Co-Designed Catchment Program for the

Werribee Catchment Region

Working together for healthy waterways

VICTORIA
State Government

Acknowledgement of Country

The communities, stakeholders and Melbourne Water, who together are responsible for implementing this *Healthy Waterways Strategy*, acknowledge and respect Traditional Owners and Aboriginal communities and organisations. We recognise the diversity of their cultures and the deep connections they have with the region's lands and waters.

We value partnerships with them for the health of people and Country.

The communities, stakeholders and Melbourne Water, who together are responsible for implementing this *Healthy Waterways Strategy*, pay their respects to Elders past and present, and we acknowledge and recognise the primacy of Traditional Owners' obligations, rights and responsibilities to use and care for their traditional lands and waters.

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A shared Strategy

Our rivers, creeks, wetlands and estuaries are shared places of enormous significance for Aboriginal culture, social gathering, the environment and economic productivity.

The community, stakeholders and scientists are telling us our region's waterways are at a tipping point. Continue as we are and we risk further decline in waterway condition across the region, threatening the significant environmental, social, cultural and economic values our waterways provide. Working collectively toward prioritised objectives and targets offers everyone a way to not only stem the decline but also unlock the significant potential our waterways offer.

The *Healthy Waterways Strategy* was collaboratively designed, bringing together professional expertise with the lived experience of landholders, community groups, Traditional Owners, developers and other stakeholders, it aims to support collaborative waterways management.

This **Co-Designed Catchment Program** supports the region-wide Strategy by providing a flexible framework for managing waterways in the Werribee catchment region that takes into account variable climatic and development conditions and changing community needs.

Partners

Thank you to all those who collaborated on the development of the *Healthy Waterways Strategy* for the Werribee catchment region:

Aquatic Systems Management

BirdLife Australia

Bunurong Land Council Aboriginal Corporation

Carranballac College

City West Water

Clearwater

Conservation Volunteers

DELWP

Dennis Family Corporation

Development Victoria

Ecology and Heritage Partners

Environmental Protection Authority Victoria

Friends of Lower Kororoit Creek

GbLA Landscape Architects

GrowWest

Hobsons Bay City Council

Korean National Parks Service

Kororoit Institute

Lendlease Communities

Melbourne Water

Melton City Council

Moorabool Catchment Landcare Group

Moorabool Shire Council

Municipal Association of Victoria

NatureWest

Parks Victoria

Pinkerton Landcare and Environment Group

Port Phillip and Westernport CMA

Port Phillip EcoCentre

RMIT University

Southern Rural Water

St.Albans Historical Society

Surf Coast & Inland Plains Landcare Network

University of Melbourne

VicRoads

VRFish

Water Technology

Wathaurung Aboriginal Corporation

Werribee River Association

Western Water

Wrapt Design

Wurundjeri Tribe Land and Compensation Cultural Heritage Council Aboriginal Corporation

Wyndham City Council

Overview

The Werribee catchment region occupies an area of 2695 square kilometres and incorporates rivers and creeks such as the Little River, Werribee River, Lerderderg River, Toolern Creek, Skeleton Creek and Kororoit Creek, which all drain into the northwest area of Port Phillip Bay (Figure 1). About 20 per cent of the area retains its natural vegetation, 65 per cent is used for agriculture and 10 per cent is urban (confined to greater Melbourne and larger townships within the Catchment).

Agriculture is the predominant land use, with forestry occurring in the upper parts of the catchment. The market gardens located around Bacchus Marsh and Werribee are key suppliers of vegetables for local, national and international markets.

Water storages, including the Melton, Pykes Creek, Djerriwarrh, Colbrook and Merrimu reservoirs, provide water supply for the Bacchus Marsh and Werribee irrigation districts, and drinking water for local townships. Since the 1980s there has been an increase in the volume of recycled water used to supplement water supplies for irrigated agriculture. And in some of the newer urban areas, recycled water is provided to houses for non-drinking water uses.

Population modelling shows that the Werribee catchment region will increase from some 660,000 people to over one million in the next 20 years, which will require an additional 8000 dwellings per year. Much of this will be in new urban development stretching out from Melbourne to Melton and Bacchus Marsh to the northwest, and west towards Werribee and Little River. The City of Wyndham and City of Melton are two of the fastest growing municipalities in Australia.

On a regional scale climate change will exacerbate some existing problems and create new ones. A drier climate in an increasingly paved landscape poses a very real threat to the long-term values of the rivers and creeks, wetlands and estuaries while at the same time increasing the importance of those spaces as a green and cool respite from the urban landscape.

If current policy and levels of investment are maintained, without improvement, then it is likely that the Werribee catchment region will experience declines in environmental and social values over the next 50 years. There is a real need to take action to avoid an otherwise inevitable decline in waterway health.

With collective action, many of the catchment's significant environmental values can be maintained or improved. For example, managing stormwater in growth areas will reduce erosion, improve instream vegetation and conditions for macroinvertebrates (waterbugs), fish, frogs and birds. Fish values can be supported through removal of fish barriers and increasing the water available for the environment. Supporting the extent and quality of streamside vegetation will support bird values. For the catchment's wetlands and floodplains, improvements to water regimes and habitat can support frogs and other environmental values.

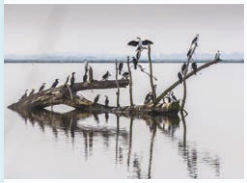
People of the *Wada wurrung* and *Woi wurrung* language groups were the original occupants of this land and their descendants place enormous cultural and spiritual significance on the region's land and waters. This Strategy proposes a new way of working with Traditional Owners and Aboriginal Victorians to support collective decisions and action in caring for country – including waterways. There is also great opportunity to manage waterway corridors as places for communities to connect, recreate and travel, for example by increasing and maintaining access along and to waterways, through paths and boat launching facilities.

As the waterway manager for the region, Melbourne Water is committed to undertaking its share of this *Healthy Waterways Strategy*. However, it has been recognised that action by Melbourne Water alone is not sufficient to unlock the full value of the region's waterways, nor stem their decline due to climate, development or land use change. For this Strategy to be effective, it demands collective action from State government, State regulators such as the Environment Protection Authority, local government and other land managers such as Parks Victoria. Even more so, it needs collective action by the development sector, landholders, Traditional Owners and community groups. Working together, the full environmental, social, cultural and economic values of the region's waterways can be realised.

SUB-CATCHMENTS

1 Cherry Creek
2 Kororoit Creek Lower
3 Kororoit Creek Upper
4 Laverton Creek
5 Lerderderg River
6 Little River Lower
7 Little River Upper
8 Lollypop Creek
9 Parwan Creek
10 Skeleton Creek
11 Toolern Creek
12 Werribee River Lower
13 Werribee River Middle
14 Werribee River Upper

WETLANDS – Western Treatment Plant



The sewage treatment plant, which has operated since 1897, supports an internationally-recognised Ramsar bird habitat where more than 280 bird species have been recorded.

Sub-catchment boundaries

Wetlands

Rivers and Creeks

Parks and reserves

ESTUARIES

1 Kororoit Creek
2 Laverton Creek
3 Little River
4 Skeleton Creek
5 Werribee River

RIVER – Lerderderg River

Lerderderg State Park provides a great escape from the busy urban lifestyle. The park has a wide variety of walking trails, a camp ground and great picnic spots to enjoy this Heritage-listed river.

WETLANDS

1 Altona Treatment Plant
2 Balls Wetland Complex (Western Grassland Reserve)
3 Baths Swamp (Western Grassland Reserve)
4 Black Forest Rd Wetland (Western Grassland Reserve)
5 Black Swamp
6 Cheetham Wetlands
7 Cherry Lake, Cherry Creek
8 Cobbledicks Ford Reserve (Western Grassland Reserve)
9 Cunningham's Swamp
10 Deans Marsh, Rockbank
11 Greens Rd E Wetland No. 2 (Western Grassland Reserve)
12 Jawbone Reserve
13 Jenz Swamp
14 Kirksbridge Rd W Wetland (Western Grassland Reserve)
15 Kororoit Creek No. 3
16 Laverton RAAF Swamp
17 Live Bomb Wetland (Western Grassland Reserve)
18 Paynes Rd Swamp
19 Point Cook Wetlands – RAAF Lake
20 Point Cook Wetlands – Spectacle Lake
21 Rabbitters Lake and Swamp (Western Grassland Reserve)
22 Richmonds Grass Swamp (Western Grassland Reserve)
23 Rockbank No. 1
24 Rockbank Railway Swamp
25 Target Range Swamp (Western Grassland Reserve)
26 The Spit Nature Conservation Reserve
27 Troups Rd Swamp
28 Truganina Swamp, Laverton Creek
29 West Quandong Swamp (Western Grassland Reserve)
30 Western Treatment Plant – Paul & Belfrages Wetland
31 Western Treatment Plant – Ponds
32 Western Treatment Plant – Ryans Swamp
33 Wetland at Holden Road Diggers Rest
34 Wetland near Rolling Thunder Raceway
35 Wyndham Vale Swamp

Figure 1 Sub-catchments and waterway assets including a sub-set of wetlands in the Werribee catchment region.

Collaborative design (co-design)

In August 2017, the Werribee *Catchment Collaborations* commenced to develop the refreshed *Healthy Waterways Strategy* for the Werribee catchment region (Figure 2). The collaboration was based on learnings from a pilot process in the Maribyrnong catchment and included interested community members, organisations and agencies. The collaborative task was to:

- Develop a vision and goals for their catchment
- Explore issues, opportunities and aspirations within the catchment
- Identify where efforts and energy might be focused
- Develop, refine and provide feedback on preliminary targets for the catchment
- Provide feedback on the draft Strategy.

In developing the Strategy:

- Two pop-up listening posts were held in Melton and Ballan
- Four workshops were held with over 122 participants representing around 36 organisations attending at least one workshop
- The YourSay website provided details and updates on the process as well as opportunities to provide input and feedback.

Collaboration process

August 2017
Werribee Catchment Collaborations commenced

September 2017
Vision, goals and waterways values defined

March 2018
Preliminary targets developed

March 2018
Feedback and discussion on preliminary targets

June 2018
Draft Strategy released

June 2018
Feedback and discussion on Draft Strategy

August 2018
Final Strategy

October 2018
Government approval

Figure 2 Collaboration process for Werribee catchment

"For Laverton Creek Estuary, add education of recreational impacts on shorebirds (e.g. dog walkers and kite surfing). Hobsons Bay Council currently undertaking engagement walks and events 'Dogs Breakfast' etc."

– from discussion on Laverton Creek targets, March 2018

"I strongly support the inclusion of robust targets for protection of streamside remnant vegetation, and revegetating according to the appropriate EVC and to defined quality standards."

– from Draft Strategy feedback via YourSay website, June 2018

VISION

The Werribee catchment community values, enjoys and actively participates in managing the health, connectivity and resilience of our rivers, estuaries and wetlands.

GOALS

1. Waterways and water resources of the Werribee catchment support and are supported by balanced and sustainable practices within industry, agriculture and the growing population.
2. Innovation and knowledge guides appropriate use of our waterways.
3. Viable, healthy, resilient and connected ecosystems across the catchment.
4. Special places (rivers, creeks, wetlands and estuaries) within the catchment are recognised and managed for their significant values.
5. Our community appreciates the values of our waterways very highly and is engaged to positively and actively contribute to waterway outcomes.

Waterways of the West

A new Ministerial Advisory Committee (MAC) for Waterways of the West will work with communities and Traditional Owners to develop a set of recommendations for government consideration. These may further support the achievement of this strategy's vision.

What we heard

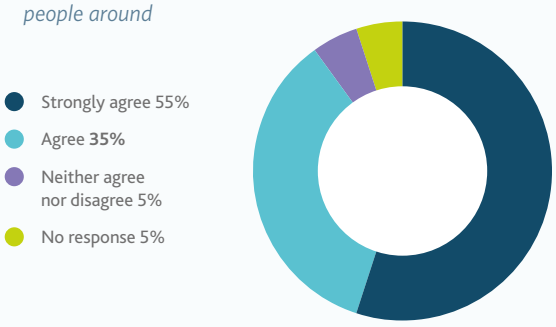
Comments were received via discussions at the workshops, the YourSay webpage and follow-ups with stakeholders. For the Werribee catchment region, a total of 298 formal comments were received on the preliminary targets with an additional 74 formal comments received on the draft Strategy.

The underlying theme was support for setting ambitious targets and performance objectives at the sub-catchment scale. Participants frequently expressed the need for reduction in litter and management of key threats including pest animals and weeds (e.g. tiger pear and serrated tussock). Existing successful partnership arrangements were highlighted, including Grow West and Greening the West. There were also questions about the willingness of agencies to invest over the long term in maintenance such as weed control.

Collaborators worked together to develop a list of potential actions across the Werribee catchment region. A sample of these actions is included on the sub-catchment pages of the Catchment Program and a full list is included in the *Collaborative Design Report*. As collaboration progressed participants became more willing to advocate for the Strategy with 90% agreeing or strongly agreeing to advocate for the Strategy at the final workshop (Figure 3).

Responses to feedback

I will advocate for this Strategy and its approach with people around



"Collectively this space has proven to be an effective way to gather passionate, like-minded people together. It has driven motivation, connection, a sense of purpose and greater awareness and education across whole catchments. It has given groups a welcomed voice and has inspired action with links being built between organisations and ideas about what waterways management needs being taken away and shared."

Figure 3 Workshop participants' responses to sensing sheets

Collaborative implementation

Caring for our waterways involves community, Traditional Owners, councils, developers, land owners and other government agencies. For this Strategy to be effective, it needs collective action. Working together, we can realise the full value of the waterways – environmental, social, cultural and economic.

This Strategy proposes systems to share knowledge and information between communities and stakeholders; to empower participation and influence waterways management through capacity building and citizen science.

People play a major part in ensuring that the Dandenong catchment region remains a place of natural beauty and somewhere that people can enjoy. Anyone can get involved by joining Friends, Landcare or other volunteer groups and becoming part of our committed catchment community.

This *Healthy Waterways Strategy* provides direction to guide regional, catchment and sub-catchment-scale decisions about the planning, delivery and integration of works (Figure 3). A *Regional Leadership Group* will be established to govern this strategy, including ensuring good linkages with related processes and policies and overseeing strategy implementation, reporting and adaptive management.

Catchment Implementation Forums will be established in each of the five catchments to guide collaborative implementation of and monitor progress on these *Co-Designed Catchment Programs*. The work of the forums may also be supported by project groups, allowing a flexible framework that takes into account variable climatic and development conditions and changing community needs.

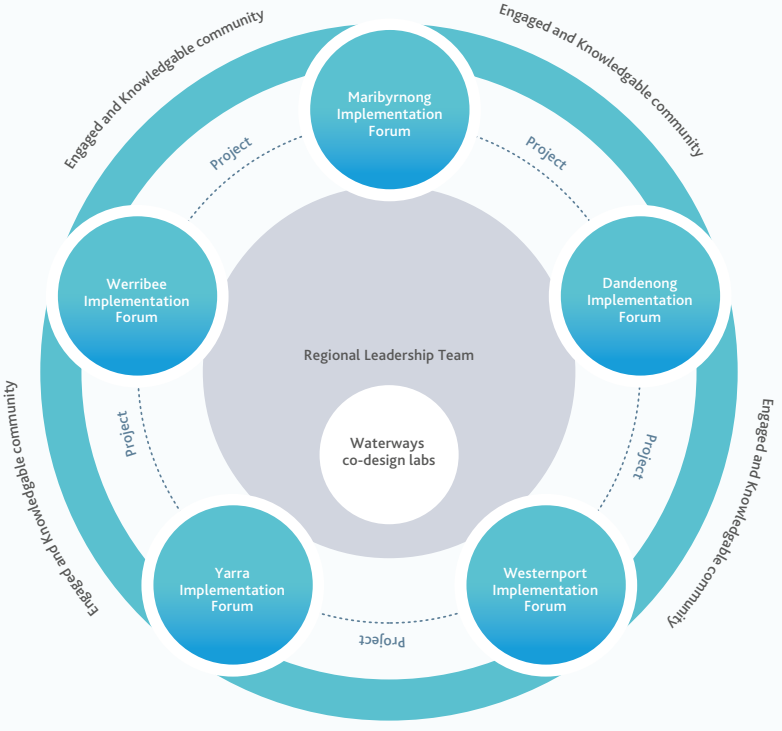


Figure 4 Collaborative Governance Model

What is a *Catchment Implementation Forum*?

Catchment Implementation Forums provide an opportunity for multiple organisations or entities from different sectors to abandon their own agendas in favour of a common agenda to tackle deeply entrenched and complex problems. These types of approaches have been successfully used in the fields of public health and education, to clean up contaminated waterways and to reduce and prevent childhood obesity. These successes are all based on the concept that large-scale social and environmental change comes from better cross-sector coordination rather than from the isolated intervention of individual organisations.

Five conditions are typically required for a catchment implementation forum to succeed[1]:

1. A common agenda
2. Shared measurement systems
3. Mutually reinforcing activities
4. Continuous communication
5. Backbone support organisations.

This Strategy offers a common agenda for managing healthy waterways. The *Catchment Implementation Forums* will determine how best to work together in each catchment to deliver that agenda, considering:

- What the shared challenges are and who should be involved in resolving them
- Communication and meeting frequency, existing forums that could support the collaborative implementation of the Strategy
- Discussion and resolutions of points of difference
- Joint approaches to solving key issues through agreed-upon actions
- Coordination of differentiated activities through a mutually reinforcing plan of action
- A structured process for effective decision-making, including the consideration of new knowledge, threats, risks and adaptive management
- Ways success will be measured and reported
- Ways to experiment and learn together
- Engagement with funding organisations towards a long-term process of change that mobilises the organisations and individuals involved to develop solutions themselves
- Knowledge gaps.

1 Collective Impact: https://ssir.org/articles/entry/collectiveimpact

Monitoring, evaluation and reporting (MER)

A detailed monitoring, evaluation and reporting (MER) plan will be developed together with the Catchment Implementation Forums to support adaptive management from planning to Strategy completion. The MER plan will be reviewed, at minimum, on an annual basis to ensure it remains current and relevant to informing adaptive management. The monitoring, evaluation and reporting plan will:

- Present the program logic underpinning the Strategy
- Clarify the assumptions associated with the program logic and identify strategies to manage potential risks
- Identify the key questions for evaluation and establish processes to monitor progress within the framework of the statewide monitoring program
- Clarify the communication and reporting needs and identify the processes required to support these needs
- Enable lessons learned from monitoring and evaluation to be gathered and inform improvement
- Consider the monitoring, evaluation and reporting needs and practices of collaborating organisations
- Facilitate synergies with the MER undertaken to support the Regional Catchment Strategy and the Yarra Strategic Plan
- Acknowledged and review *State of the Bays* and *State of the Yarra* reporting, as they provide relevant benchmark data.

Understanding the Catchment Program

The holistic approach to waterway management means managing waterways for environmental, social, cultural and economic values. Over the 10-year implementation period of the Strategy, the shorter-term outcomes (10-year performance objectives) collectively contribute to either maintaining or improving the waterway conditions, in turn maintaining or improving the status of the key waterway values, and ultimately contributing to the regional and catchment visions and goals for waterways.

Figure 5 Program logic outlining process towards achieving the vision and goals.

Waterways – refers collectively to rivers, wetlands and estuaries.

Rivers – refers to rivers, creeks, and smaller tributaries, including the water, bed, banks, and adjacent land (known as riparian land).

Wetlands – areas, whether natural, modified or artificial,subject to permanent or temporary inundation, that hold static or very slow moving water and develop, or have the potential to develop, biota adapted to inundation and the aquatic environment. They may be fresh or saline. Examples of wetlands include swamps or billabongs.

Estuaries – are where a river meets the sea, including the lower section of a river that experiences tidal flows where freshwater and saline (salty) water mix together. For this Strategy, the definition of an estuary is that it must be at least 1 kilometre in length or have a lagoon greater than 300 metres in length. The downstream extent of an estuary is where the banks of the river end and the waterway meets the bay or ocean.

Cultural and Economic Waterway Value

Cultural Values

The cultural values of waterways are based on the physical and spiritual connection of people to land and waters. Cultural values are both contemporary and ancient. Aboriginal Traditional Owners have lived in this region for tens of thousands of years, and have connection with the landscape and waterways through significant places, artefacts, language, stories and traditions.

The people of the *Wada wurrung* and *Woi wurrung* language groups were the original occupants of this catchment, as evidenced by the thousands of cultural sites and places recorded with most occurring within 200 metres of a watercourse.

The *Wada wurrung* words for waterways and animals include:

Yaluk = River or Creek

Boyurrok = Shrub

Kuwiyn = Fish

Warri = Sea

Tulum = Black Duck

Djirrm = Frog

Butbut = Swamp

Perridak = Platypus

Kunuwarra = Black or Young Swan

Buluk = Lake

Buniya = eel

While European settlers and subsequent waves of migrants have a comparatively short history of a couple of hundred years, they too have forged cultural and spiritual connections which are important to them.

Economic Values

Good waterway condition provides the essential building block for liveability[2] , growth and prosperity. River catchments provide water for Victoria's 6.5 million people and support agriculture, recreational fishing and commercial industries. Recognising the economic values of waterways is essential to appreciating the wide scope of ecosystem services – the benefits that humans receive from nature.

Economic values vary across the Werribee catchment region. In the upper and middle parts economic value includes domestic, stock and agricultural uses. On the floodplains, wetlands are being restrained to increase the value of urban properties.

2 AECOM Australia, 2012, 'Economic Assessment of the Urban Heat Island Effect and Vegetation Cover on Urban Heat Using Remote Sensing', City of Melbourne website, accessed on 25 July 2018: https://www.melbourne.vic.gov.au

Environmental and Social Waterway Values

Environmental Values

Environmentally, waterways provide habitat for plants and animals, and are critically important in sustaining much of our region's native biodiversity. Environmental values underpin all other waterway values.

In the Werribee catchment region, there are 134 expected riparian bird species. There have been recent records of nationally-significant fish including Australian grayling in the lower Werribee River. Frog species include threatened species such as the growling grass frog, Bibron's toadlet and the southern toadlet; although neither of the two toadlet species have been recorded in the catchment since the Millennium Drought.

The upper forested areas of the Werribee River and Lerderderg River within Lerderderg State Park contain areas of very high vegetation value. The value of vegetation across other parts of the catchment is of low to moderate value as a result of the modified nature of the catchment. Macroinvertebrate scores are also highest in the forested headwaters with degradation increasing towards the lower reaches, which are increasingly impacted by urban runoff.

Platypus are distributed in those parts of the Werribee River system (includes Lerderderg River) that have reliable summer flow regimes. However, they are considered to be locally threatened due to low numbers and continuing long term decline.

Social Values

Socially, waterways are important for our wellbeing. They provide places to escape the busy urban landscape, to bird watch, to fish for food, to actively commute, to meet with friends and family, to exercise and to connect with nature. They provide cool and shady spaces during hot weather, and water for swimming and boating.

In the Werribee catchment region social values for streams are currently high. The social value averages for estuaries range from moderate to very high. There is currently no data for social values of wetlands in the Werribee catchment region.

Social values are based on data from a Melbourne Water survey, Community Perceptions of Waterways. Participants from the greater Melbourne area gave feedback on how and why they use waterways and their level of satisfaction. Social values are threatened by inappropriate urban development, poor environmental condition, poor access to waterways, and pollution.

Waterway Targets

Key Values

A sub-set of nine key values have been chosen in this Strategy as representative measures of waterway values (Figure 6). Not all features of waterways can be effectively assessed and tracked, so these nine were chosen by science and collaborative teams on the basis of:

- their importance to the community
- their ability to represent the range of environmental and social values.

The understanding is that improving key values will in turn improve the environmental, social, cultural and economic waterway values, thereby paving the way to achieving the overarching vision of the Strategy.

Assumptions and limitations:

1. Although some animals such as turtles, lizards, freshwater crayfish or small mammals such as bandicoots and water rats are not amongst the key values, they are still an important part of waterway-associated biodiversity. It is assumed that when waterway management addresses these nine chosen 'key values', it will also be managing for other species and values. However, there may be cases where this does not hold true. Further research and understanding of the representativeness of these indicators is therefore still required.
2. Cultural and economic values are only considered at a regional scale. Over the life of the strategy, more research and development of cultural and economic value may be achieved, and key values will be reviewed to ensure they remain relevant.
3. A metric to measure the macroinvertebrate value of wetlands and estuaries will be developed during the implementation period of the strategy.

Figure 6 Nine key values of this Strategy

Waterway Conditions

Waterway condition refers to the overall state of the waterway, and key processes that underpin well-functioning waterway ecosystems.

Waterway conditions support the *waterway values* (environmental, social, cultural and economic values). Improvements in waterway conditions in turn improve the waterways values and the benefits that can be derived from that waterway.

Rivers, wetlands and estuaries have a different set of conditions that support their specific environmental values, and these are summarised in Figure 7.

The conditions supporting **environmental** key values for **rivers** are outlined below.

Stormwater condition:
The impact of stormwater on waterways.

Physical form: Physical attributes such as shape, size and sediment characteristics.

Water for the environment: Water that is managed to support waterway values.

Vegetation quality: The quality of vegetation relative to Ecological Vegetation Classes (EVCs) 'benchmarks'.

Vegetation extent: Extent of continuous indigenous vegetation cover within a defined width either side of the river.

Instream connectivity:
Ability of uninhibited fish passage.

Water quality – environmental: Water quality indicators such as nutrients, water clarity, dissolved oxygen, salinity, pH and metals.

The conditions supporting **environmental** key values for **wetlands** are outlined below.

Vegetation condition: Refers to the extent that the 'natural' wetland vegetation are intact or displaced and modified.

Wetland buffer condition: Wetland buffer is native vegetation above the maximum inundation extent.

Wetland water quality: Considers changed water properties within the wetland including nutrients, salinity regime and disturbance of **acid sulphate soils.**

Water regime: Considers changes to the wetland water regime, including those that impact the flow regime of the wetland water source, interfere with the natural connectivity of flow to the wetland, involve disposal of water into the wetland or extraction of water from the wetland and changed wetland depth.

Wetland habitat form: Considers the extent that the wetland area has been reduced through levees, diversions, etc., and the extent that the wetland bed has been altered through excavation and land-forming activities.

Rivers and Creeks Performance Objectives

The conditions supporting **environmental** key values for **estuaries** are outlined below.

Flow regime: Changes from 'natural conditions' to the flow regime.

Tidal exchange: The ability of sea water and fresh water to mix in the estuarine environment.

Longitudinal extent: Considers the proportion of estuary affected by constructed barriers that interfere with the movement of water **(in a typical year).**

Water quality: Water quality indicators such as nutrients, water clarity (turbidity), dissolved oxygen, pH and metals.

Estuarine vegetation: The extent to which estuarine vegetation extent and condition is modified.

Estuarine wetland connectivity: The proportion of the estuary that is connected to its fringing wetlands.

The conditions supporting **social** key values for **rivers** are outlined below[3].

Access: Accessibility to and along waterways and corridors.

Recreational water quality: The waterway water quality suitable for primary and secondary contact recreation.

Vegetation extent: Extent of continuous indigenous vegetation cover within a defined width either side of the river.

Litter absence: Litter detracts from people's enjoyment of waterways and can be detrimental to wildlife.

Participation: Amount of participation in waterway stewardship activities.

Figure 7 Waterway conditions that underpin key values

Assumptions and limitations:

4. Waterway conditions are relatively well understood and can be assessed for their contribution to environmental values. Waterway conditions for social values are less well understood, and are represented by only five measures for all waterways.
5. The assessment of the current status and setting of targets for litter in the Strategy has been limited by a lack of survey data specific to waterways across the region.

3 Conditions to support the social values of estuaries and wetlands will be further developed during the implementation of the Strategy, as we test our understanding of the links between social values, conditions that support those and actions on the ground.

Performance Objectives

Performance objectives are measures that guide progress towards the waterway targets, values and ultimately the goals and vision. They may define an area of land that must be revegetated, or a number of fish barriers that need to be removed from rivers.

Performance objectives:

- are outcome-based, and not actions
- enable a partnership approach
- are quantitative, measureable and achievable in 10 years
- inform short-term management aims through annual planning processes
- describe where they link to environmental conditions
- are underpinned by transparent and best available information and knowledge
- are able to be assessed without needing to measure waterway values and condition outcomes on every asset.

Performance objectives provide short term, tangible outcomes, which indicate progress towards less tangible, long term outcomes.

Trajectories

In order to understand how improving waterway values might contribute to long-term targets, two planning scenarios were prepared and tested for each waterway; the current trajectory and the target trajectory. The scenarios estimate the likely waterway outcomes with two different levels of management effort, policy and climate variables.

These trajectories demonstrate that a step-change in waterway management is required over the next 10 years, to prevent broad scale loss of waterway values. Many assumptions have been built into the scenario planning, including that climate change predictions will affect our waterways and that the current urban growth boundary will reach 'ultimate' development within the next 50 years.

Current Trajectory

This scenario represents the expected change in waterway health if current programs and approaches continue, otherwise referred to as the 'business as usual' approach.

This scenario indicates a worsening of key values across the majority of the region's waterways.

A key learning from this scenario is that even with the extensive existing effort and resources contributed by waterway managers, agencies and the community, it will be extremely difficult to maintain all the waterway values everywhere. This knowledge provides a definitive call to action, and confirms that aligned, increased and collaborative efforts will be required over the next 10 years.

Target Trajectory

This scenario represents what can be achieved with an increase in coordinated, collaborative and prioritised effort. It is the scenario that the Strategy partners have agreed is required. Maintaining, and where possible improving, waterway health is what the *Healthy Waterways Strategy* proposes to achieve. This 'target trajectory' includes assumptions on policy allowing increased standards for stormwater management, increased resources for waterway management, willingness to take collaborative actions, and that it is feasible to establish continuous vegetation buffers along the majority of waterways.

The current status and trajectories for key values and waterway conditions are displayed on a scale ranging from very low to very high. Further detail about the rankings for each key value or waterway condition is included at the end of this *Co-Designed Catchment Program*. Figure 8 shows the score key and compares the current status and trajectories of a sample key value. Further information on the matrix scales is included at the end of the document.

Understanding the trajectories

Current state	Current trajectory	Target trajectory	Description
Mod.	Low	High	Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is high.

Score key: Very High · High · Moderate · Low · Very Low

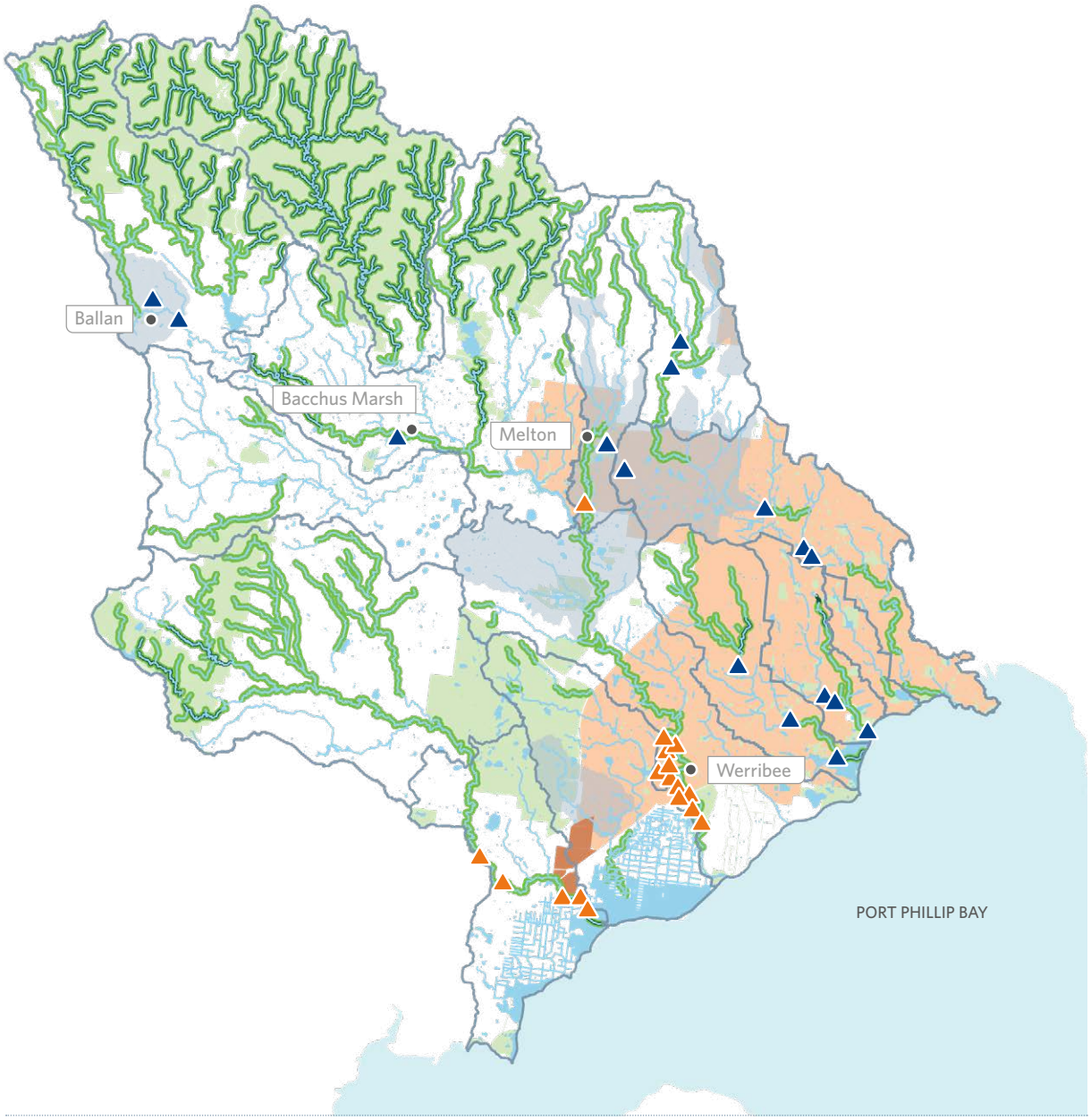


Figure 8 Summary of priorities in the Werribee catchment region

Note: This map does not show headwater streams, some minor tributaries, waterbodies on private land or wetlands greater than one hectare.

