bend Road, do not impact on rare and threatened species which may be found in Waurn Ponds Creek. Review of these works by State and Federal environment departments may be required under the EPBC and FFG Acts.</li> <li>• Continue active indigenous overstorey revegetation on both sides of the creek between Barwon Heads Road and the railway line to improve diversity of habitat values and naturally reduce the dominance of Typha/Phragmites through shading.</li> </ul>	
<b>3.</b>	<b>WOOLSCOUR LANE</b>		
3.1	<p>The existing crown land reserves along the north side of Woolscour Lane were used by the Geelong and District Riding Club, however they disbanded at the end of 2012 citing lack of members.</p>	<ul style="list-style-type: none"> <li>• As more residents move into Armstrong Creek there is potential that the Geelong and District Riding Club may re-form, given the high profile site as viewed from Barwon Heads Road.</li> <li>• Maintain the existing known reserves on the north side of Woolscour lane as local open space as part of the Marshall Precinct and ensure duplication of Barwon Heads Road provides safe pedestrian access to the area.</li> </ul>	CoGG Rec & OS
3.2	<p>The elevated Geelong-Warrnambool railway line bridge over Waurn Ponds Creek and the Barwon River is only single lane, and there is no shoulder on the bridge. The bridge can be accessed informally by pedestrians from the level crossing at Woolscour Lane. Informal use of both the level crossing and north along the single lane railway bridge may increase risk following establishment of the Barwon River Trail.</p>	<p>Review safety and the need for pedestrian access across the railway line at Woolscour Lane in Marshall Precinct planning.</p>	CoGG Rec & OS  (VicTrack)

## 9.2 North East Industrial Precinct

The North East Industrial Precinct PSP covers an area of approx. 178ha and directly adjoins the Barwon River Parklands along its northern and eastern boundary with the future East-West Link Road across the Barwon River forming the southern boundary. The precinct will be an extension of the Marshall Industrial Area and will form the key employment zone for the Armstrong Creek area providing an estimated 8,000 jobs when fully developed.

The Keystone Business Park Master Plan indicates the establishment of a continuous linear corridor along the Barwon River incorporating all land contained within the floodplain. The floodplain will provide a key habitat and link with other reserves and parks to be provided within the precinct boundary including the existing dam at the end of Jendes Lane which will be modified to provide habitat for the Growling Grass Frog. The Barwon River floodplain will provide for the future establishment of a recreational trail and the protection where possible of areas of native vegetation.

As urbanisation occurs along the eastern edge of the North East Industrial Precinct the viability and appropriateness of the Barwon River floodplain remaining a Farming Zone will need to be reviewed. This area, due to its elongated nature, fragmented ownership, urban interface and flood prone nature is unlikely to be retained for farming purpose. A review of land use controls, zones, overlays and policy position to determine the most appropriate and sustainable medium to long term land use and land use controls to transition the land from its current state to the best economic, environmental and social benefit of the landowners and community will be required.

No.	Issue	Draft Opportunity	Lead Agency
<b>4.</b>	<b>HORSESHOE BEND ROAD TO THE AQUEDUCT</b>		
4.1	Establishment of the Barwon River Trail east from Horseshoe Bend Road to the Barwon Water pipeline easement requires acquisition or use of land within the Q100 floodplain from four landowners' private properties along Tannery Road. Refer Figure 3.	Transfer of flood-prone land from these properties (NEIP) would enable public access from Horseshoe Bend Road to the east side of the Aqueduct. The Barwon Water pipeline easement and boat ramp is the logical termination for this second stage of works. The main Barwon River Trail could be aligned away from the river to enhance views down over the flood plain to the Aqueduct ruins and Goat Island. This will also improve flood protection. Following establishment of fencing to protect regeneration of the river corridor. i.e. min 30m, the land between the river corridor and trail could be re-leased for grazing as one title with access from Horseshoe Bend Road until there were sufficient resources to commence revegetation in the broader	CoGG UGAT

No.	Issue	Draft Opportunity	Lead Agency
		floodplain area.	
4.2	<p>Extensive grazing which in some areas extends right to the river bank, has removed most native vegetation between Horseshoe Bend Road and the Aqueduct.</p> <p>The removal of grazing from areas below the 10-year ARI level (i.e. most of the floodplain) between Woolscour Lane and Jendes Lane may enable many areas to recover some cover of indigenous species such as Tangled Lignum and Phragmites naturally.</p> <p>The 60 hectare Barwon Water-owned reserve on the north bank around the Aqueduct was grazed heavily until the 1980's but has since largely recovered as a mix of Lignum Swamp and Riparian Woodland, with revegetation efforts focused mainly on higher ground.</p>	<p>The following staged approach could be considered for rehabilitation of the floodplain corridor along the Barwon River.</p> <p><u>Stage 1:</u></p> <ul style="list-style-type: none"> <li>• Liaise with existing landholders 1-41 Norcott Road, 11-19 Tannery Road, 31-39 Tannery Road and 81-89 Tannery Road, to fence stock back from the Barwon River a minimum of 20-30m.</li> <li>• Augment the expected natural re growth of Tangled Lignum with scattered Red Gums in areas where these fail to naturally re-establish.</li> <li>• Prioritise woody weed control to reduce potential re establishment.</li> </ul> <p>Commence revegetation of escarpment areas away from the floodplain using indigenous overstorey trees in plots while continuing to allow grazing away from the Barwon River. These trees will take some time to establish and early planting will provide significant benefit in screening of future industrial development.</p> <p>Review initial tree planting, as part of the detailed design of each development site. Where complementary to building design facing the open space corridor, remove some planted trees along the development boundary if required to open up views to open space and Barwon River to maximise passive surveillance and public safety especially where there are no road frontages to the open space corridor.</p> <p>As part of Barwon River Trail establishment remove all remaining grazing. It is expected that Lignum will quickly re-establish and a generous 20-30m grass open space corridor with only scattered overstorey trees will need to be maintained along the trail away from the river for safety through regular slashing.</p>	<p>CoGG Env Unit</p> <p>(CCMA) (DEPI)</p>

