



THE CITY OF
GREATER GEELONG

SPARROVALE Ngubitj yoorree WETLANDS MASTER PLAN

JUNE 2021

GROWING OUR NATURAL
AREAS

We acknowledge the Traditional Custodians of the land, the Wadawurrung People of the Kulin Nations. We pay our respects to their Elders past and present and acknowledge all Aboriginal and Torres Strait Islander people who are part of the Greater Geelong community today.

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Disclaimer: This Master Plan was prepared by an independent consultant in conjunction with City of Greater Geelong (the City). The Master Plan is reflective of a higher-level vision for the Sparrovale Wetlands Master Plan and is subject to further consultation and consideration by the City.

The contents of this report are endorsed by the City, however, may require revision over time to reflect current council policy.

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REVISION	DATE	AMENDMENT
G	16/06/2021	V7 – Revised as per City of Greater Geelong comments
F	26/04/2021	V6 – Revised as per City of Greater Geelong comments and co-naming
E	31/03/2021	V5 – Incorporating Community Consultation feedback
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EXECUTIVE SUMMARY

Project Scope

In 2019 City of Greater Geelong (the City) acquired almost 500 hectares of mostly flood prone farmland adjoining the Barwon River, Lake Connewarre and Hospital Swamp area which form part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. The Master Plan, prepared in consultation with the local community and key stakeholders provides an overarching vision for the entire site along with key objectives and priority actions for the staged establishment of a nationally significant conservation reserve.

The primary purpose for acquiring the land is to provide for capture and treatment of urban stormwater runoff from the adjoining Armstrong Creek development area to mitigate development impacts on the Barwon River and the ecological character of Hospital Swamp. The natural and constructed wetlands will occupy approximately 200 hectares of the 500 hectare site and the design and construction of the new stormwater wetlands, channels and management infrastructure has now been completed.

The remaining 300 hectares, including over 4 kilometres of river frontage currently used for agricultural grazing and cropping is also flood prone and part of the Barwon River floodplain. The Master Plan will seek to guide the staged transition of this land from an agricultural landscape to public open space and rehabilitated floodplain conservation reserve to complement the biodiversity values of the natural and new wetlands and the Barwon River.

Key considerations

- In consultation with the *Wadawurrung the Ngubiti yoorree* (Wetlands) has been adopted as the co-name for the new reserve. Boot boot-a refers specifically to the 140 hectare natural section of river floodplain adjoining Lake Connewarre.
- The Barwon River and floodplain form an important part of the *Wadawurrung* cultural heritage and dreaming. There are 39 registered Aboriginal sacred sites within a 5 kilometres radius of the site.
- The Sparrovale Farm Complex is listed on the Victorian Heritage Inventory and there are a range of sites and infrastructure significant to the early development of Geelong including the former Geelong Racecourse site, lower breakwater and Geelong Harbour Trust levees and farm infrastructure.
- Remnant native vegetation on the site is representative of five Ecological Vegetation Classes (EVCs) and 5 Nationally significant and 59 State significant flora species have been identified in the broader region.
- Lake Connewarre Wetland Complex and the lower reaches of the Barwon River adjoining the site form a critical part of the Port Phillip (Western Shoreline) and Bellarine Peninsula Ramsar Site. This is one of 11 wetlands of international significance in Victoria and the area is protected under State and Federal legislation and three international treaties. Values associated with the reserves listing as a wetland of international significance include:
 - Rare and threatened species that are directly supported by the wetlands.
 - Habitat and critical life stage support for a large number of migratory shorebirds, waterfowl and water birds and fish species.
 - Important feeding and nursery areas for a number of native fish and frog species.
- The Lake Connewarre State Game Reserve is managed by Parks Victoria and directly adjoins the site. The State Game Reserve is used for seasonal duck hunting.
- 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. Planning for provision of local and regional open space east of Barwon Heads Road and adjoining the Sparrovale Master Plan area include:

- A network of recreational walking and cycling trails that provide direct links from the site to activity centres, schools and major parks in the growth area.
- Future extension of the Barwon River Trail providing off road walking and cycling access back to Belmont Common and central Geelong.
- Armstrong Creek East Precinct Active Open Space to Barwon Heads, a regional multi-purpose sports facility.
- Horseshoe Bend Precinct Regional Park including a regional playground and passive open space area.
- A supporting network of local parks and open space links throughout the new residential areas.
- Greater Geelong and The Bellarine attracts approximately 5 million visitors per year and of the 2.8 million day trippers a significant proportion pass within 500m of future Sparrovale Wetland park on Barwon Heads Road or within 3 kilometres on the Surf Coast Highway.

Vision

A diverse and sustainable wetland and waterway wildlife reserve to enjoy nature, history and improve community well-being.

Key goals

An integrated and resilient wetland and waterway parkland that:

- Protects and enhances the natural habitat and biodiversity values of Sparrovale, Barwon River and Lake Connewarre Ramsar area – a world class nature reserve.
- Retains the capacity and natural connectivity of the Barwon River floodplain.
- Recognises and celebrates values and overlap of Indigenous and non-Indigenous cultural heritage.
- Improves community access to the Barwon River and connection with the natural environment.
- Provides open space and recreational facilities in a natural setting for a diverse and growing community.
- Attracts local, regional and international visitors by providing an accessible and unique wetland and cultural history experience.
- Provides sustainable management for stormwater to maintain biodiversity values within the natural wetland basin.
- Responds and adapts to the challenges of climate change.
- Protects and enhance the natural values of the Sparrovale Wetlands.
- Increases awareness of management of threatened species habitat/values within Sparrovale.

Key Objectives and Staging

The following is a summary of the key objectives and staged approach to development of the wetland park.



PHASE 1

PROTECTING THE SPARROVALE WETLANDS PARK AND BARWON RIVER

Timeframe 2019 to 2022 - subject to completion of the constructed wetlands and channels

The new wetland and parkland area will need to remain closed to the public in the short term to ensure public safety while required major drainage and site rehabilitation works are completed in accordance with existing endorsed plans and permit requirements. Master Plan implementation projects in this period will focus on complementary environmental rehabilitation projects such as revegetation works along the Barwon River and securing the parkland perimeter and maintenance access. Public access will be limited to guided tours and planting days to minimise potential public risk while new drainage systems and access tracks are established.

The sheer size and unsupervised nature of the site means recurrent land management costs may potentially reduce available funds for new public access and environmental rehabilitation projects. Therefore, to retain and protect existing environmental values while minimising new land management costs to Council sections of the site will continue to be licenced back to the family currently working the property to continue historical grazing and cropping activities. This is the most cost-effective strategy to maintain the land in its current state and minimise changes to the ecology and proliferation of new weeds during establishment of the wetlands and parkland.

Phase 1 Key Objectives

- Engage and involve the *Wadawarrung Traditional Owners Aboriginal Corporation* in building appreciation and understanding of the cultural values of the site.
- Partner with the *Wadawarrung* to manage cultural values.
- Complete drainage infrastructure works as required to enable flexible and sustainable long-term management of the reserve wetlands and existing areas of environmental value.
- Undertake cost effective upgrade and reinstatement of maintenance access tracks and bunds using surplus material from civil works where possible to provide future for future public walking access.
- Ensure ongoing threatened species management monitoring actions are undertaken and prepare and implement management plans for areas of environmental significance.
- Ensure ongoing protection of environmental and cultural heritage values in accordance with endorsed permit requirements during works.
- Establish and implement management plan for native vegetation offset sites.
- Develop and implement native vegetation, hydrological and ecological monitoring programs on site.
- Establish of an 'operations plan' that is informed by the requirements to maintain appropriate water levels, drying cycles and water flows into the larger Ramsar system.
- Prepare a revegetation plan and commence reinstatement of Indigenous overstorey trees along the Barwon River and floodplain consistent with the prevailing EVC.
- Retain licenced grazing as the most cost-effective short term land management use for paddocks subject to low levels of inundation.
- Commence restoration of the grassy woodland on the western boundary consistent with the prevailing EVC.

- Confirm future ownership and operational management responsibility for existing and new wetland and waterway management infrastructure and assets.
- Commence local provenance indigenous seed harvesting and begin preparation for direct seeding works.
- Engage and involve the *Wadawurrung Traditional Owners Aboriginal Corporation* in building appreciation and understanding of the cultural values of the site. Partner with the *Wadawurrung* to manage cultural values.
- Ensure public safety and protection of environmentally sensitive habitat zones by keeping the reserve closed to public access for the duration of the construction and initial rehabilitation works.
- Create community awareness of the site's significance and its potential through signage and guided access for community or school groups and special events. Work with the *Wadawurrung* on cultural significance interpretation opportunities and investigate opportunities for co-naming.
- Refurbish the existing farm shed on Groves Road to provide a base and storage facility for staff and contractor operations. Restore electrical and water connections to enable the shed to be used for environmental education purposes.

Refer to Figure 12 for Phase 1 Actions and Priorities.



PHASE 2 OPENING THE SPARROVALE WETLANDS PARK

Timeframe approximately 2023 through to 2030 during the ongoing development of new residential areas and open space adjoining the wetlands park.

Following completion of major drainage and site rehabilitation works the aim is to provide public walking access through to the Barwon River and to allow informal access around the wetlands using the existing network of levees and farm tracks used in ongoing management of the site. The unsealed maintenance access tracks and existing levee banks will provide for dry weather walking only access. The tracks will provide access for fishing, bird watching and nature appreciation and the City will continue to support guided tours and community and school planting days to build local community ownership and appreciation of the natural values in consultation with the Wadawurrung.

Restricted public vehicle access to the river could be considered for single day events such as fishing competitions in dry weather subject to event management plan applications and approval but flood constraints mean there is no plan for provision of public car parking or road access within the wetlands park.

For those not as adventurous or able to undertake the 1 kilometres walk to the Barwon River and around the wetlands (approximately 1 hour return journey) a new fully accessible elevated wetland viewing point and parking area will be established at the end of Groves Road. This location provides 270-degree views and the best spot to appreciate the interaction between the Barwon River and natural and constructed wetlands during both dry and wet weather.

Other Master Plan implementation projects in this phase will focus on continued floodplain rehabilitation and improving pedestrian and cycle links to new open space areas in the adjoining Armstrong Creek and Horseshoe Bend residential development areas. Licenced grazing and cropping activities will continue in areas with lower environmental values.

Phase 2 Key Objectives

- Establish a new public open space parkland and visitor facilities with signed off-road shared trail and walking links to the adjoining open space network.
- Establish an elevated wetland interpretation and orientation point.
- Provide self-guided walking only access through the wetlands to and along the banks of the Barwon River.
- Support improved canoe/kayak access between Geelong and Barwon Heads.
- Continue revegetation focusing on establishment of indigenous overstorey shade trees for new public access areas and tracks in consultation with the Wadawurrung.
- In consultation with the *Wadawurrung* increase local and broader community awareness and appreciation of the wetlands and Barwon River through interpretative signage.
- Support continued licensed grazing as the most cost-effective land and weed management for paddocks subject to low levels of flooding.
- Ensure ongoing protection and enhancement of cultural and environmental values.
- Maintain appropriate ecological monitoring and operational management for significant revegetation communities weed threats.

- Investigate opportunities to establish sustainable farming initiatives and enhanced community engagement and education programs on licenced farming areas.
- Review, document and appropriately action the key improvements and issues arising from Phase 1 and develop appropriate adaptive management actions.

Refer to Figure 13 for Phase 2 Actions and Priorities.



PHASE 3

REGIONAL GATEWAY TO THE LAKE CONNEWARRE RAMSAR AREA

Timeframe approximately 2030 to 2040 as development of the Armstrong Creek Urban Growth Area nears completion.

The further completion of new development at Armstrong Creek will provide supporting visitor infrastructure such as picnic and toilet facilities, play spaces and additional car parking at the Horseshoe Bend Regional Park (Sparrovale Road) and Armstrong Creek Active Sports Precinct which will be linked via completion of the new Barwon River Trail around the Sparrovale Wetlands park.

As the drainage catchment reaches full development and the number of visitors to the wetlands increases funding for the final phases of floodplain environmental rehabilitation can be more easily secured reducing the need for continuation of licenced grazing and cropping activities to offset land management costs.

A direct boulevard road link from Barwon Heads Road through the Armstrong Creek East Precinct will eventually provide direct access and upgraded service connections through to the elevated wetland viewing point and parking area at the end of Groves Road established in Phase 2. Ultimately this visitor node could then be upgraded to a regional wetland visitor destination with direct access for passing tourism traffic on Barwon Heads Road and the Surf Coast Highway to the best views out over the wetland and the Lake Connewarre system.

To fast track the establishment of the site as a regional visitor destination an iconic wetland lookout structure could be developed to expand on the initial viewing mound developed in Phase 2. An iconic architectural lookout tower at this point, visible from Barwon Heads Road could assist in generating additional visitor traffic to support longer term establishment of a dedicated wetlands visitor centre with café and expanded picnic facilities to support longer stay visitation in the area.

Phase 3 Key Objectives

- Connect the Barwon River Trail back to Geelong and upgrade off road links to other open space areas within the Armstrong Creek and Horseshoe Bend Precincts.
- Upgrade and formalise wetland and Barwon River circuit walking tracks to enable all weather/all ability use.
- Investigate establishment of a regional wetland interpretation centre and iconic wetland lookout structure to promote tourism, eco tourism and wide recognition of the wetlands and Lake Connewarre Ramsar area.
- Investigate options to provide public parking and all ability access closer to the banks of the Barwon River in consultation with public land managers.
- Cease grazing and complete revegetation of remaining paddocks to expand and enhance biodiversity and habitat values.
- Review, document and appropriately action the key improvements and issues from Phase 2 and develop appropriate adaptive management actions.

Refer to Figure 14 for Phase 3 Actions and Priorities.

1. INTRODUCTION

1.1 Project Brief

The Sparrovale *Ngubiti yoorree* Wetlands Master Plan covers the 500 hectares of agricultural property acquired by the City of Greater Geelong in June 2019. The land will be used to provide end of line stormwater storage and treatment for the Armstrong Creek Urban Growth Area to protect and enhance the cultural, biodiversity and habitat values of the Barwon River and Lake Connewarre Ramsar area.

The wetlands will collect stormwater from the majority Armstrong Creek Growth Area and the new stormwater treatment wetlands and associated infrastructure such as drainage channels, levee banks and maintenance access tracks currently in construction will cover approximately 200 hectares of the 500 hectare site. The construction of the drainage infrastructure is funded through Development Contributions collected as part of the adjoining residential development. The rest of the land, whilst part of the Barwon River floodplain, is currently used for cropping and grazing. The Master Plan will seek to guide a staged transition from the existing agricultural use and landscape to a mix of public open space and conservation reserves to complement the existing natural values and the new wetlands.

The Master Plan will seek to provide an overarching vision for the site and outline the objectives and priority actions to be implemented in delivering a nationally significant conservation reserve, sustainable stormwater management system and an accessible and inclusive open space for the Geelong community.

The Master Plan will be consistent with the overall vision for the Barwon River Parklands.

1.2 Master Plan Vision

Lake Connewarre and the lower Barwon River are one of the largest, most picturesque cultural and ecologically important wetland systems in Australia with environmental values of National and International significance.

Public access and visitation to Lake Connewarre and the Barwon River in this area are generally restricted to Barwon Heads and Ocean Grove end only and the large volume of passing tourists visiting the Great Ocean Road and Bellarine Peninsula are largely unaware of the river and wetlands. This lack of awareness even extends to some people who have lived in Geelong for many years.

The limited public awareness and visitation is primarily due to the lack of a main visitor destination and access point. The development of the Sparrovale Wetlands Master Plan provides an historic opportunity for City of Greater Geelong, Parks Victoria, regional stakeholders and the local community, to be involved in creation of an inspiring and unique parkland ecosystem. A park that protects whilst at the same time celebrates recreational exploration, enjoyment and increased understanding and appreciation of the complex layers of saline and freshwater wetland habitats and cultural heritage without compromising these values, legislative and international treaty obligations and existing use of Lake Connewarre State Game Reserve as a seasonal duck hunting venue.



Photo 1: Barwon River - Lake Connemara

1.3 Study Area

The 500 hectare area covers two former farming properties. Sparrovale Farm, located at 109-215 Sparrovale Road, Charlemont and Cold Winds Farm 1-87 Groves Road, Armstrong Creek.

The site is only 8 kilometres from the centre of Geelong, located off Barwon Heads Road forming the eastern boundary of the Armstrong Creek Growth Area. The site includes 4 kilometres of Barwon River frontage along its eastern boundary and forms the buffer between the new residential area and Lake Connemara State Game Reserve, managed by Parks Victoria. These wetlands form part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.