Catchment Program for the Werribee Catchment Region

This section provides:

- A summary of priorities in the Werribee catchment region (Figure 8)
- Regional performance objectives that apply across all five major catchments in the *Healthy Waterways Strategy* including the Werribee catchment region
- A summary of the performance objectives, key values and waterway conditions for all of the sub-catchments, a sub-set of wetlands and estuaries in the Werribee catchment region
- Detailed information for all 14 sub-catchments, sub-set of 35 wetlands and five estuaries in the Werribee catchment region. Information on the wetlands and estuaries is listed immediately following its respective sub-catchment
- Further information about the key value and waterway condition metrics.

Regional Performance Objectives

Cultural Values

RPO-1.	Traditional Owners and Aboriginal Victorians have an increased expertise in contemporary land and waterway management, waterway science and lore.
RPO-2.	Partnership projects build on what is working. Expertise developed in one project is applied in others.
RPO-3.	Traditional Owner groups and Aboriginal Victorians are supported by industry partners to influence the agenda for waterway management by proactively developing communications, resolutions or project scopes and seeking industry partners.
RPO-4.	Aboriginal and Traditional Owner cultural awareness training is available to all industry professionals and is actively pursued.
RPO-5.	Cultural competency is valued as a career skill and leads to ongoing relationships.
RPO-6.	Partnerships are fostered between Traditional Owner groups and research groups, and Traditional Owner groups and community groups.
RPO-7.	Public events led and/or organised by Traditional Owners are regular and frequent.

Economic Values

RPO-8.	Environmental-economic accounts are developed for the region's waterways using contemporary international standards, and are used to demonstrate the returns on catchment and waterway investment.
RPO-9.	Environmental-economic accounting is incorporated into *Healthy Waterways Strategy* monitoring, evaluation and reporting (MER) by 2023.

Regional Performance Objectives continued

Region-wide threats to waterway values

RPO-10.	An adaptive pathways approach is adopted to understand and manage the risks of climate change on waterways.
RPO-11.	Understanding of groundwater dependent ecosystems is improved and opportunities to maintain or improve these continue to be investigated.
RPO-12.	Water for the Environment continues to be managed and delivered to the region's rivers and wetlands and recovery options continue to be investigated.
RPO-13.	Industry capacity for whole of water cycle and stormwater management is increased to enable collaboration, improved access to information and knowledge, and a skilful and capable industry with strong established networks.
RPO-14.	Standards, tools and guidelines are in place and implemented to enable reuse and infiltration of excess stormwater, and protect and/or restore urban waterways.
RPO-15.	Victoria's planning system is used effectively to protect and enhance waterway corridors.
RPO-16.	Protection mechanisms are in place for headwaters to ensure that they are retained as features in the landscape for environmental, social, cultural and economic benefits.
RPO-17.	Water quality in waterways and bays is improved by reducing inputs of sediment and other pollutants from urban construction and development.
RPO-18.	Critical waterway health assets including stormwater treatment systems, fishways and erosion control structures are maintained for their designed purpose or same outcomes delivered by alternative means.
RPO-19.	Options to transform modified waterways by creating more natural, community-loved spaces are identified and implemented.
RPO-20.	The amenity, community connection and recreation values of wetlands are better understood. Performance objectives are developed to enhance these values.
RPO-21.	The multiple benefits of waterways investment are tracked and understood.
RPO-22.	Cooler, greener and more liveable urban environments are created through revegetation and as part of managing excess stormwater.
RPO-23.	The potential impacts of emerging contaminants of concern such as microplastics, pesticides and pharmaceuticals, and toxic chemicals are better understood and mechanisms to respond collaboratively developed.
RPO-24.	Risk based programs are in place to mitigate sources of urban pollution (licenced and unlicensed discharges) to protect bays and waterways.
RPO-25.	Programs, standards, tools and guidelines are in place to manage nutrients, sediments and other pollutants from rural land in priority areas.

Regional Performance Objectives

Region-wide threats to waterway values

RPO-26.	Methods are in place to assess volume and source of litter to inform and promote litter reduction programs.
RPO-27.	Incidence of littering and illegal dumping is reduced through raised community awareness and knowledge, infrastructure and enforcement.
RPO-28.	Seasonal Herbaceous Wetland vegetation communities are identified and a management program is in place to protect them on public and private land.
RPO-29.	Programs, standards, tools and guidelines are in place to protect wetland vegetation communities from urban and rural threats, including adequate planning controls.
RPO-30.	Climate change resilient revegetation management practices are understood and implemented by selecting plant species, provenances and vegetation communities that are suited to projected future climatic conditions.
RPO-31.	A risk-based approach is adopted to prevent, eradicate and contain pest plants and animals (including deer) and protect waterway assets.

Supporting governance framework

RPO-32.	Programs are in place to protect and enhance sites of biodiversity significance associated with the region's waterways, such as through Melbourne Water's Sites of Biodiversity Significance Strategy.
RPO-33.	A Region-wide Leadership Group and Catchment Implementation Forums are established to support work towards the vison and goals of the *Healthy Waterways Strategy* at the regional and catchment scales.
RPO-34.	Waterway Labs are established as needed to tackle complex or region-wide priorities.
RPO-35.	The effectiveness of the Leadership Group, Catchment Implementation Forums and Waterways Lab are evaluated, through ongoing feedback, and one interim and one final assessment during the life of the Strategy.
RPO-36.	The Catchment Implementation Forums improve the coordination of information and activities by catchment stakeholders and communities (while ensuring waterway management includes the whole of catchment perspective).

Regional Performance Objectives continued

Engaged and knowledgeable community and stakeholders

RPO-37.	Participation rates in education, capacity building, incentive programs and citizen science activities have increased and enable greater levels of environmental stewardship for our waterways.
RPO-38.	Key messages, stories and resources for waterways and waterway health are collaboratively developed and broadly distributed, increasing community knowledge and engagement around waterways.
RPO-39.	Systems and pathways to share knowledge and information between communities and stakeholders have been developed and expanded to empower communities to participate and influence waterway management (for example digital portals, social media, Communities of Practice, signage programs).
RPO-40.	The profile of waterways is lifted, local connections to waterways are increased and leaders in waterway management are celebrated and fostered.

Adaptive Management and Reporting

RPO-41.	A monitoring, evaluation and reporting plan is in place by 30 June 2019.
RPO-42.	Wetland condition information and prioritisation, with a focus on vulnerable wetlands, is understood and informs collaborative planning.
RPO-43.	The social values framework, information and methods used to develop values assessments, targets and performance objectives are further developed and improved during the life of the strategy.
RPO-44.	Web-based systems are established to report performance and measure outcomes of the *Catchment Implementation Forums* (by 30 June 2020).

Knowledge Gaps and Research

RPO-45.	Research partnerships with universities and other research institutions are in place to address the Key Research Areas and build our knowledge and capacity to efficiently and effectively achieve the *Healthy Waterways Strategy* performance objectives and Targets.

Further information on these regional performance objectives can be found in Part C of the *Healthy Waterways Strategy.*

Werribee Catchment Region Overview

This overview presents a summary of the performance objectives, key values and waterway conditions for the rivers, a sub-set of wetlands and estuaries in the Werribee Catchment Region.

Overview of Performance Objectives for Rivers
Progressively implement stormwater harvesting in the lower and middle reaches of the Werribee River and Toolern and Lollypop Creeks. Once this catchment has reached its anticipated long term urban footprint (2050), this will require around 16.9 GL/year of stormwater harvested and 3.0 GL/year infiltrated. Ensure directly connected impervious (DCI) levels in these priority catchments do not increase beyond current levels and headwater streams are retained as features in the landscape for environmental and social benefits.
Investigate options to increase the environmental water reserve by 7 GL/year by 2028 to meet ecological watering objectives and cover projected shortfalls. Any water recovery for the environment will be considered through the Victorian SWSs, markets and use of alternative water.
Identify opportunities to maintain or improve the flow regime in refuge reaches to support instream values, including platypus.
Investigate and mitigate the threat of erosion in Kororoit Creek Lower, Lollypop Creek, Skeleton Creek, Toolern Creek, Werribee River Lower and Werribee River Middle waterways using a risk-based approach.
Maintain 196 kilometres of high and very high quality vegetation (vegetation quality levels 4 and 5) through effective monitoring and management of threats.
Establish 439 km and maintain 671 km of continuous vegetated buffers (using EVC benchmarks and to at least a level 3 vegetation quality) along at least 80 per cent of priority reaches (including sections of Werribee River (including tributaries), Little River, Lollypop Creek, Skeleton Creek, Laverton Creek, Cherry Creek and Kororoit Creek). In addition, increase vegetation cover in existing and planned urban areas by 3 km to support social values.
Increase access to and along waterways by 34 km by improving connections with existing path networks and extending paths into new urban area. Investigate opportunities to improve access for on-water activities.
Reduce nutrient and sediment runoff from rural land through improved management of 320 ha of land including works to protect and increase vegetation along headwater streams.
Provide connectivity for fish along major waterways through the removal of 18 barriers by 2028. This will improve fish passage in Werribee River between the estuary and Melton Reservoir, in Little River between the estuary and Little River township and in Toolern Creek through Melton.
Conserve all currently listed water dependent species and communities (20 fauna species, 104 flora species and 39 EVCs) through habitat protection, research and monitoring.

Werribee Catchment Region Overview - Rivers

Score key: Very Low | Low | Moderate (mod.) | High | Very High

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds score for rivers is currently moderate overall and likely to decline over the long term under current trajectory. The target is to maintain as moderate.
low	low	mod.		Fish score is currently low overall but can be improved to moderate through improved instream connectivity, stormwater management, provision of adequate stream flows and streamside revegetation.
mod.	low	mod.		Frogs score is currently moderate overall. However, in the long term scores are likely to decline because of increased urbanisation, land use intensification, introduced predators and deteriorating water quality. The target is to maintain the frog score as moderate.
mod.	mod.	very high		Macroinvertebrates score is moderate overall. Scores are higher in the forested headwaters, but the catchment has been impacted by land use intensification and urbanisation that has resulted in changes to stream flows, water quality and instream habitat. The target is to improve to very high.
low	very low	low		Platypus are distributed in those parts of the Middle and Lower Werribee River system (includes Lerderderg River) that have reliable summer flow regimes. The Werribee population is considered threatened due to low numbers, continuing long-term decline and the severe impacts drought has had on populations. With projected reduced flows they are likely to decline without intervention. The target is to maintain current populations.
mod.	low	mod.		Vegetation score is currently moderate, which is mainly due to the modified nature of the catchment. The current trajectory is low. However, with increased effort the potential trajectory is to maintain moderate scores. Forested areas of the upper catchments have higher values for riparian vegetation; however, where land clearing has been extensive, streamside vegetation is in very low to moderate condition. Revegetation projects are helping to improve riparian vegetation.
high	mod.	high		Amenity score, which is based on level of satisfaction, is currently high but likely to decline with increased urbanisation and population growth. The target is to maintain as high.
high	mod.	very high		Community connection score, which is based on level of satisfaction, is currently high but likely to decline with increased urbanisation. The target is to improve to very high. Thirty-three per cent of people in the Werribee catchment visit waterways at least fortnightly and 80 per cent are satisfied with waterways.
high	high	high		Recreation score, which is based on level of satisfaction, is currently high and likely to remain high. The target is to maintain at high.

Score key: Very Low | Low | Moderate (mod.) | High | Very High

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	mod.	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is high.
mod.	mod.	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is high.
high	mod.	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is high.
low	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
mod.	mod.	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is high.
low	low	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	mod.	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Werribee Catchment Region Overview - Wetlands

Overview of Performance Objectives for Wetlands
Protect refuge habitats through providing an appropriate wetland water regime and vegetation buffer.
Implement the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site Management Plan for wetlands in the catchment.
Implement key actions to plan for climate change adaptation and resilience.
Reduce the threat of invasive animals such as dogs, cats and foxes to protect key wetland bird habitats.
Increase the buffer of native vegetation around key wetlands.
Investigate opportunities to improve the water regime of key wetlands to meet ecological watering objectives, improve ecosystem services, and cultural and social value.
• Implement the outcomes of the Melbourne Strategic Assessment on the Western Grassland Reserves, and associated management.
Reduce threat of invasive plant species, including the impact of salt tolerant species in significant coastal wetlands.
Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance the values.

Werribee Catchment Region Overview - Wetlands

Score key: Very Low | Low | Moderate (mod.) | High | Very High

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low		Wetlands bird score is currently low. However, there are many wetlands in the Werribee catchment that are recognised for their significance as bird habitat. Bird habitat at coastal wetlands may be severely impacted by the predicted impacts of climate change which may affect wetland watering regimes, salinity regimes and vegetation communities.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this region will be developed through the Strategy implementation.
	high	very low	mod.		Frogs score is currently high, with a current trajectory of very low. Significant decline to wetland water regimes and water quality as a result of urbanisation and climate change impacts will affect frogs. Actions to reduce these threats may somewhat mitigate these impacts and retain the frog score at moderate.
	low	very low	mod.		Vegetation score is currently low. Implementing programs to improve wetland buffers, vegetation condition and habitat form is predicted to improve this score to moderate. Forward planning for adaption and migration of coastal wetland and estuarine vegetation is essential in light of predicted climate change impacts.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Werribee Catchment Region Overview - Estuaries

Overview of Performance Objectives for Estuaries
Enhance estuarine vegetation condition and reduce threat of invasive plant species to significant estuarine vegetation communities.
Protect refuge habitats through maintaining critical stream flow components.
Improve longitudinal connectivity in estuaries.
Plan to enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaption to climate change risks.
Reduce flow stress to the Little River and Werribee estuaries.
Investigate opportunities to improve access for on-water activities, and improve connections with existing path networks.
Enhance site appropriate opportunities for recreation (boating, fishing, walking/cycling).
Enhance site appropriate facilities that support passive enjoyment and recreation.

Werribee Catchment Region Overview - Estuaries

Score key: Very Low | Low | Moderate (mod.) | High | Very High

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	mod.	low	mod.	Birds are a significant waterway value across the catchment, with 350 bird species being recorded including 134 species of waterway specialists. Estuaries bird score is currently moderate, with a current trajectory of low. Improvement to estuarine wetlands connectivity, vegetation and flow regime will maintain the bird score at moderate. The Little River and Werribee estuaries provide significant habitat.
	high	mod.	high	Fish score for estuaries is high with a current trajectory of moderate. Changes to the estuarine water regime as a result of urbanisation and climate change may impact fish communities. A good diversity of estuarine dependent species inhabit the estuaries and are likely to remain. The target is to maintain at high.
	low	very low	mod.	Vegetation score is currently low with a current trajectory of very low. Forward planning for adaption and migration of coastal wetland and estuarine vegetation is essential in light of predicted climate change impacts. The target is to improve to moderate.
	mod.	mod.	high	Amenity score is moderate with a current trajectory of moderate. Increased tracks, pathways and other facilities, along with improvements to estuarine vegetation are predicted to improve the amenity value to high.
	very high	very high	very high	Community connection score is very high and will remain very high. Community groups are active for estuaries in this catchment.
	mod.	mod.	high	Recreation score is moderate with a target to increase to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	mod.	Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is moderate.
	high	mod.	high	Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is high and the target is high.
	mod.	high	high	Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is moderate and the target is high.
	mod.	very low	low	Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is low.
	low	very low	mod.	Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is low and the target is moderate.
	low	low	mod.	Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is low and the target is moderate.

"You have to work with people effectively and have good relationships to get things done. I've been opinionated and encouraged and thrilled by the collaborative process."






"It is possible, because we've had such a wonderful collaborative process here where you've brought all parties together and the ideas have generated a commitment and a consensus on the problem, we can look at how we can advocate for change in the way land is used, the way water is treated asa commodity in some sectors of the community. We can look at how we can advocate to hold our creeks so that in the future they may live more healthily."

The following section presents detailed information for all 14 sub-catchments including 35 wetlands and five estuaries. Information on the wetlands and estuaries is listed immediately following the respective sub-catchment.

Cherry Creek

- Cherry Lake, Cherry Creek

Kororoit Creek Lower

- Deans Marsh, Rockbank
- Jawbone Reserve
- Kororoit Creek No. 3
- Paynes Rd Swamp
- Rockbank No. 1
- Troups Rd Swamp
- Rockbank Railway Swamp
- Kororoit Creek Estuary

Kororoit Creek Upper

- Wetland at Holden Road Diggers Rest

Laverton Creek

- Altona Treatment Plant
- Truganina Swamp, Laverton Creek
- Laverton Creek Estuary

Lerderderg River

Little River Lower

- Baths Swamp (Western Grassland Reserve)
- Black Forest Rd Wetland (Western Grassland Reserve)
- Kirksbridge Rd W Wetland (Western Grassland Reserve)
- Richmonds Grass Swamp (Western Grassland Reserve)
- The Spit Nature Conservation Reserve
- Western Treatment Plant – Ponds
- Western Treatment Plant - Ryans Swamp
- Little River Estuary

Little River Upper

- Greens Rd E Wetland No. 2 (Western Grassland Reserve)
- Rabbitters Lake and Swamp (Western Grassland Reserve)
- West Quandong Swamp (Western Grassland Reserve)

Lollypop Creek

- Black Swamp
- Live Bomb Wetland (Western Grassland Reserve)
- Western Treatment Plant - Paul & Belfrages Wetland
- Wyndham Vale Swamp
- Balls Wetland Complex (Western Grassland Reserve)
- Target Range Swamp (Western Grassland Reserve)
- Cobbledicks Ford Reserve (Western Grassland Reserve)

Parwan Creek

- Jenz Swamp
- Wetland near Rolling Thunder Raceway

Skeleton Creek

- Cheetham Wetlands
- Laverton RAAF Swamp
- Skeleton Creek Estuary

Toolern Creek

Werribee River Lower

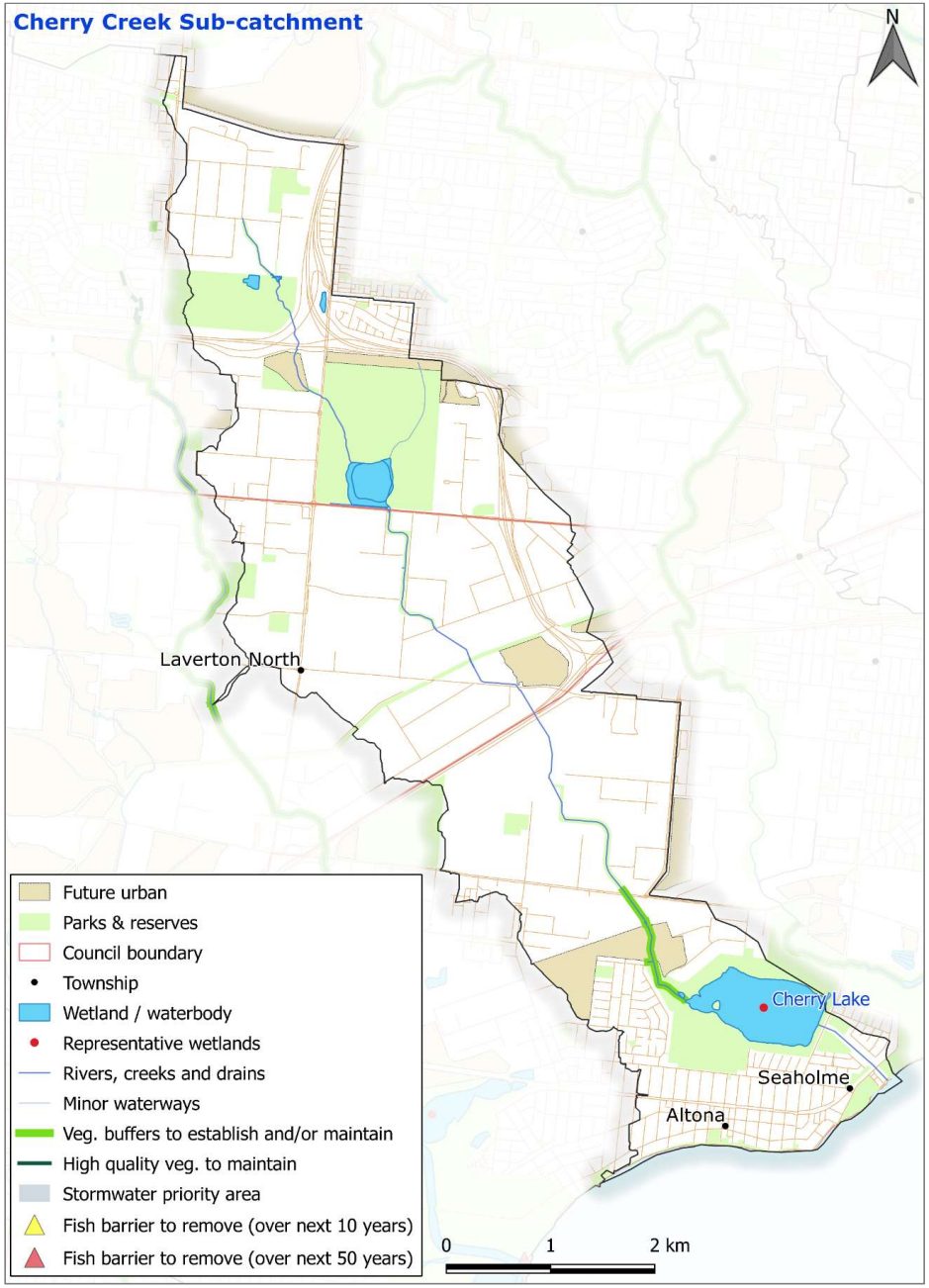
- Point Cook Wetlands - RAAF Lake
- Cunningham's Swamp
- Point Cook Wetlands - Spectacle Lake
- Werribee River Estuary

Werribee River Middle

Werribee River Upper

Further information about the key value and waterway condition metrics.

Cherry Creek Sub-catchment



Description

Cherry Creek was once a drainage line with a series of shallow wetlands and ponds on basalt plains populated by native grasses around Laverton and Altona. Today its form has been substantially modified to improve drainage and reduce flooding on nearby industrial land. A large coastal swamp in its lower reaches has been formed into a retarding basin and the very popular recreation area, Cherry Lake. Sedgeland around the lake is home to the rare Altona skipper butterfly and several species of waterbirds. Modifications to the creek have significantly reduced native vegetation, although some native grassland reserves remain in the catchment.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Industrial pollution investigation to find illegal connections. Need to protect Cherry Lake and Port Phillip Bay."

"Improve vegetation in Andersons swamp and restore natural hydrology."

"Naturalization of creek. Is this economically feasible?"

"Managing habitat for birds. Opportunity for planting. Re-vegetation at Cherry Lake and Andersons swamp."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Cherry Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 4 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Access	Increase access to and along waterways from 5% to 31% (about 3 km of path) by improving connections with existing path network and extending paths into new urban areas.
3	Water Quality – Recreational	Maintain recreational water quality at Cherry Lake (suitable for secondary contact).
4	Participation	Increase participation rates from moderate to very high; support community groups and capacity building programs for business/industry. Engage with schools to increase citizen science participation.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Cherry Creek Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	mod.		We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. The urbanised sub-catchment means poor water quality and non-natural flow regimes, which lead to a likely riparian bird score of low. Significant species include three egrets: eastern great, intermediate and little.
very low	low	mod.		Fish are currently rated as very low due to a lack of suitable instream and riparian habitat. This is largely due to extensive channel modification for flood protection and urbanisation (with the associated impacts of stormwater). The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to vegetation, flows (particularly stormwater) and water quality are expected to increase the rating to moderate over the long term whilst also supporting less common native fish.
very low	low	low		Frog score is very low since very few of the expected species of frog were recorded. With appropriate management the score could be improved to low.
very low	very low	very low		Macroinvertebrates are currently rated as very low due high levels of urbanisation which has led to poor habitat, excessive flows and poor water quality. There are no known listed species in this sub-catchment. The potential trajectory is rated as very low. Substantial improvements are required in urban stormwater management, instream habitat improvements and riparian revegetation to increase the rating in the long term.
n/a	n/a	n/a		Ephemeral waterways such as Cherry Creek are assumed to have never supported platypus populations. For this reason, there is no assessment or setting of targets.
low	very low	mod.		Vegetation is rated as low overall as a result of large scale landuse change. There are 20 listed water dependent species remaining and 3 bioregional conservation status (BCS) endangered EVCs. Through revegetation and management of threats the long term outcome is to improve the rating to moderate.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	high	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
low	low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is low and the target is low.
very low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very low and the target is moderate.
very low	very low	low		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is low.
mod.	mod.	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is moderate.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
very low	very low	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is very high.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	low	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Cherry Lake, Cherry Creek

Description

Cherry Lake, which is managed by Melbourne Water, is a flood retarding basin created in the 1970s to help prevent flooding of the rapidly expanding Altona residential area. The wetlands were converted to a lake with construction of retaining walls, levees, and flow channels. The lake and surrounding reserve is an important wildlife habitat and popular for recreation. The wetland provides habitat for the endangered Altona skipper butterfly (Hesperilla flavescens flavescens).

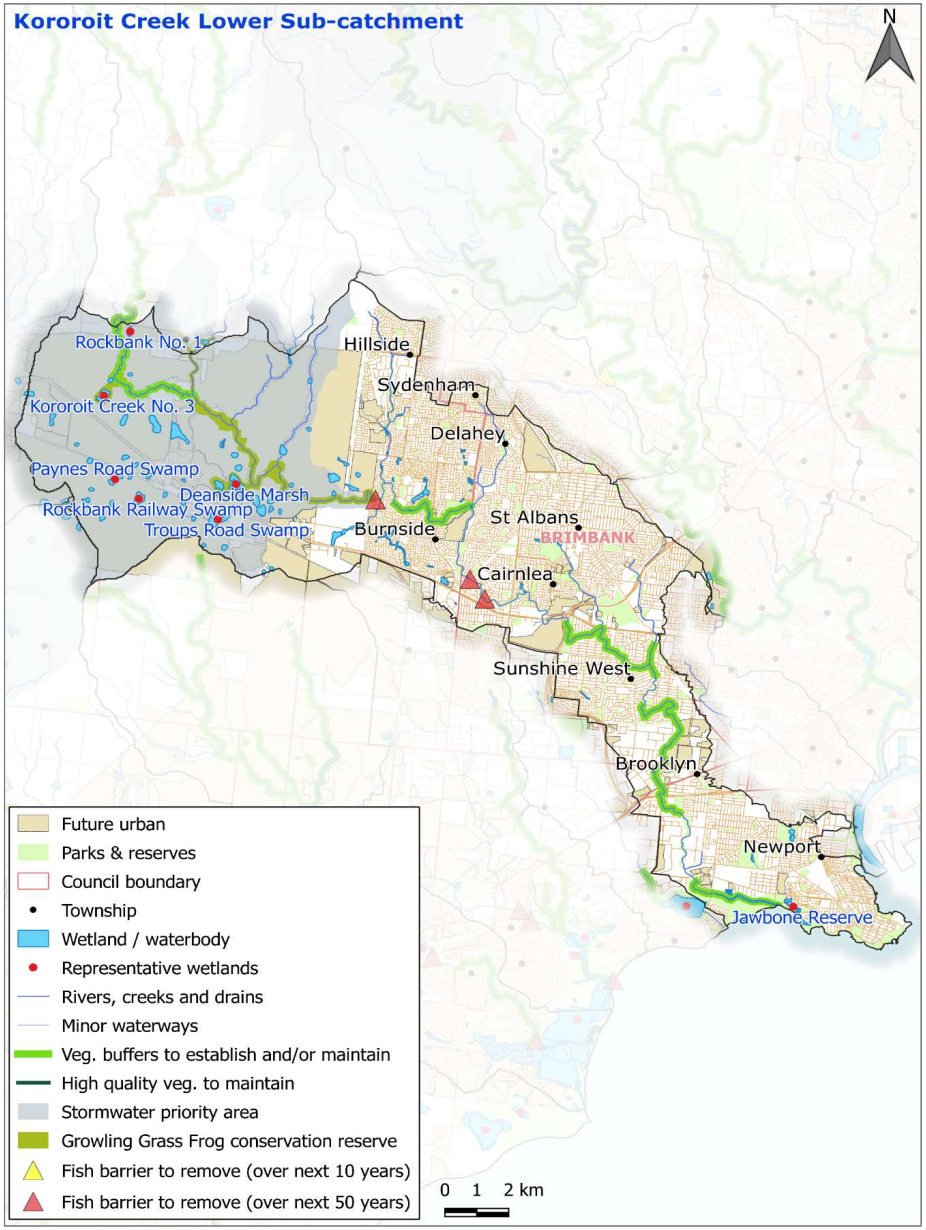
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Understand and manage water regime to ensure emergent macrophytes continue to support Altona skipper butterfly.
2	Unaligned	Minimise threat of acidification through appropriate works practices in acid sulfate soils.
3	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
4	Wetland habitat form	Reduce threat of rabbits, dogs, cats and foxes to moderate.
5	Vegetation condition	Protect high value saltmarsh and native grassland in lower Cherry Creek.
6	Vegetation condition	Ensure invasive wetland flora threat is low.

Cherry Lake, Cherry Creek

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird score at Cherry Lake is currently very low. Continuing threats associated with urbanisation including changed wetland water regime, poor vegetation quality and poor wetland water quality will maintain the wetland bird score as very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very low		The frog value at Cherry Lake is currently very high and is predicted to decline to very low in the long-term. Threats including poor water quality, changed wetland water regime and very poor wetland vegetation quality will limit the frog community.
	very low	very low	very low		The wetland vegetation score is currently very low. Climate change impacts associated with sea level rise and increasing salinity will limit improvement in vegetation value, which is therefore likely to remain very low.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	very low	very low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is low.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Kororoit Creek Lower Sub-catchment



Description

Kororoit Creek, which begins in the rural foothills of the Great Dividing Range around Gisborne and Sunbury, comprises two main branches, East and West Kororoit that join on the basalt plains above Melton. The creek enters the western suburbs of Melbourne at Caroline Springs and Deer Park and passes through substantial areas of industrial land use and other urban areas before meeting Port Phillip Bay at Altona. The growling grass frog is present in some sections of the creek, as are native water rats (rakali), and remnant native grasslands form habitat for the endangered striped legless lizard. Significant remnant stands of saltmarsh and white mangroves can be found in the lower reaches, which are also home to a large number of waterbirds including rare and threatened species. There is considerable evidence that the creek was used extensively by Aboriginal people before European settlement.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Creek naturalization to continue. Stony Creek, Jones Creek."

"Reinstate natural wetlands (e.g. Altona Coastal Park) for biodiversity."

"Large scale riparian understory restoration as opposed to mowed grass. Create buffer for diversity."