No.	Issue	Draft Opportunity	Lead Agency
4.3	<p>The establishment of the Barwon River Trail will require a bridge/culvert crossing for each of the eight stormwater outfalls from the North East Industrial Precinct that connect through the floodplain to the Barwon River. As there is no roadside access along the floodplain area the future trail will also form the preferred maintenance and fire vehicle access crossing of these drainage outfalls.</p> <p>Current design for these constructed straight linear swale drain stormwater outfalls appear to provide limited biodiversity value and will provide poor landscape amenity.</p>	<ul style="list-style-type: none"> <li>• Establish the required crossing of NEIP stormwater drain outfalls as concrete culverts rather than bridges to enable continuous maintenance and fire vehicle access along the Barwon River via the trail. This will also become more important as environmental values improve within the floodplain following removal of grazing.</li> <li>• Where a second more informal walking/dry weather maintenance path is proposed closer to the Barwon River consider use of a much smaller culvert/pipe section aimed at transmitting low flows only. Utilise a concrete section of path in these areas to reduce wear when overtopping occurs in minor flood /rainfall events.</li> <li>• Investigate opportunities to refine the planned trapezoidal channel outfall design to establish a more natural form with deeper pools and natural bends, to maximise habitat value and landscape amenity. The smaller pipe used where there is a second riverside path may also assist in detention of low flows.</li> <li>• Consider use of rock to screen and stabilise the pipe outfall into the parklands in place of urban looking concrete headwalls. Refer Melbourne Water Standards.</li> </ul>	<p>CoGG Env Unit</p> <p>(CoGG Eng)</p> <p>(CCMA)</p>
4.4	<p>Farm dams and natural wetlands provide potential habitat values for the Growling Grass Frog.</p>	<ul style="list-style-type: none"> <li>• Retain existing farm dams and natural low lying wet areas in the vicinity of Woolscour Lane, Norcotts Road and Horseshoe Bend Road.</li> <li>• Where possible, link these water bodies via proposed urban stormwater outfalls to the Barwon River.</li> <li>• Prioritise revegetation works in new open space areas to link these isolated biosites to the Barwon River, to maximise habitat links.</li> </ul>	<p>CoGG Env Unit</p> <p>(CoGG Eng)</p> <p>(CCMA) (DEPI)</p>
4.5	<p>Existing areas of Floodplain Riparian Woodland, Floodplain Reedbed and Brackish Lignum Swamp between the Aqueduct and Jendes Lane provide significant habitat value.</p>	<p>Align the Barwon River Trail to higher ground between the Aqueduct and Tannery Road to minimise impacts on existing native vegetation and to maximise flood protection.</p> <p>Improve habitat links between the Jendes Lane Dam and the Barwon River.</p>	<p>CoGG Env Unit</p> <p>(CoGG Eng)</p>

No.	Issue	Draft Opportunity	Lead Agency
<b>5.</b>	<b>OVOID SEWER AQUEDUCT</b>		
5.1	<p>The Aqueduct is listed as of architectural, historical, scientific (technical) and aesthetic significance to the State of Victoria. It provides a major landscape feature as it spans across the Barwon River and floodplain.</p> <p>There is currently no public access under or around the Aqueduct and along the Barwon River by land or water as the structural condition of the Aqueduct presents an ongoing risk to public safety with parts of the structure frequently falling into the river and adjoining public reserve. There is also increasing potential for a catastrophic 'house of cards' collapse if more than one tower collapses. Barwon Water manages fencing and on water floating booms to prevent public access to the structure.</p> <p>Any works or demolition of the Aqueduct require permit approval from Heritage Victoria and funding and future management of any retained sections of Aqueduct will need to be resolved before works could commence and access along the Barwon River can be restored.</p> <p>Barwon Water have previously confirmed that they do not want to continue to as owner/manager of the Aqueduct structure however another owner/management agency has yet to be identified.</p> <p>Heritage Victoria has previously confirmed that as the approval agency they do not want to own and manage the Aqueduct directly.</p> <p>The land on which the Aqueduct stands on the south bank is leased by Barwon Water from the owner of private property along Tannery Road.</p>	<p>Restoration of access along the Barwon River is a key outcome for opening of the Barwon River Parklands areas to the public. Barwon Water and Heritage Victoria are currently considering options for the Aqueduct including demolition of sections and future management of the site as a ruin.</p>	
5.2	<p>The Aqueduct in its current form will restrict access for the Barwon River Trail along the river.</p>	<p>Alignment of the Barwon River Trail to the south of the Aqueduct up on the escarpment provides magnificent views down over the floodplain and to the Aqueduct.</p>	<p>CoGG Rec &amp; OS  (BW)</p>
5.3	<p>The Aqueduct in its current form restricts on-water access along the Barwon River. There are no formal landing points, and canoeists are required to portage (i.e. carry canoes on land) approximately 800m-1km,</p>	<p>Demolition and removal of the overwater sections of the Aqueduct is the only long term sustainable solution to restore on water access along the Barwon River between Geelong and</p>	<p>BW HV (CCMA)</p>