The land has been used for farming purposes for over a hundred years however it is flood prone and an integral part of the Barwon River floodplain. Structures and channels completed by the Geelong Harbour Trust in the early 20th Century continue to detain stormwater on the site and connect the Barwon River directly through to Hospital Swamp. The historic structures and channels were maintained by the landowners, water authority (now Corangamite Catchment Management Authority) and Geelong Field and Game to manage water levels in the river and to provide seasonal environmental flows to the wetlands in support of biodiversity values and water bird habitat associated with the State Game Reserve. The smaller channels linking the Barwon River to the Barge Hole (partially completed channel dug in early 1900s) and then the Barge Hole to Hospital Swamp were constructed in the early 1980's by Geelong Field and Game Club.

Stormwater flows from the new Horseshoe Bend and Armstrong Creek East Development Precincts have now been diverted to the site to protect the brackish wetland ecology in Hospital Swamps.

Any works to be undertaken in the Sparrovale Wetland area are subject to the Greater Geelong Planning Scheme. The area is currently listed as Farming Zone and a separate planning process will be undertaken to finalise land use zoning and overlays applicable to the study area and surrounds.

PROJECT PROCESS



1.4 Land Ownership and Management

1.4.1 City of Greater Geelong (The City)

The 500-hectare Sparrovale Master Plan area (former Sparrovale Farm and Cold Winds Farm) is now owned by City of Greater Geelong. This includes the eastern part of the main Sparrovale levee bank and the outlet regulator. Refer Figure 2.

Adjoining road reserves including Reserve Road, Sparrovale Road, Harriot Road and Groves Road are also owned and managed by the City.

The City have licenced 70 hectares of less flood prone paddock areas in the north of the Master Plan area back to the former Sparrovale Farm owner for grazing/cropping purposes to reduce short term operational land management costs. Periodic grazing in flood prone areas to assist in managing fire risk is also being considered.

The new Sparrovale Road Constructed Wetlands built by the City and new Southern Deviation Channel Diversion from Armstrong Creek which is being built by the adjoining land developers will ultimately all be owned and managed by the City.

1.4.2 Corangamite Catchment Management Authority (CCMA)

The Crown land frontage on the Barwon River west bank downstream of Reserve Road is managed by CCMA. This land includes the northern section of the main Sparrovale levee bank.

CCMA are responsible for the bed and banks of the Barwon River and the Lower Breakwater and fishway. The CCMA are operationally responsible for the existing channel structures which control flows from the Barwon River into Hospital Swamp.

The CCMA are the approval authority for any works within the Q100 (1% ARI floodplain) of the Barwon River. This covers the majority of the 500 hectare Master Plan study area.

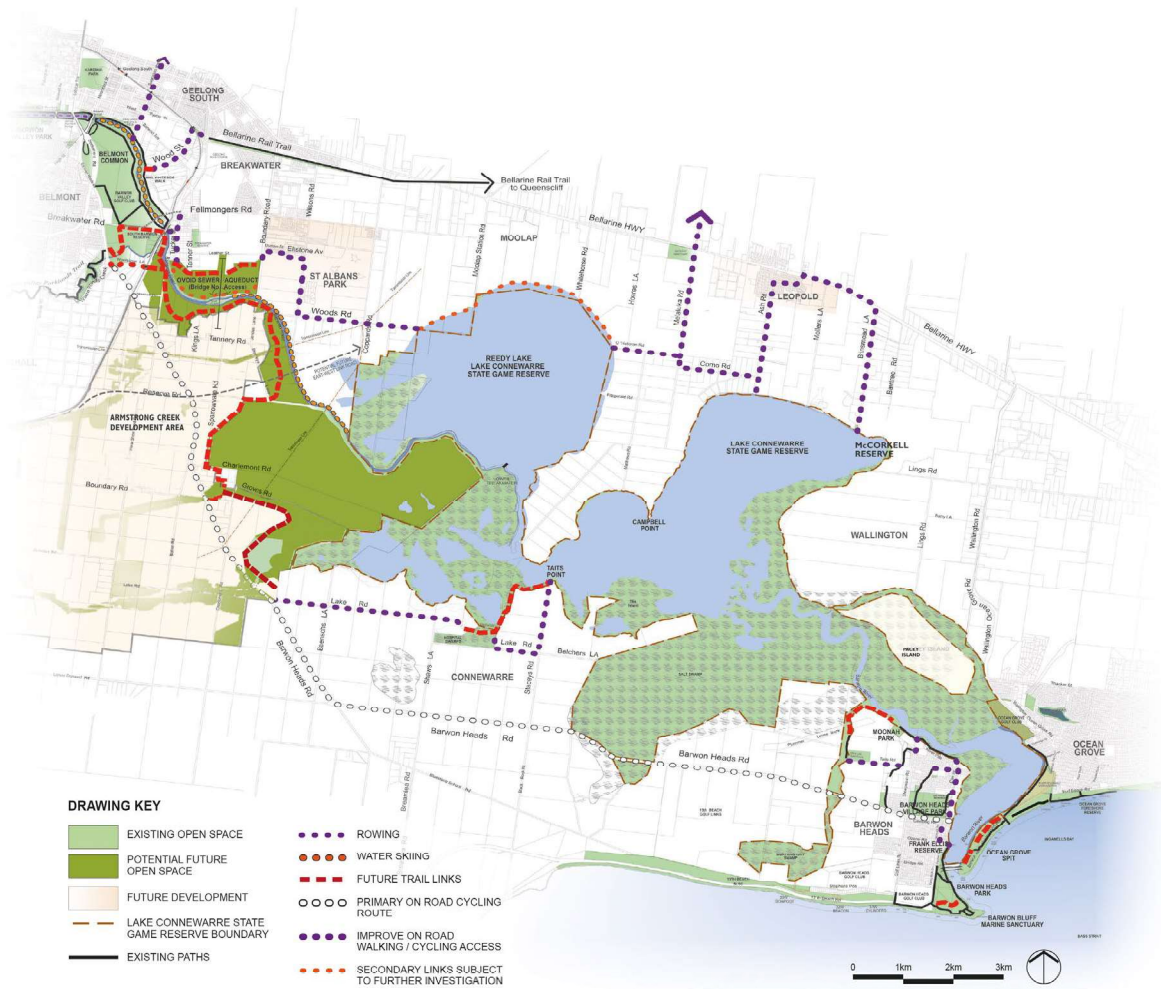


Figure 1: Site Context Plan

1.4.3 Parks Victoria (PV)

The Lake Connewarre State Game Reserve, including Hospital Swamps is Crown land managed by PV. This includes the southern section of the main Sparrovale levee bank and the new outlet channel connecting from the outlet regulator to Lake Connewarre. PV also manages a section of Barwon River crown frontage adjoining Sparrovale.

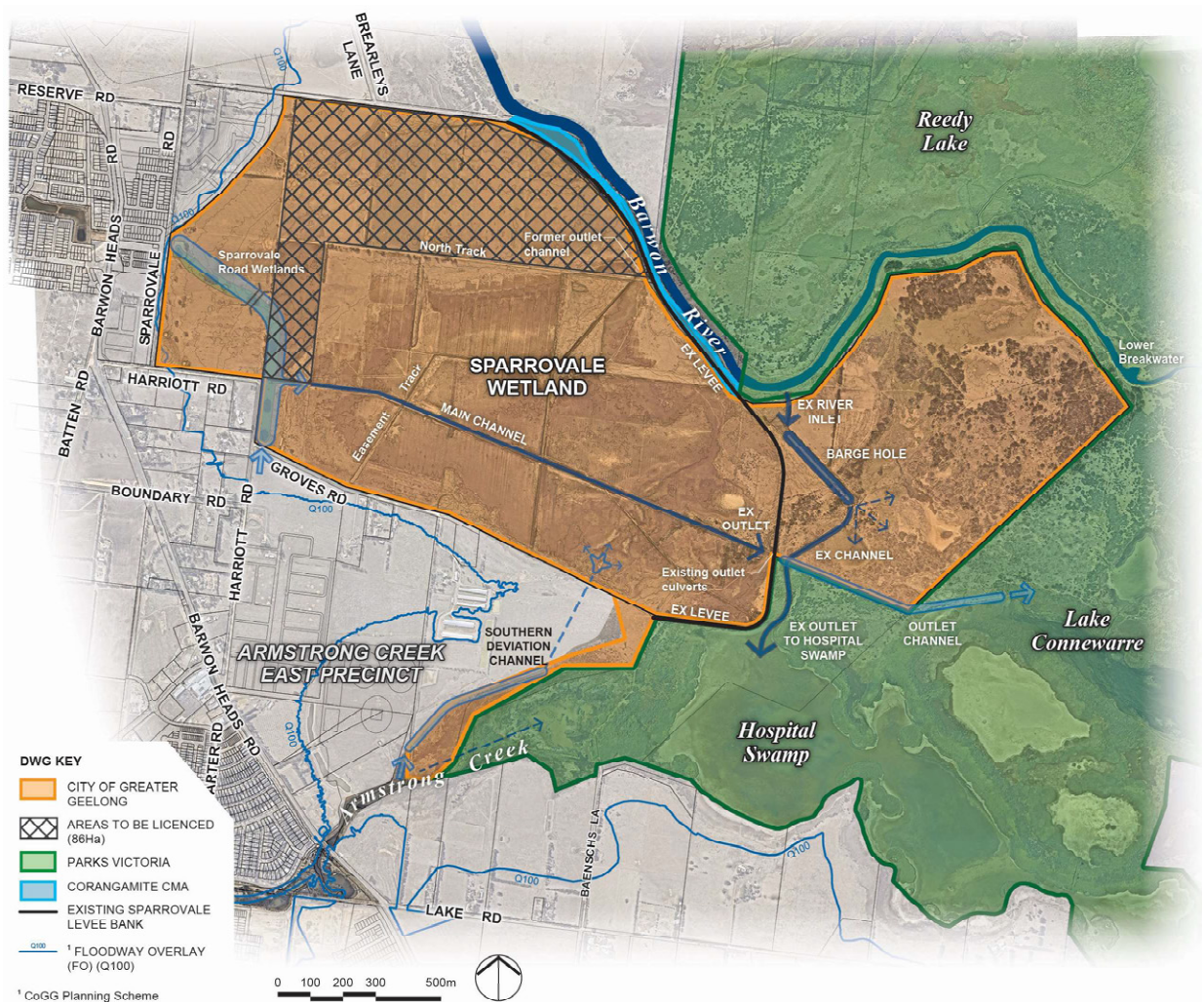


Figure 2: Land Ownership and Management Plan

1.5 Armstrong Creek Urban Growth Area

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 growth area aims to protect the high value landscape and conservation values of the Barwon River and associated floodplain, that form the Sparrovale Master Plan area, from development.

Planning for provision of local and regional open space east of Barwon Heads Road and adjoining the Sparrovale Master Plan area include:

- A network of recreational walking and cycling trails that provide direct links from the site to activity centres, schools and major parks in the growth area.
- Future extension of the Barwon River Trail providing off road walking and cycling access back to Belmont Common and central Geelong.
- Armstrong Creek East Precinct Active Open Space, a regional multi-purpose sports facility.
- Horseshoe Bend Precinct Regional Park including a regional playground and passive open space area.
- A supporting network of local parks and open space links throughout the new residential area.

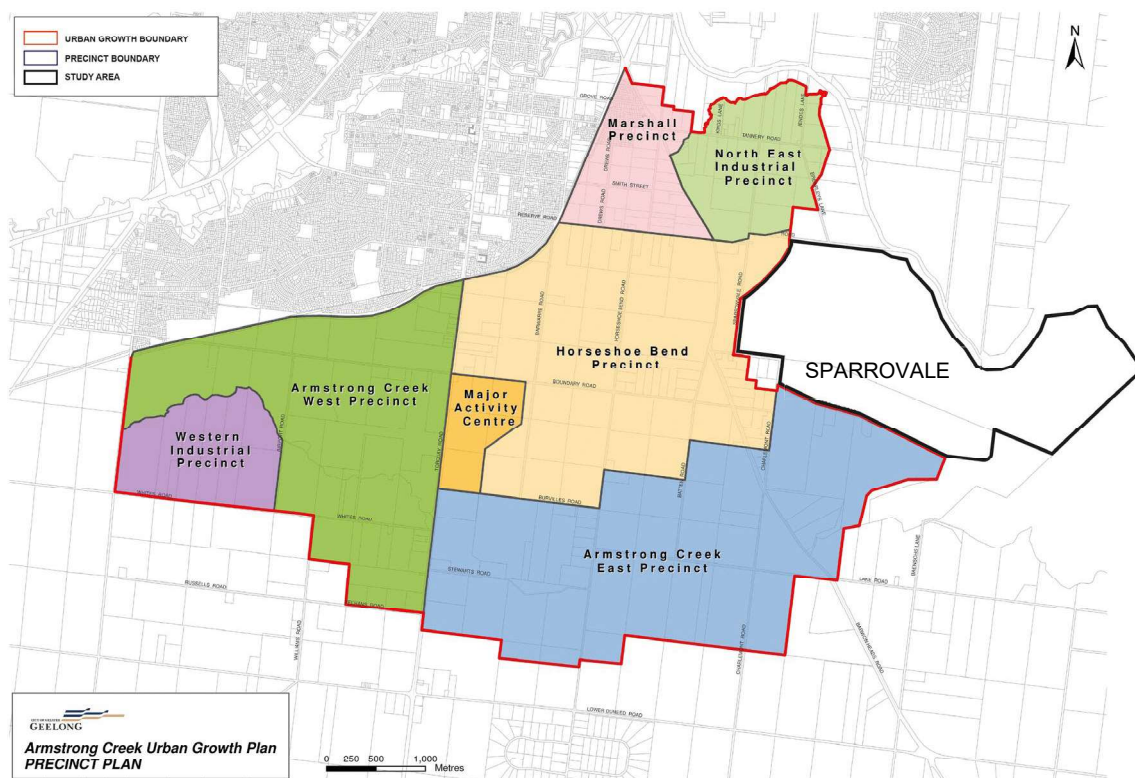


Figure 3: Precinct Plan

1.6 Zoning and Overlays

1.6.1 Zoning

The Sparrovale Wetlands area is currently zoned as Farming Zone (FZ) under the *Greater Geelong Planning Scheme*. The Master Plan vision is to transform the area into a publicly accessible space and a conservation reserve, this change of use will need a Planning Scheme Amendment to rezone the area to Public Conservation and Resource Zone (PCRZ). Areas between the new Sparrovale Parkland (PAO12) and the Urban Growth Area (UGA) boundary which are located below the Q100 flood level are subject to a Land Subject to Inundation Overlay (LSIO).

These privately owned areas are also zoned as Farming Zone (FO) and potential re-zoning of these areas is being considered in a separate planning process. Refer Figure 4.



Figure 4: Zoning and Overlays. (City of Greater Geelong Planning Scheme 2019)

1.6.2 Environmental Significance Overlay (ESO)

Land along the Barwon River and through the Lake Connemare system is covered by an Environmental Significance Overlay (ESO2) that extends 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.
- The ESO boundary does not match with the identified areas of environmental significance and realignment should be considered as part of the zoning amendment.

1.6.3 Vegetation Protection Overlay (VPO)

Native vegetation within the Sparrovale Master Plan area is covered by a Vegetation Protection Overlay (VPO1) in the *Greater Geelong Planning Scheme*. The current VPO includes grassland near the Southern Deviation Channel and the trees along Sparrovale Road. A planning permit is required to remove or destroy or lop any native vegetation. This VPO relates to protection of these identified areas during development works. The VPO will not be required after change of the entire study area zoning to PCRZ and adjustment of the ESO to cover all areas of significant indigenous vegetation.

1.6.4 Floodway Overlay (FO)

Flooding within the Sparrovale Master Plan area is covered by a Floodway Overlay (FO) in the *Greater Geelong Planning Scheme*. The purpose of this overlay is to ensure that any future development maintains or improves river and wetland health, waterway protection and flood plain health. A planning permit is required to construct a building or to construct or carry out works including fencing, roadworks and bicycle pathways and trails.