"Include development setbacks in planning scheme."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Kororoit Creek Lower Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Target three areas (min. 2 ha) for habitat improvement for Bibron's toadlet.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (21 km, 85 ha) and maintain existing vegetation (5 km, 21 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Access	Increase access to and along waterways from 33% to 39% (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
4	Participation	Increase participation rates from low to high; support community groups, connect with growth area communities and build capacity of business/industry through waterway health education. Increase support for community/environment groups as population increases.
5	Water for Environment	Maintain critical flow components in refuge reaches along Kororoit Creek to protect instream environmental values.
6	Physical form	Investigate and mitigate threats to physical form and other high values (including impacts of urbanisation).
7	Stormwater condition	To prevent decline in stormwater condition, treat urban development (e.g. Rockbank and Plumpton), so directly connected imperviousness (DCI) along the main stem of Kororoit Creek remains below 0.4% upstream of Monaghans Road. For every hectare of new impervious area, this requires harvesting around 3.8 ML/y and infiltrating 0.7 ML/y, which is about 10.4 GL/y and 1.8 GL/y for full development to the urban growth boundary.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Kororoit Creek Lower Sub-catchment

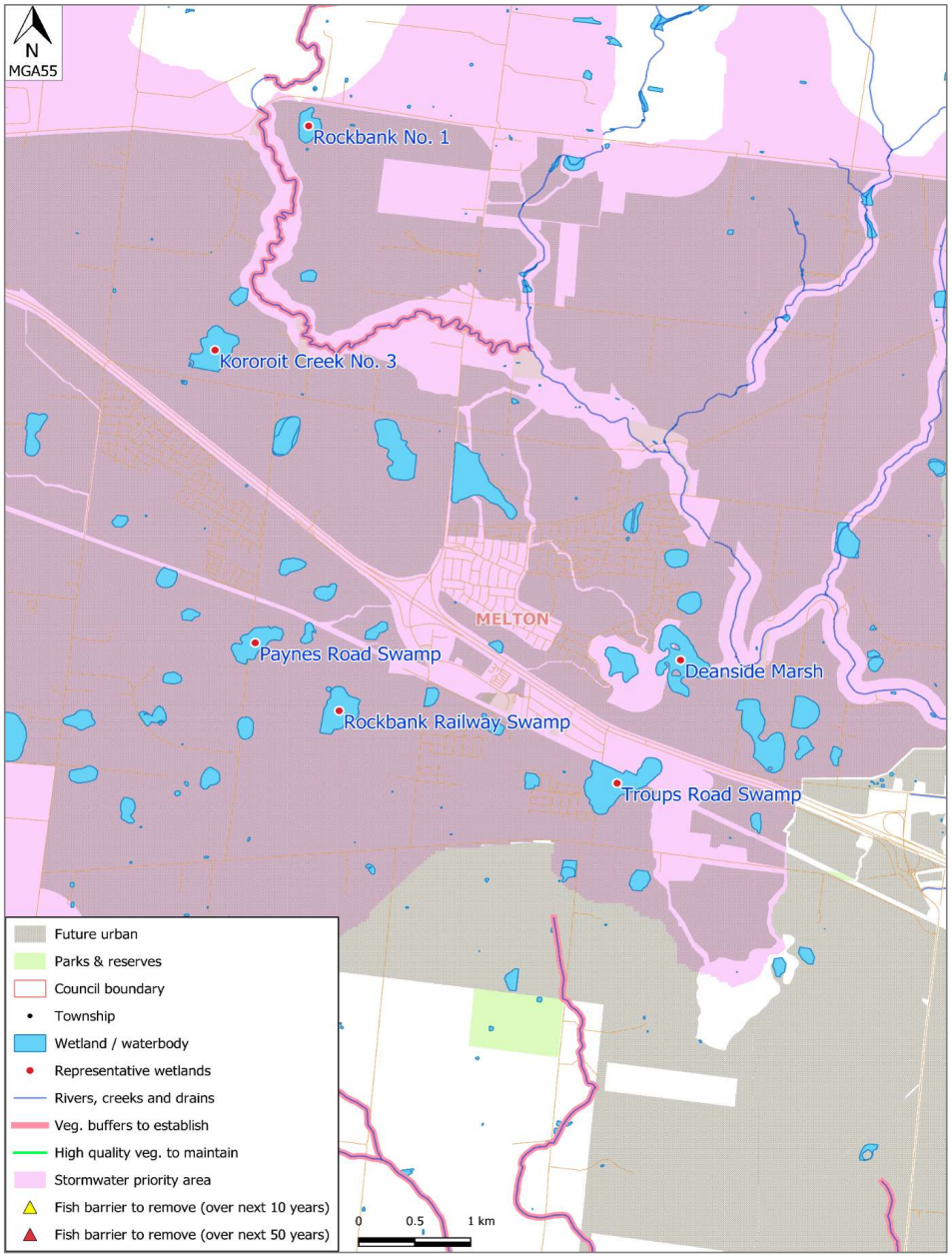
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
mod.	low	mod.	Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change, adequate investment in targeted management such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl and shorebird egrets.
low	mod.	high	Fish are currently rated as low due to a lack of suitable instream and riparian habitat, including impacts from urban stormwater. Barriers to fish movement also restrict access of a number of migratory species. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to vegetation, flows (including urban stormwater management) and removal of fish barriers are expected to increase the rating to high over the long term.
mod.	low	mod.	Frog score is moderate since not as many species of frog were recorded there as expected given the survey effort. With appropriate management the score should be maintained as moderate. Significant species include the growling grass frog and brown (Bibron's) toadlet.
low	very low	low	Macroinvertebrates are currently rated as low largely as a result of urban stormwater impacts, and a lack of instream and riparian habitat, and will decline to very low with continued urbanisation and climate change. There are no known listed species in this sub-catchment. Improvements to instream and riparian habitat through revegetation and stormwater management is expected to maintain the rating at low.
n/a	n/a	n/a	Platypus are no longer expected to be found in Kororoit Creek as a result of large-scale urbanisation, lack of suitable habitat and isolation from the Werribee and Maribyrnong River populations. For this reason, there is no assessment or setting of targets.
low	very low	mod.	Vegetation is rated as low as much of the riparian vegetation is degraded from extensive landuse modification. Without management of existing threats like pest plants and animals and in the face of climate change the rating is likely to drop to very low. There are 29 listed water dependent flora species remaining and 4 bioregional conservation status (BCS) endangered EVCs. Increasing the cover of riparian vegetation and management of key threats will improve the overall sub-catchment rating to moderate.
high	high	very high	Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high	Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
mod.	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
high	mod.	mod.		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is moderate.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
very low	very low	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is moderate.
very low	very low	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is very high.
low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is low and the target is low.
low	low	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is low and the target is very high.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	low	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is low and the target is very high.

Deanside Marsh, Rockbank



Description

Deanside Marsh at Rockbank incorporates several enclosed depressions (intermittent lakes) on the surface of the lava plain. They are sites of geological and geomorphic significance. Although there are many enclosed depressions on the Werribee Plains, most have been severely disturbed by draining, grazing, reclamation or other processes. The two wetlands at this site are therefore important remnants to illustrate the formerly complex drainage and surface water distribution of the plains. The shorelines of the lakes are low and rocky and illustrate the weathering of basalt boulders in a saline wetting and drying environment.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
4	Wetland habitat form	Maintain the current water regime, and ensure that future urban stormwater is not diverted into the two last remaining wetlands.

Deanside Marsh, Rockbank

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low		Wetland bird value is currently low at Deanside Marsh wetland at Rockbank and is predicted to decline to very low. Reducing the threats posed by invasive fauna may maintain the bird value at low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The wetland frog value is currently very high with listed frog species being recorded at the site. Encroaching urbanisation and predicated climate change impacts indicate a current trajectory of decline to very low. However, maintenance of the water regime, improvement to the wetland habitat form and buffer may allow maintenance of the frog value at very high.
	mod.	very low	mod.		The wetland vegetation value is currently rated as moderate. With increasing urbanisation and climate change impacts, particularly the likelihood of stormwater impacting the water regime, the vegetation value is currently predicted to decline to very low. However, use of planning controls mitigate the risk of water regime change and ensuring that an appropriate wetland buffer is protected may somewhat mitigate the risks and allow the vegetation to be maintained at moderate value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Jawbone Reserve

Description

Jawbone Reserve is a stormwater treatment wetland with the primary function of filtering urban stormwater and creating a buffer between the surrounding housing developments and the sensitive costal foreshore area.

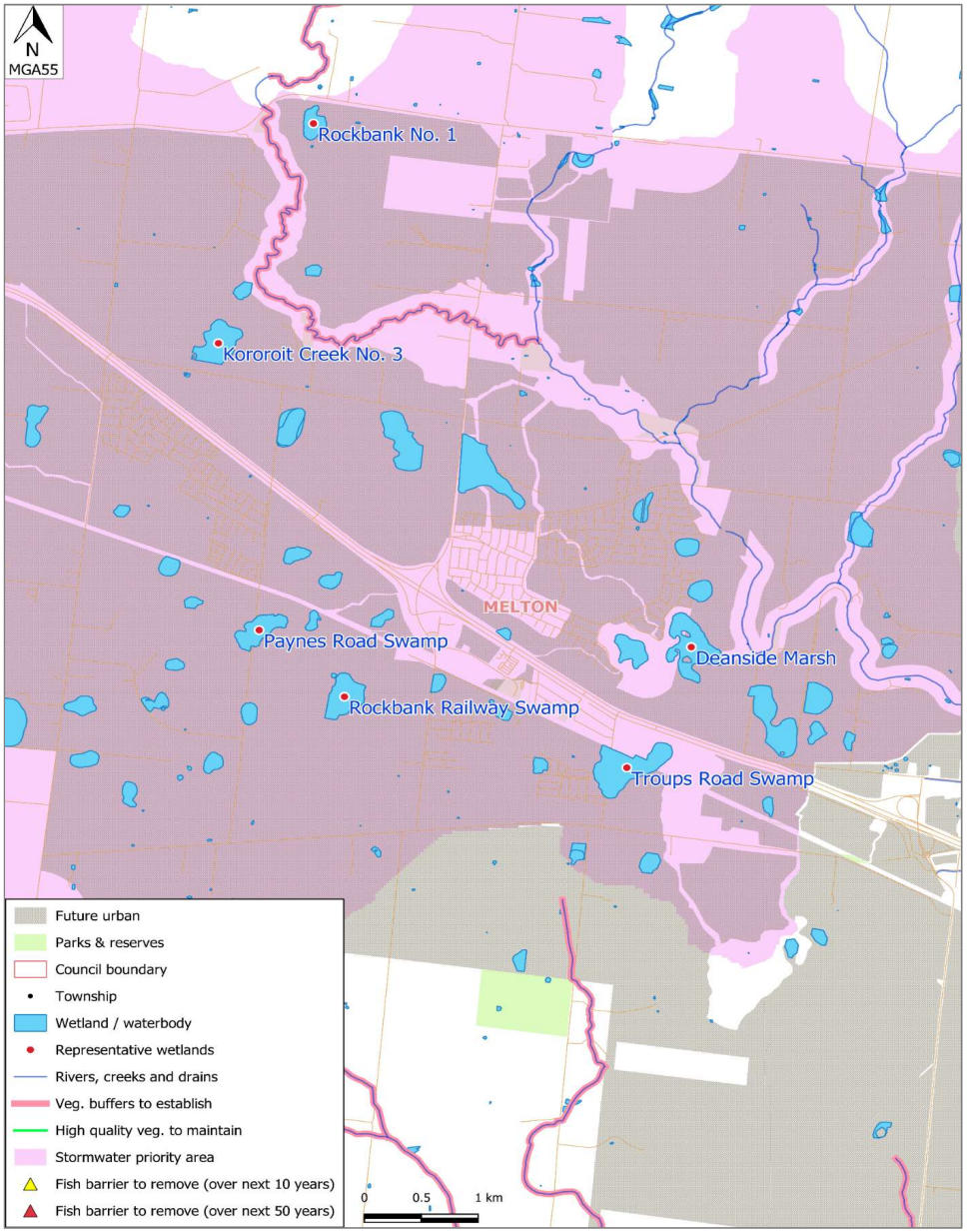
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.

Jawbone Reserve

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The bird value at Jawbone Reserve is currently very low and is predicted to remain very low. Although significant bird species have been found at the wetland, the wetland is managed primarily for its stormwater treatment function.
	n/a	n/a	n/a	Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.	The frog value is currently moderate. The Kororoit Creek Lower sub-catchment frog value score was used for Jawbone Reserve. It is predicted to decline to very low under the current trajectory scenario, and will be maintained at moderate in the long-term.
	mod.	very low	mod.	The wetland vegetation value is currently moderate with a current trajectory of very low. In the long term improvements to the wetland buffer and vegetation condition may maintain the vegetation value at moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is low.
	mod.	mod.	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is moderate and the target is moderate.
	very low	very low	mod.	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	mod.	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	very low	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Kororoit Creek No. 3



Description

Kororoit Creek No. 3 wetland is a Seasonal Herbaceous Wetland protected under the Environment Protection and Biodiversity Conservation Act.

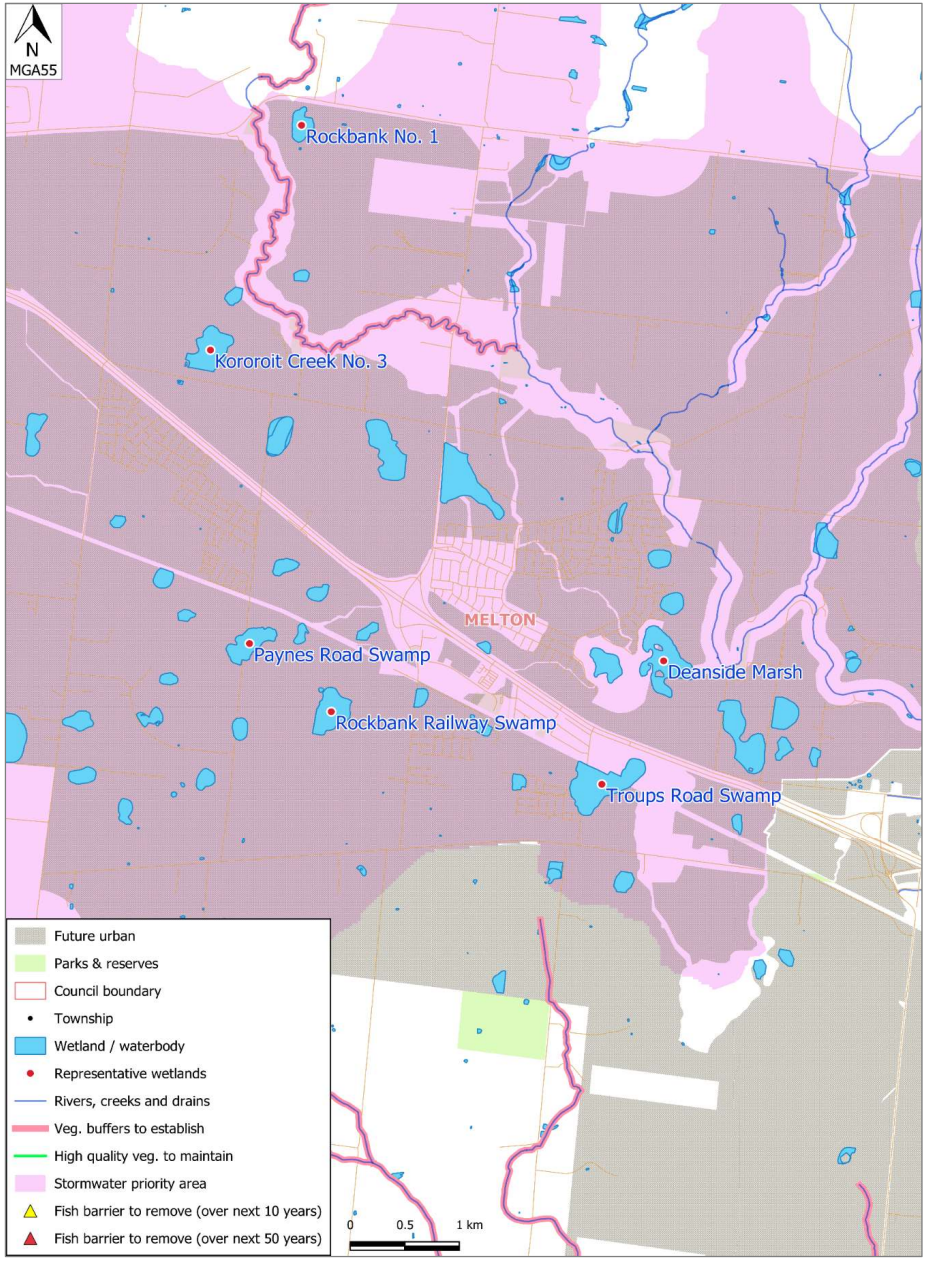
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Undertake Index of index of wetland condition assessment and identify performance objectives after assessment.

Kororoit Creek No. 3

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change and urbanisation will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.		The frog value is currently moderate. The Kororoit Creek Lower sub-catchment frog value score was used for Kororoit Creek No. 3 wetland. It is predicted to decline to very low under the current trajectory scenario, and will be maintained at moderate in the long-term.
	very low	very low	mod.		Kororoit Creek No. 3 wetland is a Seasonally Herbaceous Wetland protected under the Environment Protection and Biodiversity Conservation Act. The vegetation condition is currently very low. Reducing the threats of poor wetland habitat form, buffer and vegetation condition will improve the vegetation value score to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Paynes Rd Swamp



Description

Paynes Road Swamp is a 15 hectare lignum swamp with many large old red gum trees. It is a Seasonal Herbaceous Wetland protected under the Environment Protection and Biodiversity Conservation Act.

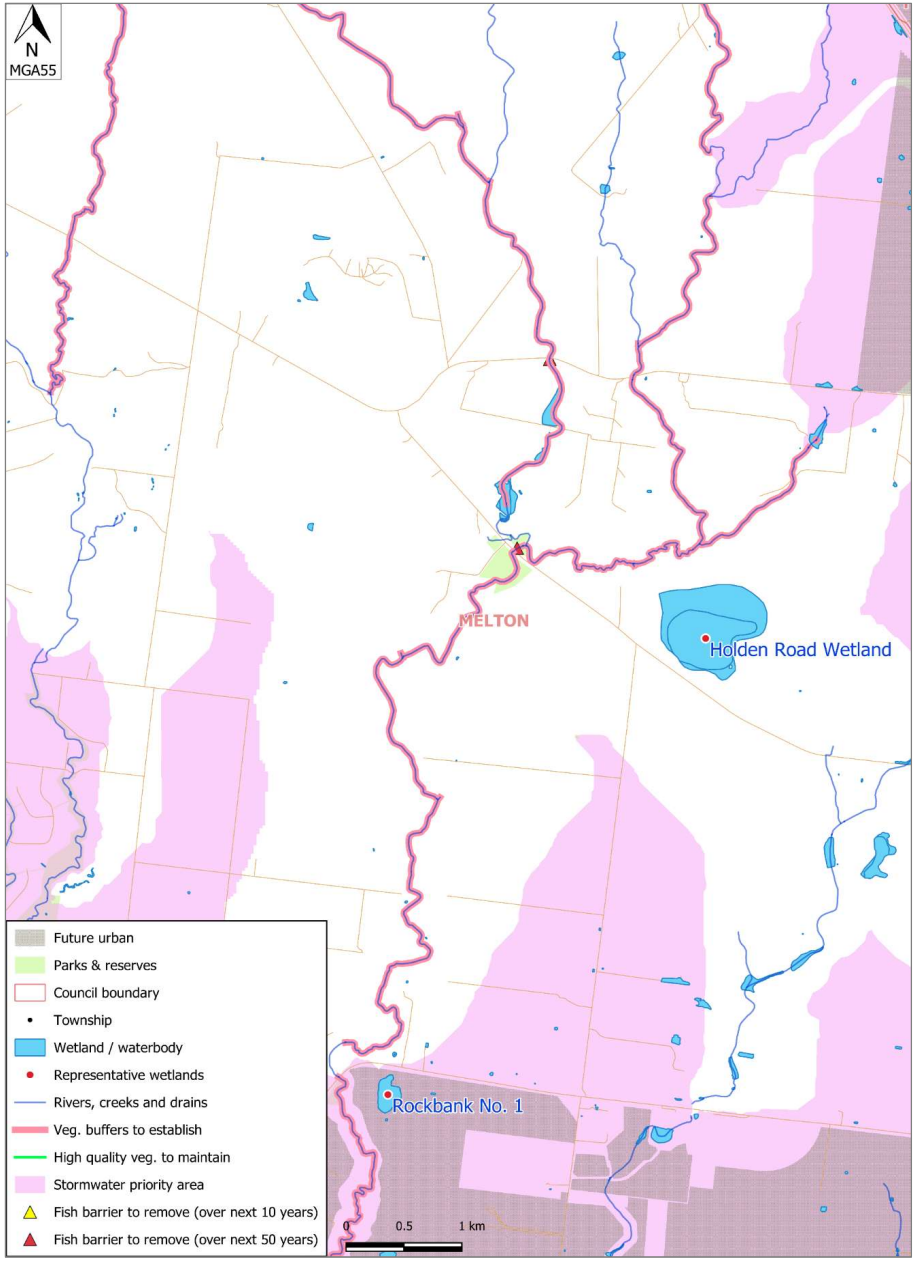
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats, rabbits and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
4	Vegetation condition & Wetland water quality	Confirm threat to wetland from livestock access and reduce threat to low.

Paynes Rd Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low		The bird value score is currently low, with a current trajectory of very low. With improvements to the Lignum vegetation and wetland habitat form, the bird value score could be maintained at low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog value at Paynes Road Swamp is currently very high with listed species being present. Increasing encroachment from urbanisation and predicted drying from climate change means a current trajectory of decline to very low. However, the potential trajectory is to maintain at very high and to protect the listed species present.
	very low	very low	mod.		Paynes Road Swamp is a Seasonally Herbaceous Wetland protected under the Environment Protection and Biodiversity Conservation Act. The vegetation value score is currently very low, however reducing the threats of poor wetland vegetation condition, habitat form and buffer condition, the value may be increased to moderate in the long-term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Rockbank No. 1



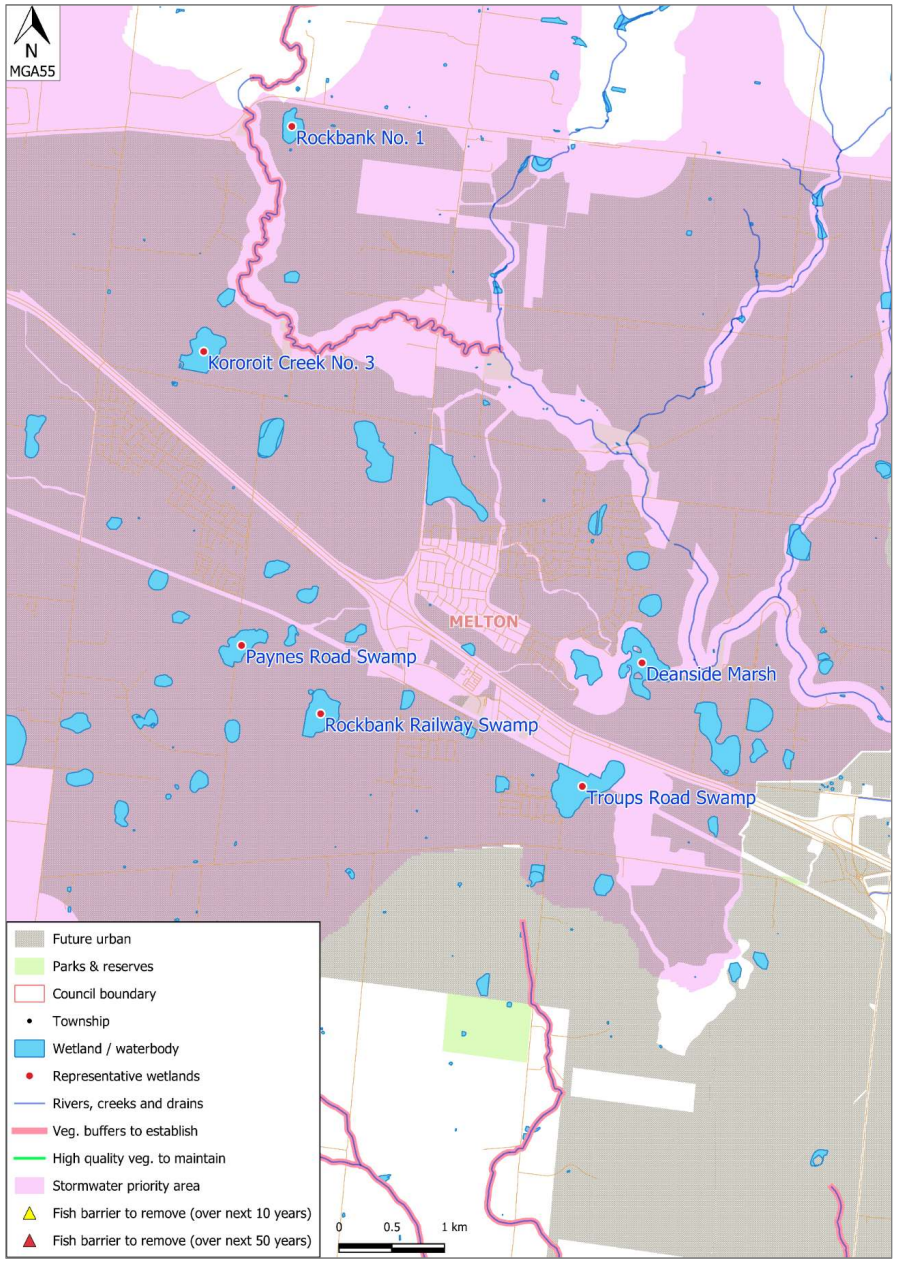
Description
Rockbank No. 1 is a Seasonal Herbaceous Wetland.

Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	All	Undertake Index of index of wetland condition assessment and identify performance objectives after assessment.
2	All	Ensure appropriate planning controls are in place (e.g. Environmental Significance Overlay) to protect Seasonally Herbaceous Wetland.

Rockbank No. 1

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change and urbanisation will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.		The frog value is currently moderate. The Kororoit Creek Lower sub-catchment frog value score was used for Rockbank No. 1 wetland. It is predicted to decline to very low under the current trajectory scenario, and will be maintained at moderate in the long-term.
	very low	very low	mod.		The wetland vegetation value is currently very low. Improvements to wetland vegetation condition, habitat form and buffer condition is predicted to increase the vegetation value to moderate in the long-term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Troups Rd Swamp



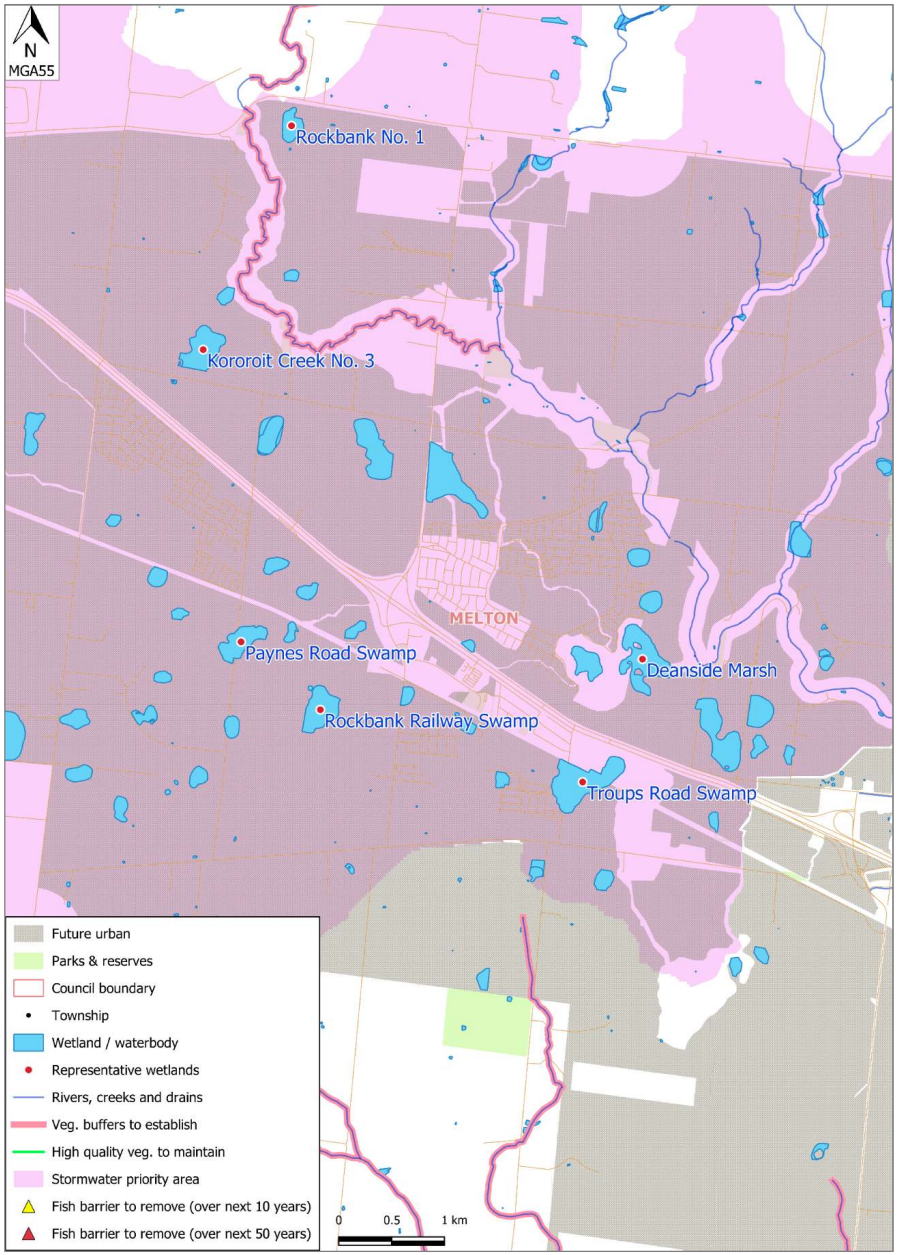
Description
Troups Road Swamp is a Seasonal Herbaceous Wetland.

Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Wetland habitat form	Investigate and implement measures to reduce soil disturbance to low.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
4	Wetland habitat form	Investigate opportunities to improve wetland area and habitat.

Troups Rd Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change and urbanisation will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog value at this wetland is currently very high with listed species being present. Increasing encroachment from urbanisation and predicted drying from climate change means a current trajectory of decline to very low. However, the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.		The wetland vegetation value is currently very low. Improvements to wetland vegetation and buffer condition is predicted to increase the vegetation value to moderate in the long-term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	low	very low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Rockbank Railway Swamp



Description

A Seasonal Herbaceous Wetland that supports breeding populations of black-tailed native hen, black-winged stilt, red-necked avocet and australian shelduck.

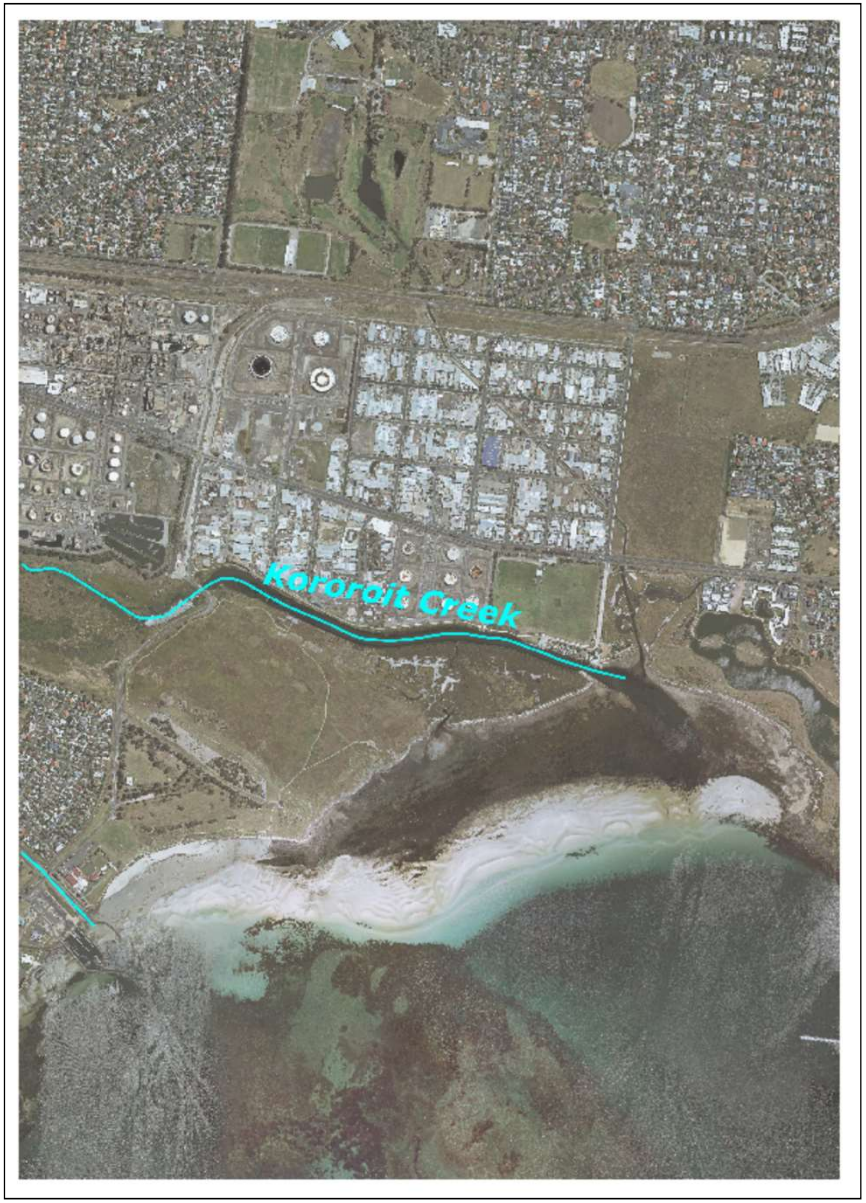
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Undertake Index of index of wetland condition assessment and identify performance objectives after assessment.
2	All	Ensure appropriate planning controls are in place (e.g. Environmental Significance Overlay) to protect Seasonally Herbaceous Wetland.

Rockbank Railway Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change and urbanisation will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.		The frog value is currently moderate. The Kororoit Creek Lower sub-catchment frog value score was used for Rockbank Railway Swamp. It is predicted to decline to very low under the current trajectory scenario, and will be maintained at moderate in the long-term.
	very low	very low	mod.		The wetland vegetation value is currently very low. Improvements to wetland vegetation condition, habitat form and buffer condition is predicted to increase the vegetation value to moderate in the long-term. Unfortunately, the wetland water regime is very low and predicted to remain very low, however with interventions it may be increased to low to support wetland vegetation.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Kororoit Creek Estuary



Description

The Kororoit Creek Estuary opens to Port Phillip Bay between Altona and Williamstown. The estuary extends about 1.5 km upstream to the ford on Racecourse Road. Land use on the northern side of the estuary is a mix of urban and industrial. Altona Coastal Park, which is on the southern side, provides more natural connectivity between the floodplain and the waterway. It also supports mangroves and saltmarsh.