No.	Issue	Draft Opportunity	Lead Agency
	when this section of the river is used for special events.	Barwon Heads.	
5.4	Barwon Water lease the land on which the Aqueduct occupies from the owner on Tannery Road.	If the Aqueduct is still standing subdivision of property at on Tannery Road into two separate titles to match the fencing/public exclusion zone is recommended to clarify land and risk management responsibilities.	CoGG UGAT  (BW)
5.5	Goat Island is assumed to be Crown Land however there is not specific title or appointed land manager. There is no written agreement for use of the island as part of the Aqueduct support towers.	Clarify the land ownership and management status of Goat Island.	DEPI
5.6	Lack of access to Goat Island maximises habitat value. However as an island all maintenance access is via boat. Recent works have been coordinated by Barwon Water to remove woody weeds including Willows and Ash. Ongoing monitoring will be required to prevent reinvasion.	Continue active control of woody weeds on Goat Island to improve habitat values and reduce potential spread of invasive weeds. Ensure follow up revegetation is undertaken using indigenous species of local provenance and retains views to the Aqueduct, and maximise habitat values.	DEPI BW CCMA
<b>6.</b>	<b>THE AQUEDUCT TO JENDES LANE</b>		
6.1	<p>Barwon Water owns the pipeline easement which connects through to the Barwon River as an extension of Tannery Road. There is a boat ramp and gravel turn around area located on the river used by Barwon Water to maintain floating booms and other infrastructure associated with the pipeline and Aqueduct.</p> <p>Barwon Water will continue to require vehicle access to the Barwon River for maintenance at the sewerage pipeline river crossing point downstream (east) of the Aqueduct.</p>	Investigate formalising public access to the Barwon River for fishing and canoe landing at the existing Barwon Water boat ramp downstream (east) of the Aqueduct. Investigate potential use of the easement and potentially the existing boat ramp for public access via a license agreement with Barwon Water.	CoGG Rec & OS  (BW) CCMA
6.2	Extension of the Barwon River Trail east of the Barwon Water pipeline easement to Jendes Lane requires transfer of land within the Q100 floodplain from the landowners including no's 35, 36 and 37.	The floodplain land along the Barwon River has some regenerating indigenous vegetation and the Barwon River Trail could be again aligned away from the river to connect to the future open space surrounding the large existing dam west of Jendes Lane. The extension of the trail east into this area would not be required until this area redevelops if access can be achieved via the Barwon Water pipeline easement.	CoGG UGAT  CoGG Rec & OS  CoGG Env Unit

No.	Issue	Draft Opportunity	Lead Agency
6.3	Extent and management of the Australian Tannery Ruins at the end of Jendes Lane will need to be confirmed in planning future access for the Barwon River Trail and management of the floodplain.	Review permit conditions for management of the Australian Tannery Ruins in planning for the Barwon River Trail link to Jendes Lane. Develop practical management solutions for any remnants contained within the floodplain.	CoGG UGAT  (HV)
6.4	The establishment of the Barwon River Trail will require a bridge/culvert crossing for each of the stormwater outfalls from the North East Industrial Precinct that connect through to the Barwon River. As there is no roadside access along the future open space the future trail will also form the preferred maintenance and fire vehicle access crossing of these drainage outfalls.	<ul style="list-style-type: none"> <li>• Establish the required crossing of NEIP stormwater drain outfalls as concrete culverts rather than bridges to enable continuous maintenance and fire vehicle access along the Barwon River via the trail. This will also become more important as environmental values improve within the floodplain following removal of grazing.</li> <li>• Where a second more informal walking/dry weather maintenance path is proposed closer to the Barwon River consider use of a much smaller culvert/pipe section aimed at transmitting low flows only. Utilise a concrete section of path in these areas to reduce wear when overtopping occurs in minor flood /rainfall events.</li> <li>• Investigate opportunities to refine the planned trapezoidal channel outfall design to establish a more natural form with deeper pools and natural bends, to maximise habitat value and landscape amenity. The smaller pipe used where there is a second riverside path may also assist in detention of low flows.</li> </ul>	CoGG Eng  CoGG Env Unit
<b>7.</b>	<b>JENDES LANE TO FUTURE EAST – WEST LINK ROAD</b>		
7.1	<p>The Barwon River floodplain narrows just downstream of Boundary Road (Green Banks/Jendes Lane). This area forms a natural choke in the floodplain and is subject to higher flow velocities during a major flood event. The proximity of development to the Barwon River may restrict opportunities for establishment of the Barwon River Trail and habitat corridor improvements.</p> <p>Establishment of the Barwon River Trail near Jendes Lane will require resolution of access through the former Tannery Site ruins and may potentially require acquisition of</p>	<p>Review future development interface at properties along Jendes Lane to ensure there is sufficient open space for safe establishment of the Barwon River Trail, retention of flood transmission capacity and habitat corridor improvements.</p> <p>As an interim measure until the above can be resolved, Jendes Lane and Brearleys Lane could be utilised for trail establishment without needing to cross roads as Tannery Road is unmade east of Jendes Lane.</p>	CoGG UGAT  (CCMA) (HV)