1.6.5 Public Acquisition Overlay (PAO)

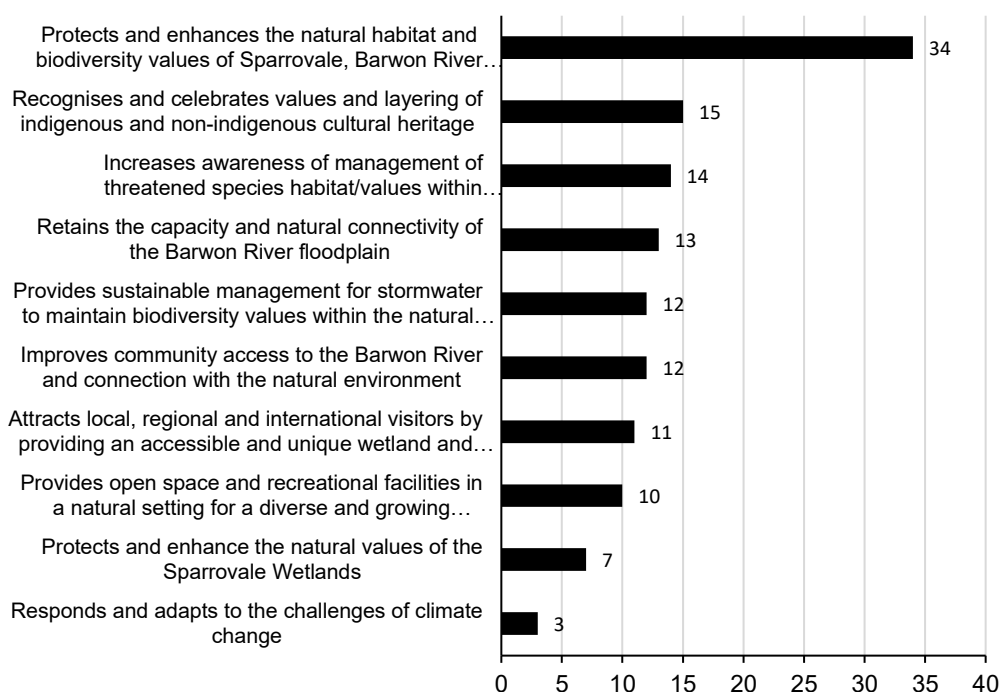
The Greater Geelong Planning Scheme has currently classified the Sparrovale Wetlands area as Public Acquisition Overlay (PAO12). As the area has now been acquired by the City in June 2019, a Planning Scheme Amendment will need to be undertaken at some point in the future to remove this overlay. This will likely be done in conjunction with the reset of the (ESO) environmental protection overlay and with any changes to the farming zone needed to guide change of use in this area.

1.7 Community Consultation

Engagement with key stakeholder groups was undertaken throughout 2019 and 2020 culminating with an eight week community consultation period from May to August 2020. The project has been promoted through a number of different activities, including:

- Seven face to face meetings with the *Wadawurrung* (including two site visits).
- 3,200 Have Your Say postcards were letter dropped throughout the Armstrong Creek postcode.
- A video promoting the project and the opportunity to contribute to the master plan was placed on Facebook and Instagram which generated over 25,000 views, 93 shares and 479 reactions on Facebook and 1,411 views on Instagram.
- An advertisement was placed in the Armstrong Creek Times on the 2 July.
- An article about the Sparrovale Wetlands and master plan featured in the April edition of the City's Community News. Other media releases included Geelong Advertiser 11/05/2020 and Surfcoast Times 28/05/2020.
- A total of 42 surveys were completed (actual number received was 45 with one submission repeated 4 times) along with nine detailed written responses emailed directly to the project officer by the closing date of 13/07/2020. The responses have been summarised below.
- Six presentations have been given to interested community groups and agencies through into 2021 and there was one on site community guided tour.
- Copies of a series of four Sparrovale values plans were provided to developer sales offices for distribution.

Community response to key master plan goals was as follows:



Detailed written submissions were also received from the following groups:

- Barwon Heads Association
- Berissa Eels P/L
- Corangamite CMA
- Geelong Environment Council
- Geelong Field Naturalists Club

- Geelong Field and Game Association
- National Trust Geelong and Region Branch
- Spiire (Jinding Australia)

Community and stakeholder feedback was used to refine and finalise the masterplan. Refer to the full summary at Attachment B.

2. CULTURAL HERITAGE

2.1 Indigenous Heritage

The *Wadawurrung Traditional Owners Aboriginal Corporation* are the Registered Aboriginal Party (RAP) for the area under the Victorian Aboriginal Heritage Act 2006 (Amended 2016). The *Wadawurrung* is the Aboriginal language group who have continually occupied the Geelong area for tens of thousands of years. Their language boundary extended from the Otway Ranges to the Werribee River and incorporates the Bellarine Peninsula and Geelong.

The floodplain and wetland environments along the Barwon River including the Sparrovale Master Plan area would have provided an abundance of food and resources to Wadawurrung 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.

The Aboriginal Cultural Heritage Management Plan (*EHP 2019*) findings have indicated the existing vegetation such as Plains Sedgy Wetland (EVC647) were utilised for food, either directly or by supporting game which could be hunted and developing weapons, domestic items and potentially medicines. In particular, the leaves of the Hollow Sedge (*Carex tereticaulis*) were used in basket making, and Poison Lobelia (*Lobelia pratoides*) may have had medicinal uses (Williams 2013:429).

Other vegetation ecosystems such as Tall Marsh (EVC 821) and Coastal Alkaline Scrub (EVC858) were used within the community to make baskets, and to build fish-traps (Gott and Conran 1991:58). Flax lily leaves were boiled as a tea drink and blue roots and blue fruits of some species are edible, and the needle-like stems of the various species of she-oak (*Allocasuarina spp.*) were chewed to quench thirst (Nash 2004:5,12).

Plains Grassland (EVC 132) in particular Kangaroo Grass seeds ripen in summer can be ground into some flour for the preparation of damper (Nash 2004). Other plants and fungi were also valuable food and medicine. Bowls and dishes were made from the bark and from large tree gnarled growths, for food and water transportation. Canoes were also made from the bark of gum trees. The removal of bark characteristically results in visible modification of the trees that make them identifiable as scarred or culturally modified trees. Other items such as spears, boomerangs and spears were made from the timber of Eucalypts (Nash 2004).

It is an ongoing process for the *Wadawurrung* to trace and record their histories, traditions, culture and language, as traditions, culture and language has been impacted by European colonisation of their Traditional lands. City of Greater Geelong endeavours to continue working closely with *Wadawurrung* as the recognised Traditional Owners of the City municipal area, building relationships through the City Reconciliation Action Plan, in order to preserve important cultural values and heritage and in collaboration with *Wadawurrung* to educate the wider community regarding the rich cultural history of this area.

As part of this process the name *Ngubitj yoorree* which means wetlands has been adopted for the overall Sparrovale Wetlands Reserve. The name *Boot boot-a*, which means swampy place, will also be used to identify the 140 hectare natural river floodplain area directly adjoining Lake Connewarre.

There has been various desktop, standard and complex assessments undertaken as part of the completed Armstrong Creek PSPs and ongoing liaison with Aboriginal Victoria and

Traditional Owners as required under the Victorian Aboriginal Heritage Act 2006 (Amended 2016) and Victoria Aboriginal Heritage Regulations 2018. The Victorian Aboriginal Heritage Register (VAHR) indicates that there are 39 registered archaeological sites within approximately a 5 kilometres radius of the study area. The majority of these sites take the form of stone artefact scatters, mostly low in density and ranging from single isolated pieces to multiple finds.

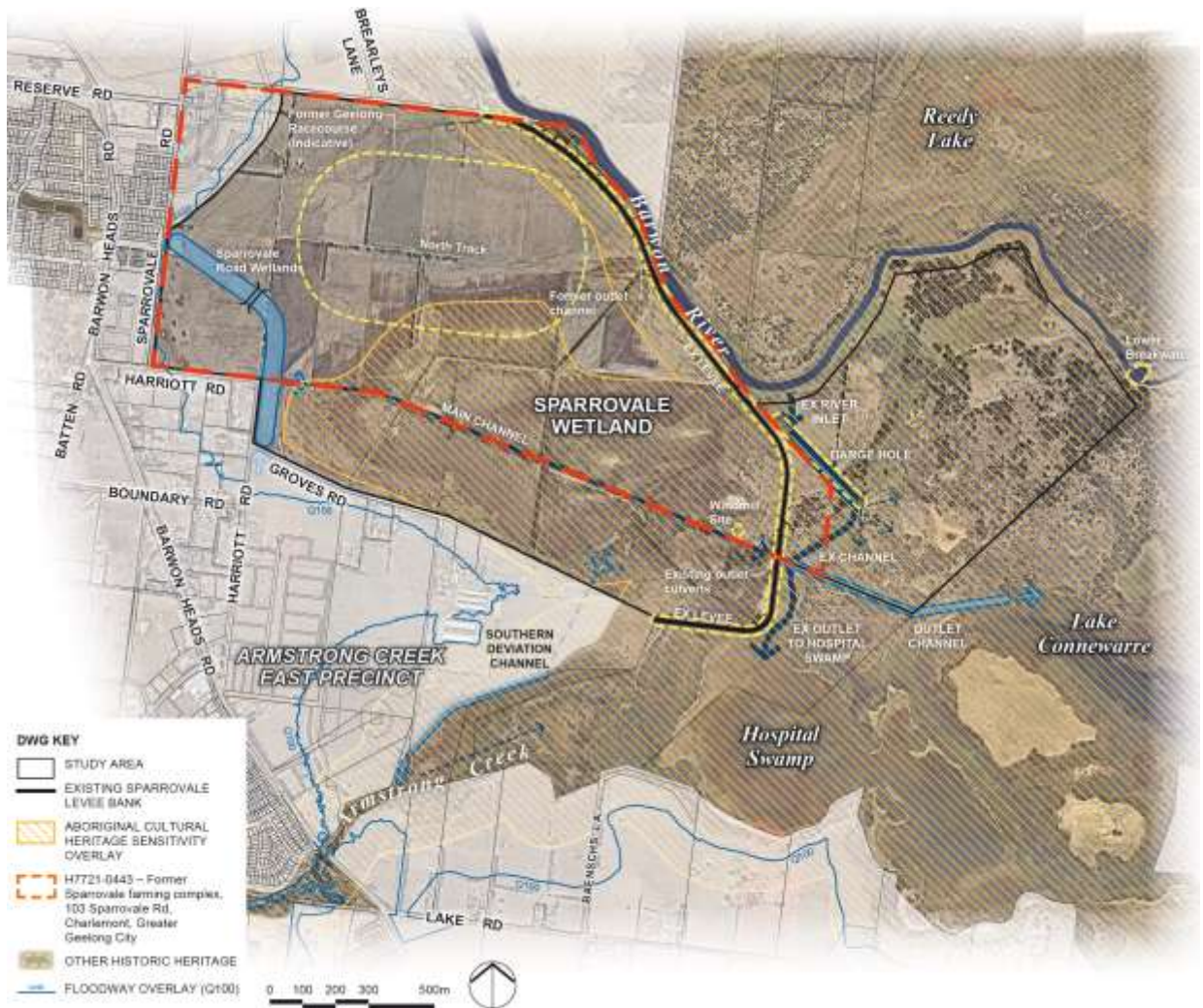


Figure 5: Cultural Heritage

Ongoing consultation with the *Wadawurrung* will be undertaken as part of cultural heritage management plan requirements and as part of the Sparrovale Master Plan development process.

Protection and awareness of Sparrovale's cultural areas in particular flora and fauna will be incorporated in the Sparrovale Master Plan to provide visitors understanding of the cultural significance of the site.

The key framework for consideration will be The Healthy Country Plan: Paleert Tjaara Dja – Let's make country good together 2020-2030.

Key Master Plan opportunities include:

- Investigation and research associated with Aboriginal naming of the parklands and key features.
- Naming of unnamed waterways and other features.
- On site Aboriginal cultural heritage interpretation.

- Ongoing engagement and involvement of the *Wadawurrung* as the Traditional Owners in land and water management.
- Explore potential links of Sparrovale's Cultural Heritage with the *State Government of Victoria: Protecting Victoria's Biodiversity 2037 Plan* in relation to working with Traditional Owners and Aboriginal Victorians to consider Aboriginal values in biodiversity planning and management.

2.2 Other Historical Heritage

2.2.1 Barwon River Breakwaters

When European settlers first arrived in Geelong, the water from Barwon River was seasonally brackish right through to Buckley Falls. The ebb and flow of the tides brought saltwater from the Barwon Estuary all the way into Geelong. To improve access to fresh water at the new settlement a stone breakwater was built across the river at Breakwater Road (now Gun Dog Lane) in 1841 which still exists today. (*Carmichael et al 2002*)

During the dry summer of 1893, local farmers, without government approval, built a second breakwater, 7 kilometres downstream from the 1841 structure and 1.5 kilometres before the river flows into Lake Connewarre at the current lower Breakwater site within the Sparrovale Master Plan area. As a result, stock could now drink fresh water between the two breakwaters.

The lower Breakwater was rebuilt a few metres upstream of the 1893 structure by the Geelong Harbour Trust in 1905 to support their farming operations. The new breakwater construction also included a ramp so that rowing crews could move their boats over it when they were rowing from Geelong to Barwon Heads. (*Carmichael et al 2002*)

The last major refurbishment works were completed by CCMA in 2019 and included incorporation of fish ladders. The lower Breakwater continues to maintain water levels in the Barwon River adjoining Sparrovale and allows diversion of environmental flows into both Reedy Lake and Hospital Swamp as well as water skiing use from Boundary Road to Coppards Road.



Photo 2: Flood gates released in 1971 (*Geelong Advertiser*, February 1971)



Photo 3: *Current lower breakwater in 2018*

2.2.2 Marshalltown (Geelong) Racecourse

In 1849 a start was made on a Racecourse for Geelong, with 727 acres of land beside the Barwon River at Marshalltown set aside within the current Sparrovale Master Plan area. Refer Figure 5. In 1862 The Australian Champion stakes ran at the Marshalltown course. This was the richest race run at Geelong until after World War II. The Geelong Racing Club was founded in March 1865 and in 1872 the first Geelong Cup was held at Marshalltown course, where a new grandstand was opened. In 1878, a railway branch line was provided to the course. The Geelong Cup and other race meetings were held at the Marshalltown course until 1905 when frequent flooding forced the club to relocate to higher ground at the current Geelong Racecourse site on Breakwater Road, East Geelong. (Geelong Racing Club, 2018 <<https://country.racing.com/geelong/about-us/past-cup-winners>>)

2.2.3 Geelong Harbour Trust

In 1905 the government handed over 4,500 hectares of land on both sides of the Barwon River to the newly created Geelong Harbour Trust. Most of this land was salt laden, flood prone and less than a metre above sea-level. The Harbour Trust decided to use this land as a dairy farm. This necessitated the building of a levee bank and the conversion of salt affected land into productive paddocks. Some more land was purchased on the north bank for agistment. Stock were moved across the Barwon River using a punt.

In 1907 the Marshalltown Racecourse site was relocated, and the land endowed to the Geelong Harbour Trust. The farm was named “Sparrovale” after Mr. E.R.Sparrow, the auctioneer and secretary of the Geelong Racing Club. The design and construction of the Sparrovale Farmland reclamation and channel works was carried out under the direction of A.C.MacKenzie, the chief engineer of the Geelong Harbour Trust. William Baird was the farm manager.

The Trust decided that a levee bank was needed to prevent flooding of the farm area. The original levee was only 2.6m high however Sparrovale Farm was inundated by flood waters in 1909 and 1911 with levels reaching 4m. These floods left a layer of silt on the ground which dried and cracked, preventing stock from grazing. It was decided



Figure 6: Marshalltown Racecourse in 1888 (State Library)

to raise the main Sparrovale levee to a height of 4.6m. To provide the material for the levee, the Trust decided to dig a new channel from the adjoining bend in the river through to Lake Connewarre to enable the flood waters to drain more quickly. (*Sparrovale Farm, Marshall*, Ferguson, *Investigator (Magazine of the Geelong Historical Society, Vol 28, No 3, September 1993)*).

The remains of this channel, now known as the Barge Hole are still visible on the site today and it has been used since the 1970's to direct flows from the Barwon River through to Hospital Swamp.