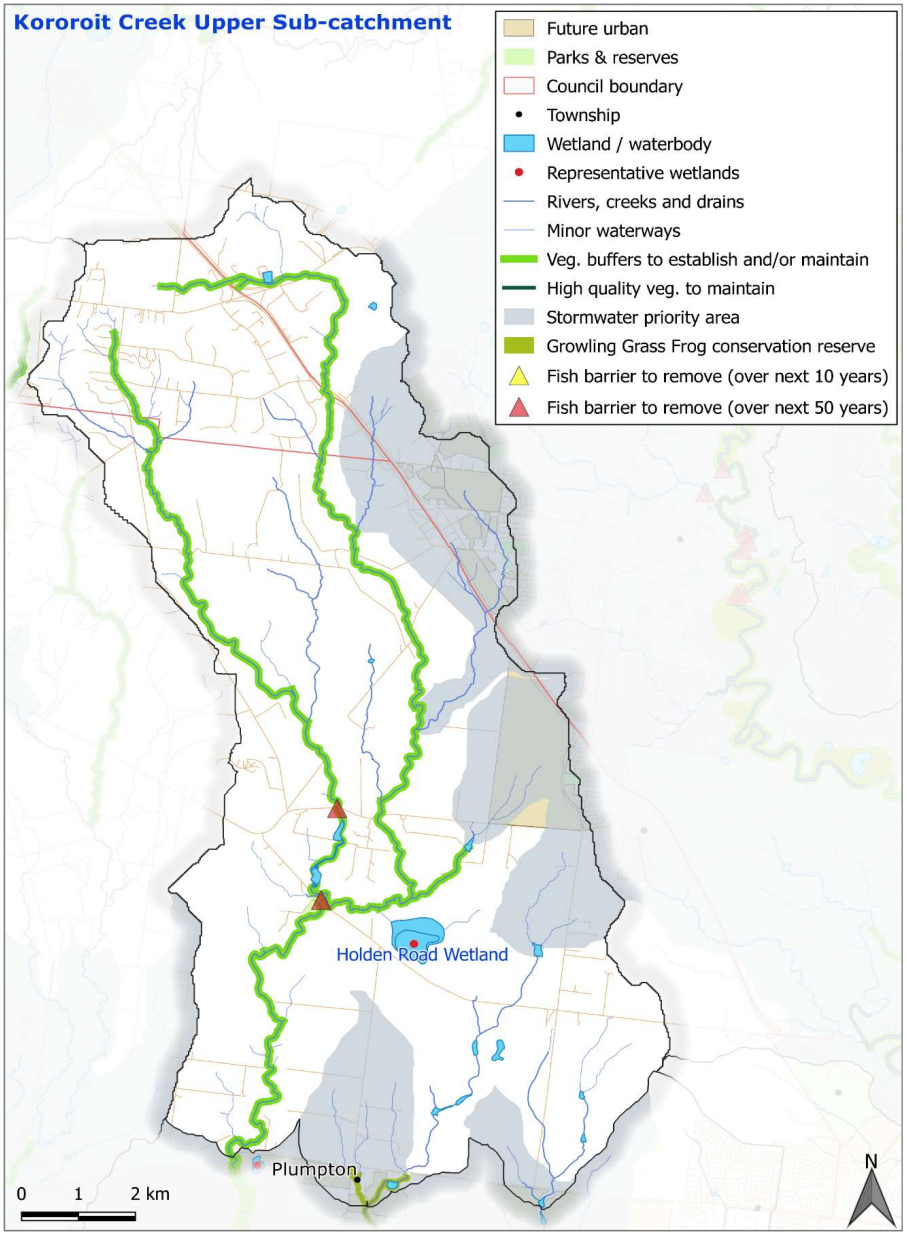
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine wetland connectivity	Improve longitudinal connectivity and tidal exchange by removing barrier at Racecourse Road.
2	Estuarine wetland connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities in Altona Coastal Park to allow adaption to climate change risks.
3	Estuarine vegetation	Enhance remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
4	Access & Recreation	Maintain and support existing opportunities for access and recreation including walking and fishing.
5	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
6	Amenity	Enhance access and facilities that support passive enjoyment.

Kororoit Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	low		The estuarine bird score is currently very low for Kororoit Creek. The estuary is fringed by a highly industrial environment and the predicted climate change impacts will further erode suitable bird habitat. Target is to improve to low.
	high	high	high		The fish value score for the Kororoit Creek is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabits the estuaries and are likely to remain.
	mod.	very low	mod.		The estuarine vegetation value in Kororoit Creek is currently moderate with significant flora species and permanent salt marsh present. Although the current trajectory is very low, reducing the threat of invasive weeds to the little remaining areas of salt marsh vegetation will maintain the vegetation at moderate. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation, however, the estuary is fringed by highly industrialised and urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions. Vegetation value will be maintained at moderate.
	mod.	mod.	mod.		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary , is currently moderate and is expected to remain moderate in the long-term; target is to maintain at moderate.
	very high	very high	very high		Community connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	mod.	mod.	high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently moderate and is expected to remain moderate in the long-term if supply keeps up with population growth; target is to improve to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is low.
	high	high	high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is high and the target is high.
	high	high	high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is high and the target is high.
	mod.	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is low.
	mod.	very low	mod.		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is moderate and the target is moderate.
	very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

Kororoit Creek Upper Sub-catchment



Description

Kororoit Creek, which begins in the rural foothills of the Great Dividing Range around Gisborne and Sunbury, comprises two main branches, East and West Kororoit that join on the basalt plains above Melton. The creek enters the western suburbs of Melbourne at Caroline Springs and Deer Park and passes through substantial areas of industrial land use and other urban areas before meeting Port Phillip Bay at Altona. The growling grass frog is present in some sections of the creek and also native water rats (rakali) can be found.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Build capacity of land care groups to partner with private land holders for big revegetation projects."

"Review conflicting policies regarding storm water harvesting. Maintenance responsibility."

"Retain storm water in landscape – include in future developments. E.g. ephemeral wetlands, oxbox lakes etc."

"Retain ephemeral nature of creek in urban area."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Kororoit Creek Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Frog (value)	Target three areas (min. 2 ha) for habitat improvement for Bibron's toadlet.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (45 km, 180 ha) and maintain existing vegetation (4 km, 15 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase support for community/environment groups as population increases.
4	Water for Environment	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Kororoit Creek Upper Sub-catchment

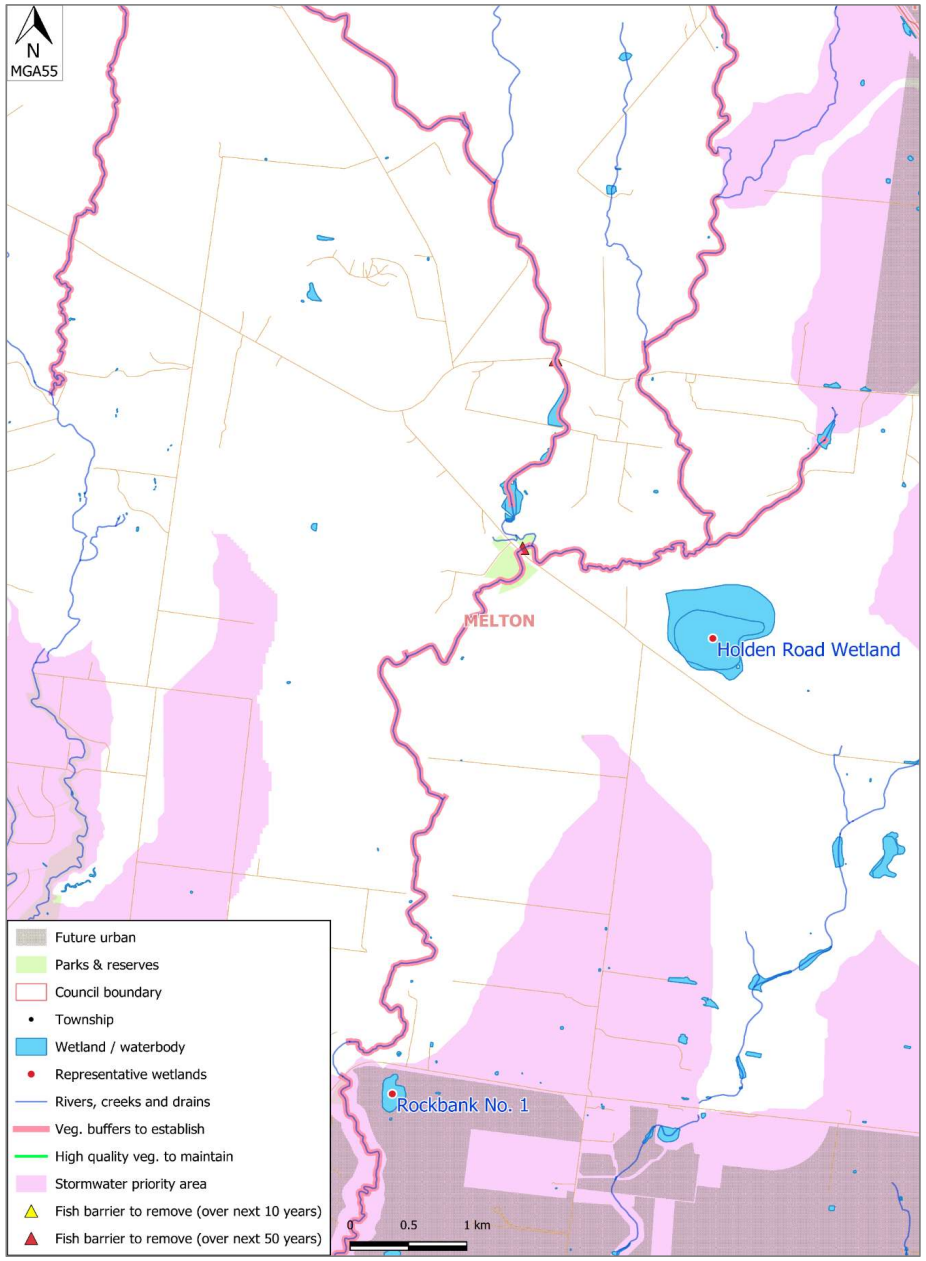
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	low	mod.	We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate.
very low	mod.	high	Fish are currently rated as very low due to lack of flows, lack of suitable habitat (instream and riparian), poor water quality and barriers to migration. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to fish passage, instream and riparian habitat, water quality and flows through management of future stormwater impacts is predicted to increase the rating to high in the long term.
high	low	high	Frog score is high since most of the expected species of frog were recorded. With dedicated management the score should be maintained at high.
low	low	mod.	Macroinvertebrates are currently rated as low as a result of a lack of instream and riparian habitat, and poor water quality from rural activities. There are no known listed species in this sub-catchment. Management of stormwater and flows and improvements to riparian vegetation is predicted to improve the rating to moderate.
n/a	n/a	n/a	Platypus are no longer expected to be found in Kororoit Creek as a result of large-scale urbanisation, lack of suitable habitat and isolation from the Werribee and Maribyrnong River populations. For this reason, there is no assessment or setting of targets.
low	very low	mod.	Vegetation is rated as low overall and predicted to decline further unless threats are adequately managed. There are 7 water dependent listed species remaining and 4 bioregional conservation status (BCS) endangered EVCs. Increasing the cover of riparian vegetation and management of key threats will improve the overall sub-catchment rating to moderate.
high	high	very high	Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high	Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	mod.	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is high.
mod.	mod.	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is high.
very high	mod.	mod.		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is moderate.
very low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very low and the target is moderate.
very low	very low	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is moderate.
low	low	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is very high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	very low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is very low.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
n/a	n/a	n/a		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. No data exists for this sub-catchment.
mod.	low	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Holden Road Wetlands, Diggers Rest



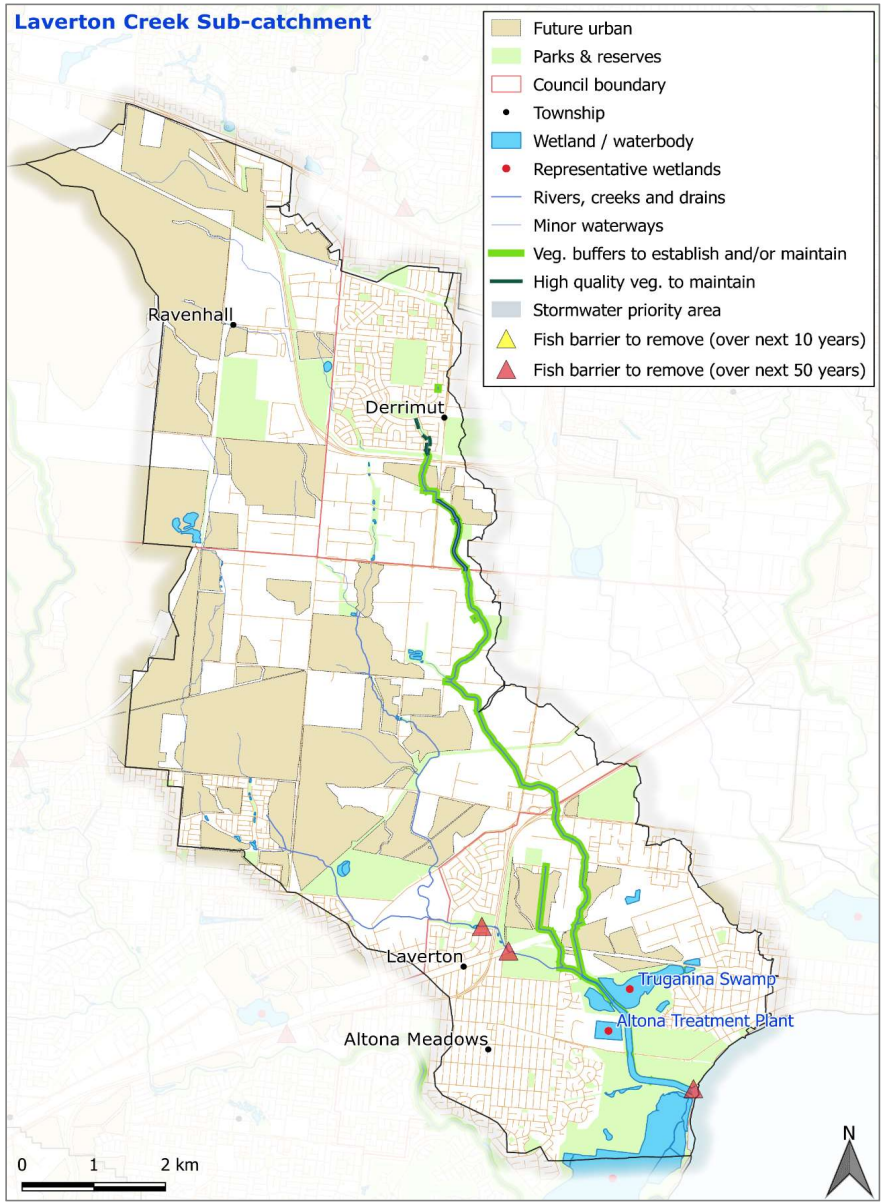
Description
Wetland 70601 in the Kororoit Creek Upper sub-catchment supports significant frog, bird and vegetation communities.

Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Wetland habitat form	Reduce threat of dogs, cats, rabbits and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Holden Road Wetlands, Diggers Rest

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change and urbanisation will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog value at this wetland is currently very high with listed species being present. Increasing encroachment from urbanisation and predicted drying from climate change means a current trajectory of decline to very low. However, the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.		Wetland vegetation value is currently very low. However, in the long-term it is predicted that it can be improved to moderate value through improvements to water regime, wetland buffer condition, and vegetation condition. Reduction of threat of invasive flora species will also improve the vegetation value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is low.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Laverton Creek Sub-catchment



Description

Laverton Creek originates in Ravenhall immediately south of the Western Freeway and passes through Derrimut, Truganina and Laverton before discharging to Port Phillip Bay at Altona. The main tributaries include Kayes and Dohertys drains, which join the creek in its lower reaches. The creek originally terminated in Truganina Swamp but a channel was constructed to drain water to the bay following flooding in the 1960s. The original grassland ecosystem has largely been replaced by farmland or housing. Patches of remnant landform and vegetation are significant surviving features of the creek. Important remnants of the vast coastal saltmarsh that linked the estuaries of these waterways survive in protected reserves such as Truganina Swamp. These waterways also incorporate significant heritage values.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Work with community/ residence to remove illegal sewer to storm water connections (Bay Health) – Note 100% of system 'constructed or highly modified'"

"Amenity connections – create access through golf course"

"Creek naturalization project and storm water harvesting for urban forest."

"Education program in schools"

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Laverton Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (14 km, 57 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Access	Increase access to and along waterways from 25% to 44% (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
3	Participation	Increase participation rates from moderate to very high; support community groups, connect with growth area communities and build capacity of land owners in upper catchment through rural programs. Increase support for community/environment groups as population increases.
4	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 2 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Laverton Creek Sub-catchment

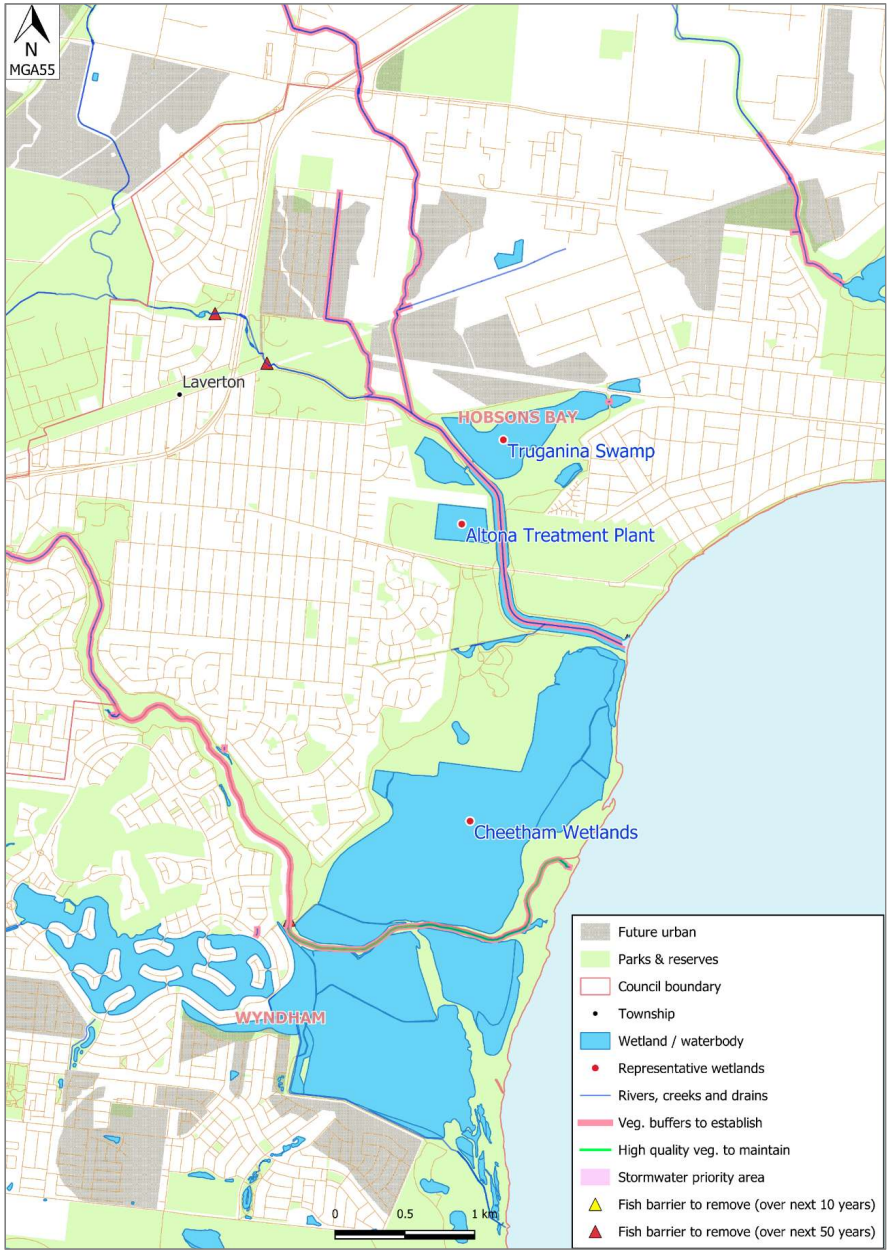
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Shorebirds are a significant bird group in this sub-catchment.
low	mod.	mod.		Fish are currently rated as low due to channel modifications and extensive stormwater impacts, which results in a lack of suitable instream and riparian habitat. Barriers to fish movement also restrict access for some migratory species. The increased current trajectory score is due to climate change increasing habitat suitability increases for common and widespread species. Improvements to vegetation, stormwater and fish passage are expected to increase suitability of habitat for less common native fish species, particularly in the lower reaches.
low	low	low		Frog score is low since only some of the expected species of frog were recorded. The combined impacts of urbanisation and climate change driven changes to surface flows and water quality are likely to see the score remain at low.
very low	very low	low		Macroinvertebrates are currently rated as very low due to high levels of urbanisation which has led to poor instream and riparian habitat, excessive flows and poor water quality. There are no known listed species in this sub-catchment. Improvements to flows and water quality through urban stormwater management combined with revegetation is predicted to increase the rating to low the long term.
n/a	n/a	n/a		Ephemeral waterways such as Laverton Creek are assumed to have never supported platypus populations. For this reason, there is no assessment or setting of targets.
low	very low	mod.		Vegetation is rated as low as much of the riparian vegetation is degraded with only isolated patches of high quality reaches remaining in the upper reaches. The rating is predicted to decline to very low due to persistent and emerging threats such as pest plant and animals and climate change. There are 26 water dependent listed species remaining and 2 bioregional conservation status (BCS) endangered EVCs. Increasing the cover of riparian vegetation and management of key threats will improve the overall sub-catchment rating to moderate in the long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
very low	very low	low	Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	high	high	Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
low	very low	low	Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is low and the target is low.
very low	very low	mod.	Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very low and the target is moderate.
very low	very low	mod.	Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is moderate.
low	low	very high	Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is very high.
low	very low	low	Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is low and the target is low.
low	low	very high	Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is low and the target is very high.
high	mod.	high	Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high	Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	low	very high	Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Altona Treatment Plant



Description

The Altona Treatment Plant operated by City West Water treats sewage to a tertiary standard. The land includes wetlands that are no longer used as part of the treatment process, and now serve to increase they available land for adjoining environmental values.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Ensure acid sulfate soils disturbance is kept to a minimum and that if there is any disturbance appropriate management techniques are employed.
2	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.

Altona Treatment Plant

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change and urbanisation will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat, although significant bird species have been recorded, and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	low	very low	low		The frog values is currently low, with a predicted decline to very low. The predicted impacts of climate change on coastal wetland environments will impact the likelihood that sites will support significant frog populations. Improvements to wetland vegetation may maintain the current frog value at low.
	very low	very low	mod.		Wetland vegetation value is currently very low. However, in the long-term it is predicted that it can be improved to moderate value through improvements to wetland buffer condition and wetland vegetation condition. Reduction of the threat of invasive flora species will also improve the vegetation value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Truganina Swamp, Laverton Creek

Description

Truganina Swamp provides valuable habitat for fauna such as waterbirds and provides habitats for two vulnerable species, the Altona skipper butterfly which feeds on chaffy saw sedge and the orange-bellied parrot which feeds on beaded glasswort and the scrubland species glasswort. The wetland is an important habitat for many migratory wading birds.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 25 per cent of the wetland perimeter.
3	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value and re engage the natural wetland area.

Truganina Swamp, Laverton Creek

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low		The wetland bird value is currently low and is on a current trajectory of decline to very low. The wetland provides habitat for significant species including Orange-bellied Parrot and has moderate vegetation condition. Existing and predicted threats associated with climate change and urbanisation will continue to impact the value of the wetland as bird habitat and the bird value will be maintained at low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	low	very low	low		The frog value at Truganina Swamp is currently low and is predicted to decline to very low. Increasingly saline conditions will limit the value of the site as frog habitat.
	mod.	very low	very low		The wetland vegetation value is currently moderate but is predicted to decline to very low as a result of predicted climate change impacts.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	low	very low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
	very low	very low	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	mod.	very low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is low.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Laverton Creek Estuary

Description

The Laverton Creek estuary opens to Port Phillip Bay near Altona adjacent to the Cheetham Wetlands. Rock weirs at 2.2 and 2.4 km upstream from mouth are likely to limit tidal flow and possibly fish passage at times of low fluvial flow. Modification has included the removal of native vegetation, some channelisation and construction of a basalt rock wall around the entrance. The substrate in the estuary is silty and riparian vegetation is primarily halophytic shrubs, grass, sedge tussocks and some exotic trees. There is moderate lateral connectivity between the waterbody and coastal saltmarsh communities north of Queens Street, and some connectivity to saltmarsh in the Cheetham Wetlands to the south.

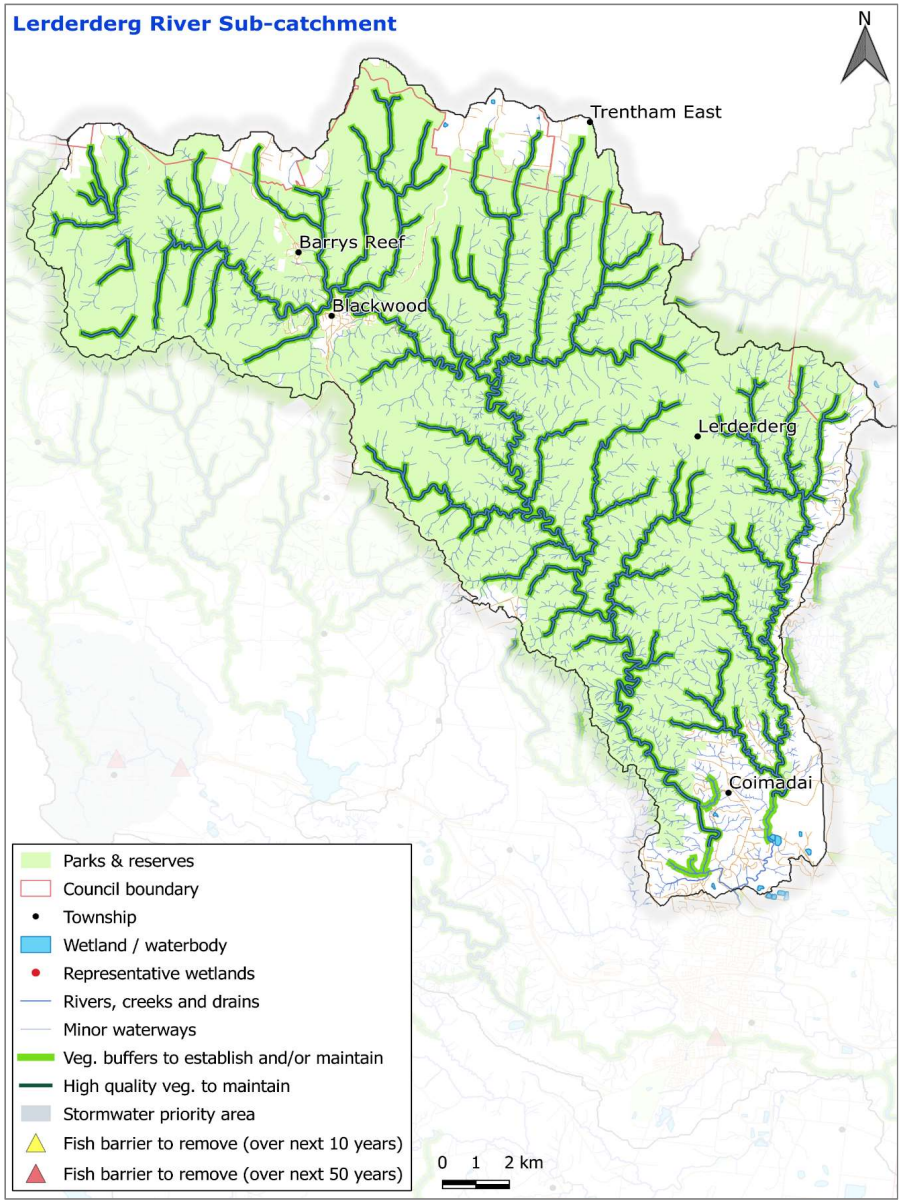
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine wetland connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities in floodplains to allow adaption to climate change risks.
2	Estuarine vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive animals and salt tolerant plant species.
3	Access & Recreation	Enhance opportunities for recreation and appropriate access including improving connections with existing path networks.

Laverton Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The estuarine bird score is currently very low for Laverton Creek. The estuary is fringed by a highly industrial environment and the predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		The fish value score for the Laverton Creek is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabits the estuaries and are likely to remain.
	very low	very low	very low		The estuarine vegetation value in Laverton Creek is currently very low, with very poor condition and no significant ecological vegetation classes present. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation, however, the estuary is fringed by highly industrialised and urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions.
	low	low	high		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary , is currently low and likely to remain low in the long-term; target is to improve to high.
	very high	very high	very high		Community connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	low	low	high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently low and is expected to remain low in the long-term if supply keeps up with population growth; target is to improve to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is low.
	high	high	high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is high and the target is high.
	high	high	high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is high and the target is high.
	very low	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is low.
	very low	very low	low		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is low.
	very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

Lerderderg River Sub-catchment



Description

The Lerderderg River rises in the Lerderderg State Park and flows south to join the Werribee River downstream of Bacchus Marsh. The main tributary of Lerderderg River is Goodman Creek, which rises near Mt Bullengarook in the Lerderderg State Park and joins upstream of Darley. Lerderderg River is an important environmental asset and is one of two Victorian Heritage Rivers in the Port Phillip and Westernport region. The Lerderderg has retained many of its natural features and supports a range of environmental, geological and cultural values.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Education – Encourage improved land stewardship"

"Managing escaped weeds as boundary fences – thorn, blackberries. Use native prickly plants to create fencing/barriers"

"Working with owners to maintain septic and new installation don't impact water quality"

"Investigate die-back along Goodman Creek. Is this associated with levels or drought stress? Fungus? Contamination from washing stations?"

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Lerderderg River Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Participation	Increase participation rates from high to very high; support community groups, connect with growth area communities and build capacity of land owners through rural programs. Increase participation through promotion of high value areas (e.g. Lerderderg State Park).
2	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land in the Lerderderg River and Goodmans Creek. This may include establishment of vegetated buffers in headwater streams.
3	Water for Environment	Maintain critical flow components in refuge reaches along Lerderderg Gorge to protect instream environmental values.
4	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 278 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
5	Vegetation Extent	Establish a continuous riparian vegetated buffer (8 km, 32 ha) and maintain existing vegetation (290 km, 1160 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
6	Vegetation Quality	Improve understanding of the extent, composition and condition of high and very high quality vegetation, and effectively monitor and manage both values and threats.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Lerderderg River Sub-catchment

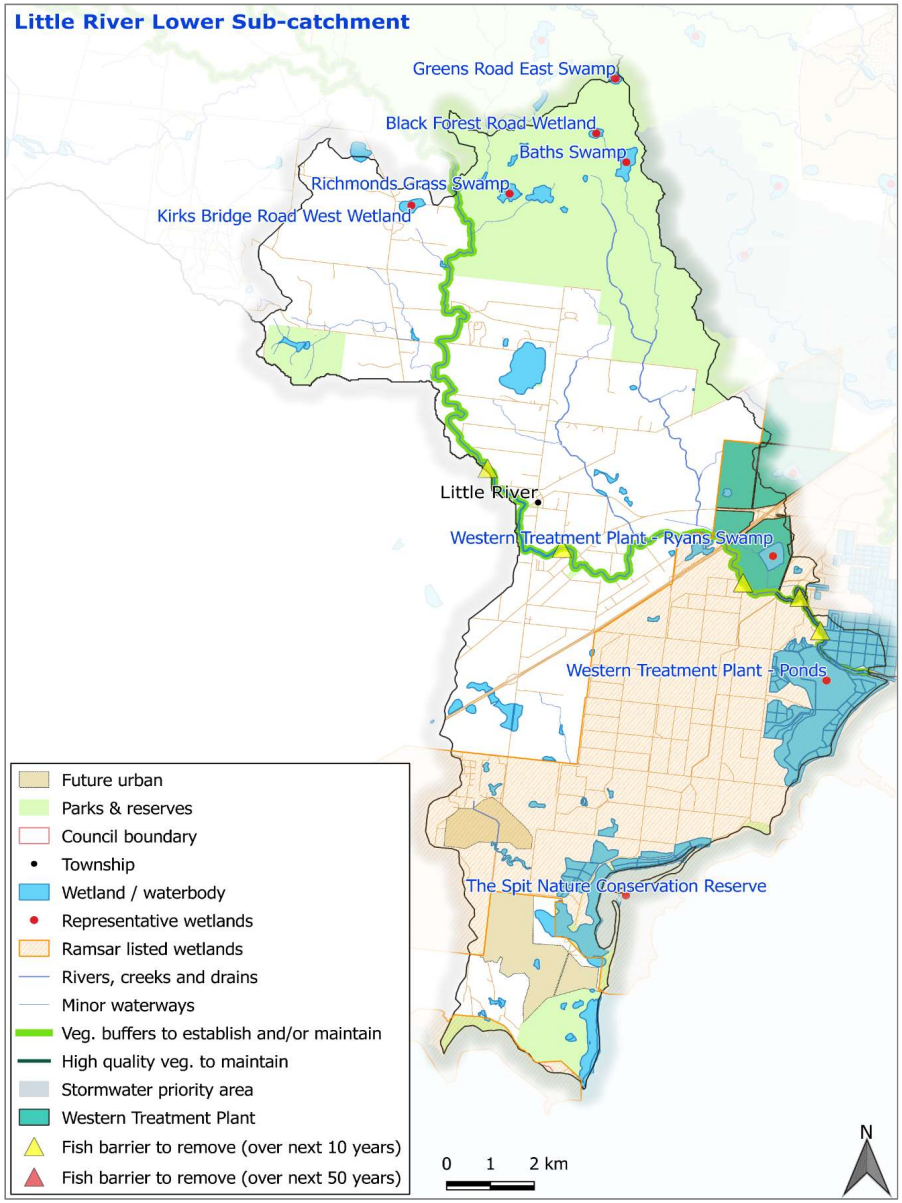
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	low	mod.	We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species include the powerful owl.
low	low	low	Fish are currently rated as low. This is partly expected for a headwater stream due to naturally low flows; however a number of fish barriers in the lower reaches (including the diversion weir in the lower reach and Melton Reservoir) also contribute to this rating. Without removal of substantial barriers to fish movement, the rating for fish is predicted to remain low in the long term.
very high	low	very high	Frog score is very high since all, or almost all, species of frog were recorded there relative to those expected given the survey effort. With appropriate management the score should be maintained as very high.
very high	very high	very high	Macroinvertebrates are currently rated as very high in the Lerderderg River as the catchment is largely forested with good instream and riparian habitat. There are no known listed species in this sub-catchment. Monitoring and maintenance of existing high quality habitats including ensuring vegetation condition does not decline will ensure the rating remains as very high.
low	low	low	Platypus are currently rated as low as a result of a lack of stream flows and potentially barriers to movement in the lower reach. Platypus may occasionally use the lower reach near the confluence with the Werribee River.
high	mod.	high	Vegetation is rated as high with very high quality in the forested reaches. The riparian vegetation has structural elements present and high connectivity. A number of existing threats including pest plants and animals, recreational access and climate change are predicted to reduce the rating to moderate if not adequately addressed. There are 20 listed water dependent species remaining and 8 bioregional conservation status (BCS) endangered EVCs. The long term outcome is to maintain the current high rating with a focus on areas of high quality.
mod.	mod.	high	Amenity, which is based on level of satisfaction, is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
high	high	very high	Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very high	high	very high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very high and the target is very high.
very high	high	very high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is very high.
high	mod.	high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is high and the target is high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
very low	very low	low		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is low.
very high	high	very high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very high and the target is very high.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
very high	very high	very high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is very high and the target is very high.
high	mod.	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is high and the target is very high.