No.	Issue	Draft Opportunity	Lead Agency
	additional land at the heritage listed Greenbanks property.		
7.2	The establishment of the Barwon River Trail will require a bridge/culvert crossing for each of the stormwater outfalls from the North East Industrial Precinct that connect through to the Barwon River. As there is no roadside access along the future open space the future trail will also form the preferred maintenance and fire vehicle access crossing of these drainage outfalls.	<ul style="list-style-type: none"> <li>• Establish the required crossing of NEIP stormwater drain outfalls as concrete culverts rather than bridges to enable continuous maintenance and fire vehicle access along the Barwon River via the trail. This will also become more important as environmental values improve within the floodplain following removal of grazing.</li> <li>• Investigate opportunities to refine the planned trapezoidal channel outfall design to establish a more natural form with deeper pools and natural bends, to maximise habitat value and landscape amenity. The smaller pipe used where there is a second riverside path may also assist in detention of low flows.</li> </ul>	CoGG Eng  CoGG Env Unit
7.3	<p>Geelong Water Ski Club currently has almost exclusive use of the Barwon River between Boundary Road and Coppards Road. As Armstrong Creek develops and water-skiing and other uses of the Barwon River including fishing and canoeing increase, the potential for conflicts with water-skiing use may also increase.</p> <p>Use of the Barwon River by Geelong Water Ski Club contributes to bank erosion and impacts on bird habitat values. Development of Armstrong Creek may increase powered boating use in this section of the Barwon River.</p>	<ul style="list-style-type: none"> <li>• Monitor the impacts of powered boating, including boat numbers, speed and periods of use.</li> <li>• Undertake regular review of operating requirements including the use of ski jumps and lanes/turn-around areas, to ensure public safety and protection of the environmental values of the Barwon River.</li> <li>• Improve bank stabilisation measures at turn around areas.</li> <li>• Liaise with landholders on both sides to strengthen native vegetation along the banks for stability and to maximise habitat corridor width.</li> </ul>	CCMA
7.4	The future Barwon River Trail will need to cross the southern outfall channel from the NEIP.	<ul style="list-style-type: none"> <li>• A designed pedestrian/cycle bridge could be used in place of a concrete culvert in this more high profile location as viewed from the future elevated East-West Link Road as there will be a road interface to the public open space reserve. There is good maintenance access to either side of the channel so the bridge will <u>not</u> need to be vehicle rated, which will reduce costs.</li> <li>• Investigate opportunities to refine the planned trapezoidal channel outfall design to establish a more natural form with deeper pools and natural</li> </ul>	

No.	Issue	Draft Opportunity	Lead Agency
		<p>bends, to maximise habitat value and landscape amenity. The smaller pipe used where there is a second riverside path may also assist in detention of low flows.</p>	
<b>8.</b>	<b>EAST – WEST LINK ROAD</b>		
8.1	<p>There appears to be no provision for pedestrian/cycle access on the proposed East-West Link Road across the Barwon River.</p> <p>Establishment of a separate pedestrian/cycle bridge would be extremely expensive and it is critical that any road bridge also provides for pedestrians and cyclists. The elevated bridge will provide magnificent views down along the Barwon River to Reedy Lake.</p> <p>It is also critical that there is sufficient open space and clearance for the establishment of north-south pedestrian/cycle access for the Barwon River Trail under the bridge to maintain off road access along the river.</p>	<p>Liaise with VicRoads in future planning for the future east-west ring road bridge crossing of the Barwon River to ensure that pedestrian cycle access is considered and incorporated in the final design. Key requirements include:</p> <ul style="list-style-type: none"> <li>• Retention of north-south access for the Barwon River trail under the bridge (off-road)</li> <li>• Provision of separated pedestrian/cycle access on the bridge. (not just cycle lanes)</li> <li>• Ideally pedestrian/cycle access will be located on the south side to retain views south along the river to the Reedy Lake/Lake Connewarre Ramsar area. Ensure the road bridge design maintains sufficient clearance for safe shared trail access and on-water access along the Barwon River.</li> </ul>	<p>CoGG Eng  (VicRoads) (CCMA)</p>
8.2	<p>The construction of the future East West Link Road bridge will require access to the banks of the Barwon River. Post construction maintenance vehicle access to the underside of the bridge is also typically required.</p>	<p>The future East-West Link Road bridge will require continuing maintenance vehicle access to the western bank of the Barwon River. This access could also potentially also provide for public vehicle access to the river without further impacting on environmental values. This access would also improve all ability access to the Barwon River.</p> <p>Areas in the vicinity of road bridges across rivers are typically subject to higher flow velocities during flood events however there is public vehicle access under the James Harrison Bridge and Moorabool Street Bridge upstream so it is possible that these issues could be overcome at design.</p>	<p>VicRoads  CCMA  CoGG Rec &amp; OS</p>

## 9.3 Horseshoe Bend Precinct

The Horseshoe Bend PSP covers an area of approx. 650ha and directly adjoins the Barwon River Parklands at Sparrovale Road. The precinct will be predominantly residential and is expected to include 7,000 to 7,500 new homes when fully developed.