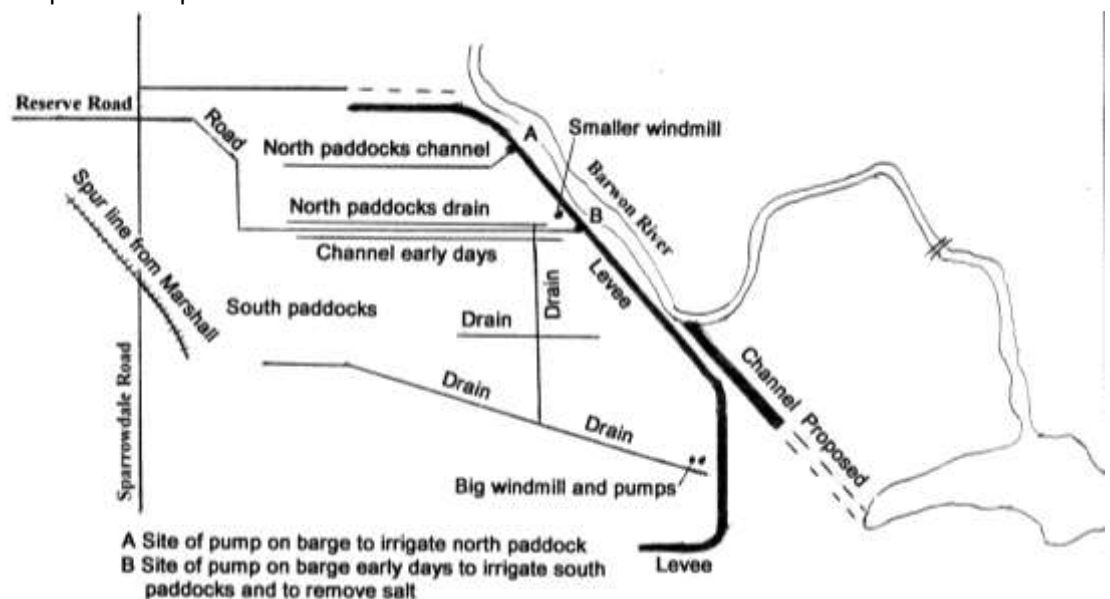


Figure 7: Sketch map of Sparrovale Farm (Carmichael et al 2002)

Excavation of the channel commenced in 1913 using a steam powered grab shovel. A light rail line was laid from the farm buildings, along the outside of the levee bank and along the side of the channel. The excavated material was placed directly into rail trucks which delivered the earth to the work site where workers, with the aid of horse-drawn scoops and other equipment, placed and compacted the earth on the levee bank. These works were continued until 1914 when the Trust could no longer provide funding for the channel and the work was abandoned. The light rails were removed and rolling stock was sold.

To reclaim the land inside the levee bank, agricultural drains were placed 30m apart. When the land was irrigated, the fresh water removed salt as it seeped down through the soil. It was then able to move through the agricultural pipes to open drains which directed the water to the south-east corner of the farm. The effluent was then pumped over the levee bank and found it was way into Lake Connearre. Irrigation water was pumped from the river to irrigate various paddocks while the salt affected effluent was pumped out with a huge windmill, whose sail-wheel was 7m in diameter. The pump was mounted above flood level on a massive concrete foundation and enclosed by a weatherboard building, beside the windmill (Photo 4).

Sparrovale Farm was a 'progressive' farm in the early 20th Century. It had a boiler and refrigeration plant for the milk, steam traction engines to pull ploughs and other implements for driving the machines which cut maize and other crops for fodder. Fodder was stored in 2 large reinforced concrete silos whose construction was advanced technology in 1910 with designs completed by Sir John Monash.

The milking sheds held 50 cows, 25 to a side with a railway line running down the middle (Photo 5). Cow bails were opened and closed by an innovative device designed by A.C.MacKenzie and there were also 12 Hartnett milking machines driven by an oil engine.



Photo 4: The big windmill and the weatherboard building housing the centrifugal pump. ("Sparrovale Farm, Marshall", Ferguson, Investigator - Magazine of the Geelong Historical Society, Vol 28, No 3, September 1993)



Photo 5: Milk cans transported by rail truck. ("Sparrovale Farm, Marshall", Ferguson, Investigator - Magazine of the Geelong Historical Society, Vol 28, No 3, September 1993)

There were other farm buildings for stables, stock shelter, pens, and machinery sheds. Production of each animal was recorded, and prizes were won at agricultural shows. Accommodation was also built for employees and there was another accommodation

building for students of the University of Melbourne who did practical work at "Sparrovale". (*"Sparrovale Farm, Marshall", Ferguson, Investigator - Magazine of the Geelong Historical Society, Vol 28, No 3, September 1993*).

In 1927 William Baird retired and the farm was privately leased until 1934. It was also at the same time Geelong Harbour Trust was restructured and the farm was sold, and it has since been private property. (*Carmichael et al 2002*)

Sparrovale Farm is listed as a Victorian Heritage Inventory site (H7721-0443) however there is no heritage overlay in the Greater Geelong Planning Scheme.

2.2.4 Cold Winds Farm

The main area of the Geelong Harbour Trust land was made up of 2 properties – Sparrovale and the Wyllies. The property known as Cold Winds was part of the Wyllies. In 1934 the land reverted to Crown land and was auctioned by the Lands Department. The properties were to be sold in one lot however there was no-on bid, so the properties were then split with the Wyllies (Cold Winds Farm) sold to W.J. Hanson. Sparrovale was not sold until 1936 to W.H.Bailey.

2.2.5 Landowners

In 1952 "Sparrovale" was purchased by Claude Perkins and farmed until his retirement in the mid-1970s, when the ownership transferred to Graham Perkins and family. It was run as a fat lamb and vealer property until 2019 when the acquisition by the City of Greater Geelong took place.

Farm operations included grazing and dry land cropping. Graham also continued to manage the remaining operational Geelong Harbour Trust infrastructure including the levee, on behalf of the Barwon Water and later the Corangamite CMA.

CCMA manages the regulator infrastructure. Graham has made an adjustment on occasion where the adjustment was time critical (later reviewed by CCMA). Through over 60 years of direct management he has a detailed understanding of the hydrology and interaction of the various channels with the floodplain as experienced in major and minor floods events including that of 1995. This knowledge and extensive historical information made available to the City and CCMA forms an important part of the current understanding of the site.

The Perkins family have agreed to continue to maintain some of the drier areas in the northern end of the site for grazing and cropping activities, continuing their ongoing involvement with the property.



Photo 6: Water Flowing over the levee bank in November 1978 (G. Perkins, 1978)



Photo 7: Photo of Levee bank in 1971 (Geelong Advertiser, February 1971)

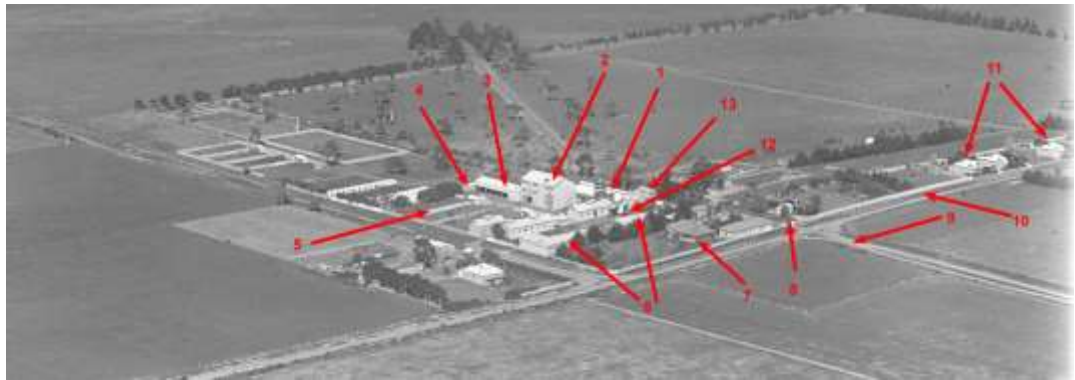


Photo 8: 1936 aerial photo of Sparrovale Farm by Charles Pratt [Airspy]. (State Library of Victoria, H91-160-861)

Key:

- | | |
|--------------------------------|--|
| 1. Milking Shed | 8. Farm gate |
| 2. 3 Storey barn | 9. Reserve Road |
| 3. Stables | 10. Sparrovale Road |
| 4. Small building near piggery | 11. Farmworkers cottages |
| 5. Piggery | 12. Dairy buildings, boiling house and Stabling |
| 6. Employees quarters | 13. Brick dairy building – refrigeration and testing |
| 7. Manager's residence | |

The original Sparrovale Farm buildings are listed in the Greater Geelong Outer Areas Heritage Study 1998 - 2000 (Huddle and Rowe) as of Regional significance.

The key features include:

- The Stables, at 103 Sparrovale Road
- The Manager's House
- The silo ruins, which were built to specifications of civil engineer and later WW1 Army General Sir John Monash.

These sites are located outside the Sparrovale Wetlands Master Plan area and are subject to redevelopment as part of the Horseshoe Bend Precinct.

3. ENVIRONMENT

3.1 Geology and Geomorphology

The site is located within the Pleistocene alluvial terrace deposits and the Holocene coastal lagoon deposits commonly found across the Barwon Estuary. The land is predominately flat and low-lying with occasional rises many of which have been created by historical farming operations. The north-western part of Sparrovale is underlain by significant sand, gravel and silt derived from the underlying alluvial terrace deposits (channelled stream flow) from the Pleistocene Age. The south-eastern part of Sparrovale is underlain by significant silt and clay derived from the underlying coastal lagoon deposits (water process-delta plain) from the Holocene Age. (*Diomides & Associates Pty Ltd, 2018*)

3.2 Flora

The Lake Connewarre State Game Reserve, which includes Reedy Lake, sections of Hospital Swamp 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.

The study area is located on the boundary of the Otway Plain and Victorian Volcanic Plain bioregions, but predominantly falls within the Otway Plain bioregion. Biodiversity assessment completed by Ecology & Heritage Partners identified five Ecological Vegetation Classes (EVCs) across the Master Plan area.

It is vital to maintain the monitoring regime regarding these existing areas of native vegetation to ensure appropriate management practices are undertaken during the development of the Sparrovale Master Plan and to guide ongoing future management of the site in accordance with relevant permit requirements.

The environmental rehabilitation of the Sparrovale site will mainly focus on protecting existing areas of indigenous vegetation assisting the natural regeneration and expansion of these communities with targeted weed control, pulse grazing and hydrologic management to maintain and enhance biodiversity values.

New planting works will be undertaken in partnership with the CCMA and PV and will initially focus on reinstatement of indigenous overstorey canopy cover where this is unlikely to recover without planting. Seed sourced from existing remnant indigenous overstorey trees on the site and nearby will be used to grow new trees and shrubs which will be planted in accordance with EVC benchmarks and to suit the modified hydraulic conditions at Sparrovale.

New planting will target riparian areas along the Barwon River where native vegetation has been removed and areas of modified/disturbed slightly raised land along existing tracks and channels which will favour the sustainable establishment of indigenous trees including Moonah and Bellarine Yellow Gum. Plantings will also be targeted at the western end of the property to enhance the large remnant River Red Gums.

The revegetation program will also be guided by ongoing ecological assessment and review of habitat and biodiversity values as a key component of adaptive management for the site.

3.2.1 Lignum Swamp (EVC 104)

Lignum Swamp is the predominant EVC within the area to the east of the existing levee, and was considered to be in poor condition, due to the low native species diversity and high weed cover. This community is likely to spread following reduction in grazing activities.

Lignum Swamp is dominated by *Duma florulenta* associated with the wetland and offers the ideal habitat for smaller birds or as nesting resources for larger species.

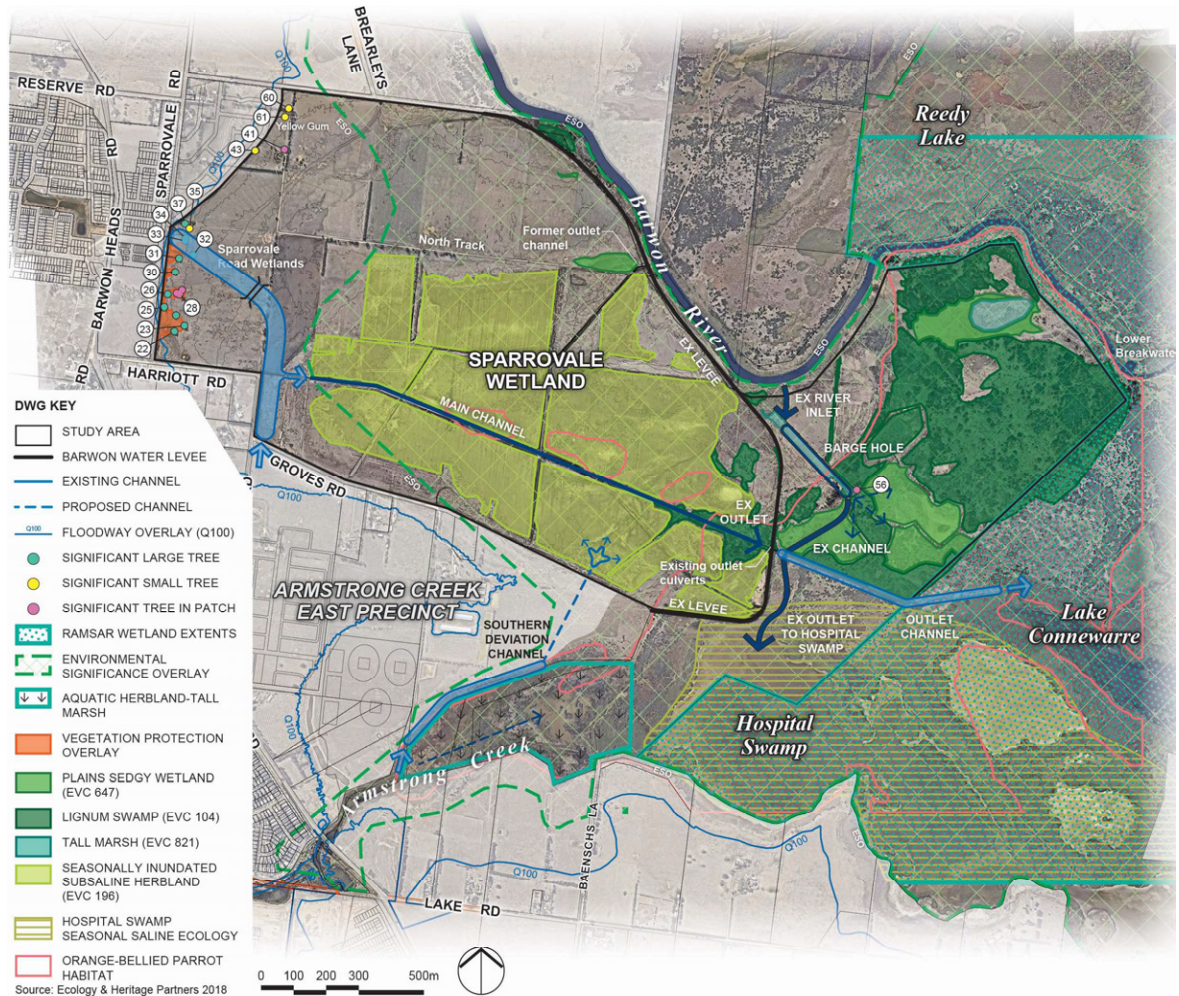


Figure 8: Biodiversity Values.

3.2.2 Tall Marsh (EVC 821)

Tall Marsh was identified in one area to the east of the levee and was considered to be in moderate condition. This community is likely to spread to new channels once established and can inhibit the free passage of water. CCMA complete regular ongoing clearance in existing channels through to Reedy Lake to maintain water flow.



Photo 9: Lignum Swamp (EHP 2018).



Photo 10: Tall Marsh (EHP 2018).

3.2.3 Seasonally Inundated Sub-saline Herbland (EVC 196)

Seasonally Inundated Sub-saline Herbland was present across the majority of Sparrovale Wetland (west of the levee bank) and was considered to be in poor condition as despite having low weed cover, as species diversity is limited to one dominant species Bearded Glasswort.

It is vital to maintain the monitoring regime for protection of these existing areas of native vegetation which provide habitat for the critically threatened species such as the Orange-bellied Parrot and to ensure appropriate management practices are undertaken during the development and ongoing implementation of the Master Plan.

3.2.4 Plains Sedgy Wetland (EVC 647).

Plain Sedgy Wetland was recorded in two areas within the far eastern portion of the study area and was considered to be in poor condition.



Photo 11: Seasonally Inundated Sub-saline Herbland (EHP 2018).



Photo 12: Plains Sedgy Wetland (EHP 2018).

3.2.5 Plains Grassy Woodland (EVC 55)

Plains Grassy Woodland was recorded in three areas within the far western portion of the study area and was considered to be in poor condition. Removal of grazing will also enable natural regeneration and expansion of these areas to complement the new constructed wetlands.

3.2.6 Mature trees

The assessment identified fourteen scattered River Red-gums *Eucalyptus camaldulensis* trees (including 11 Large Trees), and one Yellow Gum, *Eucalyptus leucoxylon*, along Sparrovale Road. The Yellow Gum is considered an intergrade between the two state significant subspecies *bellarinesis* (Bellarine Yellow-Gum) and *connata* (Melbourne Yellow-Gum) but has not been clearly classified as either subspecies. However, as both subspecies are considered State significant, the specimen recorded during the site assessment is likewise considered of State significance. These trees and other remnant indigenous trees located within nearby Dooliebeal will provide an important source of local provenance seed for future revegetation works within the study area.



Photo 13: Planted River Red Gums



Photo 14: Plains Grassy Woodland (EHP 2018).

3.2.7 Hospital Swamp

Hospital Swamp supports a complex system of Wet Saltmarsh, Coastal Tussock Saltmarsh and Brackish Lignum Swamp. The section adjoining Sparrovale at Baenchs Lane also has Aquatic Herbland and Tall Marsh.