Little River (Worrin-yaloke) Lower Sub-catchment



Description

Little River (Worrin-yaloke) rises in the northern section of the Brisbane Ranges National Park and flows through the townships of Balliang and Little River before joining Port Phillip Bay in the Western Treatment Plant.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Establish better communication of activities. Bring on organizations to foster better collaboration and remove duplication – clear messaging."

"Education program targeted at groups and land owners to identify and help manage the pattern."

"Analyze past programs (Melbourne Water, Local Government). What worked? What didn't work? Start new programs to fill gaps! (e.g Kick start Little River land care group.)"

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Little River Lower Performance Objectives

ID	Condition Supported	Performance Objectives
1	Access	Increase access (about 2 km of path) by improving and extending path network to and along river around Little River (Worrin-yaloke) township and to coastal wetlands.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (25 km, 99 ha) and maintain existing vegetation (2 km, 10 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Participation	Support participation in Landcare and other rural programs that improve waterway habitats and build capacity of land owners. Increase support for community/environment groups as population increases.
4	Water for Environment	Maintain critical flow components in refuge reaches in Little River (Worrin-yaloke) to protect instream environmental values and platypus (perridak).
5	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, climate change, diversions or urbanisation.
6	Instream Connectivity	Increase instream connectivity provide fish (kuwiyn) passage along the Little River (Worrin-yaloke) from the mouth to Geelong-Bacchus Marsh Rd, by removing five fish barriers in the lower reaches.
7	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 4 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Little River (Worrin-yaloke) Lower Sub-catchment

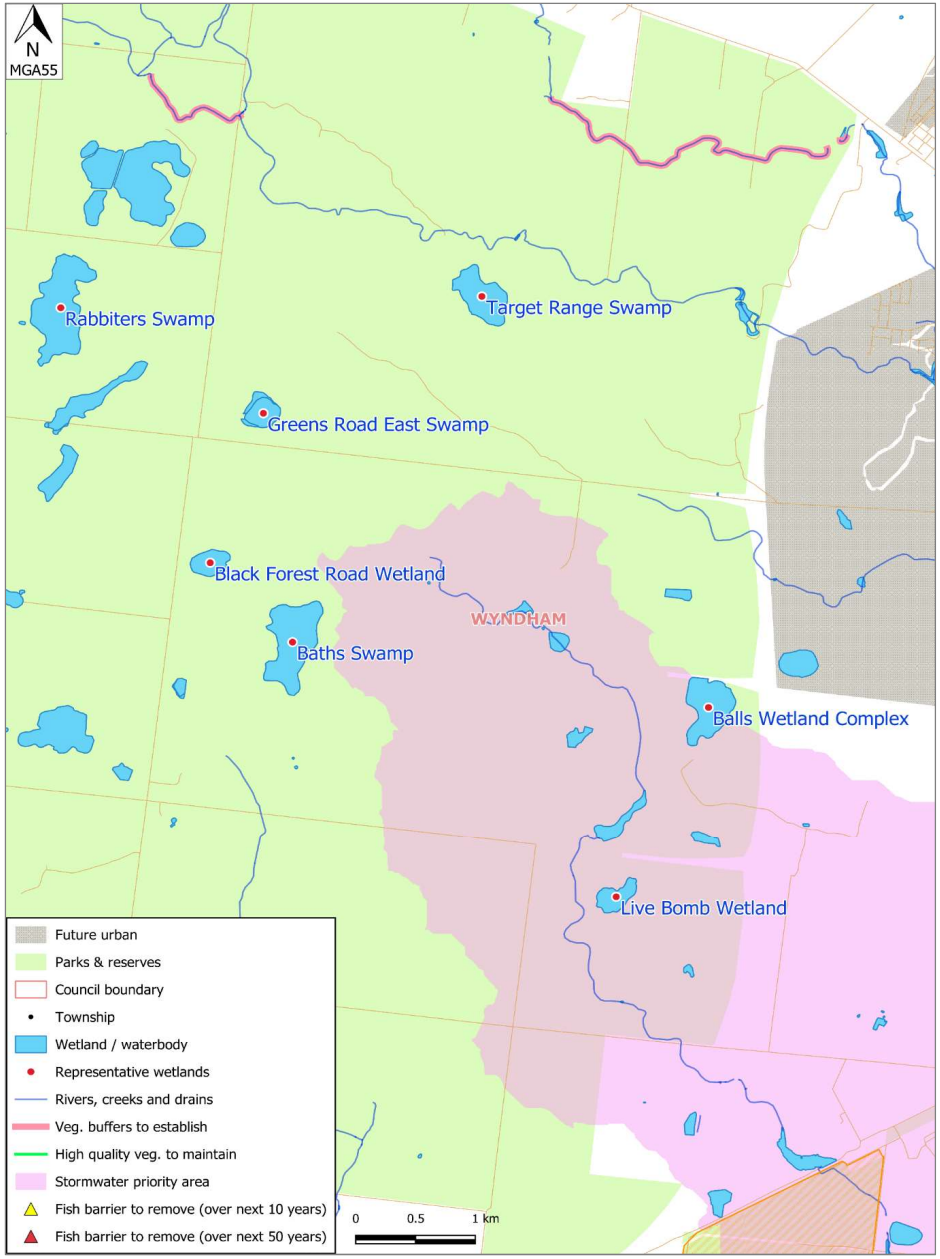
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
low	low	low		Birds (riparian) score is low, meaning few of the expected riparian bird species were recorded. Poor water quality, vegetation clearance and changes to natural flow regimes mean the riparian bird score will remain low. Several listed species of (estuarine) shorebird occur, which includes an internationally important Ramsar Wetland.
low	high	very high		Fish (kuwiyn) are currently rated as low due to a lack of suitable habitat (instream and riparian), barriers to fish migration, and flow stress. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improving riparian vegetation, fish passage and flows is predicted to increase the rating to very high over the long term. There are no known listed species in the sub-catchment.
very low	very low	very low		Frog (djirrm) score is very low since very few of the expected species of frog were recorded. The combined effects of reduced rainfall and flows, and urban land use intensification mean the score is likely to remain very low. Significant species include endangered growling grass frog.
low	mod.	high		Macroinvertebrates are currently rated as low primarily from lack of suitable instream and riparian habitat, and flow stress. There are no known listed species in this sub-catchment. With significant improvements to riparian vegetation the rating is expected to increase to high over the long term.
very low	very low	low		Platypus (perridak) are currently rated as very low, due to a lack of instream and riparian habitat, and lack of flows. While there are unconfirmed records of platypus in the lower reaches, they are likely to represent transient use of this sub-catchment. With improvements to riparian habitat and maintenance of flow regime, the habitat suitability is predicted to increase to low in the long term.
low	very low	mod.		Vegetation is rated as low. It is highly modified and fragmented as a result of large scale landuse change. There are 21 listed water dependent species remaining and 5 bioregional conservation status (BCS) endangered EVCs. Through revegetation and management of threats the long term outcome is to improve the rating to moderate.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
mod.	mod.	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
mod.	low	mod.		Water (ngubitj) for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is moderate.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
very low	very low	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is very high.
very low	very low	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is very high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
very high	very high	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is very high and the target is very high.

Baths Swamp (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Bath Swamp, incorporated with the Western Grassland Reserve is a Seasonal Herbaceous Wetland.

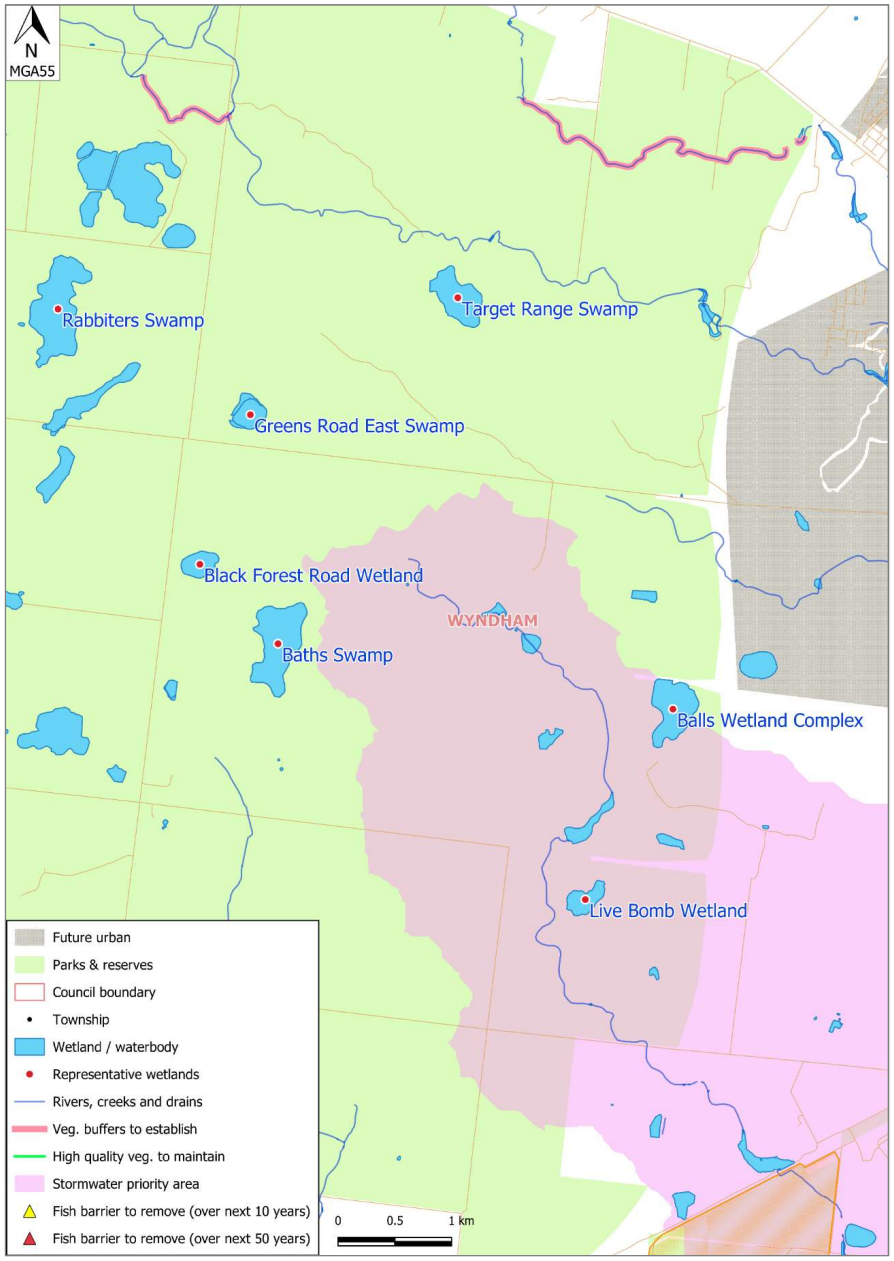
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Implement the Western Grassland Reserves adaptive management regime.
2	All	Incorporate wetland into the Western Grassland Reserve.
3	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
4	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.

Baths Swamp (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low		The wetland bird value is currently low, with a predicted decline to very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.		The wetland vegetation value is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Black Forest Rd Wetland (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Black Forest Road Wetland, incorporated with the Western Grassland Reserve is Seasonal Herbaceous Wetland.

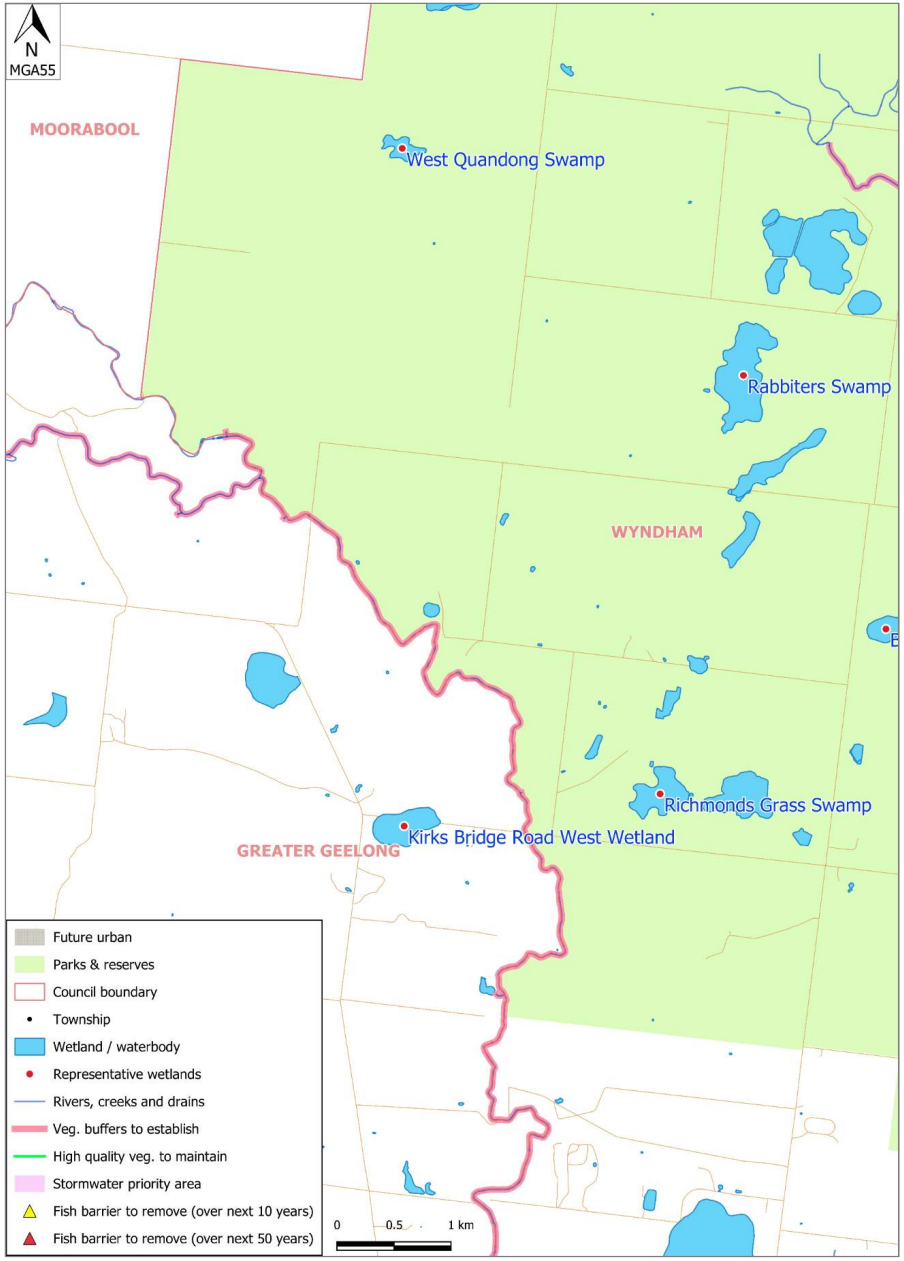
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Undertake index of wetland condition assessment and identify performance objectives after assessment.

Black Forest Rd Wetland (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The wetland bird value is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	high	The frog (djirrm) value applied to the Little Yarra Lower sub catchment has been applied to Black Forest Rd Wetland. The frog value is currently moderate, with a current trajectory of very low due to the predicted warming and drying impacts of climate change. With improvements to wetland buffer and vegetation condition these impacts may be somewhat offset and the frog value is predicted to improve to high.
	very low	very low	mod.	The wetland vegetation value is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Kirks bridge Rd W Wetland (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Kirks Road West Wetland, incorporated with the Western Grassland Reserve is a Seasonal Herbaceous Wetland.

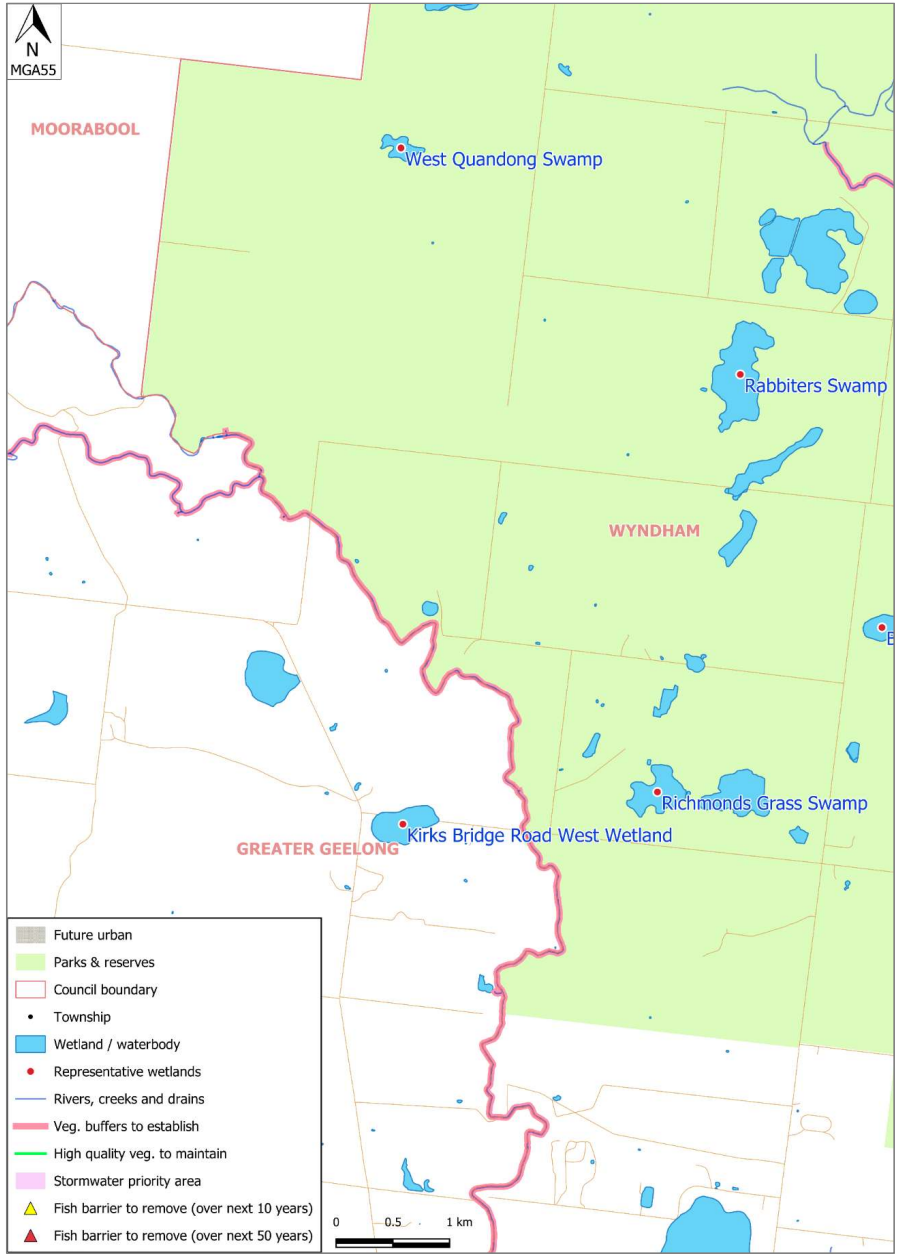
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Kirks bridge Rd W Wetland (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The bird value at Kirksbridge Rd W Wetland is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	high	The frog (djirrm) value applied to the Little Yarra Lower sub catchment has been applied to this wetland. The frog value is currently moderate, with a current trajectory of very low due to the predicted warming and drying impacts of climate change. With improvements to wetland buffer and vegetation condition these impacts may be somewhat offset and the frog value is predicted to improve to high.
	very low	very low	mod.	The wetland vegetation value is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Richmonds Grass Swamp (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Richmonds Grass Swamp, incorporated within the Western Grassland Reserve is a Seasonal Herbaceous Wetland.

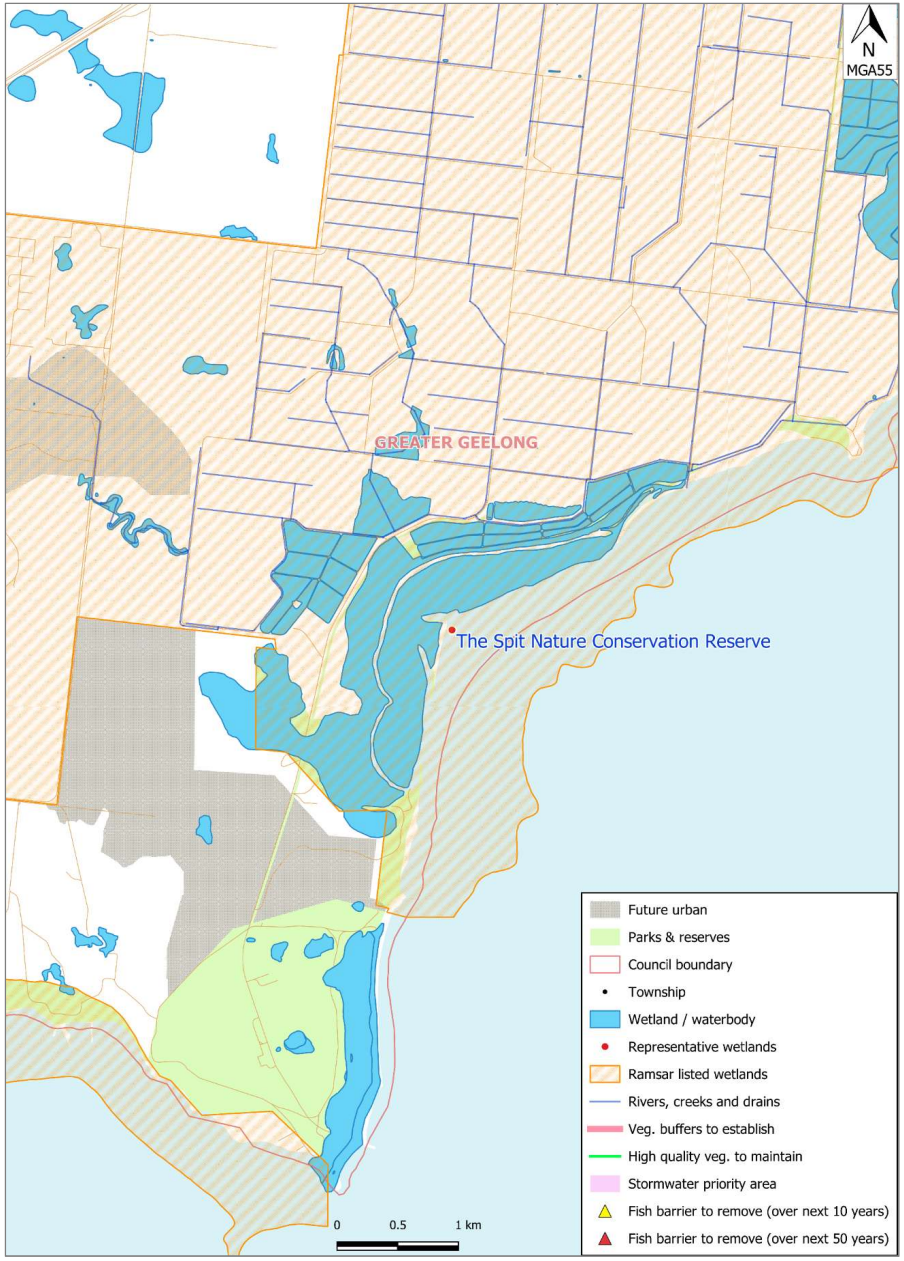
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	All	Implement the Western Grassland Reserves adaptive management regime.
4	All	Incorporate wetland into the Western Grassland Reserve.

Richmonds Grass Swamp (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value this wetland is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and protections provided in the Western Grasslands Reserve and the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.		The wetland vegetation value at Richmonds Grass Swamp is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value in this Seasonal Herbaceous Wetland to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

The Spit Nature Conservation Reserve



Description

This environment provides an area which is an extremely important feeding ground for a variety of birds, especially waders and waterbirds. The saltmarsh is important as one of the main wintering sites for the critically endangered orange-bellied Parrot. The Spit is listed as a wetland of international importance under the Ramsar Convention as part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

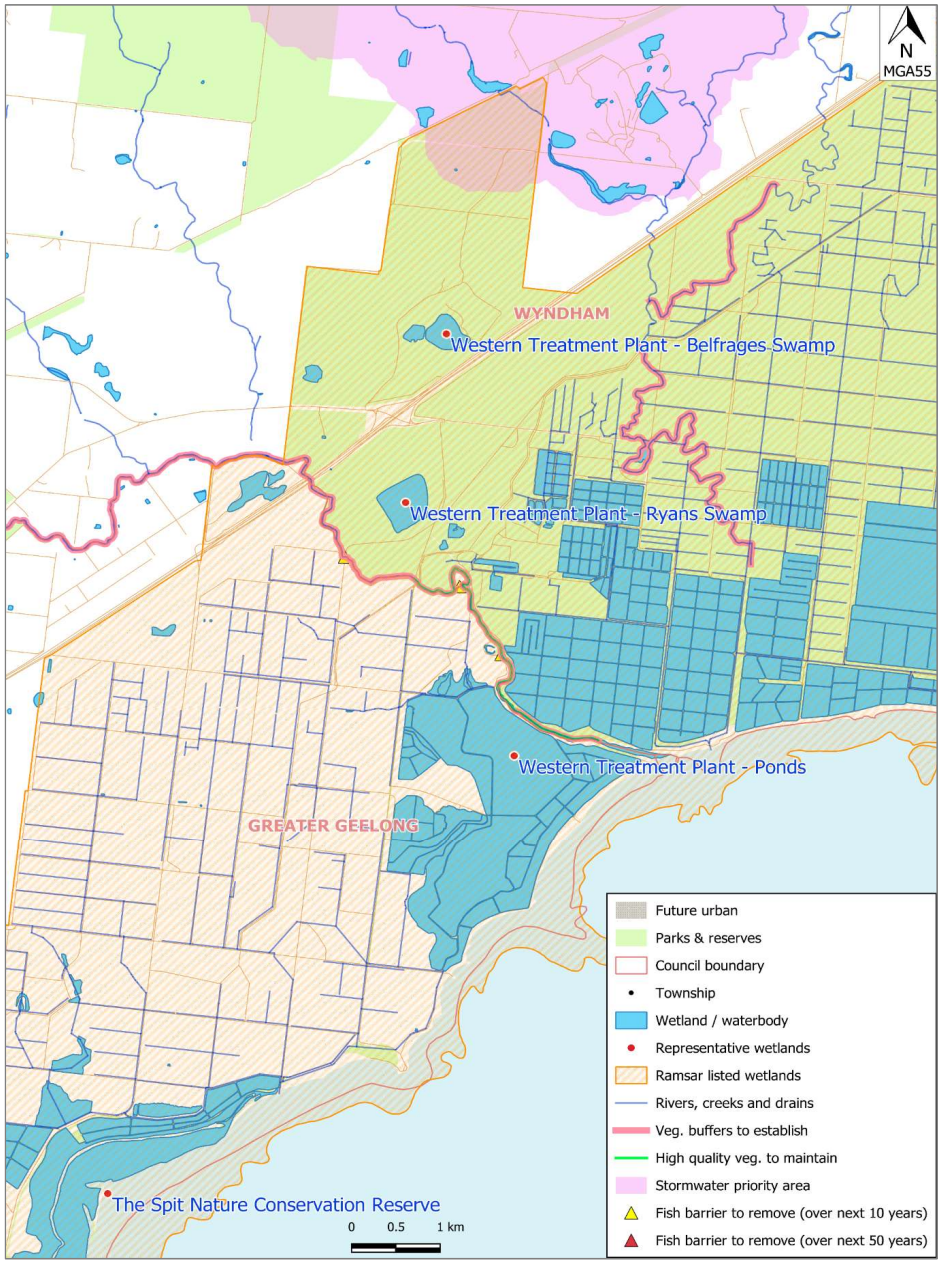
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
2	Vegetation condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
3	Wetland habitat form	Reduce invasive fauna threat (cats and foxes) to low focussing on orange-bellied parrot, shorebird and nesting bird habitats.
4	All	Undertake monitoring to ensure that site stays within the limits of acceptable change as identified in the Ramsar Management Plan and in accordance with new requirements for monitoring, evaluation and reporting at Ramsar sites.
5	All	Identify and assess management options for addressing risk to coastal habitat from sea level rise and increasing coastal storm surge.
6	All	Identify opportunities for habitat creation and migration with the adjacent to Ramsar to mitigate habitat loss due to climate change risks.

The Spit Nature Conservation Reserve

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	low	high		The Spit Nature Conservation Reserve wetlands are formally recognised as significant bird habitat and are included in the Port Phillip Bay (Western Shoreline) & Bellarine Peninsula Ramsar Site, as well as being listed in the Directory of Important Wetlands. Many significant bird species have been recorded. The bird value is currently high, with a current predicted decline to low value. The predicted impacts of climate change on coastal wetlands in the region are significant, however, it is anticipated that these impacts may be somewhat mitigated with the bird value remaining high.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very low		The frog (djirrm) value at this wetland is currently very high with listed species being present. The predicted impacts of climate change on coastal wetland environments will impact the likelihood that sites will support significant frog populations. The frog value is predicted to decline to very low.
	high	very low	high		The wetland vegetation value at is currently high with a current trajectory of decline to very low. Predicted climate change impacts will increase risk to significant coastal wetland vegetation communities including salt marsh. It is anticipated that adaptation strategies could be applied, including allowing landward migration, to maintain vegetation value at high. Improvements to the wetland buffer and reducing the threat of invasive salt tolerate weeds species is predicted to assist with maintaining the vegetation condition.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	high	very low	high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is high and the target is high.
	very high	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is very high and the target is low.

Western Treatment Plant - Ponds



Description

The Western Treatment Plant contains a network of lagoons, wetlands, inter-tidal and shoreline areas that provide a haven for thousands of birds, including thousands of migratory waders that fly 12,000 kilometres from Siberia to avoid the harsh northern winter. The plant and areas of the surrounding bay and peninsula were declared a sanctuary for native animals in 1921, and in 1983 the plant became part of the Port Phillip (Western Shoreline) and Bellarine Ramsar site, internationally recognised for supporting waterfowl.