A key element of the Horseshoe Bend Precinct Draft Master Plan 2012 is the extension of the Barwon River Parklands by over 500 hectares. This will include a 300+ hectare drainage/wetland complex and biodiversity conservation area located east of Sparrovale Road that will also provide for future establishment of recreational trails.

The Draft Master Plan also includes a regional passive public open space reserve of 3 hectares on the western side of Sparrovale Road. This reserve will include a regional playground, picnic facilities and car park. The reserve will extend through to Barwon Heads Road will provide views and the primary address for the Barwon River floodplain at this key entry.

No.	Issue	Draft Opportunity	Lead Agency
<b>9</b>	<b>MAIN WETLAND</b>		
9.1	Large new wetlands (300+ hectares) are proposed for the naturally low-lying areas of Sparrovale and Cold Winds Farms to treat stormwater run-off from the Horseshoe Bend Precinct. The shallow depth, lack of overstorey trees and ephemeral character make it likely the wetland areas will be quickly covered in naturally occurring reeds especially Typha and Phragmites sp. favored by these conditions. Later establishment of trees may be difficult due to the high water table.	<p>The establishment of new, fresh water quality treatment wetlands on low-lying areas of the Sparrovale and Cold Winds Farms will enhance biodiversity and habitat values to complement the existing Barwon River floodplain and the adjoining Lake Connewarre Ramsar area.</p> <p>Key design considerations to maximise habitat values may include:</p> <ul style="list-style-type: none"> <li>• Retention of existing native and exotic overstorey trees where possible.</li> <li>• Provision of some raised areas to enable new trees to be planted within and around the wetland perimeter without becoming water logged.</li> <li>• Establishment of some deeper open water areas on the western side adjoining the future Barwon River trail and more active areas of the open space corridor. These areas could be used to permit dog access enabling more stringent dog exclusion policies for areas closer to the Barwon River and Ramsar Area.</li> </ul>	<p>CoGG Eng</p> <p>CoGG Env Unit</p>
9.2	The SP Ausnet high voltage electricity easement will pass directly through the proposed Sparrovale wetlands.	Maintenance access to the SP Ausnet electricity towers will be retained via raised levees. These tracks will also be	CoGG Eng

No.	Issue	Draft Opportunity	Lead Agency
	<p>Five transmission towers will be located within the wetland areas and SP Ausnet will continue to require maintenance vehicle access. The xxx levels for the existing access tracks are not well known.</p> <p>There are strict requirements for planting underneath high voltage transmission towers and planted vegetation must be maintained at or below a height of 3m.</p>	<p>used by walkers and birdwatchers. The expected regrowth of reed species within the wetland will remain below 3m so these areas would be preferred directly underneath the transmission lines.</p> <p>Where possible align any new or built up maintenance vehicle access tracks and levees away from underneath the transmission lines so that the raised levee areas can also be used for tree planting to improve biodiversity, habitat and landscape character values.</p> <p>Provide directional information for walkers and longer term once wetlands have established investigate provision of bird hides at key viewing areas.</p>	<p>CoGG Env Unit</p> <p>(SP Ausnet)</p>
<b>10.</b>	<b>WETLAND INLET CHANNEL</b>		
10.1.	<p>Stormwater outfalls from future urban development at Horseshoe Bend will connect into the future wetland east of Sparrowvale Road. The current design indicates a straight linear constructed channel easement.</p>	<p>During detailed design of the Horseshoe Bend Precinct stormwater outfall channels, investigate use of a more natural form, alignment and shape including:</p> <ul style="list-style-type: none"> <li>• Consideration of the Barwon River trail crossing point, making this as narrow as possible.</li> <li>• Establishment of some deeper pools, especially in the vicinity of the proposed crossing point to add landscape interest.</li> <li>• Provision of a diverse range of ecological niches for proposed revegetation, avoiding use of a uniform trapezoidal channel.</li> <li>• An architecturally designed pedestrian/cycle bridge could be used in this high profile location, especially if the bridge is eventually located closer to the proposed Regional Playground area off Barwon Heads Road. There is good maintenance access to either side of the channel so the bridge will not need to be vehicle rated, which will reduce costs.</li> </ul>	<p>CoGG Eng</p> <p>CoGG Env Unit</p>
<b>11.</b>	<b>EPHEMERAL WETLAND</b>		
11.1.	<p>Floodplain areas between proposed wetlands on the Sparrowvale and Cold Winds Farms and the Barwon River will be</p>	<p>Consider retention of leased grazing to control pasture grass and woody weeds in the short-medium term especially if</p>	<p>CoGG Env Unit</p>