Hospital Swamp is part of the Lake Connewarre State Game Reserve managed by Parks Victoria and is not part of the master plan study area however the addition of fresh water and urban runoff from development along Armstrong Creek presents a significant threat to the Hospital Swamp system. A key focus of planning for the Sparrovale site has been to maintain and protect the existing brackish wetland character and associated habitat values of Hospital Swamp particularly in summer by diverting the additional urban stormwater from Armstrong Creek to the Sparrovale site via the new Southern Deviation channel. The works include adjustable inlet and outlet structures which will enable flows to be regulated as needed to support the existing brackish wetland ecology.

3.2.8 Revegetation

There have been various attempts at revegetation on the site. River Red Gums plots established on the Barwon River by Barwon Water/CCMA in partnership with Graham Perkins have become well established however the seed provenance is unknown (likely Barwon Water nursery stock) and should not be used for seed collective unless verified.

Shelter belt row planting using a mix of exotic and native species along the main farm tracks has struggled to become established due to periodic inundation and harsh saline conditions. Where possible these trees should be retained to provide habitat and landscape character until new tree planting of appropriate native vegetation can be established.

The environmental rehabilitation of the Sparrovale site will mainly focus on protecting existing areas of indigenous vegetation assisting the natural regeneration and expansion of these communities with targeted weed control, pulse grazing and hydrologic management to maintain and enhance biodiversity values.

Targeted new planting works will be undertaken in partnership with the CCMA and PV and will initially focus on reinstatement of indigenous overstorey canopy cover where this is unlikely to recover naturally without planting. Seed sourced from known existing remnant indigenous overstorey trees on the site and nearby will be used to grow new trees and shrubs which will be planted in accordance with EVC benchmarks and to suit the modified hydraulic conditions at Sparrovale.

New planting will target riparian areas along the Barwon River where native vegetation has been removed and areas of modified/disturbed slightly raised land along existing tracks and channels which will favour the sustainable establishment of indigenous trees including Moonah and Bellarine Yellow Gum.

Plantings will also be targeted at the western end of the property to enhance the large remnant River Red Gums. This can include direct seeding using local provenance native grasses and wildflowers consistent with the ECV.

The revegetation program will also be guided by ongoing ecological assessment and review of habitat and biodiversity values. Ongoing ecological assessment will be used to monitor the natural regeneration of indigenous vegetation at the site and to prioritise targeted weed control. Ecological monitoring will be a key component of adaptive management for the site as it changes back to an indigenous landscape and targeted intervention to enhance key habitat for key species may be required if regeneration indicates outcomes reduce habitat for significant species.

3.3 Fauna

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 11 wetlands of international ecological significance in Victoria listed under the Convention on Wetlands (Ramsar, Iran 1971). The values associated with the reserves listing as a wetland of international significance include:

- Threatened species that are directly supported by the wetlands.
- Habitat and critical life stage support for a large number of migratory shorebirds, waterfowl and water birds and fish species.
- Important feeding and nursery areas for a number of native fish and frog species.



Figure 9: Port Phillip Bay, (Western Shoreline) and Bellarine Peninsula Ramsar Site. (DELWP 2018.)

The Barwon River downstream of Waurin Ponds Creek is 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 a variety of common to rare water birds including Brolga *Grus rubicunda* (vulnerable under *Flora and Fauna Guarantee Act 1988*), White faced Heron, and Pacific Black Duck amongst others.



Photo 15: *Brolga Grus rubicunda*



Photo 16: *Barwon River upstream of the lower breakwater*

The existing vegetation and the location of the wetlands provide an important habitat refuge for a range of native birds and other wildlife such as the Red-necked Stint, Sharp-tailed Sandpiper and the critically endangered Curlew Sandpiper. No significant fauna species were recorded during the most recent assessment by EHP in 2018; however, there is suitable habitat within the study area for several significant fauna species, including but not limited to the threatened species including Orange-bellied Parrot *Neophema chrysogaster*, Brolga *Grus rubicunda* Yarra Pygmy Perch *Nannoperca obscura*, Australian Mudfish *Neochanna clevaeri* and Growling Grass Frog *Litoria raniformis*.

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, Australasian Swamphen and where un-grazed and featuring dense vegetation potentially rare Crakes and Rails including Lewins Rail, Butt-banded Rail and Latham's Snipe Swamp Rat. There is habitat for frogs including Common Froglet and Spotted Marsh Frog as well as reptiles such as Lowland Copperhead and potentially Glossy Grass Skink. The site provides habitat for Water Rat (Rakali) and Swamp Rat.

Threats include a large fallow deer population who move in and out of the site from Hospital Swamp.



Photo 17: *Orange-bellied parrot in saltmarsh (Port Phillip Bay - Western Shoreline and Bellarine Peninsula Ramsar Site Management Plan, DELWP, 2018).*



Photo 18: *Yarra Pygmy Perch *Nannoperca obscura*. (Friends of Waurn Ponds Creek)*

4. FLOODING AND DRAINAGE

4.1 Flooding

The 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.

Assessment of flooding (overbank flow) on the Barwon River (*Craigie 2012*) 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 Swamp 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 with summer storm events.
- 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 Connnewarre and Hospital Swamp 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. Refer photo 1 and 2.



Photo 19: Sparrovale Levee bank



Photo 20: Outlet



Photo 21: Main channel

The proposed Armstrong Creek development will also generate significant stormwater run-offs and some areas will be subject to flooding after local rainfall events even when there is no flooding on the Barwon River. The design of the new drainage infrastructure is further discussed in section 4.2.

The design and siting for new recreational infrastructure such as paths, bridges and other facilities within the site must consider the impacts of flooding on cultural heritage and public safety, and the durability and sustainability of these facilities when inundated.

Key principles to be considered for development of infrastructure include:

- Barwon River Trail to be located above Q10 (10% ARI) flood level where possible in accordance with Melbourne Water guidelines for the establishment of Shared trails.
- 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 drown-outs or other access control measures will be needed 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.
- Bridges and culverts used for pedestrian and cycle access across drainage outfalls and overland flow paths are to generally achieve Q10 protection and ensure no impact 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 flows 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 formal Cultural Heritage due diligence assessment 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 with the floodplain. Therefore, links to open space areas such as Regional Open Space in the Glenlee Estate and the Future Active Open Space where toilets and BBQ facilities can be provided is critical.

4.2 Drainage

4.2.1 Horseshoe Bend Precinct

The primary purpose for acquiring the land is to provide for capture and treatment of urban stormwater runoff from the adjoining Armstrong Creek development area to mitigate development impacts on the Barwon River and the ecological character of Hospital Swamp. The natural and constructed wetlands occupy approximately 200 hectares of the 500 hectare site and the design and construction of the new stormwater wetlands, channels and management infrastructure has been coordinated by the City of Greater Geelong Capital Works Department.

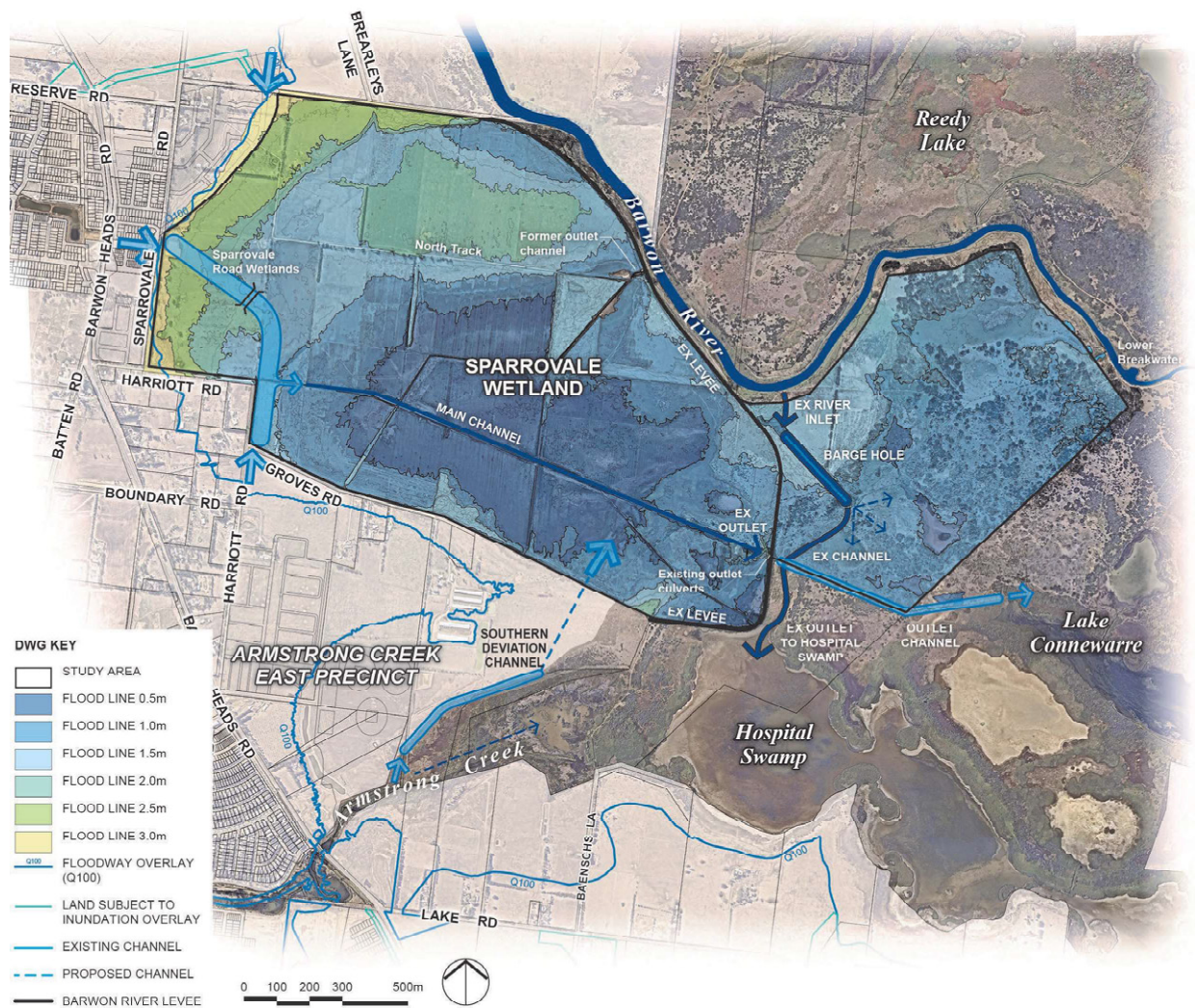


Figure 10: Drainage and Flooding

The new constructed wetlands will form the primary interface of the wetlands park to urban development on the west side. Retention of existing mature trees and longer-term establishment of the Horseshoe Bend Regional Park and Barwon River Trail (along Sparrovale Road) will significantly benefit from views and passive recreation opportunities as revegetation becomes established within the new wetland.



Photo 22: Sparrovale Road Constructed Wetlands Site (Sparrovale Road) prior to construction



Photo 23: Sparrovale Road Constructed Wetlands Site (Harriott Road) prior to construction



Photo 24: Sparrovale Constructed Wetlands at Harriott Road

The Sparrovale Road Wetlands treat stormwater run-off from urban development in the Horseshoe Bend Precinct. There are two main inlets directed into the wetland along low lying natural gully forms and existing farm dam. These inlets are joined together at the north east corner of Harriott Road before discharging into the main wetland via the main channel.

The Sparrovale Road Wetlands have been designed for ultimate development however their connection to the Barwon River floodplain and natural wetland system means they will operate after flooding as soon as the new levee system and regulators are established.

4.2.2 Armstrong Creek (Southern Deviation Channel)

Armstrong Creek is the main stormwater outfall from the Armstrong Creek 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 Swamp. These wetlands and creek rehabilitation works will also enhance habitat values and corridor links to inland bio sites at Dooliebeal, Charlemont and the Cemetery Land.

A key requirement for drainage management is the protection of the existing wetlands at Hospital Swamp. The Southern Deviation Channel diverts urban stormwater fresh water flows from Armstrong Creek over summer to the Sparrovale Wetlands to maintain the existing saline ecology in Hospital Swamp.



Photo 25: Southern Deviation Channel (prior to construction)

The diversion structure at Armstrong Creek is adjustable and diverts flows via an open channel with the last 100m consisting of a large underground concrete pipe to overcome the change in topography and protect adjoining native vegetation.

There is also a large stormwater harvesting system proposed to service the active open space on the north side of the creek, east side of Barwon Heads Road. These works will be delivered by the land developer.



Photo 26: *Southern Deviation Channel (Pipe Section)*



Photo 27: *Southern Deviation Channel (in construction)*

4.2.3 North East Industrial Precinct (Keystone Business Park)

A small catchment from Tannery Road will be ultimately directed towards the Sparrovale Road Wetlands however there is no current detailed design for the outfall to be located in the north west corner of the site off Reserve Road.

4.2.4 Sparrovale Levee Bank

The levee was constructed in 1913 by the Geelong Harbour Trust (refer section 4.2.3) and extends almost 3 kilometres along the Barwon River Frontage to separate the Sparrovale Farm from Hospital Swamp. The levee is constructed of compacted earth and rises to a height of 2.6 metres AHD with outflow controlled by a concrete culvert. The City have recently upgraded the outlet and created a new channel through to Hospital Swamp to improve the function of the system.

The northern section of the levee is contained with the CCMA managed Crown land river frontage. This section is in good condition and can be used by maintenance vehicles and pedestrians. Refer photo 19.



Photo 28: *The City managed levee section.*



Photo 29: *PV managed levee section.*

The City manage the central section including the regulator and new outfall channel. This section is not suitable for maintenance vehicles but provides all weather walking access.

Parks Victoria manage the southern section of the levee. This section is in poor condition and cannot be safely accessed by maintenance vehicles and/or walkers at the moment. There is severe rabbit infestation and lignum regrowth restricts access for inspection and ongoing maintenance.

The levee was breached by David Perkins and Vic Draper as the outlet became blocked by rubbish during the 1995 floods. This lowered the level enough to open Groves Road to allow feed trucks carrying pallets to the Broiler sheds. This lowered the water level to allow pasture to dry out, with the remaining water being pumped out. David Perkins repaired the

levee with his bulldozer. The current structural integrity of the levee in this section is unknown as there is no ANCOLD assessment for the structure. Lowering and strengthening the levee such that it can be used for walking and maintenance vehicle access through to the Barwon River in winter and other periods of inundation is a key opportunity. These works need to also consider use of passive drown outs (sections artificially set below the main levee at the start and end) to restrict access into the site during a major flood event when the entire structure may be overtopped. It is also recommended that management of the levee is delegated to a single authority (likely City of Greater Geelong) to ensure continuity of management and regular inspections as needed for this type of structure.

5. RECREATION

5.1 Existing Adjoining Open Space

5.1.1 Lake Connewarre State Game Reserve

The reserve is managed by Parks Victoria (PV) and forms the eastern boundary of the Barwon River Parklands study area including approximately 2 kilometres of river frontage. The adjoining Sparrovale is Crown land also managed by PV. 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 11 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.
- Aboriginal Cultural heritage management.
- 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 and vice versa.
- 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:

5.1.2 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 Swamp. Access is only via car along Staceys Road from Barwon Heads Road.

5.1.3 Baenchs Lane

There is an informal grass car park which provides access to Hospital Swamp for bird watchers and hunters during duck season. There are no other facilities and the area is difficult to access in wet conditions. Corangamite Catchment Management Authority (CCMA) are currently undertaking resurfacing of the access track through to the levee as this track still goes under water.



Photo 30: Taits Point



Photo 31: Baenchs Lane

5.2 Future Open Space

5.2.1 Horseshoe Bend Precinct

- A Horseshoe Bend Precinct Regional Park (Glenlee Estate)**
The Horseshoe Bend Precinct Regional Park is to be developed as outlined in the *Armstrong Creek Horseshoe Bend Precinct Structure Plan 2014* (ACHBPSP). The Regional Passive Park (1.94Ha) is located south of 274-280 Reserve Road, Charlemont and west of Sparrovale Road Wetlands (Glenlee Estate). It includes existing trees and views over Sparrovale Road to the new constructed wetlands. The reserve will feature a regional scale play space, public toilets and picnic facilities and will be connected via the future Barwon River Trail which will approximately run along the current Sparrovale Road. The planning and design of the Regional passive park will be in accordance with the Horseshoe Bend Precinct Structure Plan guidelines.
- B Horseshoe Bend Precinct Local Park (103 Sparrovale Road, Charlemont)**
The Horseshoe Bend Precinct Local Park is being proposed at the higher ground of Sparrovale at 103 Sparrovale Road, Charlemont. The local park (0.60Ha) is located on the eastern side of the estate near Brearleys Lane to protect the 5 remnant trees located within the proposed area.