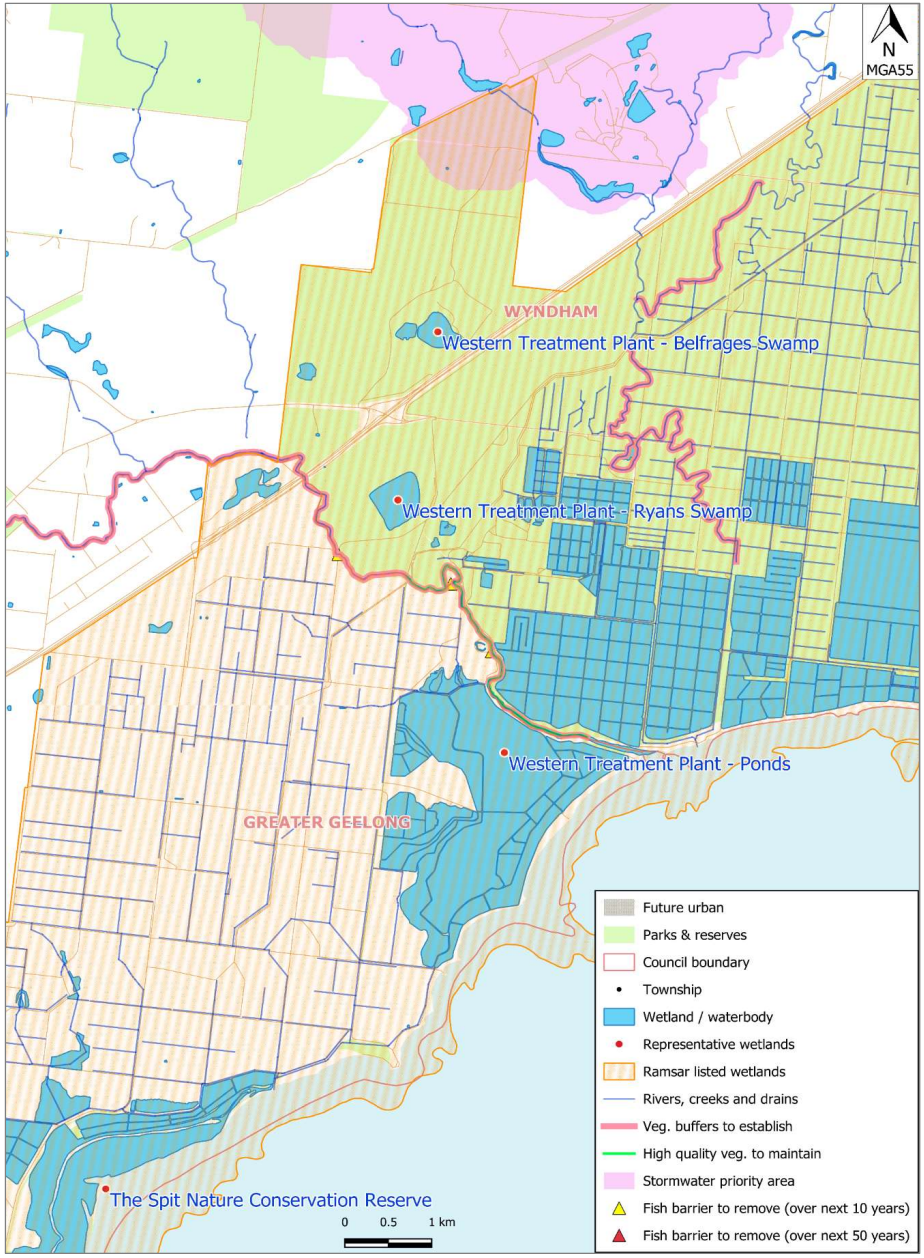
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
2	Wetland habitat form	Reduce invasive fauna threat (cats and foxes) to low focussing on orange-bellied parrot, shorebird and nesting bird habitats.
3	Unaligned	Undertake monitoring to ensure that site stays within the limits of acceptable change as identified in the Ramsar Management Plan and in accordance with new requirements for monitoring, evaluation and reporting at Ramsar sites.
4	All	Identify and assess management options for addressing risk to coastal habitat from sea level rise and increasing coastal storm surge.
5	All	Identify opportunities for habitat creation and migration with the adjacent to Ramsar to mitigate habitat loss due to climate change risks.
6	Water regime	Continue to implement water regime management to meet ecological objectives in artificial habitats within the Ramsar site.

Western Treatment Plant - Ponds

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	very low	mod.		The Western Treatment Plant –Ponds (Austin Road Ponds, Lake Borrie Ponds, Paradise Road Ponds and Western Lagoon Ponds) currently have moderate bird value. Although the sites have formally recognised significance as bird habitat, wetland vegetation condition lowers the habitat available. A current trajectory of decline to very low value will be offset by improvements to wetland habitat form, buffer condition and vegetation condition maintaining the value at moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (djirrm) value at this wetland is currently very high with listed species being present. Climate change predictions are likely to lead to very low value score, however, these impacts can be somewhat offset at these ponds through improvements to wetland habitat and maintenance of the water regime.
	very low	very low	very low		The wetland vegetation value is currently very low and will remain very low. Predicted impacts of climate change will limit improvement in vegetation value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	very low	very low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is low.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Western Treatment Plant - Ryans Swamp



Description

The Western Treatment Plant contains a network of lagoons, wetlands, inter-tidal and shoreline areas that provide a haven for thousands of birds, including thousands of migratory waders that fly 12,000 kilometres from Siberia to avoid the harsh northern winter. The plant and areas of the surrounding bay and peninsula were declared a sanctuary for native animals in 1921, and in 1983 the plant became part of the Port Phillip (Western Shoreline) and Bellarine Ramsar site, internationally recognised for supporting waterfowl.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
2	Wetland habitat form	Reduce invasive fauna threat (cats and foxes) to low focussing on orange-bellied parrot, shorebird and nesting bird habitats.
3	Unaligned	Undertake monitoring to ensure that site stays within the limits of acceptable change as identified in the Ramsar Management Plan and in accordance with new requirements for monitoring, evaluation and reporting at Ramsar sites.
4	All	Identify and assess management options for addressing risk to coastal habitat from sea level rise and increasing coastal storm surge.
5	All	Identify opportunities for habitat creation and migration with the adjacent to Ramsar to mitigate habitat loss due to climate change risks.
6	Water regime	Continue to implement water regime management to meet ecological objectives in artificial habitats within the Ramsar site.

Western Treatment Plant - Ryans Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very high	mod.	very high		The bird value at this site is very high, with predicted climate change impacts threatening a decline to moderate. However, these impacts may be mitigated at this site with substantial public land buffers allowing adaption planning, maintaining the bird value at very high.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very low		The frog (djirrm) value at this wetland is currently very high with listed species being present. The predicted impacts of climate change on coastal wetland environments will impact the likelihood that sites will support significant frog populations. The frog value is predicted to decline to very low.
	high	very low	high		The wetland vegetation value at is currently high with a current trajectory of decline to very low. Predicted climate change impacts will increase risk to significant coastal wetland vegetation communities including salt marsh. It is anticipated that adaptation strategies could be applied, including allowing landward migration, to maintain vegetation value at high. Improvements to the wetland buffer, wetland habitat form and reducing the threat of invasive salt tolerate weeds species is predicted to assist with maintaining the vegetation condition.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is moderate.
	very low	very low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is low.
	very low	very low	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	high	very low	high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is high and the target is high.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Little River Estuary

Description

The Little River Estuary is continuously open to Port Phillip Bay and extends about 3.6 km upstream from the river mouth. The estuary is in good ecological condition and largely unaltered. The estuary entrance is within the Western Treatment Plant and access to the estuary entrance is restricted. It is a partially mixed estuary with occasional defined 'salt wedge'. The estuary forms part of the Port Phillip Bay (Western Shoreline) Ramsar site; shorebirds and waders use the estuary for feeding and roosting during high and low tides; marsh saltbush is a threatened species in this estuary; and the area is important for orange-bellied parrot.

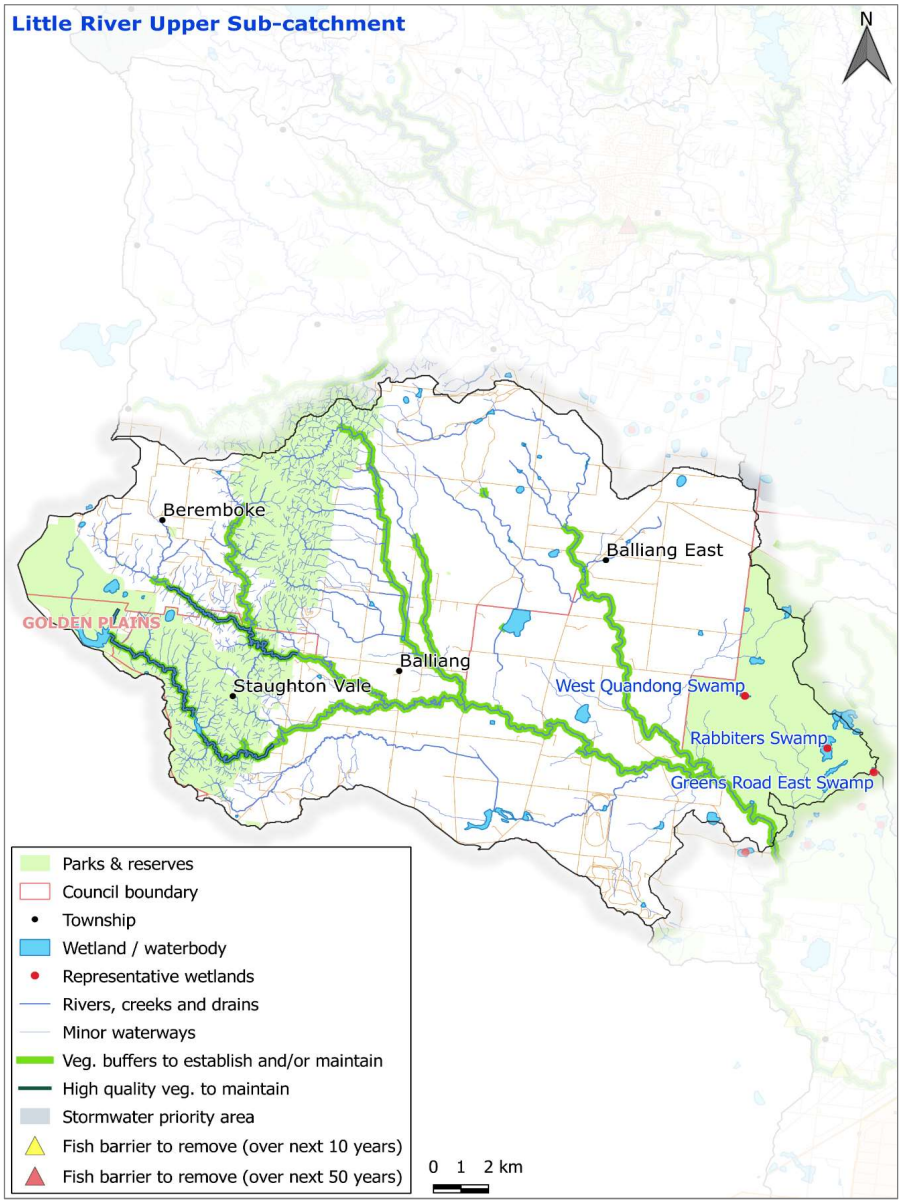
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine wetland connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
2	Flow regime	Maintain critical flow components in refuge reaches to protect instream environmental values and platypus.
3	Flow regime	Reduce the threat of flow stress on Little River (e.g. climate change, diversions and water for domestic and stock uses) by developing and implementing agreed environmental watering objectives.
4	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
5	Estuarine vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.

Little River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		The estuarine bird score is currently high for Little River as the estuary is formally recognised for its value as bird habitat (through Ramsar, East Australasian Flyway Site, Directory of Important Wetlands, Important Bird Area and Important Bird Habitat) and the vegetation condition is currently in moderate condition. The current trajectory is a decline to moderate due to predicted climate change impacts, however, with appropriate climate change adaptation planning, allowing migration of estuarine vegetation communities and reducing the threat of invasive fauna, the long-term bird value score could be maintained at high.
	high	low	mod.		The estuarine fish (kuwiyn) value score is currently high. A good diversity of estuarine dependent species inhabit the estuary. However, the current trajectory would lead to a significant decline to low due to a decline in freshwater mixing with the salt water in the estuary as a result of predicted climate change impacts and the continuing impact of water for domestic and stock uses in the catchment. Improvement in environmental flow condition could potentially mitigate some of this risk and lead to a moderate fish (kuwiyn) score.
	mod.	very low	high		The estuarine vegetation value score is currently moderate with a current trajectory of very low. However, with appropriate climate change adaptation planning and control of invasive plant species, allowing migration of estuarine vegetation communities the long-term value score could be maintained at high.
	low	low	low		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary , is currently low and is expected to remain low in the long-term; target is to maintain at low.
	very high	very high	very high		Community connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	very low	very low	very low		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently very low due to limited accessibility to the estuary and is expected to remain very low in the future.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is moderate.
	high	high	high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is high and the target is high.
	high	high	high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is high and the target is high.
	mod.	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is low.
	mod.	very low	high		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is moderate and the target is high.
	high	high	high		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is high and the target is high.

Little River Upper Sub-catchment



Description

Little River (Worrin-yaloke) begins in the northern section of the Brisbane Ranges National Park and flows through the towns of Balliang and Little River (Worrin-yaloke) before joining Port Phillip Bay at the Western Treatment Plant. Little River (Worrin-yaloke) is ephemeral and runs through an important landscape, which includes significant native grassland and grassy woodlands associated with the remnant river red gums that line the river.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Agricultural run-off could benefit from riparian buffer zones"

"Whole catchment strategy to control Tiger pear. Coordination. Collaboration between Melbourne Water and Councils"

"Increase riparian zone. Trees (canopy). Biolinks from Brisbane Ranges to You Yangs"

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Little River Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (91 km, 363 ha) and maintain existing vegetation (63 km, 251 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 28 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	Participation	Support participation in Landcare and other rural programs that improve waterway habitats and build capacity of land owners. Increase participation through promotion of high value areas (e.g. Brisbane Ranges National Park).
4	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land. This may include establishment of vegetated buffers in headwater streams.
5	Water for Environment	Maintain critical flow components in refuge reaches in Little River (Worrin-yaloke) Upper to protect instream environmental values.
6	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, climate change, diversions or urbanisation.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Little River Upper Sub-catchment

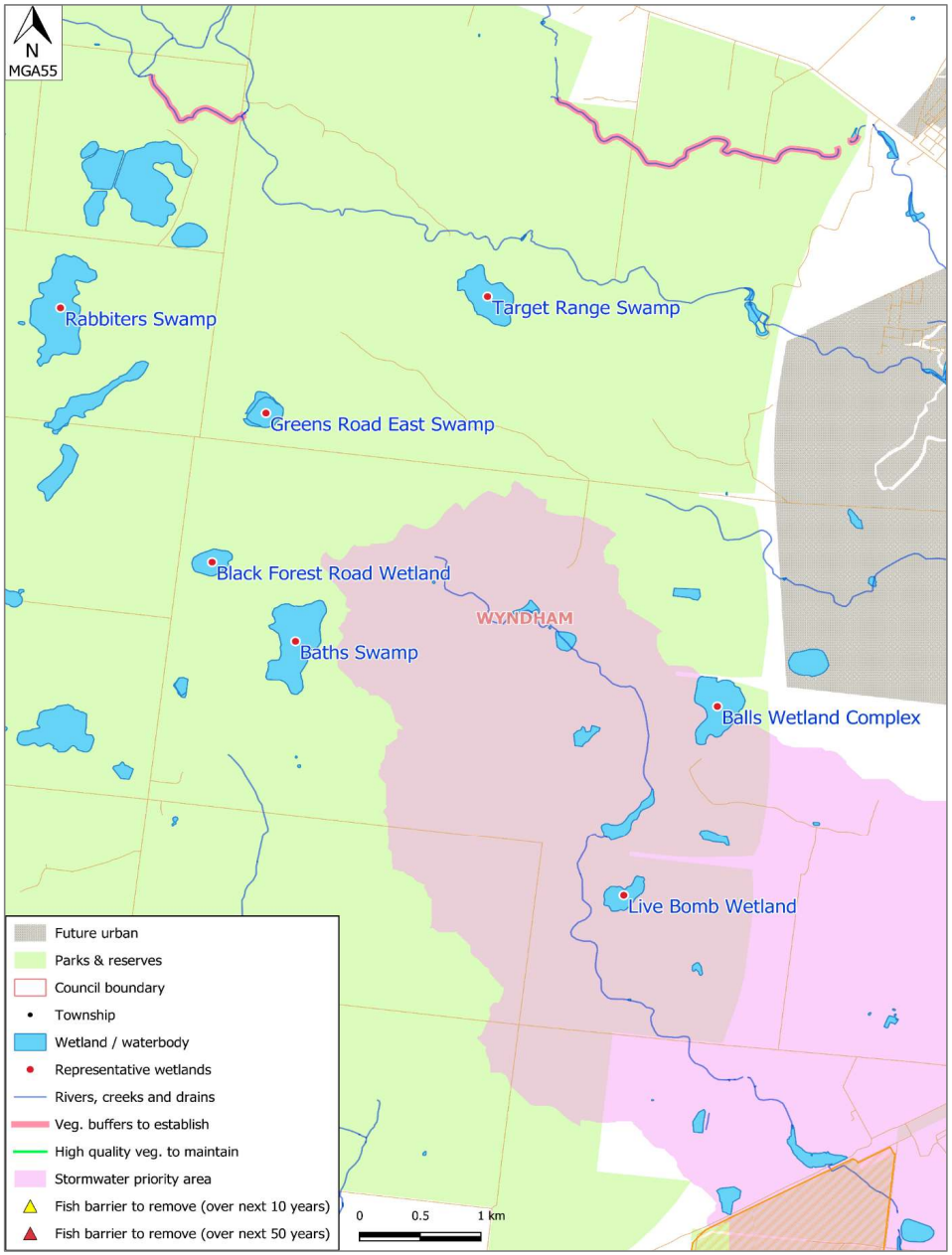
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
mod.	low	mod.	Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl and eastern great egret.
very low	mod.	high	Fish (kuwiyn) are currently rated as very low due to a lack of suitable habitat (instream and riparian), barriers to fish migration, and flow stress. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improving riparian vegetation, fish passage and flows is predicted to increase the rating to high over the long term. There are no known listed species in the sub-catchment.
high	low	high	Frog (djirrm) score is high since most of the expected species of frog were recorded. With dedicated management the score should be maintained at high. Significant species include endangered growling grass frog.
mod.	mod.	very high	Macroinvertebrates are currently rated as moderate due a lack of suitable instream and riparian habitat, and flow stress. There are no known listed species in this sub-catchment. With significant improvements to riparian vegetation the rating is expected to increase to very high over the long term.
very low	very low	low	Platypus (perridak) are currently rated as very low due to a lack of instream and riparian habitat, and lack of flows, although platypus are not known to occur in this sub-catchment. With improvements to riparian habitat and maintenance of flow regime, the habitat suitability is predicted to increase to low in the long term.
low	very low	mod.	Vegetation is rated as low overall as most of the sub-catchment is highly modified and fragmented. There are some areas of high quality vegetation remaining in the upper reaches (Stony Creek) around the Brisbane Ranges National Park. There are 46 listed water dependent species remaining and 10 bioregional conservation status (BCS) endangered EVCs. Through revegetation and management of threats the long term outcome is to improve the rating to moderate.
mod.	mod.	high	Amenity, which is based on level of satisfaction, is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
high	high	very high	Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
mod.	mod.	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
mod.	low	mod.		Water (ngubitj) for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is moderate.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
low	low	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is low and the target is very high.
low	low	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
n/a	n/a	n/a		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. No data exists for this sub-catchment.
very high	very high	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is very high and the target is very high.

Greens Rd E Wetland No. 2 (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Greens Road East Wetland No. 2, incorporated with the Western Grassland Reserve is a Seasonal Herbaceous Wetland.

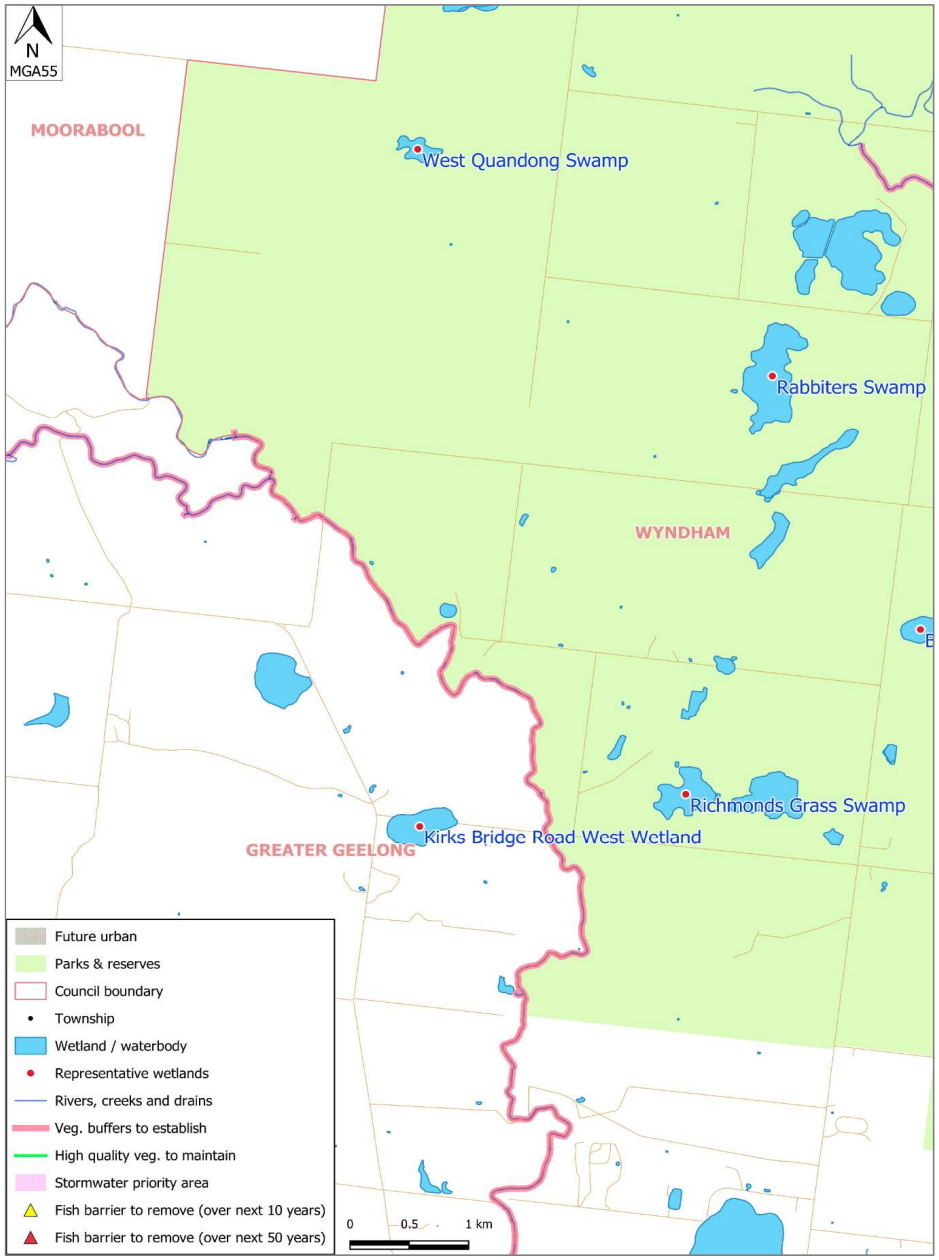
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
2	Wetland habitat form	Reduce invasive fauna to moderate.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
4	All	Implement the Western Grassland Reserves adaptive management regime.
5	All	Incorporate wetland into the Western Grassland Reserve.

Greens Rd E Wetland No. 2 (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The bird value of this wetland is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	high	very low	high	The frog (djirrm) value at this wetland is currently high (Refer to Little River Upper Catchment). However the current trajectory is a decline to very low due to the predicted warming and drying effects of climate change. Improvements of conditions include habitat form, wetland buffer and vegetation condition are predicted to maintain the frog value as high.
	very low	very low	mod.	The wetland vegetation value at this Seasonal Herbaceous Wetland is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Rabbitters Lake and Swamp (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Rabbitters Lake, incorporated within the Western Grassland Reserve is a Seasonal Herbaceous Wetland.

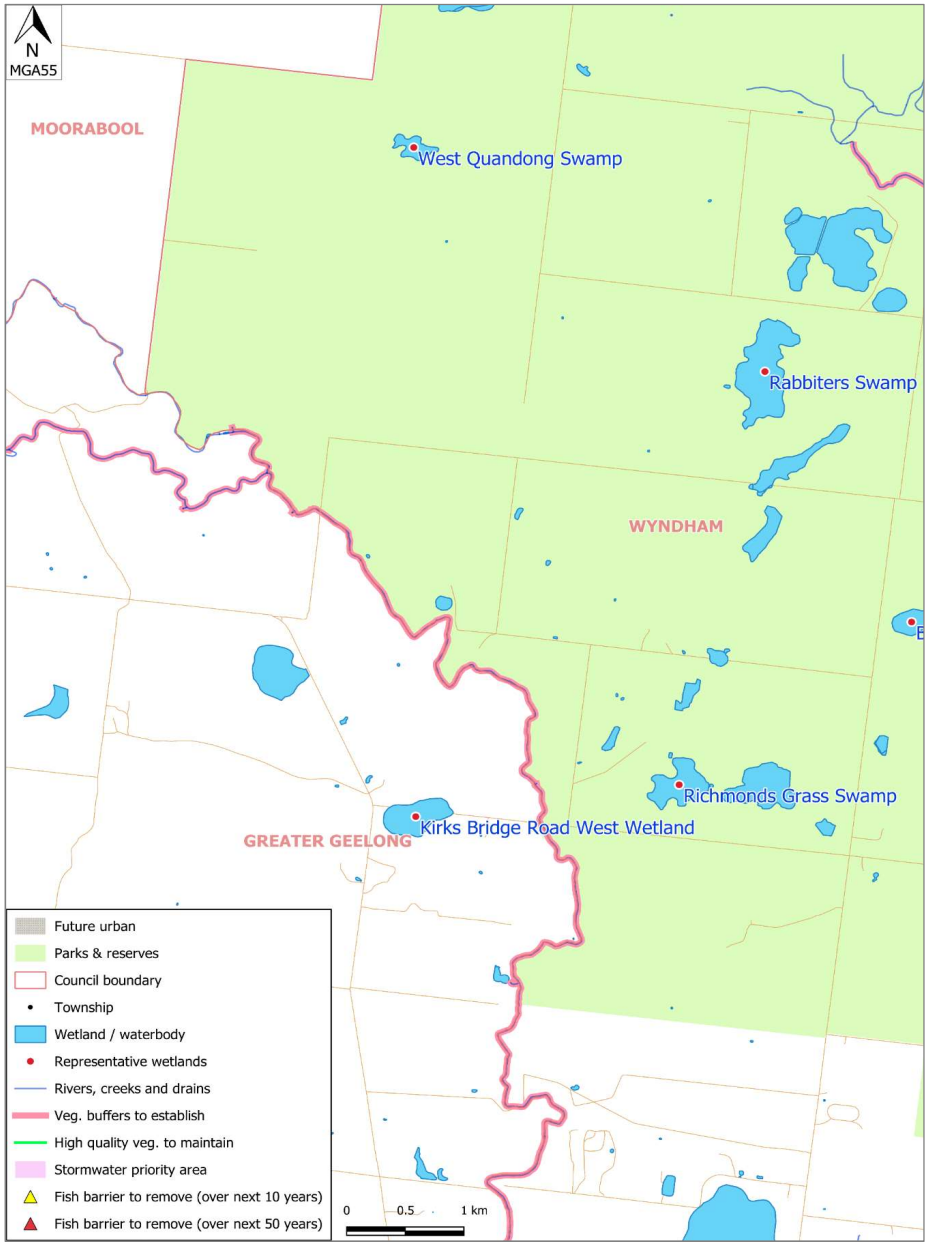
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
4	All	Implement the Western Grassland Reserves adaptive management regime.
5	All	Incorporate wetland into the Western Grassland Reserve.
6	Vegetation condition	Reduce livestock access threat to low.

Rabbitters Lake and Swamp (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low	The bird value score at Rabbitters Lake and Swamp is currently low with a current trajectory of decline to very low. The site currently has very low vegetation condition, with a predicted improvement to moderate vegetation condition, however the site is not formally recognised as significant bird habitat.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high	The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and protections provided in the Western Grasslands Reserve and the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.	The wetland vegetation value is currently very low. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate for this significant Seasonal Herbaceous Wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

West Quandong Swamp (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. West Quandong Swamp, incorporated with the Western Grassland Reserve is a Seasonally Herbaceous Wetland.

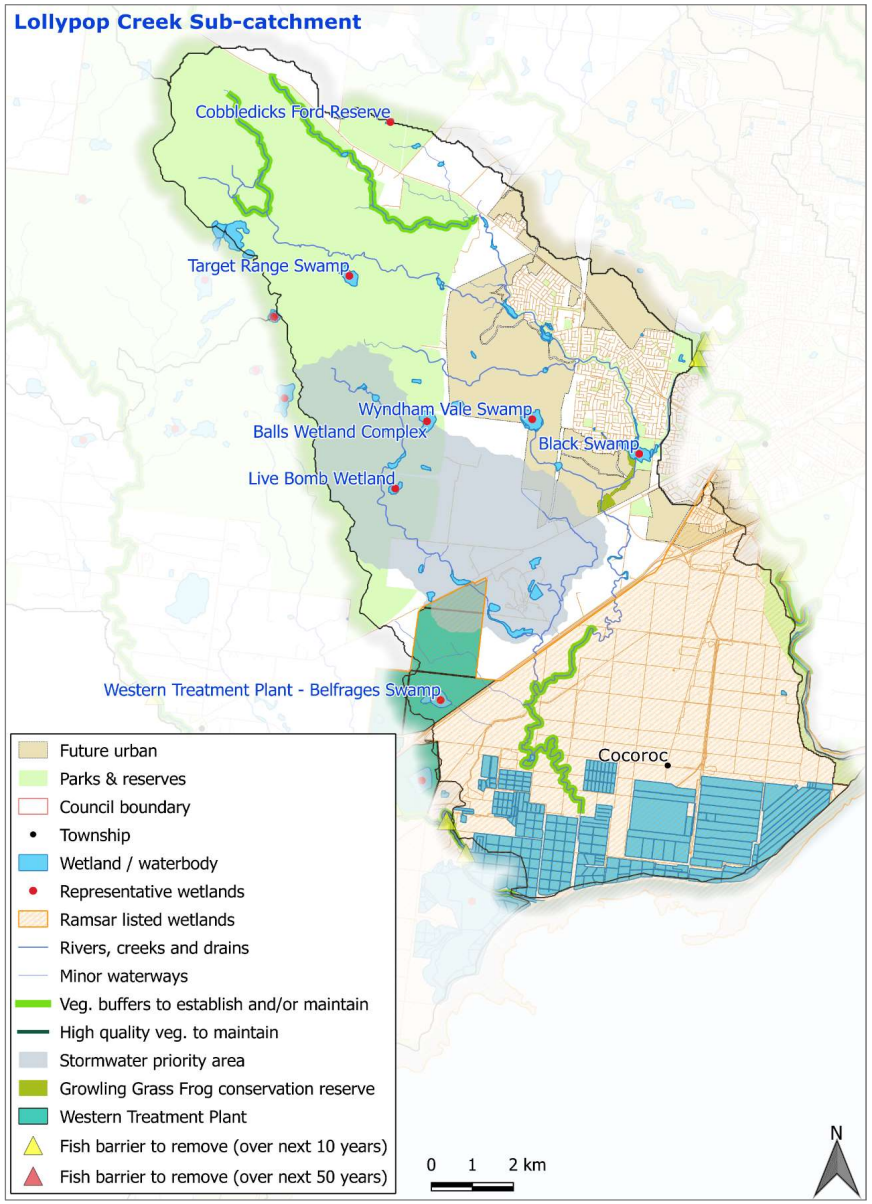
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Implement the Western Grassland Reserves adaptive management regime.
2	All	Incorporate wetland into the Western Grassland Reserve.
3	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
4	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

West Quandong Swamp (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low		The bird value this wetland is currently low and it is has a current trajectory of decline to very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate. The potential long-term trajectory is to maintain at low.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	high	very low	high		The frog (djirrm) value at this wetland is currently high (Refer Little River Upper Catchment). However the current trajectory is a decline to very low due to the predicted warming and drying effects of climate change. Improvements of conditions include habitat form, wetland buffer and vegetation condition are predicted to maintain the frog value as high.
	very low	very low	mod.		The wetland vegetation value at this Seasonal Herbaceous Wetland is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	low	low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Lollypop Creek Sub-catchment



Description

Lollypop Creek is an ephemeral stream that drains farm land west of Werribee township, before entering the Western Treatment Plant (WTP) and discharging to Port Phillip Bay near the 145W outlet. Cherry Creek is a tributary of Lollypop Creek that joins just prior to entering WTP. Black Swamp is a natural floodplain depression on Lollypop Creek between Black Forest Road and Bulban Road.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

No actions were provided for this sub-catchment. The following actions were suggested for the whole Werribee Catchment Region:

"Revegetate along riparian arms. Big opportunity for biolinks."

"Work on alternative water to return flows."

"Manage weeds. Start at the top of catchment. Whole of system benefit."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Lollypop Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (25 km, 100 ha) and maintain existing vegetation (3 km, 13 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality). In addition, to improve social values increase vegetation cover in existing and planned urban areas by 1 km.
2	Stormwater condition	To prevent decline in stormwater condition, treat urban development in the upper reaches of Cherry Creek (e.g. Mambourin), so directly connected imperviousness (DCI) of Cherry Creek remains below 0.2% at Princes Freeway. For every hectare of new impervious area, this requires harvesting around 3.2 ML/y and infiltrating 0.5 ML/y.
3	Access	Increase access (about 2 km of path) to and along waterways by improving connections with existing path network and extending paths into new urban areas of Wyndham Vale and west part of Werribee.
4	Participation	Increase participation rates from moderate to very high; support community groups, connect with growth area communities and build capacity of land owners through rural programs. Increase support for community/environment groups as population increases.
5	Water for Environment	Maintain critical flow components in refuge reaches in Lollypop Creek to protect instream environmental values.
6	Physical form	Investigate and mitigate threats to physical form and other high values (including impacts of urbanisation).