No.	Issue	Draft Opportunity	Lead Agency
	largely separated from new development and will experience only low levels of public access. It is likely that much of this area will quickly recover naturally as Lignum Swamp following removal of grazing.	dry conditions persist. Ideally the change over from grazing/agriculture will occur following a flood or wet period when conditions favor re-establishment of Lignum and other robust native species. At this time access will have been already reduced and the shift to permanently remove grazing would cause less disruption. A follow up with targeted weed control to promote natural regeneration will be required to prevent spread of woody weeds. During the regeneration period target establishment and retention of dry weather maintenance and walking track alignments by continuing to slash min 4m wide access routes.	(CoGG Eng)  (CCMA)
<b>12.</b>	<b>SPARROVALE FARM (Potential continuation of leased grazing/agriculture)</b>		
12.1	The majority of land within the floodplain is used for grazing. While this activity restricts potential for regeneration of native vegetation in many areas, especially higher and drier land, grazing is a cost effective method for managing growth of pasture grasses and fire risks.	Support continued leased grazing of the floodplain away from the Barwon River and wetlands until there are sufficient resources to commence environmental restoration or the need for additional open space for active open space is identified.	CoGG Env Unit  (Rec & Open Space)
12.2	<p>The alignment of the future Barwon River Trail and other public access tracks may complicate management of leased grazing land. It is not desirable or easy to manage stock without direct road access or where there is a need to cross a public recreational trail.</p> <p>The need for electrified fencing for grazing use by cattle and potential disturbance by dogs of livestock can also present significant boundary issues where leased grazing land adjoins public open space.</p>	<p>Review alignment of the Barwon River Trail between Brearleys Lane and Groves Road once the preferred arrangements for continued short-medium term arrangements for leased grazing/agriculture on the Sparrovale and Cold Winds properties are known.</p> <p>If areas are to be grazed and or used for agriculture in the short to medium term the preferred trail alignment will be closer to the wetland and Barwon River to maximize the available land available for lease. This will put the trail level below the Q10 flood level and an unsealed interim lower level of service alignment along secondary maintenance access tracks/future walking links may be appropriate.</p> <p>Longer term any establishment of for the sealed trail should be made along the preferred higher ground alignment irrespective of short term grazing/agricultural lease requirements.</p>	CoGG Rec & Open Space

No.	Issue	Draft Opportunity	Lead Agency
<b>13.</b>	<b>COASTAL SALTMARSH ZONES</b>		
13.1	The eastern end of the Cold Winds Farm and Sparrovale Farm is salt affected and contains areas of Coastal Saltmarsh.	The Coastal Saltmarsh areas at the eastern end of the Cold Winds and Sparrovale Farms are an important habitat zone and will be protected by the establishment of a new levee to retain and control freshwater input from the proposed main Horseshoe Bend wetland. The levee will also provide direct walking access from the end of Groves Road through to the Barwon River completing a circuit walk around the new main wetland of 5-6km. This walk could form the basis of an excellent wetland interpretation trail.	CoGG Env
<b>14.</b>	<b>WETLAND OUTLETS, REGULATORS AND CONTROL STRUCTURES</b>		
14.1	There are a series of existing levees and regulators established by the Geelong Harbour Trust and maintained by the current landowner. Management of both the existing and new control structures are critical to the operation of the new wetlands and the health of downstream areas of significant vegetation. At times there may be conflict between flood management, recreational management and environmental objectives.	The ownership and management of historic flood control structures has yet to be confirmed. Development of an operational manual with clear objectives and responsibilities in operation of existing and new levees, outlets and regulators will be required.	CoGG Eng  CoGG Env Unit  CCMA
14.2	The existing and proposed new levees at Sparrovale will generally have a 10yr ARI protection level. They will be used for maintenance vehicle access to regulators and outlets and will afford excellent views over the wetland and to the Barwon River in many areas.	<p>The existing levee and proposed levee system and associated maintenance vehicle access tracks to key wetland control infrastructure will provide an opportunity for a network of walking tracks around the proposed wetlands with links to and along the Barwon River. These tracks will complement the Barwon River Trail and provide an additional approximate 3-6km of tracks where users can escape to a beautiful and remote natural setting.</p> <p>Monitor the impacts of dog walking use of these tracks on bird habitat values. Initial use is expected to be low and a ban on dog walkers difficult to justify and enforce. The establishment of these tracks will need to be carefully staged in conjunction with a gradual change in land use from grazing to nature conservation.</p>	CoGG Env Unit

No.	Issue	Draft Opportunity	Lead Agency
<b>15.</b>	<b>BARWON RIVER FRONTAGE</b>		
15.1	The existing Crown Land frontage to the Barwon River at Sparrovale Farm is managed by the CCMA and leased to the current landowner G.Perkins.	Remove grazing and agriculture from these areas as soon as possible if not already done in accordance with the recommendations of Barwon Through Geelong Management Plan.  Review management responsibilities for these areas to ensure consistency of management along the entire Barwon River frontage.	CCMA  DEPI
<b>16.</b>	<b>LOWER BREAKWATER</b>		
16.1	The lower breakwater is managed by the CCMA. The fish race was recently upgraded however there is no provision for canoe landing and access as required to safely passing around the structure.  The need for retention of maintenance vehicle access through existing tracks from Sparrovale Farm will mean there is good public access to the structure.	The lower breakwater could become a potentially popular destination for anglers and use by canoe/kayakers of this section of the Barwon River and will also increase areas of the floodplain area transferred to public ownership.  The lower breakwater provides an ideal control point for notification to canoe/kayakers about conditions and any potential restrictions for passage downstream into the Lake Connewarre State Game Reserve.  Establishment of permanent canoe/kayak landing points for portage around the structure will also be popular with anglers who have made the long walk in from the end of Groves Road.	CCMA  PV
<b>17.</b>	<b>ADJOINING THE RAMSAR AREA</b>		
17.1	The eastern end of Sparrovale Farm directly adjoins the Ramsar area and Lake Connewarre State Game Reserve.	The eastern end of Sparrovale Farm has areas of naturally regenerating Lignum Swamp and Coastal Saltmarsh. Public access to these areas could be restricted at the existing Sparrovale levee and these high value habitat areas could be incorporated into the Lake Connewarre Reserve. This could extend the buffer to the Ramsar area while enabling interpretation and viewing at key points on the potential wetland circuit trail.	CoGG Env  PV  DEPI
<b>18.</b>	<b>HARRIOTT ROAD</b>		
18.1	Private rural residential properties along Harriott Road are outside the Armstrong Creek Urban Growth Zone. These properties are contained within the Q100	Investigate and prepare specific design guidelines for future development of these properties and the interface to Barwon River floodplain.	CoGG UGAT