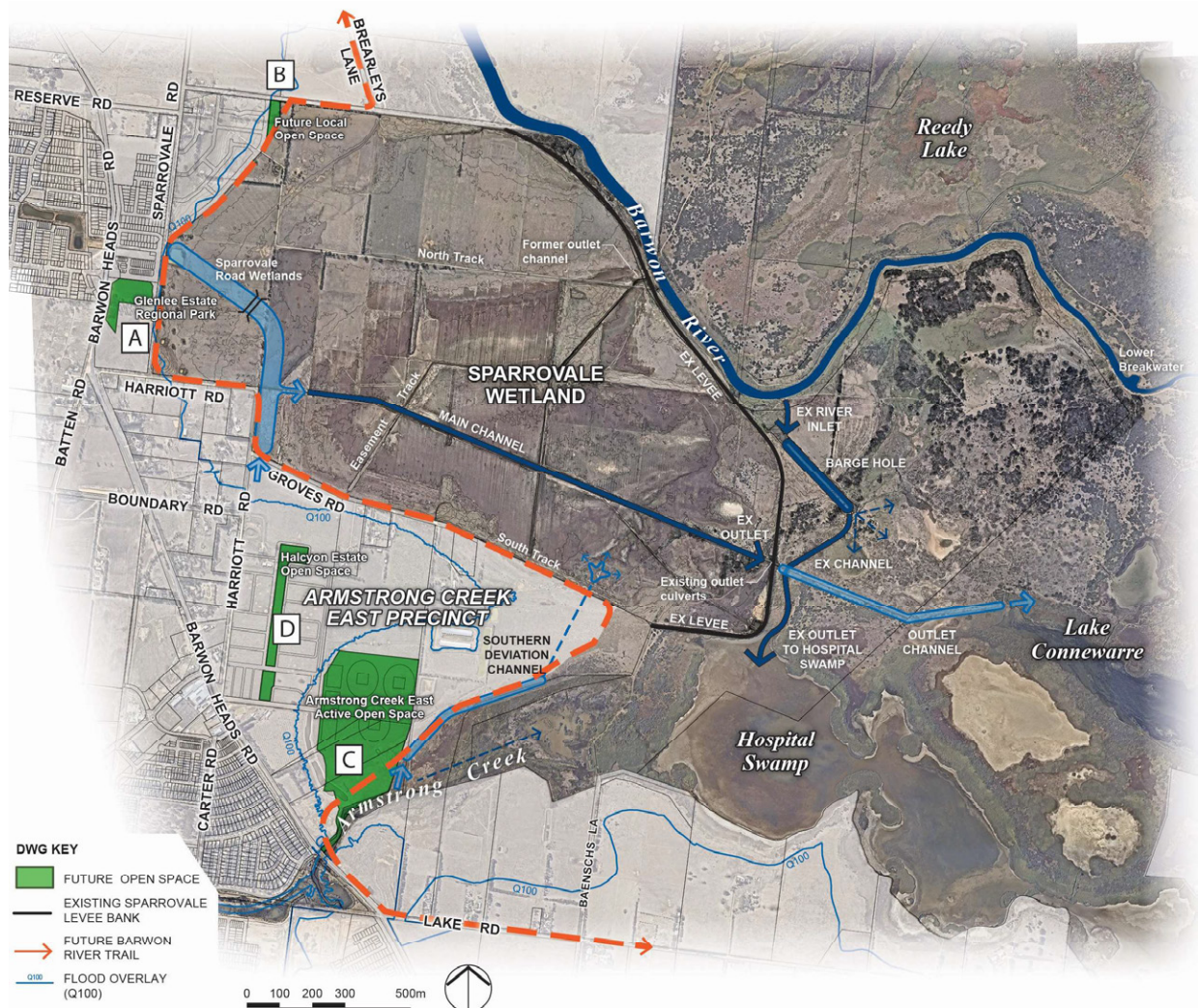


Figure 11: Future Open Space Plan

5.2.2 Armstrong East Precinct



Armstrong Creek East Regional Active Open Space

The Armstrong Creek East Regional Active Open Space will be developed in accordance with the *Armstrong Creek East Precinct Structure Plan 2010* (ACPSP). The Regional Active Open Space (21.40Ha) will include playing fields, courts, pavilions and public toilets in support of active sporting use. The Active Open Space will be accessed directly from Barwon Head Road and via the Armstrong Creek Shared Path and a new boulevard.



Halcyon Estate Linear near Open Space

A 30m wide linear open space reserve is being proposed in the central area of Halcyon Estate, south-west of Sparrovale Wetlands. This reserve is an important part of the shared path connection between Sparrovale Warralily Neighbourhood Activity Centre (NAC) through the East Precinct to the Active Open Space on the Surf Coast Highway. The reserve runs from north to south with a 30m wide boulevard with on street parking, pedestrian paths, bicycle lane and on street parking provisions. The boulevard will also provide direct access through to The Active Open Space and eventually the Sparrovale Wetlands from Barwon Heads Road.

5.3 Recreational Trails

5.3.1 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 (20 kilometres+) with safe off-road access back into central Geelong. In the longer term with completion of the Ring road crossing on the river, the community will have access to 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:

- Provide access above the Q10 flood level in accordance with Melbourne Water Shared Path Guidelines.
- 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*.
- Be developed in accordance with current AustRoad Standards and the City Guidelines.

To achieve Q10 flood protection the Barwon River Trail will need to be located around the perimeter of the new wetland park. Refer Figure 11

The trail will utilise mostly the former Sparrovale Road and may meander into the western body of Sparrovale, ensuring protection of existing trees. It will then use the road reserves at Harriott Road and Groves Road. As these existing roads are below the Q100 flood level they will be replaced with new roads as residential development progresses. Eventually the Barwon River Trail will connect from the east of Groves Road to future path links to be provided along Southern Deviation Channel and Armstrong Creek, while maintaining a buffer to habitat values in Hospital Swamp.



Photo 32: Sparrovale Road (Future Barwon River Trail)



Photo 33: Groves Road (Future Barwon River Trail)

5.3.2 Wetland 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. Fencing and gates to restrict illegal vehicle and motorbike access will be a key requirement to protect habitat values in the wetlands and along the Barwon River.



Photo 34: Existing north track



Photo 35: Former electrical easement track



Photo 36: New Main Channel Converts

5.3.3 Proposed Walking loops Sparrovale Road Wetland Walking Loop

This will be an all ability circuit of just over 2 kilometres (approximately 30 minutes) and will require a bridge/boardwalk crossing on the new Sparrovale Road constructed wetlands. This circuit will likely be the most popular circuit in the initial phase of wetland park development as it is closest to the residential area and Barwon River Trail. The circuit walk will also have direct connection to the future Horseshoe Bend Regional Park which provides an important additional passive recreation options that will have a playspace, picnic facilities and public toilets. The walking path will be subject to inundation only in a

major flood event and views will be focused more on the constructed wetlands rather than the larger natural wetlands further east.

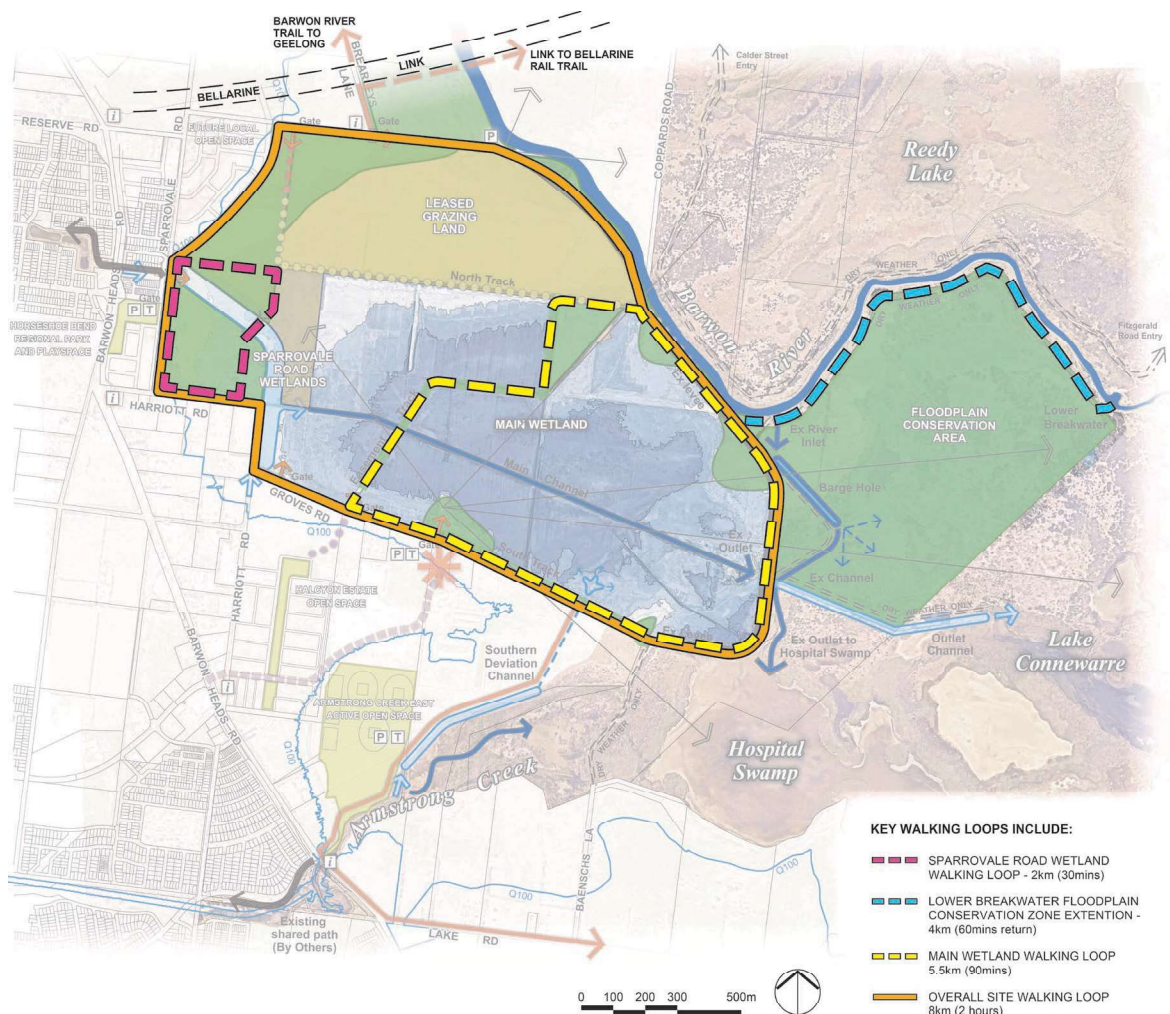


Figure 11a: Potential walking loops

Main Wetland Walking Loop

This circuit of 5-6 kilometres (approximately 90 minutes) will start/end at the proposed viewing point and car parking area at the end of Groves Road. Targeting more intrepid walkers and bird watchers this circuit will use the existing network of levee banks and maintenance access tracks to complete a full circuit of the main wetland. Use of the existing levee system will require establishment of a new culvert/bridge crossing across the main channel on the former electrical service easement track (currently in planning) and use of the main Sparrovale levee, requiring improvements to access in the PV managed sections. The walking path will be subject to inundation only in a major flood event and will provide access into the wetlands and Barwon River when they are almost full of water and at their most spectacular. Passive drop outs (artificially lowered sections of path which are covered by water first) will be used at the path entry points to restrict access to the site before flood waters reach dangerous levels. Use of chicanes and stiles will be needed to restrict illegal motorbike access at the entries.

Lower Breakwater Floodplain Conservation Area Walking Loop

This extension to the main wetland walking loop of approximately 4 kilometres (60 minutes return) will form an informal track along the Barwon River down to the Lower Breakwater. It will be best accessed from the end of Groves Road and will only be useable in dry weather. The lower breakwater is likely to become a popular fishing spot and intrepid fishers and bird watchers are likely to be the main users of this informal 'rubber boots required' walking track.

Overall Site Walking Loop

A circuit walk including the Sparrovale Road Wetland Walking Loop and the Main Wetland Walking Loop will take around 2 hours. This route would enable users to visit both the Horseshoe Bend Regional Park and the proposed viewing point and future visitor centre at the end of Groves Road providing the complete wetland experience.

5.4 Other Recreation

5.4.1 Passive Recreation

New regional active open space and sporting ovals will be established within the Armstrong Creek East Precinct and a new regional park and playspace will provide for passive recreation. Other local open space will be provided for within the Urban Growth Area as indicated in each Precinct Structure Plan. There is currently no land based active recreation or sporting use planned within the study area.

Bush Walking/Bird Watching

Bush walking/bird watching and nature appreciation 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. Refer section 3. An opportunity to escape from the urban environment will also be a key attraction for many visitors.

An initial environmental educational centre will be established with re-development of the existing farm sheds on the corner of Groves Road and Harriott Road. Longer term a more expansive purpose built facility will be considered as part of potential future visitor centre development near the eastern end of Groves Road.

5.4.2 Water Sports

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

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 and duck hunting season 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 Connemara is also difficult to negotiate with shallow tidal conditions suited to only the most experienced of users.

5.4.3 Hunting

The Lake Connemara State Game Reserve is managed by Parks Victoria (PV) and forms the eastern boundary of the new Sparrovale Wetlands Park. The Lake Connemara State Game Reserve hosts recreational hunting activities primarily focussed on the duck season which extends from March to June depending on seasonal conditions. Quail hunting is also held at the between April to June.

Approximately 2 kilometres of the southern bank Barwon River frontage adjoining Sparrovale is also Crown Land managed by Parks Victoria. There is currently no public access to Sparrovale from the east and access to the southern section of the main levee

bank, directly adjoining the State Game reserve is completed from the south via Baensch Lane.

Hunting is not proposed on Council owned and managed land at Sparrovale Wetlands. The Master Plan also does not propose any changes to the Lake Connewarre State Game Reserve which will continue to be used for hunting under existing agreements unless altered by the State Government.

Public access into the new Sparrovale Wetlands Park will be via controlled entry points on Sparrovale Road, Groves Road and at Brearleys Lane.

The management of the interface between the new Council managed Sparrovale Wetlands Park and the Lake Connewarre State Game Reserve during duck season will be consistent with other similar the City managed public open space areas around the lake as follows:

- There will be a signed and clearly identified boundary established between the new Council managed wetlands park and the State Game Reserve.
- Signage will clearly indicate that there is to be no shooting on or over Council land and this will be enforced as with other regulations during duck and quail season.
- There will be no access through the new Sparrovale wetlands park to the State Game Reserve for the purposes of hunting or recovery of injured birds.
- Evaluation of these public safety measures will be reviewed over duck and quail season prior to the new wetland park being opened to the public.
- The City will also seek to review and refine management of the new wetland park interface responsibilities with the CCMA and PV via a separate management agreement.
- The City will engage contractors as needed to control feral animals including deer.
- The City does not intend to sell or lease any part of Sparrovale for hunting purposes.

5.4.4 Fishing

There is currently no public access to the west bank of the Barwon River south of Horseshoe Bend Road. The establishment of the Sparrovale Wetlands Park will enable a significant improvement to fishing access with over 4 kilometres of new river frontage and provision of improved access to the lower breakwater area.

There is currently no public road access to the river and fishers will need to walk in from adjoining roads. Flood restrictions and the cost of providing and maintaining public road access and parking will preclude establishment of this higher-level access until road access improvements can be completed near Brearleys Road. The most direct access will be via the levee however there is no continuous pedestrian access in the Parks Victoria managed section.

5.4.5 Recreational Facilities

The entire study area is located within the Barwon River floodplain and is therefore subject to flooding. There will only be limited recreational infrastructure provided within the wetlands with visitor infrastructure such as public toilet facilities, picnic areas, play spaces, drinking fountains, rubbish/recycling bins and car parking located to adjoining new open space areas outside the Sparrovale Wetlands conservation zone.

The placement of seats and potentially bird hides and other low key recreational infrastructure along tracks within the wetlands and along the Barwon River will be further considered once the regeneration of indigenous vegetation allows a more detailed assessment of habitat impacts and views. Future siting, design and management of this low key infrastructure will at all times consider the ecological impacts and will be constructed of durable natural materials consistent with the natural character of the wetland and floodplain environment.

6. COMMERCIAL

6.1 Tourism

Pre COVID-19 the Greater Geelong and Bellarine region attracted around 5 million visitors annually including around 2.8 million day trippers most of whom pass within 3 kilometres of Sparrovale via the Surf Coast Highway or within 500 metres on Barwon Heads Road.

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 Connnewarre 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.