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Lollypop Creek Sub-catchment

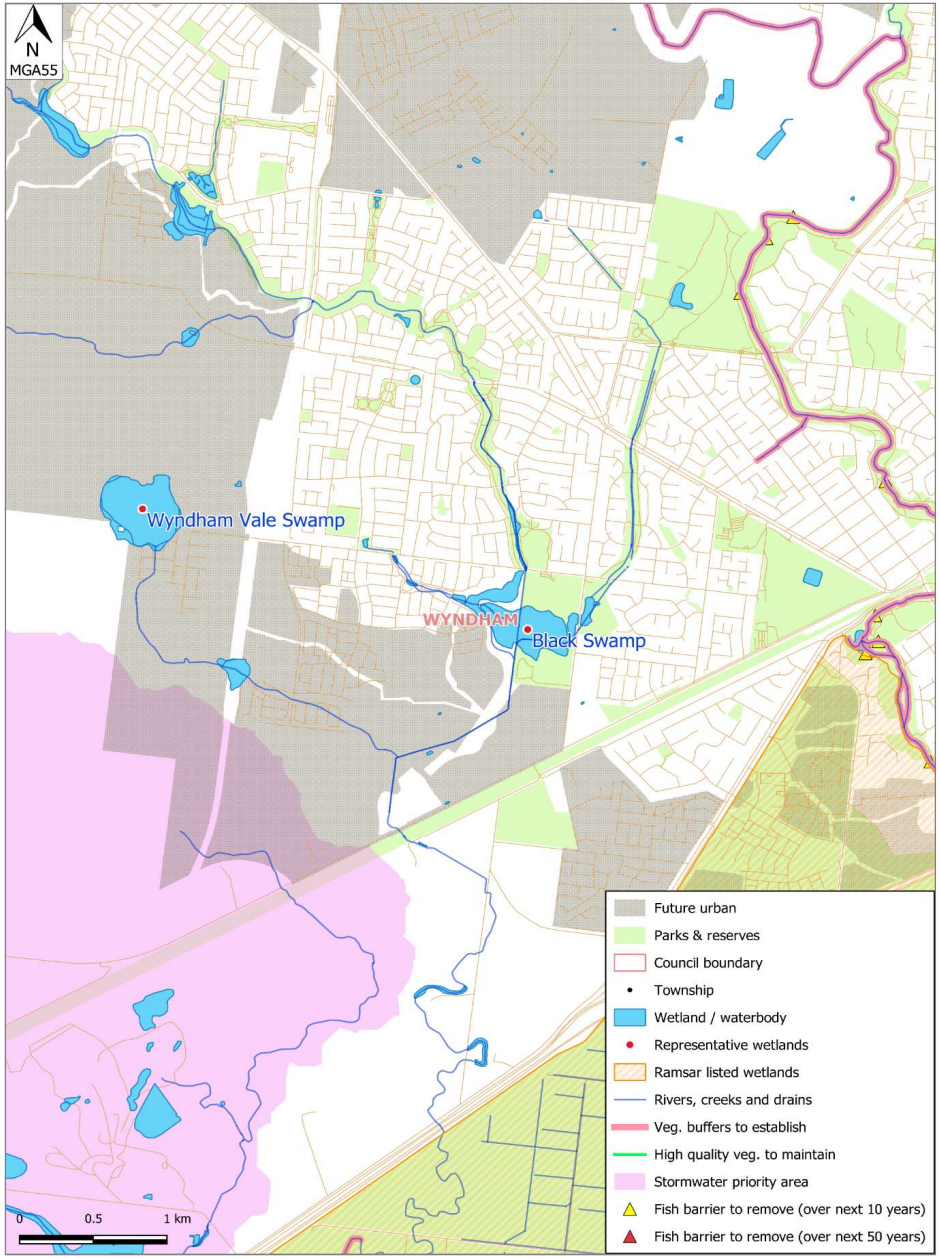
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
low	low	low	Birds (riparian) score is low, meaning few of the expected riparian bird species were recorded. The urbanising sub-catchment means poor water quality, vegetation clearance and changes to natural flow regimes will mean the riparian bird score remains low. Several listed species of (estuarine) shorebird occur in this area, which includes an internationally important Ramsar Wetland.
low	mod.	mod.	Fish (kuwiyn) are currently rated as low, largely due to a lack of suitable habitat (instream and riparian) and urban stormwater impacts. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, and improved management of stormwater, are expected to increase suitability of habitat for less common native fish species and will ensure a rating of moderate in the long term.
very low	very low	very low	Frog (djirrm) score is very low since very few of the expected species of frog were recorded. The combined effects of reduced rainfall and flows, and urban land use intensification mean the score is likely to remain very low. Significant species include endangered growling grass frog.
low	low	mod.	Macroinvertebrates are currently rated as low due to a lack of instream and riparian habitat, and urban stormwater impacts. There are currently no known listed species in this sub-catchment. Habitat improvements as well as progressive management of urban stormwater is expected to increase the rating to moderate in the long term.
n/a	n/a	n/a	Ephemeral waterways such as Lollypop Creek are assumed to have never supported platypus (perridak) populations. For this reason, there is no assessment or setting of targets.
low	very low	mod.	Vegetation is rated as low overall primarily as a result of large scale urbanisation and persistent threats such as pest plants and animals. There are 16 listed water dependent species remaining and 3 bioregional conservation status (BCS) endangered EVCs. Through progressive revegetation and management of threats the long term outcome is to improve condition to moderate.
high	high	very high	Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high	Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	low	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is high.
mod.	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
high	mod.	mod.		Water (ngubitj) for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is moderate.
very low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very low and the target is moderate.
very low	very low	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is high.
very high	very high	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very high and the target is very high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	mod.	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Black Swamp



Description

Black Swamp is a natural floodplain depression on Lollypop Creek between Black Forest Road and Bulban Road which has been artificially drained. The excavated drains have significantly altered the natural hydrology of the swamp (butbut) by lowering drainage levels and drying the swamp out.

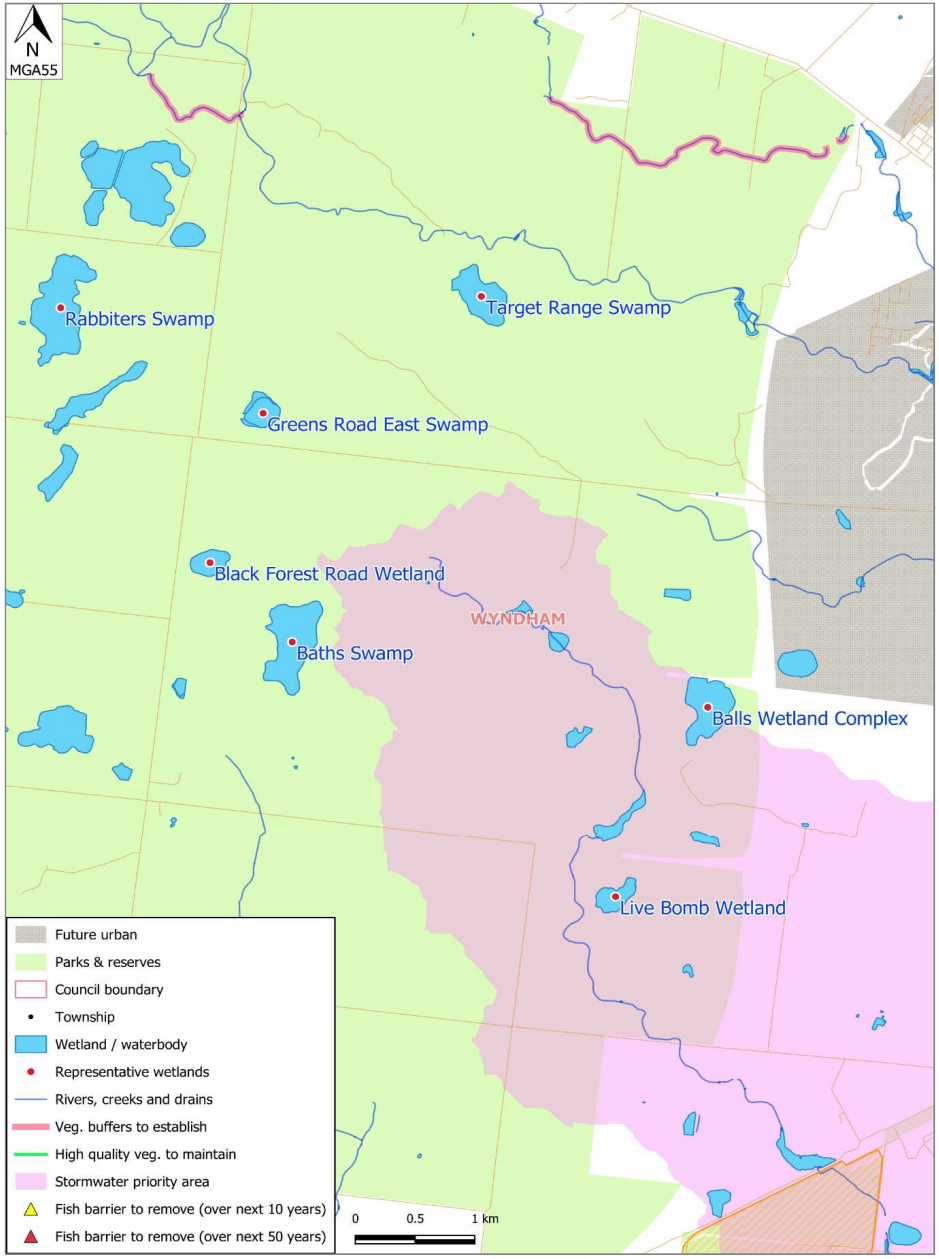
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
2	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
3	Wetland habitat form	Reduce invasive fauna to moderate.

Black Swamp

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The bird value of this wetland is currently very low and it is predicted to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	very low	The frog (djirrm) value from the Lollypop Creek Sub Catchment has been applied. The frog value is currently very low and is predicted to remain very low due to the ongoing threats associated with urbanisation and the predicted threats associated with climate change.
	very low	very low	mod.	The wetland vegetation value at Black Swamp is currently very low. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to improve the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is very low and the target is low.

Live Bomb Wetland (Western Grassland Reserve)



Description

Live Bomb Wetland is a Seasonal Herbaceous Wetland.

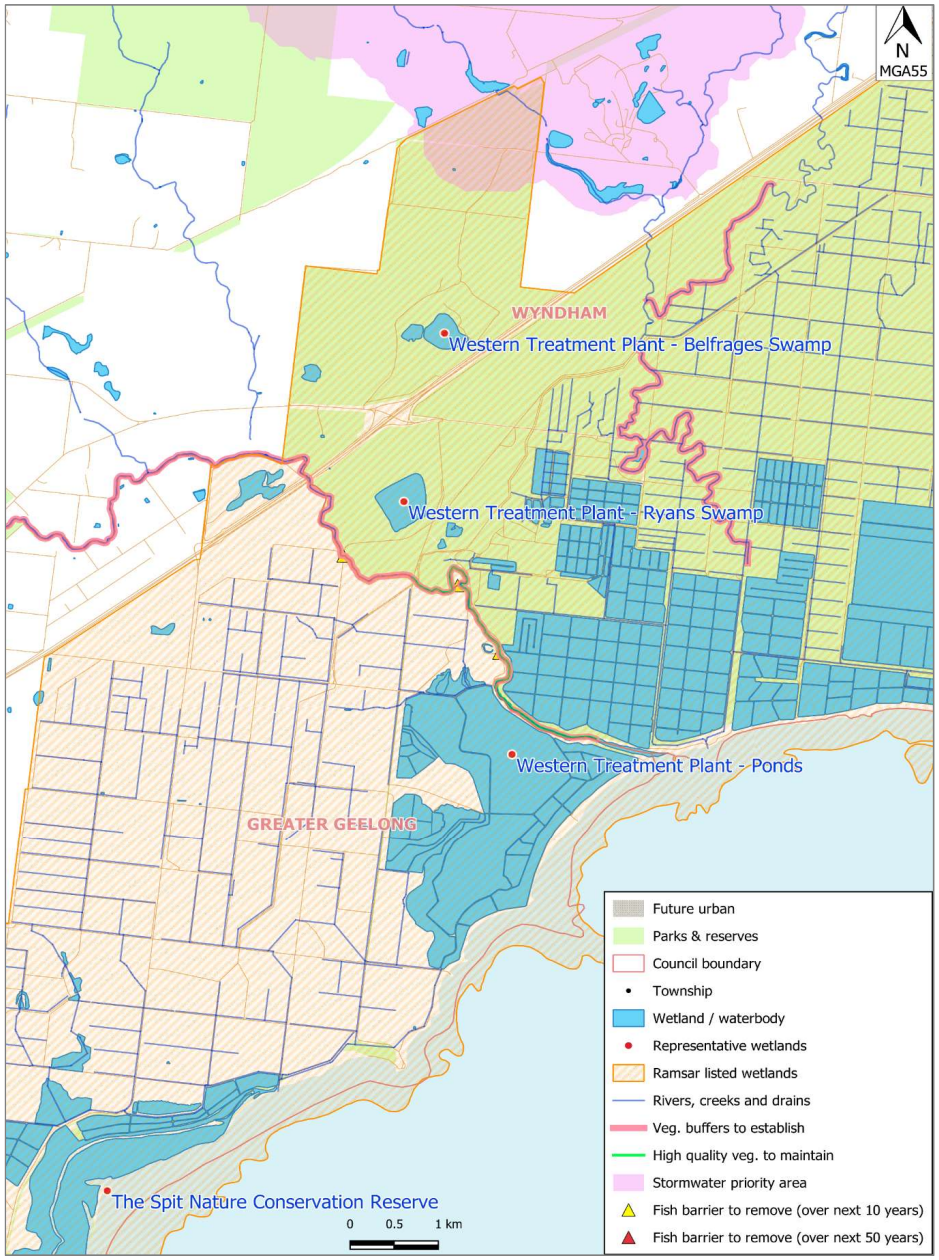
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
2	Wetland habitat form	Reduce threat of soil disturbance to the wetland to low.
3	All	Implement the Western Grassland Reserves adaptive management regime.
4	All	Incorporate wetland into the Western Grassland Reserve.

Live Bomb Wetland (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value of this wetland is currently very low and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	very low		The frog (djirrm) value from the Lollypop Creek Sub Catchment has been applied. The frog value is currently very low and is predicted to remain very low due to the ongoing threats associated with urbanisation and the predicted threats associated with climate change.
	very low	very low	mod.		The wetland vegetation value is currently very low at Live Bomb Wetland. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate for this significant Seasonal Herbaceous Wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Western Treatment Plant - Paul & Belfrages Wetland



Description

The Western Treatment Plant contains a network of lagoons, wetlands, inter-tidal and shoreline areas that provide a haven for thousands of birds, including thousands of migratory waders that fly 12,000 kilometres from Siberia to avoid the harsh northern winter. The plant and areas of the surrounding bay and peninsula were declared a sanctuary for native animals in 1921, and in 1983 the plant became part of the Port Phillip (Western Shoreline) and Bellarine Ramsar site, internationally recognised for supporting waterfowl.

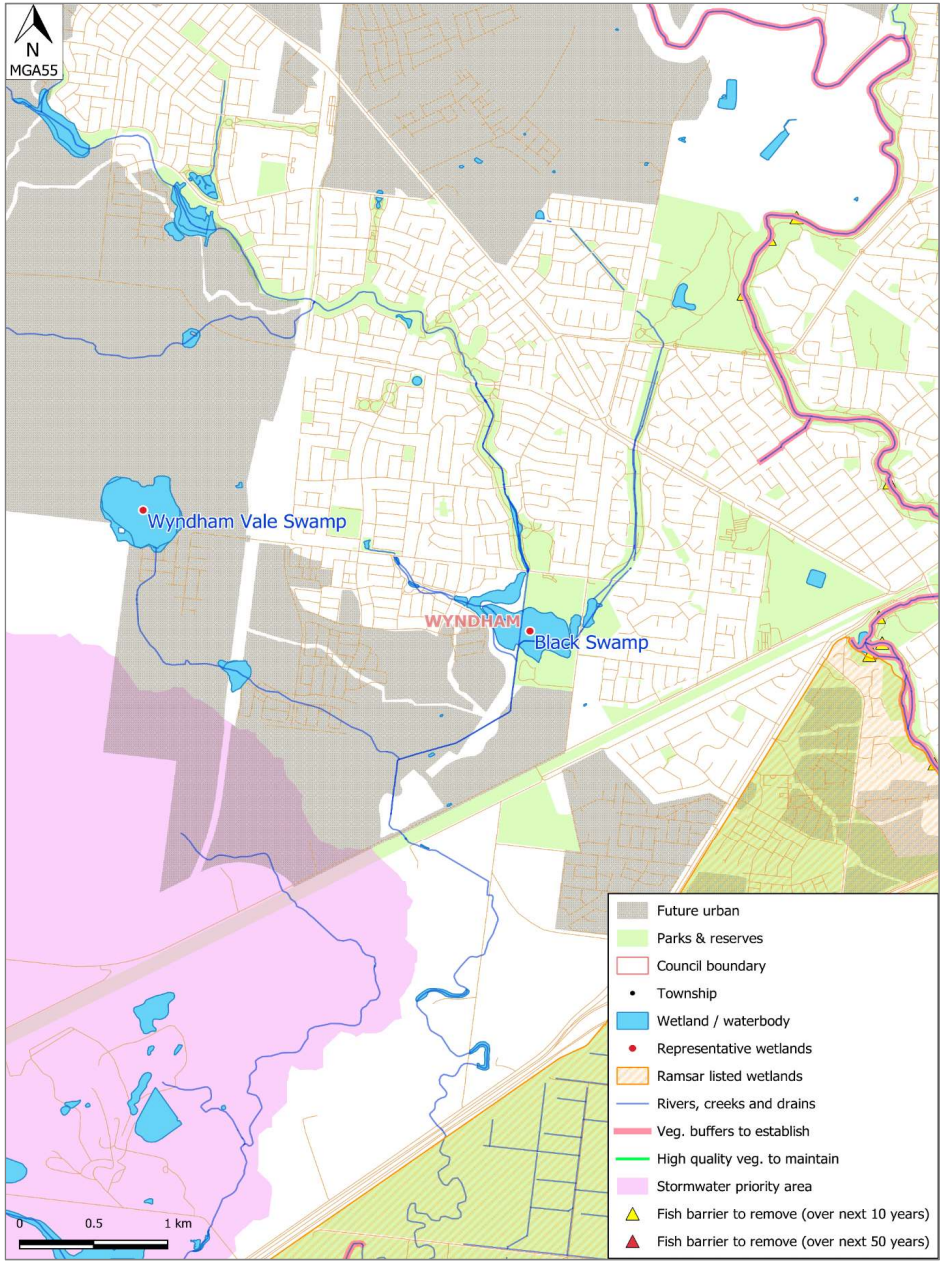
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
2	Wetland habitat form	Reduce invasive fauna threat (cats and foxes) to low focussing on orange-bellied parrot, shorebird and nesting bird habitats.
3	Unaligned	Undertake monitoring to ensure that site stays within the limits of acceptable change as identified in the Ramsar Management Plan and in accordance with new requirements for monitoring, evaluation and reporting at Ramsar sites.
4	All	Identify and assess management options for addressing risk to coastal habitat from sea level rise and increasing coastal storm surge
5	All	Identify opportunities for habitat creation and migration with the adjacent to Ramsar to mitigate habitat loss due to climate change risks.
6	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Western Treatment Plant - Paul & Belfrages Wetland

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very high	mod.	very high	The bird value at this site is very high, with predicted climate change impacts threatening a decline to moderate. However, these impacts may be mitigated at this site with substantial public land buffers allowing adaption planning, maintaining the bird value at very high.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	very low	The frog (djirrm) value at Paul and Belfrages Wetlands is currently very low. The value is predicted to remain very low due to predicted climate change impacts.
	high	very low	high	The wetland vegetation value at is currently high with a current trajectory of decline to very low. Predicted climate change impacts will increase risk to significant coastal wetland vegetation communities including salt marsh. It is anticipated that adaptation strategies could be applied, including allowing landward migration, to maintain vegetation value at high. Improvements to the wetland buffer, wetland habitat form and reducing the threat of invasive salt tolerate weeds species is predicted to assist with maintaining the vegetation condition.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is moderate.
	very low	very low	low	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is low.
	low	very low	mod.	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is moderate.
	high	very low	high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is high and the target is high.
	mod.	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Wyndham Vale Swamp



Description

Wyndham vale Swamp is a Seasonal Herbaceous Wetland. Latham's snipe, Australasian bittern, hoary-headed grebe, red-kneed dotterel and growling grass frog have been recorded at the site. This area has been approved for residential development. Residential development will present a direct challenge to achieving the performance objectives and key value outcomes.

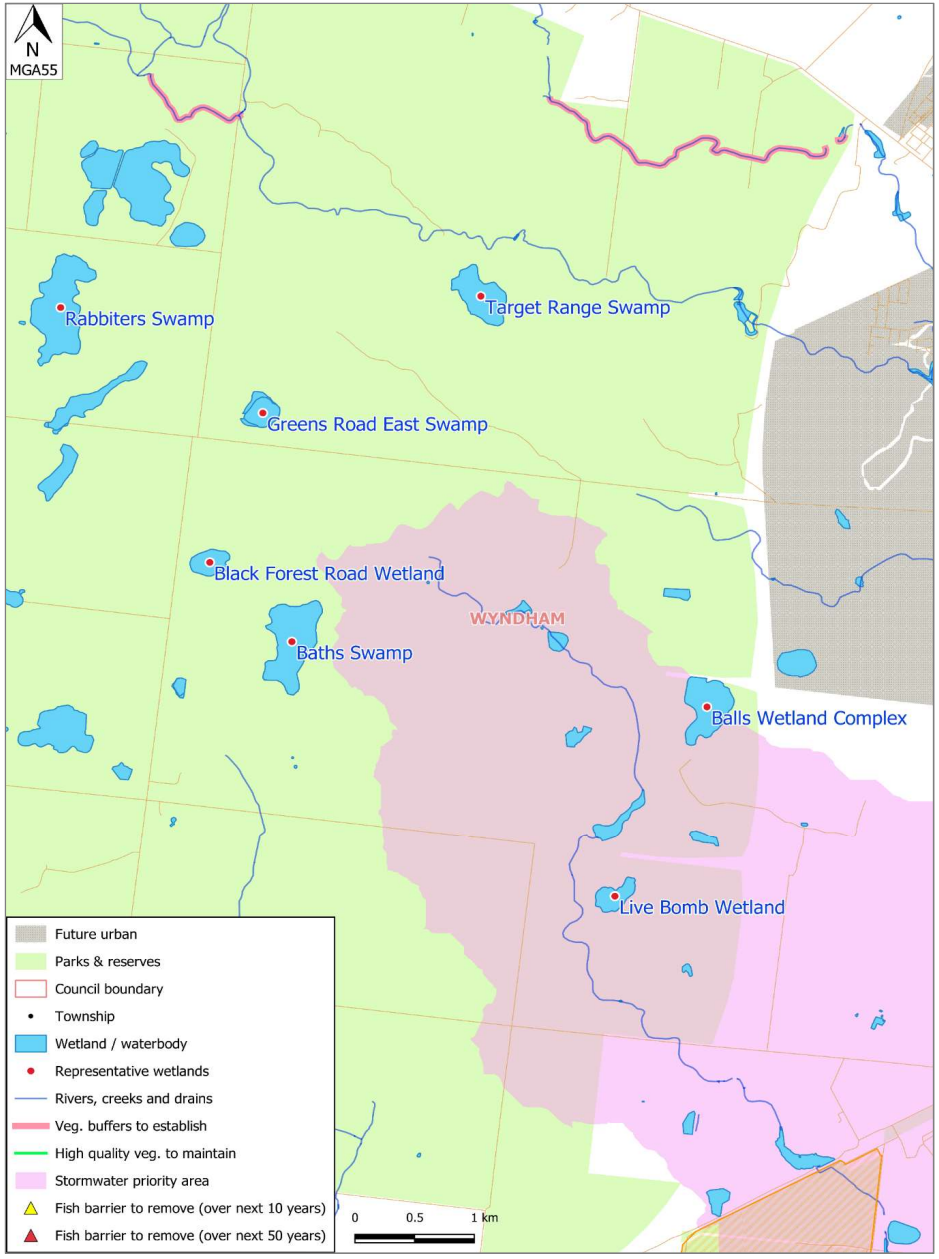
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Ensure appropriate planning controls are in place (e.g. Environmental Significance Overlay) to protect Seasonally Herbaceous Wetland.
2	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
3	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
4	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
5	Wetland habitat form	Reduce soil disturbance threat to low.

Wyndham Vale Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value of this wetland is currently very low and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and the potential trajectory is to maintain at very high to protect the listed species present
	very low	very low	mod.		The wetland vegetation value is currently very low at this wetland. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate for this significant Seasonal Herbaceous Wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is very low and the target is low.

Balls Wetland Complex (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Balls Wetland Complex, incorporated with the Western Grassland Reserve are Seasonal Herbaceous Wetlands.

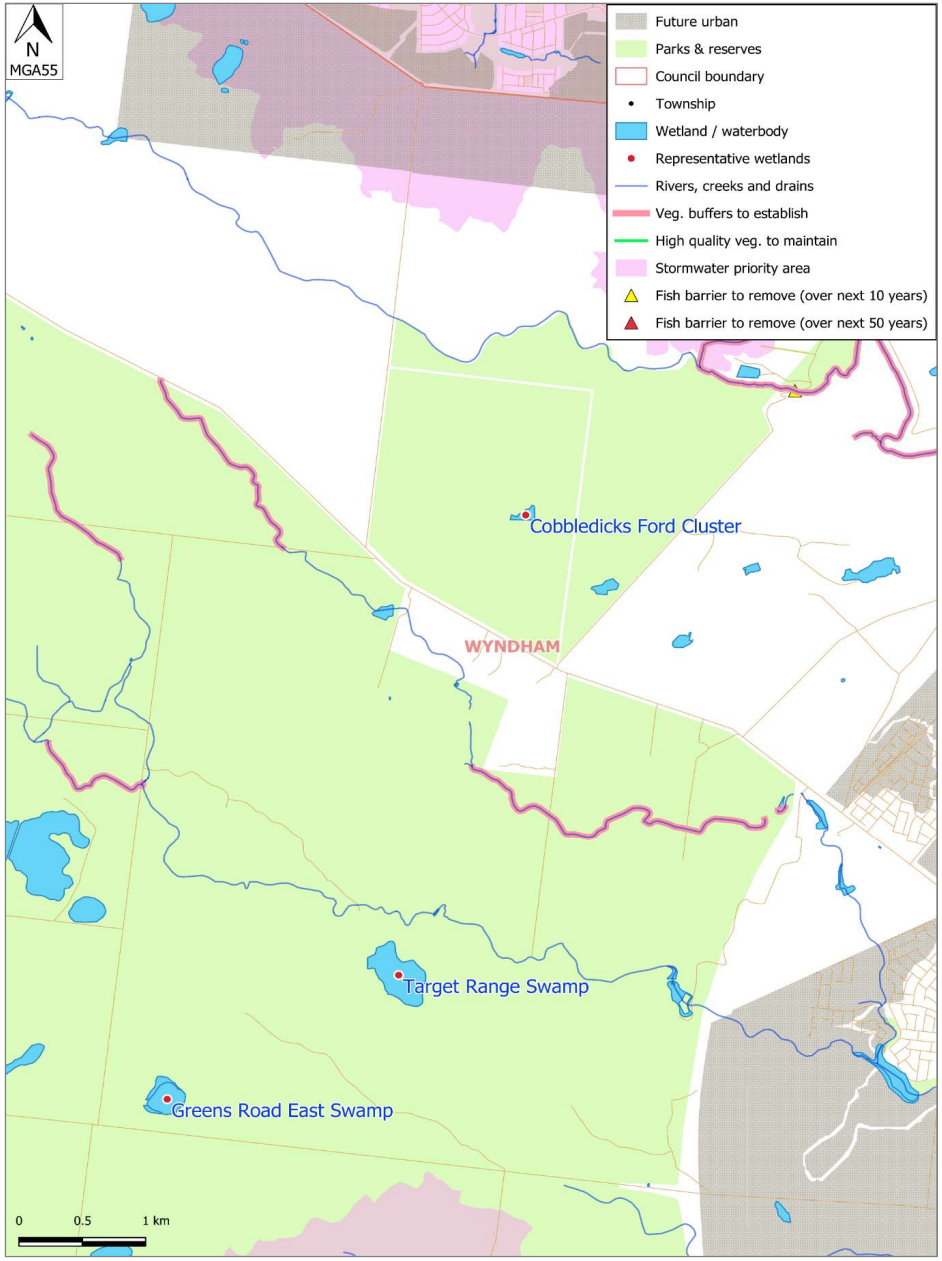
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
4	All	Implement the Western Grassland Reserves adaptive management regime.
5	All	Incorporate wetland into the Western Grassland Reserve.

Balls Wetland Complex (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	very low	low	The bird value this wetland is currently low and it is has a current trajectory of decline to very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat and vegetation condition supporting bird habitat is predicted to only improve to moderate. The potential long-term trajectory is to maintain at low.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high	The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and protections provided in the Western Grasslands Reserve and the potential trajectory is to maintain at very high to protect the listed species present.
	mod.	very low	mod.	The wetland vegetation value Balls Wetland Complex, a significant Seasonal Herbaceous Wetland, is currently moderate. Reducing the threats from degraded habitat form, poor wetland buffer and poor wetland vegetation condition is predicted to maintain the vegetation value to moderate in the long term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Target Range Swamp (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. Target Range Swamp, incorporated with the Western Grassland Reserve is a Seasonal Herbaceous Wetland.

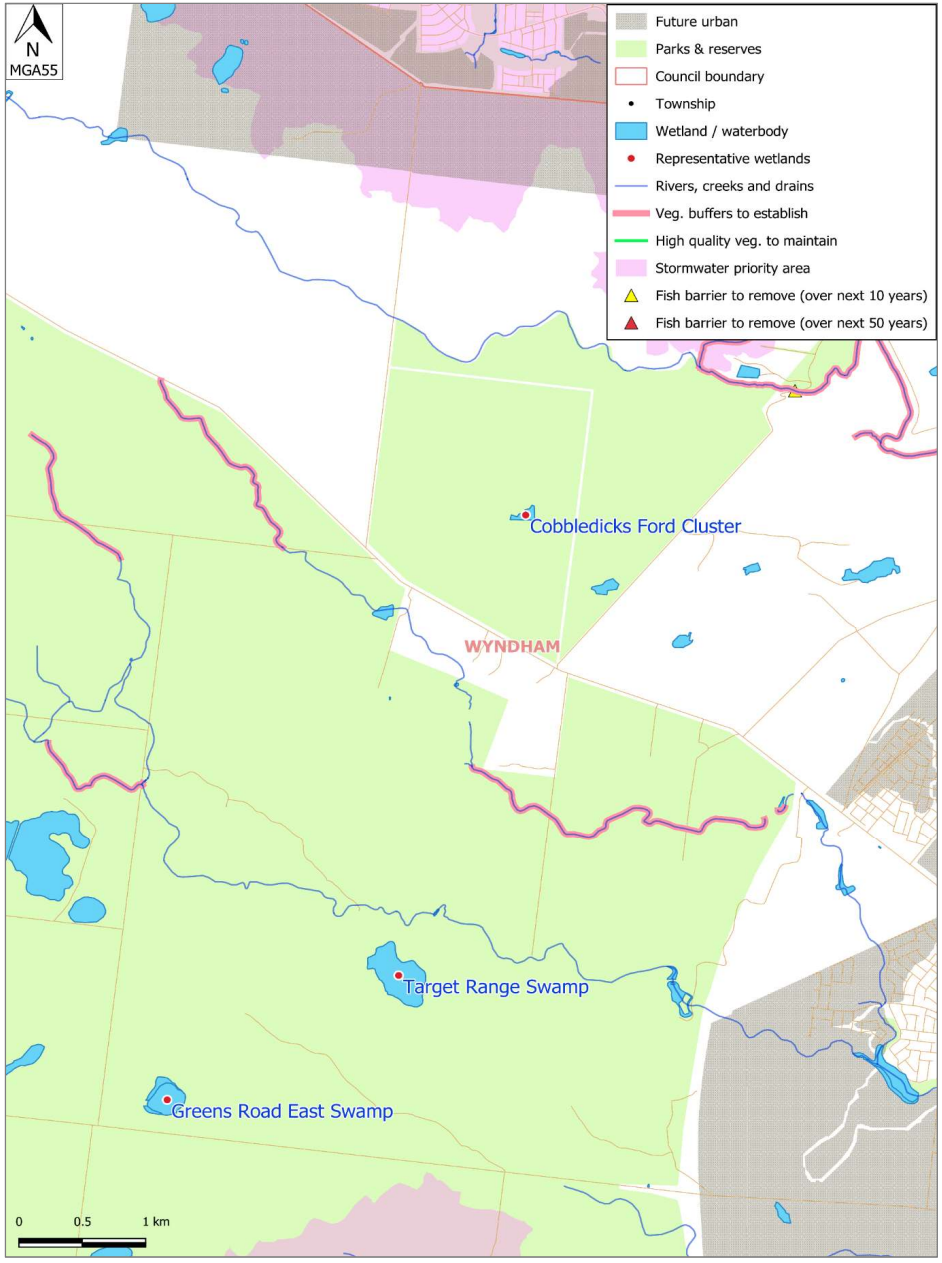
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Implement the Western Grassland Reserves adaptive management regime.
2	All	Incorporate wetland into the Western Grassland Reserve.
3	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Target Range Swamp (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value of this wetland is currently very low and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	very low		The frog (djirrm) value from the Lollypop Creek Sub Catchment has been applied. The frog value is currently very low and is predicted to remain very low due to the ongoing threats associated with urbanisation and the predicted threats associated with climate change.
	very low	very low	mod.		The wetland vegetation value is currently very low at this wetland. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate for this significant Seasonal Herbaceous Wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Cobbledicks Ford Reserve (Western Grassland Reserve)



Description

The Western Grassland Reserves will cover two areas of land outside the Urban Growth Boundary south-east of Melton and west of Werribee that connect the You Yangs area to the Werribee River (Wirribi-yaluk) across the volcanic plains. The Cobbledicks Ford Reserve, incorporated with the Western Grassland Reserve are Seasonal Herbaceous Wetlands.