No.	Issue	Draft Opportunity	Lead Agency
	floodplain however the houses in some instances have been built up to minimize potential flooding.		
<b>19</b>	<b>BARWON RIVER TRAIL BREARLEYS LANE TO GROVES ROAD</b>		
<b>19.1</b>	The design standards and criteria for establishment of the main shared trail and the importance of connecting new residential areas and open space links within the Armstrong Creek to Geelong along a reasonably direct route will mean the alignment of the main trail will away from the Barwon River in many areas.	<p>The preferred alignment for the Barwon River Trail between Brearleys Lane and Grove Road will be on the west side of new wetlands closer to Sparrovale Road.</p> <p>Alignment of the main trail to higher ground will maximise views down over the new wetlands and improve connections to proposed new regional playground and other open space along Sparrovale Road.</p> <p>However if grazing/agriculture is to be continued in the short-medium term at Sparrovale Farm and alignment closer to the new wetland area may be more appropriate to reduce the need for stock crossings and to maximize the available lease area. Refer 12.</p>	

## 9.4 Armstrong Creek East Precinct

The Armstrong Creek East PSP covers an area of approx. 794ha and directly adjoins the Barwon River floodplain along Groves Road and at the Barwon Heads Road crossing of Armstrong Creek. The precinct will be predominantly residential and with a net developable area of approximately 477ha is expected to include housing for over 7,000 new homes when fully developed.

A key element of the Armstrong Creek East Precinct Structure Plan is the establishment of a continuous linear open space corridor along Armstrong Creek which will connect into the Barwon River floodplain. The Armstrong Creek open space corridor will provide a key habitat corridor linking remnant vegetation and conservation reserves in the west including Stewarts Reserve with Hospital Swamps and the Lake Connewarre system. The open space corridors along Armstrong Creek and the Barwon River floodplain will provide for the future establishment of recreational trails and a linked network of open space.

The Armstrong Creek East Precinct Structure Plan also includes a regional active public open space reserve located east of Barwon Heads Road, directly connected to the Barwon River floodplain to include 3 AFL football/cricket ovals, 3 soccer pitches, 9 netball courts, 18 tennis courts and 2 pavilions.

No.	Issue	Draft Opportunity	Lead Agency
<b>20.</b>	<b>GROVES ROAD</b>		
<b>20.1</b>	Groves Road is within the Q100 level and the proposed Barwon River floodplain open space continues on both sides of the road.	Groves Road could provide the main public entry to the Barwon River floodplain, running beside the new wetland and connecting through to a potential future wetland interpretation centre and active open space reserve located on higher ground at the eastern end of the parklands. Refer 21.	CoGG UGAT  PV
<b>21.</b>	<b>BROILER FARM (POTENTIAL FUTURE WETLAND INTERPRETATION CENTRE)</b>		
<b>21.1</b>	<p>The establishment of the Barwon River Parklands at Armstrong Creek is expected to become a key attractor for visitors to the area. The parklands will provide public access to one of the most significant bird habitat areas in Victoria and an area of National and International significance. An opportunity to escape from the urban environment will also be a key attraction for many visitors and the site is located on the key tourist route to the Great Ocean Road and Bellarine Peninsula.</p> <p>In the longer term as development proceeds at Armstrong Creek and use of the Barwon River floodplain increases the need for additional visitor facilities and a visitor centre of some description for access to toilet</p>	<p>The broiler farm site at the end of Groves Road could in the long term become the key visitor interpretation area for both the Barwon River Parklands and the Lake Connewarre and Ramsar Area. Advantages of the site for this purpose include:</p> <ul style="list-style-type: none"> <li>• Elevated views out over the proposed main Wetland, Hospital Swamps and across to Lake Connewarre.</li> <li>• Existing vehicle access from Groves Road.</li> <li>• Connection via the Barwon River Trail to future planned active open space east of Barwon Heads Rd.</li> <li>• The site is the closest area of land on which buildings could be established with views to the Lake Connewarre</li> </ul>	PV  CoGG UGAT  CoGG Env Unit  CCMA