The Greater Geelong and Bellarine has its primary tourism strengths in nature-based attractions and that the water-based assets of the region act as a key motivator for visitation and this is expected to be further strengthened post COVID. The development of the Sparrovale Wetlands has the potential to provide a gateway to the Lake Connnewarre Ramsar Area with provision of viewing, walking and interpretive information/signage (in consultation with *Wadawurrung*) about one of the most significant wetlands in Victoria and Australia adding significant value to the existing local tourism offer. Establishment of a regional wetland interpretation centre and iconic wetland lookout structure will also promote tourism, eco-tourism and wider recognition of the wetlands and Lake Connnewarre Ramsar area.

The State Government of Victoria: Protecting Victoria's Biodiversity 2037 Plan has been developed to stop the decline of Victoria's native plants and animals and improve on the natural environment, so it is healthy, valued and actively cared for.

The plan indicates specific aspects such as helping Victorians take advantage of the many health and development benefits of connecting to nature and explore the wonders of Victoria's biodiversity.

The development of the Sparrovale Wetlands has the potential to provide nature-based tourism and recreational activities such as bush walking, bird watching and fishing as this provides an important vehicle for people to connect with nature. On-going management of tourism is vital to ensure visitors have the opportunity to enjoy the site whilst protecting the biodiversity of Sparrovale Wetlands.

6.2 Existing Agreements

6.2.1 Mixed Farming Licence

The northern section of the site is less subject to flooding and will remain as viable farming land while development in the Stormwater catchment area continues. It will continue as a mixed farming license agreement with the former land owner who has agreed to license approximately 70 hectares of the site on an annual basis with the option for periodic grazing when agreed for areas of the site if needed to control pasture grass. The area south of the main track is not included in the licensed areas. Refer Figure 2.

Grazing/cropping of these areas will remain the most cost-effective land management approach to maintain the land of lower environmental value in its current condition until full scale floodplain revegetation works can commence. In order to continue grazing the license will require access to potable water (for stock) and stockyards and access roads.

Longer term as more urban stormwater is diverted to the wetlands the extent and duration of inundation will increase and viability and environmental impact of continued agricultural use.

6.2.2 Other activities

There are three types of eel fisheries permitted in Victoria: wild harvest, stock enhanced and intensive aquaculture. The Victorian eel fishery is managed under the *Victorian Eel Fishery Management Plan 2017* guided by *Fisheries Act 1995* to ensure that the fishery remains viable, profitable, and sustainable for all users of the resource.

There are two commercial licenses for wild harvest eel fishing on the Barwon River. The licenses cover areas from Queen's Park to Lake Connemara and part of the river downstream of the lake. Any requests including license amendments will need to be referred to Victorian Fisheries Authority for approvals.

Aboriginal Victorians currently have a number of existing rights to access natural resources recognised under law. Members of Traditional Owner groups with a Native Title determination under the Commonwealth's Native Title Act 1993 have non-exclusive rights to hunt, fish and gather natural resources for personal, communal, and cultural purposes, without the need to obtain a license. Eels were, and continue to be, an important resource for some Aboriginal communities (*Traditional Owner Settlement Act 2010*).

Commercial activities are unlikely to be supported and will not be considered where they conflict with the primary vision and objectives of the park.

6.3 Events

The restriction of public access to the site as required for safe completion of planned new wetlands and flood management works will last for at least 3 years. However, in order to increase public awareness, appreciation and use of the site during this period a series of regular events could be considered. These may include:

- **Site tours and planting days**
These could involve local community groups as well as schools.
- **Fishing competitions**
Supervised day access into the site via the north track and use of temporary grass areas for public parking in coordination to enable fishing competitors on a difficult to access and rarely fished section of the Barwon River.
- **Bird watching tours**
Guided walking tours with members Geelong Field Naturalists Club during seasonal bird-watching periods.
- **Partnering with education sectors such as Schools/Universities**
Investigate partnering with schools and universities to set up conservation programs within the wetland for the benefit of future management of the site.

Other events are unlikely to be supported and will not be considered where they conflict with the primary vision and objectives of the park.

7. ADAPTIVE MANAGEMENT

7.1 Management Planning

The Sparrovale Wetland Monitoring and Management Plan, June 2020 has been prepared to guide the monitoring of environmental conditions in the Sparrovale wetlands so that the City of Greater Geelong, Department of Environment, Land, Water and Planning (DELWP), Parks Victoria and the community are better able to determine the success of environmental management actions to protect and enhance the ecological values of the wetlands.

The plan also serves a statutory function as a tool for auditing management actions and testing the assumptions of the hydraulic modelling undertaken to design the wetland system. The monitoring program is integral to planning approval granted on the condition of “no loss of native vegetation” or significant impacts on the receiving Ramsar site.

The plan enables management actions to be adapted (adaptive management) in response to on-ground learnings and observations. Consequently, the outcomes of the management actions may result in requirements to offset any significant loss in the extent of native vegetation or reinstate any environmental values impacted in the receiving environment. This monitoring process enables management processes to be adapted in response to on-ground learnings and observations.

7.2 Ecological Monitoring

The main key ecological attributes to monitor the function of Sparrovale as outlined in the plan are:

- Water regime and quality (set parameters)
- Native vegetation (quality and extent of ecological vegetation classes (EVC), changes in composition, quality and extent of native vegetation in addition to EVC benchmarks)
- Birds (number and diversity)
- Macroinvertebrates (diversity)
- Frogs (species and distribution)
- Fish (species)
- Threats to (high priority species and distribution)

Adaptive management requires significant on-going monitoring, the data collected will be used to delve into why indices do or do not change over time. Project evaluation provides the mechanism to look at the strength of causality between what has been implemented (intervention) and what is happening on the ground (response). Key evaluation questions focus the monitoring program and provide a quantitative and qualitative interpretation.

The key questions for the Sparrovale Wetland system are:

- How has the vegetation within the Sparrovale wetland basin changed (health, extent)?
- To what extent have vegetation assemblages in Baenschs wetland and Hospital Swamps changed? If so, why?
- To what extent were the changes directly or indirectly produced by the planned interventions?
- To what extent have the on-ground actions addressed the threatening processes?
- How have the faunal species responded to the management interventions?

- How effective was the function of the Sparrovale stormwater wetland system in achieving vegetation protection (improved condition, diversity and reduced threat of high threat weeds)?
- To what extent has the Sparrovale management plan been implemented?
- To what extent have the planned activities achieved their outcomes (water regime, improved vegetation condition, reduced high threat weeds and pests)? Why or why not?
- How appropriate are the prescribed management actions been in achieving biophysical outcomes?
- What were the unexpected outcomes from the project?

The overarching objectives for the Sparrovale Wetland Monitoring Plan 2020-2030 are:

- The floristic communities of the Ramsar wetlands of Hospital Swamps and Lake Connemara are not impacted by poor water quality, including through inappropriate freshwater intrusion, from the Armstrong Creek and Horseshoe Bend Development precincts.
- Sparrovale wetlands will continue to provide suitable habitat values for significant faunal species (waterbirds, frogs and fish) based on 2019/2020 baselines through the abatement of threatening processes.
- Maintain, and where possible, improve the extent, floristic diversity, structural complexity and ecological function of native vegetation (including mapped ecological communities as identified in Biodiversity Assessment: 1-87 Groves Road, Armstrong Creek, and 109-215 Sparrovale Road, Charlemont, Victoria (Sparrovale Wetland).
- Maintain the distribution and abundance of high priority invasive weed species, restrict new introductions, and eradicate outlying occurrences of Weeds Of National Significance (WONS) so that the impacts on native species are reduced.

The monitoring program is to facilitate assessment of:

- The concentrations and loads of pollutants from the upstream catchments in the Horseshoe Bend and Armstrong Creek Precincts;
- The effectiveness of stormwater treatment measures in the Horseshoe Bend and Armstrong Creek Precincts;
- The water quality status of the receiving wetlands;
- Wetland ecology and sustainability (flora & fauna);
- Potential water quality risks and management responses.

Reporting on adaptive management will be ongoing and will inform implementation and potential changes to master plan actions and priorities where needed. Refer to Sparrovale – Wetland Monitoring and Management Plan June 2020.

8. IMPLEMENTATION

8.1 Overall Objectives and Staging

8.1.1 Phase 1 - Protecting the Sparrovale Wetlands Park and Barwon River

Timeframe 2019 to 2022 - subject to completion of the constructed wetlands and channels

The new wetland and parkland area will need to remain closed to the public in the short term to ensure public safety while required major drainage and site rehabilitation works are completed in accordance with existing endorsed plans and permit requirements. Master Plan implementation projects in this period will focus on complementary environmental rehabilitation projects such as revegetation works along the Barwon River and securing the parkland perimeter and maintenance access. Public access will be limited to guided tours and planting days to minimise potential public risk while new drainage systems and access tracks are established.

The sheer size and unsupervised nature of the site means recurrent land management costs may potentially reduce available funds for new public access and environmental rehabilitation projects. Therefore, to retain and protect existing environmental values while minimising new land management costs to Council sections of the site will continue to be licenced back to the family currently working the property to continue historical grazing and cropping activities. This is the most cost-effective strategy to maintain the land in its current state and minimise changes to the ecology and proliferation of new weeds during establishment of the wetlands and parkland.

Phase 1 Actions

- Engage and involve the *Wadawurrung Traditional Owners Aboriginal Corporation* in building appreciation and understanding of the cultural values of the site. Partner with the *Wadawurrung* to manage cultural values.
- Monitor water quality and flooding in the constructed and natural wetlands and implement adaptive management actions where required to meet the management plan objectives.
- Monitor flora and fauna across the site and implement adaptive management actions where required to meet management plan objectives.
- Refurbish the existing farm shed to provide an operations base for staff, contractors and volunteers working at the site and facilities for school and community groups on environmental education tours.
- Top dress the former electrical easement access track to improve maintenance and walking access.
- Investigate provision of flow controls at the former electrical easement culvert across the main channel to enable short term detention of stormwater upstream for habitat and weed management purposes.
- Liaise with Parks Victoria to monitor the structural integrity of the levee bank. Investigate options to strengthen and formalise a new spillway point closer to the Groves Road end to restrict high risk access along the levee during major Barwon River floods.
- Top dress the informal track east of Groves Road to improve all weather access to the levee bank. Use material from the Sparrovale Road wetland bund or Southern Deviation Channel works if available at no cost.
- Undertake general removal of rubbish and top dress left over spoil stockpiles improve site amenity and prepare for future indigenous overstorey tree planting works. Continue ongoing removal of windblown litter.

- Repair and secure reserve perimeter fence lines and gates to prevent unauthorised vehicle access into the reserve. Progressively remove redundant fencing from within the reserve retaining timber fence posts in place.
- Establish new unsealed maintenance access road from Brearleys Lane through to the main track to facilitate maintenance and lease area access.
- Maintain potable water connection and meter for offline stock watering from the former Sparrovale Farm homestead when land is redeveloped.
- Retain grazing access to northern paddocks and along the Barwon River (summer only) for fire prevention and to minimise weed control and other land management costs.
- Continue community and contractor revegetation works along the Barwon River.
- Direct seed the understory with native grasses and wildflowers of local provenance in appropriate places.
- Protect existing remnant indigenous on Sparrovale Road and undertake propagation of new trees for Grassy Woodland revegetation using collected seed.
- Co-ordinate development interface planning to minimise visual and environmental impacts on the wetland reserve and to maximise open space links and passive surveillance.
- Continue onsite community engagement with supervised controlled access public events such as planting days, walking, birdwatching tours and potential one day only fishing competitions to ensure maximum safety while works are completed, and the site is made safe for public access.
- Install new reserve signage including Wadawurrung co-naming for key areas.

Refer to Figure 12 for Phase 1 Actions and Priorities.

KEY PHASE 1 ACTIONS

- 1 Monitor water quality and flooding in the constructed and natural wetlands and implement adaptive management actions where required to meet the management plan objectives.
- 2 Monitor flora and fauna across the site and implement adaptive management actions where required to meet management plan objectives.
- 3 Engage and involve the Wadawurrung Traditional Owners Aboriginal Corporation in building appreciation and understanding of the cultural values of the site. Partner with the Wadawurrung to manage cultural values. Install new reserve signage including Wadawurrung co-naming for key areas.
- 4 Top dress the former electrical easement access track to improve maintenance and walking access.
- 5 Investigate provision of flow controls at the former electrical easement culvert across the main channel to enable short term detention of stormwater upstream for habitat and weed management purposes.
- 6 Liaise with Parks Victoria to monitor the structural integrity of the levee bank. Investigate options to strengthen and formalise a new spillway point closer to the Groves Road end to restrict high risk access along the levee during major Barwon River floods.
- 7 Top dress the informal track east of Groves Road to improve all weather access to the levee bank. Use material from the Sparrovale Road wetland bund or Southern Deviation Channel works if available at no cost.
- 8 Undertake general removal of rubbish and top dress left over spoil stockpiles improve site amenity and prepare for future indigenous overstorey tree planting works. Continue ongoing removal of windblown litter.
- 9 Repair and secure reserve perimeter fence lines and gates to prevent unauthorised vehicle access into the reserve. Progressively remove redundant fencing from within the reserve retaining timber fence posts in place.
- 10 Establish new unsealed maintenance access road from Brearleys Lane through to the main track to facilitate maintenance and lease area access.
- 11 Maintain potable water connection and meter for offline stock watering from the former Sparrovale Farm homestead when land is redeveloped.
- 12 Retain grazing access to northern paddocks and along the Barwon River (summer only) for fire prevention and to minimise weed control and other land management costs.
- 13 Continue community and contractor revegetation works along the Barwon River.
- 14 Protect existing remnant indigenous on Sparrovale Road and undertake propagation of new trees for Grassy Woodland revegetation using collected seed.
- 15 Co-ordinate development interface planning to minimise visual and environmental impacts on the wetland reserve and to maximise open space links and passive surveillance.
- 16 Continue onsite community engagement with supervised controlled access public events such as planting days, walking, birdwatching tours and potential one day only fishing competitions to ensure maximum safety while works are completed, and the site is made safe for public access.
- 17 Refurbish the existing farm shed to provide an operations base for staff, contractors and volunteers working at the site and facilities for school and community groups on environmental education tours.

DRAWING KEY

- MAIN WETLAND
- FLOODPLAIN REVEGETATION AREA
- FLOODPLAIN CONSERVATION AREA
- LEASED GRAZING LAND
- EXISTING CHANNEL
- CONSTRUCTED WETLAND/CHANNEL
- Q100 1% ARI FLOODLINE
- SPARROVALE LEVEE
- EXISTING MAINTENANCE ACCESS TRACK
- UPGRADED MAINTENANCE ACCESS TRACK
- NEW MAINTENANCE ACCESS TRACK
- MAINTENANCE ACCESS GATE
- UPGRADE FENCING
- EXISTING SHARED PATH (BY OTHERS)

PHASE 1 PROTECTING THE WETLANDS AND BARWON RIVER (2019-2023)

SPARROVALE Ngubitj yoorree WETLANDS MASTER PLAN

Figure 12
JUNE 2021

0 100 200 300 500m

THOMPSON BERRILL LANDSCAPE DESIGN P/L

8.1.2 Phase 2 - Opening the Sparrovale Wetlands Park

Timeframe approximately 2022 through to approximately 2030 during the ongoing development of new residential areas and open space adjoining the wetlands park.

Following completion of major drainage and site rehabilitation works the aim is to provide public walking access through to the Barwon River and to allow informal access around the wetlands using the existing network of levees and farm tracks used in ongoing management of the site. The unsealed maintenance access tracks and existing levee banks will provide for dry weather walking only access. The tracks will provide access for fishing, bird watching and nature appreciation and the City will continue to support guided tours and community and school planting days to build local community ownership and appreciation of the natural values in consultation with the Wadawurrung.

Restricted public vehicle access to the river could be considered for single day events such as fishing competitions in dry weather subject to event management plan applications and approval but flood constraints mean there is no plan for provision of public car parking or road access within the wetlands park.

For those not as adventurous or able to undertake the 1 kilometres walk to the Barwon River and around the wetlands (approximately 1-hour return journey) a new fully accessible elevated wetland viewing point and parking area will be established at the end of Groves Road. This location provides 270-degree views and the best spot to appreciate the interaction between the Barwon River and natural and constructed wetlands during both dry and wet weather.

Other Master Plan implementation projects in this phase will focus on continued floodplain rehabilitation and improving pedestrian and cycle links to new open space areas in the adjoining Armstrong Creek and Horseshoe Bend residential development areas. Licenced grazing and cropping activities will continue in areas with lower environmental value.

Phase 2 Actions

- Establish a small picnic area opposite Horseshoe Bend Regional Park amongst the existing trees and overlooking the Sparrovale Road Wetlands to include small picnic shelter, picnic tables and drinking fountain.
- Provide walking path access and links to the new Horseshoe Bend Municipal Park and former Sparrovale Road greenway including low boardwalk across natural drainage lines.
- Provide unsealed path link along the Southern Deviation Channel from Groves Road through to the future Active Open Space Reserve and existing open space and path networks along Armstrong Creek in the Warralily Estate.
- Provide a fully accessible elevated lookout point at the eastern end of Groves Road with views out over the wetlands and across the levee to Hospital Swamp and Lake Connewarre.
- Develop and install interpretive signage highlighting historical and environmental values and the functionality of wetland management infrastructure at the new picnic area and lookout point.
- Provide directional signage to the wetland reserve and new visitor areas on Barwon Heads Road.
- Provide an unsealed walking path link from the new Sparrovale Road picnic area to the north track. Use new timber stiles at existing north track stock gates to providing public walking only access to the Barwon River while retaining livestock security and restricting motorbike access.
- Provide seats at fishing and viewing spots on the Barwon River in conjunction with signage highlighting environmental and cultural heritage values.

- Sign the return walking loop from the Barwon River via the natural wetlands using the former electrical easement track and levee bank using passive drown outs to restrict public access to these areas during major floods.
- Expand indigenous revegetation works to new parkland areas east of Sparrovale Road.
- Undertake indigenous overstorey tree planting along the north track and the former electricity easement track to improve habitat diversity and amenity for walkers.
- Remove grazing from the eastern conservation area to allow natural regeneration to restrict public access to more sensitive environmental areas.
- Investigate establishment of a rest space/viewing area at the Barge Hole with interpretive signage.
- Investigate opportunities to establish sustainable farming initiatives and enhanced community engagement and education programs on licenced farming area.
- Implement adaptive management for key habitat areas as needed and guided by ongoing ecological monitoring.

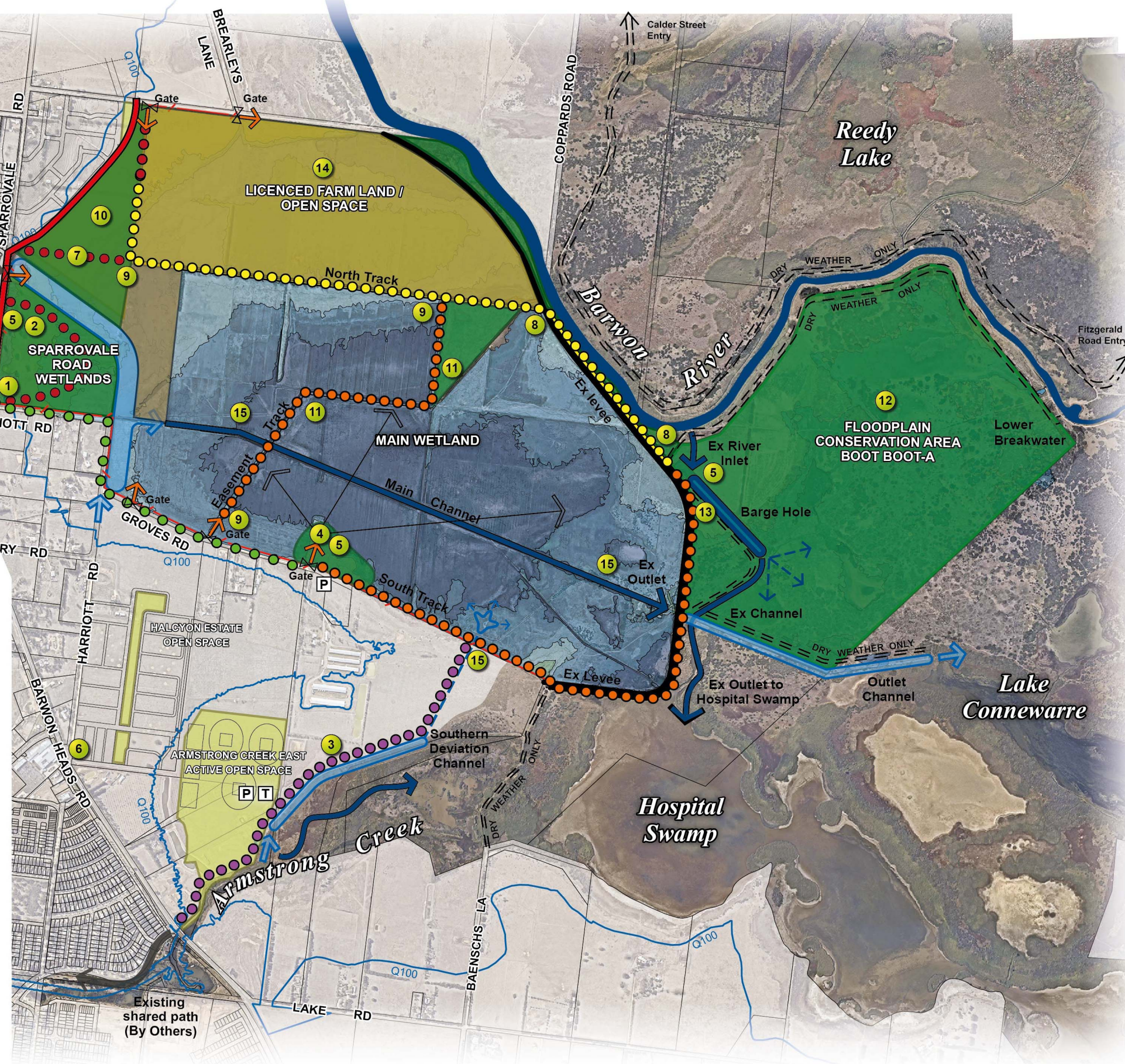
Refer to Figure 13 for Phase 2 Actions and Priorities.

KEY PHASE 2 ACTIONS

- 1 Establish a small picnic area opposite Horseshoe Bend Regional Park amongst the existing trees and overlooking the Sparrovale Road Wetlands to include small picnic shelter, picnic tables and drinking fountain.
- 2 Provide walking path access and links to the new Horseshoe Bend Municipal Park and former Sparrovale Road greenway including low boardwalk across natural drainage lines.
- 3 Provide unsealed path link along the Southern Deviation Channel from Groves Road through to the future Active Open Space Reserve and existing open space and path networks along Armstrong Creek in the Warrally Estate.
- 4 Provide a fully accessible elevated lookout point at the eastern end of Groves Road with views out over the wetlands and across the levee to Hospital Swamp and Lake Connewarre.
- 5 Develop and install interpretive signage highlighting historical and environmental values and the functionality of wetland management infrastructure at the new picnic area and lookout point.
- 6 Provide directional signage to the wetland reserve and new visitor areas on Barwon Heads Road.
- 7 Provide an unsealed walking path link from the new Sparrovale Road picnic area to the north track. Use new timber stiles at existing north track stock gates to providing public walking only access to the Barwon River while retaining livestock security and restricting motorbike access.
- 8 Provide seats at fishing and viewing spots on the Barwon River in conjunction with signage highlighting environmental and cultural heritage values.
- 9 Sign the return walking loop from the Barwon River via the natural wetlands using the former electrical easement track and levee bank using passive down outs to restrict public access to these areas during major floods.
- 10 Expand indigenous revegetation works to new parkland areas east of Sparrovale Road.
- 11 Undertake indigenous overstorey tree planting along the north track and the former electricity easement track to improve habitat diversity and amenity for walkers.
- 12 Remove grazing from the eastern conservation area to allow natural regeneration to restrict public access to more sensitive environmental areas.
- 13 Investigate establishment of a rest space/viewing area at the Barge Hole with interpretive signage.
- 14 Investigate opportunities to establish sustainable farming initiatives and enhanced community engagement and education programs on licenced farming area.
- 15 Implement adaptive management for key habitat areas as needed and guided by ongoing ecological monitoring.

DRAWING KEY

- MAIN WETLAND
- FLOODPLAIN REVEGETATION AREA
- FUTURE OPEN SPACE
- LEASED GRAZING LAND
- EXISTING CHANNEL
- CONSTRUCTED WETLAND/CHANNEL
- 1% ARI FLOODLINE
- SPARROVALE LEVEE
- EXISTING MAINTENANCE ACCESS TRACK
- UPGRADED MAINTENANCE ACCESS TRACK
- NEW MAINTENANCE ACCESS TRACK
- NEW PATH LINKS
- BARWON RIVER TRAIL
- ON ROAD CYCLING/WALKING ACCESS
- MAINTENANCE ACCESS GATE
- UPGRADE FENCING
- EXISTING SHARED PATH (BY OTHERS)
- PUBLIC TOILETS
- PUBLIC PARKING
- VIEWING POINT/LOOKOUT



PHASE 2 OPENING THE PARK (2023-2030)

SPARROVALE Ngubitj yoorree WETLANDS MASTER PLAN

Figure 13

MAY 2021

0 100 200 300 500m

THOMPSON BERRILL LANDSCAPE DESIGN P/L

8.1.3 Phase 3 - Regional Gateway to the Lake Connewarre Ramsar Area

Timeframe approximately 2030 to 2040 as development of the Armstrong Creek Urban Growth Area nears completion.

The further completion of new development at Armstrong Creek will provide supporting visitor infrastructure such as picnic and toilet facilities, play spaces and additional car parking at the Horseshoe Bend Regional Park (Sparrovale Road) and Armstrong Creek Active Sports Precinct which will be linked via completion of the new Barwon River Trail around the Sparrovale Wetlands park.

As the drainage catchment reaches full development and the number of visitors to the wetlands increases funding for the final phases of floodplain environmental rehabilitation can be more easily secured reducing the need for continuation of licenced grazing and cropping activities to offset land management costs.

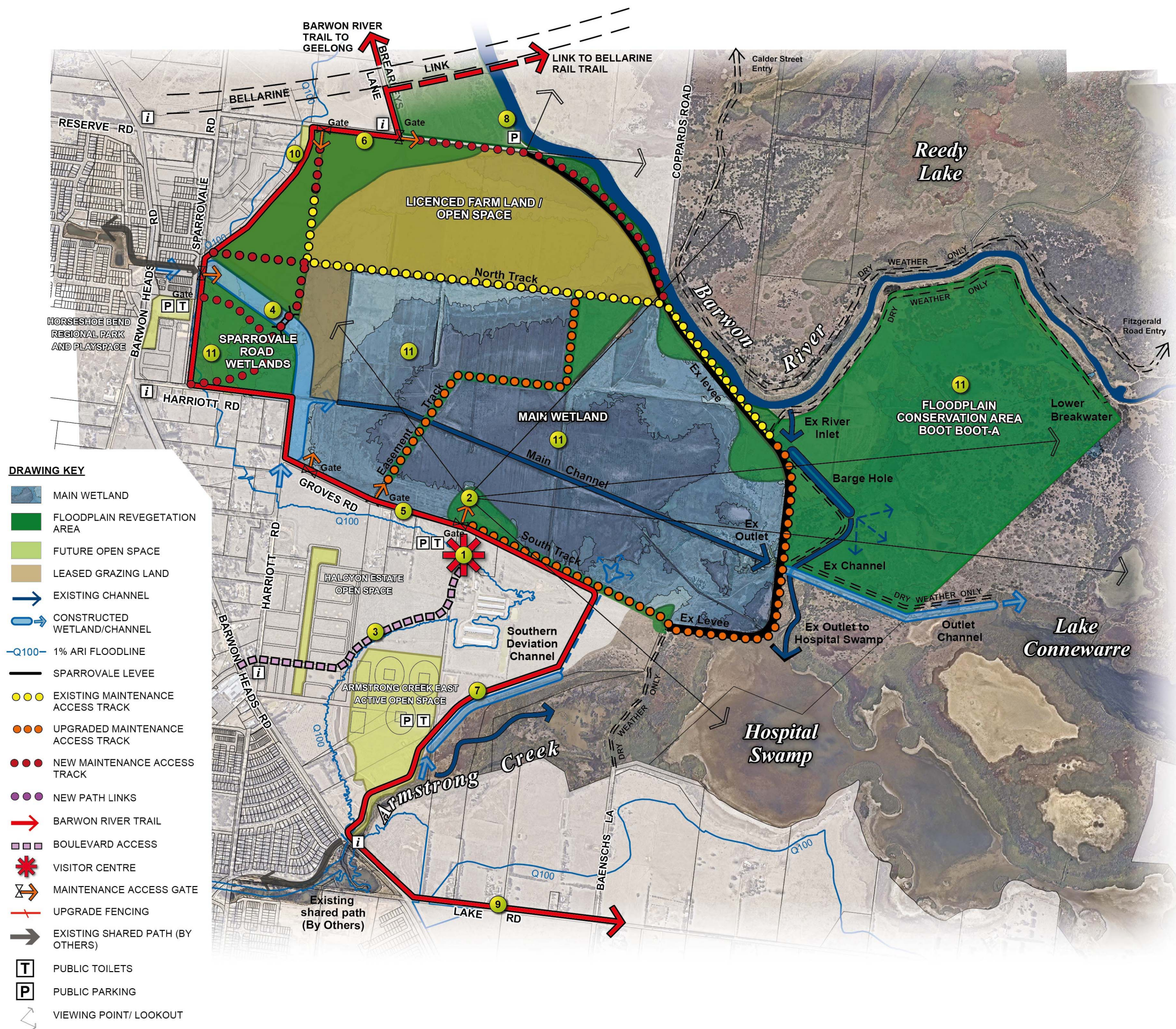
A direct boulevard road link from Barwon Heads Road through the Armstrong Creek East Precinct will eventually provide direct access and upgraded service connections through to the elevated wetland viewing point and parking area at the end of Groves Road established in Phase 2. Ultimately this visitor node could then be upgraded to a regional wetland visitor destination with direct access for passing tourism traffic on Barwon Heads Road and the Surf Coast Highway to the best views out over the wetland and the Lake Connewarre system.

To fast track the establishment of the site as a regional visitor destination an iconic wetland lookout structure could be developed to expand on the initial viewing mound developed in phase 2. An iconic architectural lookout tower at this point, visible from Barwon Heads Road could assist in generating additional visitor traffic to support longer term establishment of a dedicated wetlands visitor centre with café and expanded picnic facilities to support longer stay visitation in the area.

Phase 3 Key Objectives

- Connect the Barwon River Trail back to Geelong and upgrade off road links to other open space areas within the Armstrong Creek and Horseshoe Bend Precincts.
- Upgrade and formalise wetland and Barwon River circuit walking tracks to enable all weather/all ability use.
- Investigate establishment of a regional wetland interpretation centre and iconic wetland lookout structure to promote tourism, eco-tourism and wide recognition of the wetlands and Lake Connewarre Ramsar area.
- Investigate options to provide public parking and all ability access closer to the banks of the Barwon River in consultation with public land managers.
- Cease grazing and complete revegetation of remaining paddocks to expand and enhance biodiversity and habitat values.
- Review, document and appropriately action the key improvements and issues arising from Phase 2 and develop appropriate adaptive management actions.

Refer to Figure 14 for Phase 3 Actions and Priorities.



KEY PHASE 3 ACTIONS

- 1 Investigate establishment of a wetland interpretation centre in conjunction with the Armstrong Creek Active Open Space facility and strengthen links to the Groves Road lookout area and levee bank walking loop. (Refer Figure 18)
- 2 Investigate expansion of the existing wetland lookout mound established in phase 2 to include an architecturally designed lookout tower with an expanded open space areas and picnic facilities. (Refer Figure 18)
- 3 Liaise with planning to establish direct boulevard road access from Barwon Heads Road to the Groves Road lookout point to maximise tourism opportunities.
- 4 Upgrade the Sparrovale Road parkland visitor facilities opposite the Horseshoe Bend Regional Park to include a shorter wetland accessible all-weather circuit walking path and new bridge/boardwalk crossing across the Sparrovale Road wetlands.
- 5 Formalise closure of Groves Road to cars and incorporate as part of the future Barwon River Trail. Connect the elevated lookout and expanded parking area to the new development road network and Active Open Space/Sporting reserve with Q100 flood protection.
- 6 Subject to complete of the Barwon River Trail off road from Bearleys Lane through to North East Industrial Precinct back to Geelong and Belmont Common.
- 7 Upgrade Southern Deviation Channel path to a sealed shared path linking Groves Road through to Armstrong Creek Active Open Space and Waralilly. Investigate revegetation along the channel.
- 8 Investigate provision of accessible public parking access closer to the Barwon River at the northern end of the site (subject to final confirmation of the Ring Road crossing point and adjoining road network).
- 9 Longer term investigate future extension of the Barwon River Shared Trail to Tait's Point and Barwon Heads via Lake Road.
- 10 Investigate future discovery/art trail linking the proposed interpretation centre with Glenlee Regional Park through the easement track up to the main channel to allow visitors to explore the history/science of Sparrovale.
- 11 Implement adaptive management for key habitat areas as needed and guided by ongoing ecological monitoring.

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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
The City	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

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