No.	Issue	Draft Opportunity	Lead Agency
	<p>facilities and orientation will be required.</p> <p>The broiler farm at the end of Groves Road is positioned within the Armstrong Creek East Urban Growth Zone. The farm has an existing operational lease which will potentially be extended in the short medium term limiting development within 1km.</p> <p>The structural condition and arrangement of the existing buildings has not been assessed however the site is assumed to be fully serviced as required for such a large commercial operation.</p>	<p>system.</p> <ul style="list-style-type: none"> <li>• The site has existing services including power, water and sewerage. The potential for adaptation of buildings is unknown but could be further investigated.</li> <li>• The location is within the largest area of floodplain and adjoins the proposed Armstrong Creek East future active open space reserve allowing potential cost efficiencies in provision of car parking etc.</li> <li>• Site is located with excellent links to the potential future main wetland trail network and could provide public toilets and visitor information/orientation.</li> </ul> <p>Most importantly the site is also subject to an existing lease meaning decisions regarding establishment of any new interpretation centre can be deferred until the Barwon River floodplain management has been resolved and the visitor profile to the area is better known.</p> <p>This delay in timing is likely to allow for a far more cost effective and practical cost benefit analysis and design brief for establishment of any potential future visitor centre. It will also enable time for further investigation of educational and commercial partnership opportunities that may provide additional sources of funding for delivery of a visitor centre.</p>	
<b>22.</b>	<b>FUTURE ACTIVE OPEN SPACE</b>		
22.1	<p>Regional active public open space will be established east of Barwon Heads Road as part of the Armstrong Creek East Precinct Development Contributions Plan. The reserve will include:</p> <ul style="list-style-type: none"> <li>• 3 x full size football/cricket ovals</li> <li>• 3 x soccer ovals</li> <li>• 9 x netball courts</li> <li>• 18 x tennis courts</li> <li>• 2 x pavilions</li> </ul>	<p>Key design considerations for development of planned active opens space within the Armstrong Creek East Precinct east of Barwon Heads Road include:</p> <ul style="list-style-type: none"> <li>• Provide off road connection to new active open space facilities via the future Barwon River Trail.</li> <li>• Develop an implementation plan to guide the staged on-ground development of new facilities and the interim management of land required for long term projects.</li> <li>• Commence tree planting as soon as possible to improve landscape character and wind protection, while</li> </ul>	CoGG Rec & OS

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		<p>retaining sufficient space for future development of facilities.</p> <ul style="list-style-type: none"> <li>• Continue investigation of stormwater harvesting opportunities for irrigation of sports fields, from Armstrong Creek.</li> <li>• Ensure the design of the park address to Barwon Heads Road reflects the key character values of the broader Barwon River floodplain at this key interface.</li> </ul>	
<b>23.</b>	<b>ARMSTRONG CREEK</b>		
23.1	<p>Extensive water quality treatment wetlands will be provided on Armstrong Creek. Detailed assessment of both the Armstrong Creek East and Horseshoe Bend precinct drainage schemes by Neil Craigie identified opportunities for cost effective treatment of flows from Armstrong Creek East in proposed Horseshoe Bend precinct wetlands.</p>	<p>Coordinate detailed design of stormwater systems for Armstrong Creek East Precinct and Horseshoe Bend to maximise efficiency and environmental benefit.</p>	CoGG Eng
23.2	<p>Extension of the Barwon River Trail south across Armstrong Creek will require a bridge crossing.</p>	<p>Liaise with VicRoads to ensure consideration of pedestrian and cycle access across Armstrong Creek in planning for duplication/upgrade of Barwon Heads Road.</p>	CoGG Rec & OS  (VicRoads)
<b>24.</b>	<b>HOSPITAL SWAMPS</b>		
24.1	<p>Sensitive existing saltmarsh areas and saline herbfields may be threatened by the introduction of additional fresh urban stormwater inputs. New levees are proposed to retain separation of fresh and saline areas to maximise habitat and biodiversity values.</p>	<ul style="list-style-type: none"> <li>• Review and monitor detailed design of proposed wetlands on Armstrong Creek and stormwater discharges from the Horseshoe Bend Precinct to protect areas of existing saltmarsh and saline herbfields.</li> <li>• Monitor the impacts of climate change and rising sea levels on these sensitive communities.</li> <li>• Require preparation of detailed environmental flow management plans to guide the seasonal operation of existing and proposed control structures under all conditions.</li> </ul>	CoGG Env Unit  (CoGG Eng) (CCMA) (PV)
24.2	<p>Current flow/ecology reports for Hospital Swamps and Lake Connemare have all assumed current tidal regimes are continued into the future. As identified by Neil Craigie predictions of a mean sea level rise from 0.0m AHD to 0.25m AHD by 2030 and to 0.8m AHD by 2100 mean that Hospital</p>	<p>Review and update flow/ecology assessments for Hospital Swamps to further assess the impacts of predicted sea level rise.</p>	CCMA

No.	Issue	Draft Opportunity	Lead Agency
	Swamps may be permanently saline and inundated above 0.5m AHD.		
<b>25.</b>	<b>BAENCHES LANE</b>		
25.1	Baenches Lane is difficult to access and is not regularly well used outside of duck season.	Retain restricted access via Baenches Lane for duck season only.	PV
25.2	There is no designated pedestrian/cycle access to Taits Point from Armstrong Creek.	Extend the Barwon River Trail along Lake Road; initial use will be shared on road, however longer term an off road link may be possible along the southern edge of Hospital Swamps.	CoGG Rec & OS  PV

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