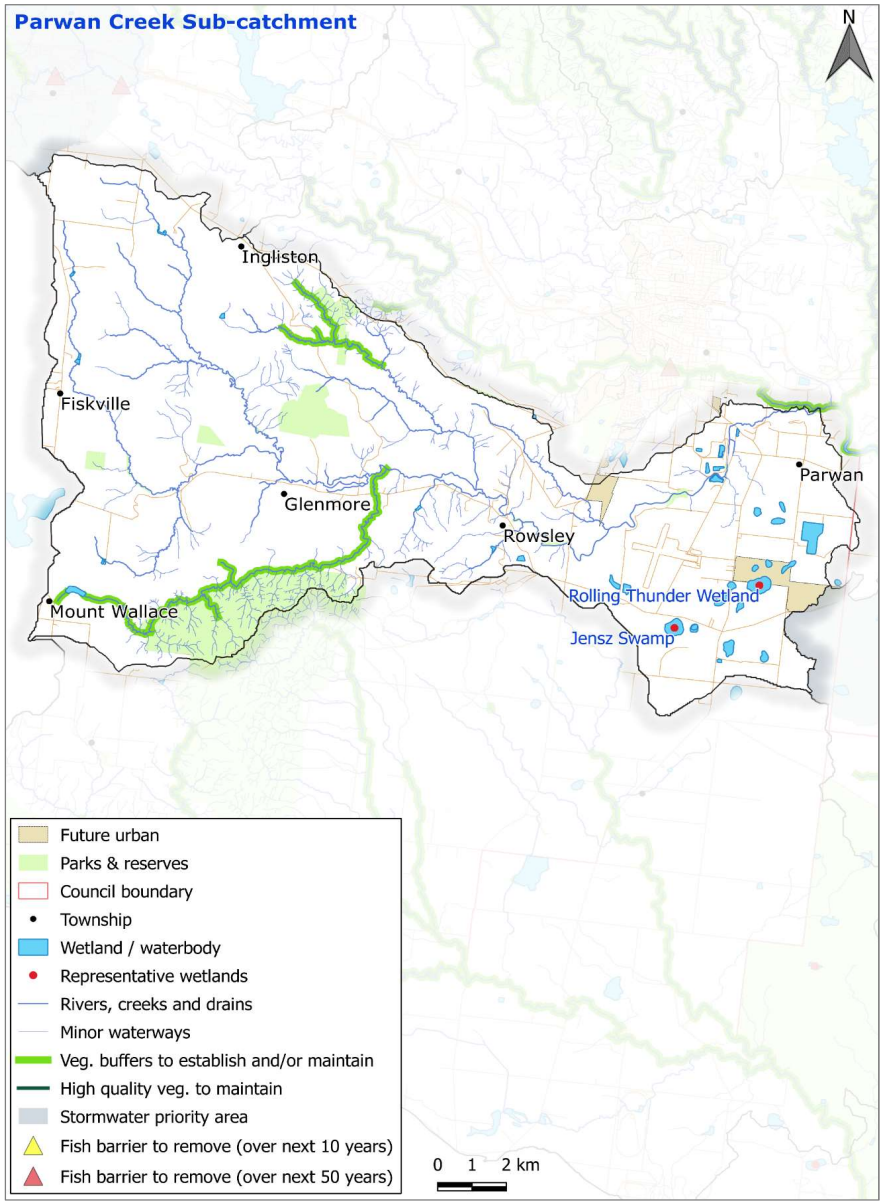
Performance Objectives

ID	Condition Supported	Performance Objectives
1	All	Undertake Index of index of wetland condition assessment and identify performance objectives after assessment.
2	All	Implement the Western Grassland Reserves adaptive management regime.
3	All	Incorporate wetland into the Western Grassland Reserve.

Cobbledicks Ford Reserve (Western Grassland Reserve)

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	low	The bird value of this wetland is currently very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat, although improvement in the wetland vegetation condition will improve the bird habitat and improve the bird value score to low. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a	Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	very low	The frog (djirrm) value from the Lollypop Creek Sub Catchment has been applied. The frog value is currently very low and is predicted to remain very low due to the ongoing threats associated with urbanisation and the predicted threats associated with climate change.
	very low	very low	mod.	The wetland vegetation value is currently very low for the Cobbledicks Ford Reserve. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition, and the water regime is also predicated to remain in moderate condition. Therefore it is predicted that the vegetation value can improve to moderate for this cluster of significant Seasonal Herbaceous Wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Parwan Creek Sub-catchment



Description

Parwan Creek rises near Fiskville and runs in an easterly direction through Glenmore and Rowsley towards Maddingley before joining the Werribee River south of Bacchus Marsh at Parwan. Tributaries of Parwan Creek include Spring and Yaloak Creeks. The Parwan Creek sub-catchment includes the northern area of the Brisbane Ranges National Park.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Align with Local Government targets."

"Rocky escarpment and habitat pools – Action to protect refuge pools (Rowsley to Parwan)"

"Riparian fencing – stock access – bed erosion and small benefit for Water Quality."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Parwan Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (9 km, 37 ha) and maintain existing vegetation (16 km, 64 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Vegetation Quality	Determine extent of and maintain high quality vegetation along the upper reaches of the Parwan River adjacent to, and around, the Werribee Gorge State Park through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	Participation	Support participation in Landcare and other rural programs that improve waterway habitats and build capacity of land owners. Increase participation through promotion of high value areas (e.g. Brisbane Ranges National Park).

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Parwan Creek Sub-catchment

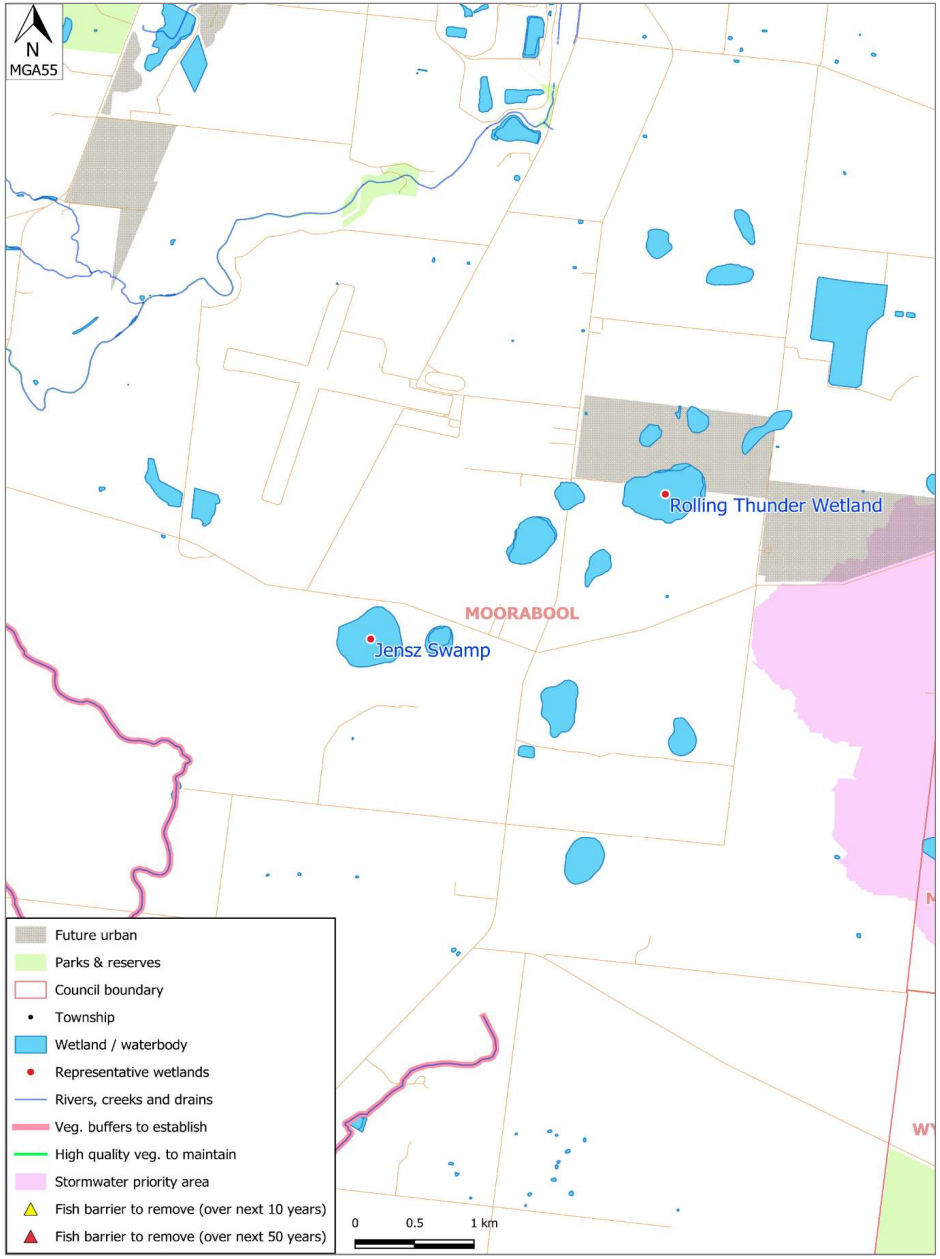
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	low	mod.	We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species of riparian bird include the eastern great egret.
very low	low	mod.	Fish (kuwiyn) are currently rated as very low due to lack of suitable habitat (instream and riparian) and flow stress. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation and flow are expected to increase suitability of habitat for less common native fish species, and increase the rating to moderate in the long term.
high	low	high	Frog (djirrm) score is high since most of the expected species of frog were recorded. With dedicated management the score should be maintained at high.
mod.	mod.	very high	Macroinvertebrates are currently rated as moderate due to a lack of suitable instream and riparian habitat. There are no known listed species in this sub-catchment. It is expected that improving riparian vegetation will result in a very high rating in the long term.
low	low	low	Platypus (perridak) are no longer expected to be found in Parwan Creek as a result of a lack of suitable instream and riparian habitat and flow stress. Without extensive improvements to instream and riparian habitat as well as substantial changes to stream flows, this sub-catchment is unlikely to support platypus (perridak) in the long term other than occasional uses of the lower reach near the confluence of the Werribee River (Wirribi-yaluk).
low	very low	low	Vegetation is rated as low. It is highly modified and fragmented as a result of large scale landuse change and persistent threats. There are 21 listed water dependent species remaining and 10 bioregional conservation status (BCS) endangered EVCs. Managing threats will be required to prevent further decline.
mod.	mod.	high	Amenity, which is based on level of satisfaction, is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
high	high	very high	Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very low	very low	low		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very low and the target is low.
high	mod.	mod.		Water (ngubitj) for environment indicates compliance with flow requirements of freshwater river (yaluk) systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is moderate.
very low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very low and the target is moderate.
very low	very low	low		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is low.
mod.	mod.	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is moderate.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences (e.g. fishing places or kuarka) and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
n/a	n/a	n/a		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. No data exists for this sub-catchment.
very high	high	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is very high and the target is very high.

Jenz Swamp



Description

Jenz Swamp (Butbut) is located in the Moorabool Shire on the Victorian Volcanic Plain. Significant frog species have been recorded the wetland.

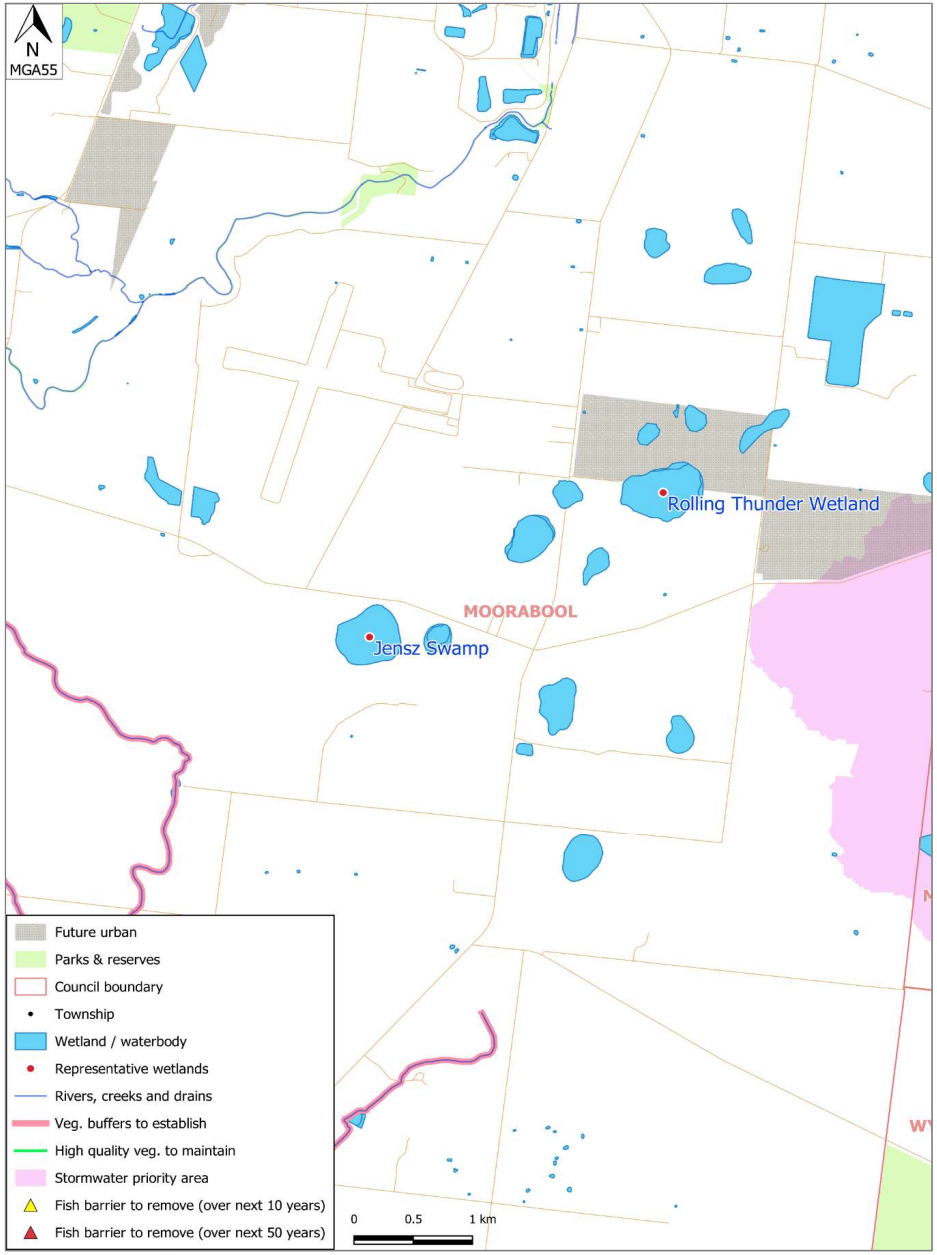
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
2	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.

Jenz Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value of this wetland is currently very low and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.		The wetland vegetation value is currently very low at this wetland. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Rolling Thunder Wetlands



Description

Rolling Thunder Wetland (Wetland 15851) in the Parwan Creek sub-catchment supports significant frog (djirrm), bird and vegetation communities.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
2	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.

Rolling Thunder Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value of this wetland is currently very low and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish (kuwiyn) and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (djirrm) value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and the potential trajectory is to maintain at very high to protect the listed species present.
	very low	very low	mod.		The wetland vegetation value is currently very low. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water (ngubitj) properties within the wetland. The current state is moderate and the target is low.

Skeleton Creek Sub-catchment

Description

Skeleton Creek originates near the Western Freeway in Truganina and passes through Hoppers Crossing and Point Cook before discharging to Port Phillip Bay near Altona Meadows via the Cheetham Wetlands. Tributaries to Skeleton Creek include Dry Creek, Forsyth Road Drain and Cheetham Creek. The waterways are important corridors for recreation and natural habitat in an area where industrial landuse once dominated, but is now rapidly transforming into residential areas. The ephemeral nature of these creeks, stemming from the relatively low rainfall and underlying volcanic rock, has made them vulnerable to modification. The original grassland ecosystem has largely been replaced by farmland or housing. Patches of remnant landform and vegetation such as rocky escarpments are significant surviving features of Skeleton Creek.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Enforcement of development permits and litter."

"Bay trail interpretive signage. Education opportunities, connectedness, recreation opportunity."

"Monitoring of water quality entering wetlands."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Skeleton Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 6 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (38 km, 153 ha) and maintain existing vegetation (1 km, 5 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality). In addition, to improve social values increase vegetation cover in existing and planned urban areas by 1 km.
3	Access	Increase access to and along waterways from 27% to 35% (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
4	Participation	Increase participation rates from low to high; support community groups, connect with growth area communities and build capacity of land owners in upper catchment through rural programs. Increase support for community/environment groups as population increases.
5	Water for Environment	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
6	Physical form	Investigate and mitigate threats to physical form and other high values.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Skeleton Creek Sub-catchment

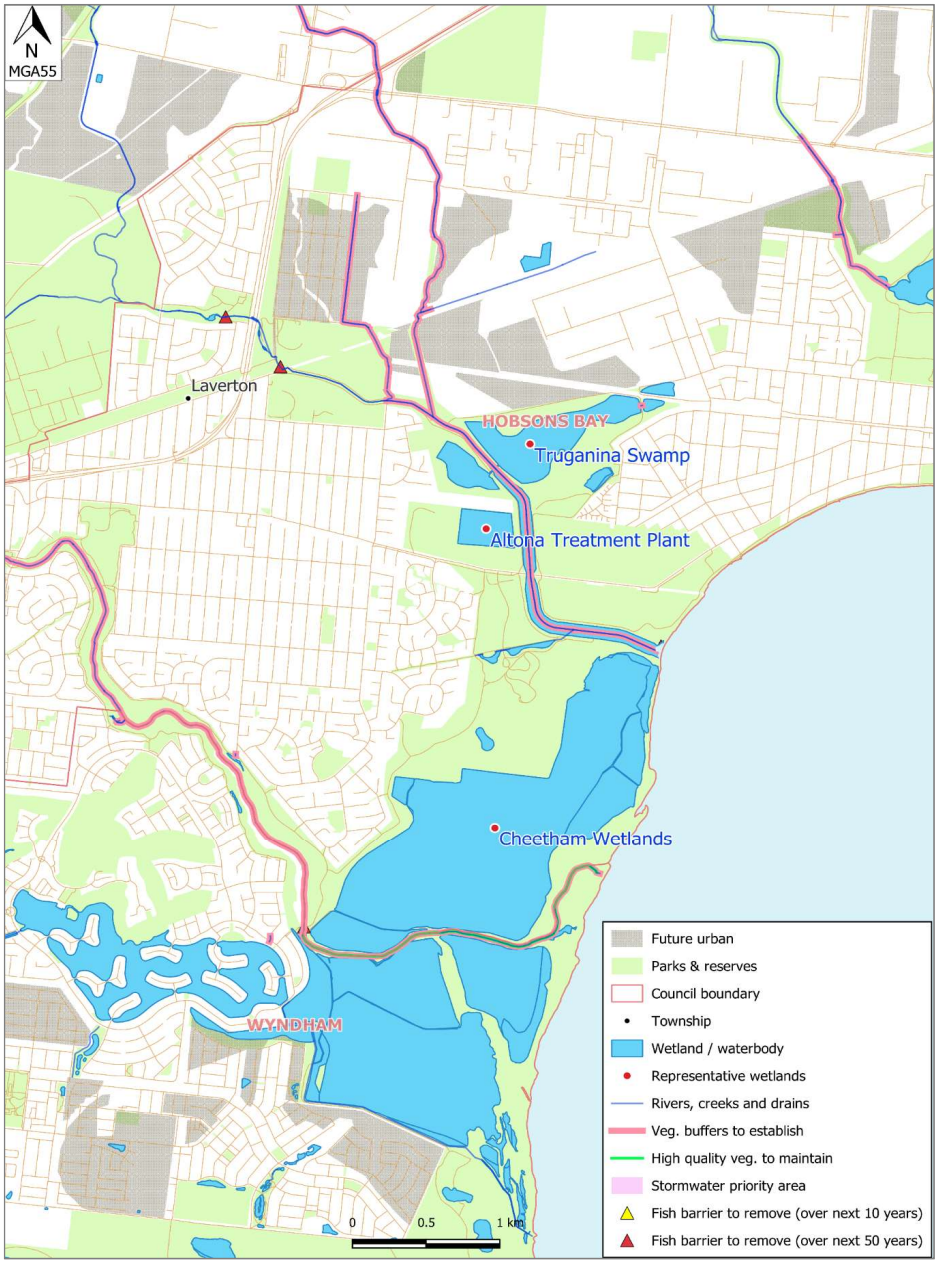
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Several listed species of (estuarine) shorebird occur, which includes an internationally important Ramsar wetlands.
low	mod.	mod.		Fish are currently rated as low due to a lack of habitat (riparian and instream), impacts of urban stormwater and barriers to migration. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation and progressive improvements to stormwater and fish barriers in the long term, is expected to benefit a number of less common species. There are no known threatened species found in the sub-catchment.
low	low	low		Frog score is low since only some of the expected species of frog were recorded. The combined impacts of urbanisation and climate change driven changes to surface flows and water quality are likely to see the score remain at low. Significant species include endangered growling grass frog.
low	very low	mod.		Macroinvertebrates are currently rated as low largely due to the impacts of urban stormwater. There are no known listed species in this sub-catchment. With improvements to riparian vegetation, flows and progressive management of urban stormwater, the rating is predicted to increase to moderate in the long term.
n/a	n/a	n/a		Ephemeral waterways such as Skeleton Creek are assumed to have never supported platypus populations. For this reason, there is no assessment or setting of targets.
low	very low	mod.		Vegetation is rated as low overall due to large scale landuse change and is predicted to decline to very low with persistent threats and climate change. There are 30 listed water dependent species remaining and 1 bioregional conservation status (BCS) endangered EVCs. With improvement works the rating is predicted to increase to moderate in the long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
low	very low	mod.	Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is low and the target is moderate.
mod.	low	mod.	Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
high	low	low	Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is low.
low	very low	mod.	Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
very low	very low	high	Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is high.
low	low	very high	Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is very high.
mod.	low	mod.	Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
low	low	very high	Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is low and the target is very high.
high	mod.	high	Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high	Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	low	very high	Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is low and the target is very high.

Cheetham Wetlands



Description

The Cheetham Wetlands were originally a natural salt marsh and grassy woodlands; the area was later used as a saltworks. The later use created the lagoons, which attract many birds to the area. In 1996, the land was set aside to protect the wetland system and its diverse fauna and flora, including migratory birds. It is a Nationally Important Wetland, listed in the Directory of Important Wetlands Australia. Parks Victoria manages Cheetham Wetlands.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Investigate opportunities to improve wetland area and habitat.
2	Water regime	Continue to implement water regime management in artificial habitats within the Ramsar site. Prepare adaption pathway for climate change and stormwater impacts on the water regime.
3	Vegetation condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
4	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
5	Wetland habitat form	Reduce invasive fauna threat (cats and foxes) to low focussing on orange-bellied parrot, shorebird and nesting bird habitats.
6	All	Undertake monitoring to ensure that site stays within the limits of acceptable change as identified in the Ramsar Management Plan and in accordance with new requirements for monitoring, evaluation and reporting at Ramsar sites.
7	All	Identify opportunities for habitat creation and migration with the adjacent to Ramsar to mitigate habitat loss due to climate change risks.

Cheetham Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	low	high		Cheetham Wetlands are formally recognised as significant bird habitat with part of the wetlands included in the Port Phillip Bay (Western Shoreline) & Bellarine Peninsula Ramsar Site, as well as being listed in the Directory of Important Wetlands. Many significant bird species have been recorded. The bird value is currently high, with a current predicted decline to low value. The predicted impacts of climate change on coastal wetlands in the region are significant, however, it is anticipated that these impacts may be somewhat mitigated at Cheetham with the bird value remaining high.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very low		The frog value at this wetland is currently very high with listed species being present. The predicted impacts of climate change on coastal wetland environments will impact the likelihood that sites will support significant frog populations. The frog value is predicted to decline to very low.
	mod.	very low	mod.		The wetland vegetation value at Cheetham is currently moderate with a current trajectory of decline to very low. Predicted climate change impacts will increase risk to significant coastal wetland vegetation communities including salt marsh. It is anticipated that the adaptation strategies could be applied to maintain vegetation value at moderate. Improvements to the wetland buffer and reducing the threat of invasive salt tolerate weeds species is predicted to assist with maintaining the vegetation condition.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Laverton RAAF Swamp

Description

Laverton RAAF Swamp is located at Laverton Airbase. This land was originally all swampy however, RAAF Swamp is the one significant wetland that remains in the south-west corner of the base. The Swamp connects to Skeleton Creek during times of high flow.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Improve the wetland buffer to 100 per cent of the wetland perimeter.
2	Wetland habitat form	Reduce threat of dogs, cats, rabbits and foxes to moderate.
3	Water regime	Prepare adaption pathway for climate change impacts, including opportunities to maintain water regime in light of climate change and stormwater impacts.

Laverton RAAF Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value of at Laverton RAAF Swamp is currently very low, despite records of significant bird species, and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat, despite an improvement in wetland vegetation condition to moderate. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog value at this wetland is currently very high with listed species being present. Predicted drying from climate change and higher temperatures means a current trajectory of decline to very low. However, these impacts may be somewhat mitigated through reduction in key threats and the potential trajectory is to maintain at very high to protect the listed species present.
	low	very low	mod.		The wetland vegetation value is currently low. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Skeleton Creek Estuary

Description
The Skeleton Creek Estuary enters Port Phillip Bay within the Cheetham Wetlands. A ford on a maintenance track at 2.6 km upstream from the mouth is likely to limit tidal flow and possibly fish passage at times of low fluvial flow. Modification has included the removal of native vegetation and some channelisation. The substrate in the estuary is a combination of silt and sand. There is some connectivity to saltmarsh in the Cheetham Wetlands.

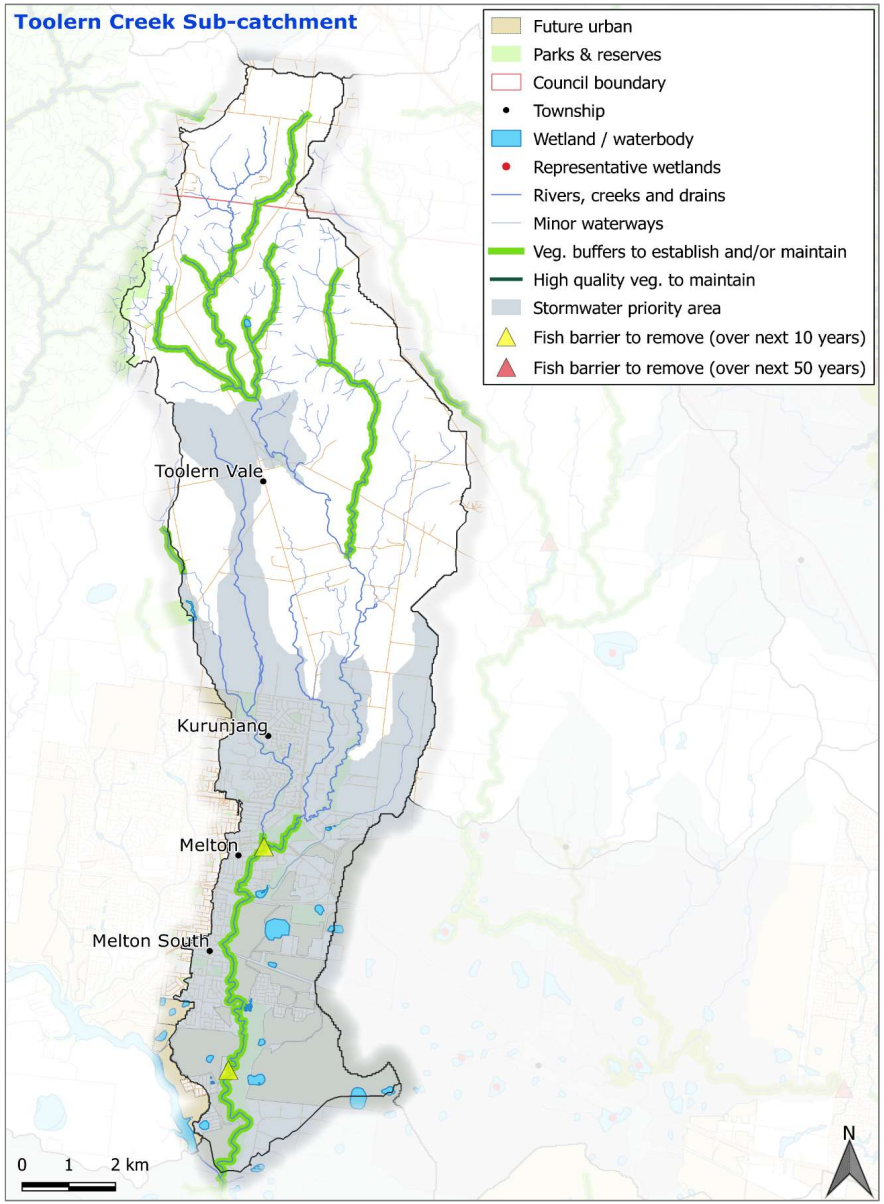
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
2	Estuarine wetland connectivity	Investigate opportunities to mitigate climate change impacts to significant salt marsh vegetation community by facilitating lateral or longitudinal migration on the floodplain including in Altona Meadows Natural Features Reserve and aligning with planned mitigation measures for Cheetham Wetlands.
3	Estuarine vegetation	Protect remnant estuarine vegetation communities by reducing threats from salt tolerant weeds in saltmarsh communities.
4	Access & Recreation	Enhance opportunities for recreation, such as walking and fishing.
5	Tidal exchange & Longitudinal extent	Improve longitudinal connectivity and tidal exchange in estuary.
6	Amenity	Enhance access and facilities that support passive enjoyment.

Skeleton Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	mod.		The estuarine bird score is currently high for Skeleton Creek as the estuary is formally recognised for its value as bird habitat (through Ramsar, East Australasian Flyway Site, Directory of Important Wetlands, Important Bird Area and Important Bird Habitat) and the vegetation is currently in moderate condition. The current and potential trajectory is a decline to moderate due to predicted climate change impacts which are unable to be mitigated as the estuary is fringed by a highly industrial environment and the predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		The fish value score for the Skeleton Creek is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabits the estuaries and are likely to remain.
	low	very low	low		The estuarine vegetation value score in Skeleton Creek is currently low with a trajectory of very low. Reducing the risk of invasive flora species and undertaking some climate change mitigation planning will maintain the vegetation condition at moderate and the vegetation value score at low.
	mod.	mod.	high		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary , is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
	very high	very high	very high		Community connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	mod.	mod.	high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently moderate and is expected to remain moderate in the long-term if supply keeps up with population growth; target is to improve to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is low.
	high	very low	high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is high and the target is high.
	very low	low	low		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very low and the target is low.
	high	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is high and the target is low.
	mod.	very low	mod.		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is moderate and the target is moderate.
	very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

Toolern Creek Sub-catchment



Description

Toolern Creek is a tributary of the Werribee River. The creek rises near Gisborne South and flows through Melton and Melton South, separating the industrial and residential areas. The creek forms a confluence with the Werribee River at Exford immediately downstream from the Melton Reservoir. Much of the lower parts are planned for urban growth.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

No actions were provided for this sub-catchment. The following actions were suggested for the whole Werribee Catchment Region:

"Revegetate along riparian arms. Big opportunity for biolinks."

"Address significant risks to values from pollution (water quality) from emerging contaminants of concern such as microplastics, pesticides and pharmaceuticals"

"Manage weeds. Start at the top of catchment. Whole of system benefit."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Toolern Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Stormwater condition	To prevent decline in stormwater condition, treat urban development (e.g. Melton), so directly connected imperviousness (DCI) of Toolern Creek remains below 3.4% at confluence with Werribee River. For every hectare of new impervious area, this requires harvesting around 3.6 ML/y and infiltrating 0.6 ML/y, which is about 2.8 GL/y and 0.5 GL/y for full development to the urban growth boundary.
2	Vegetation Extent	Target three areas (min. 2 ha) for habitat improvement for Bibron's toadlet.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (30 km, 119 ha) and maintain existing vegetation (10 km, 39 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality). In addition, to improve social values increase vegetation cover in existing and planned urban areas by 1 km.
4	Vegetation Quality	Determine extent of and maintain high quality vegetation along the upper reaches of Toolern Creek near the Lerderderg State Park (Pyrete Range) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
5	Access	Increase access to and along waterways from 14% to 20% (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
6	Participation	Increase participation rates from moderate to very high; support community groups, connect with growth area communities and build capacity of land owners in upper catchment through rural programs. Increase support for community/environment groups as population increases.
7	Instream Connectivity	Increase instream connectivity provide fish passage along Toolern Creek from confluence with Werribee River to the headwaters by removing barriers at Melton South (near Exford Road) and High St, Melton.
8	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
9	Physical form	Investigate and mitigate threats to physical form and other high values.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Toolern Creek Sub-catchment

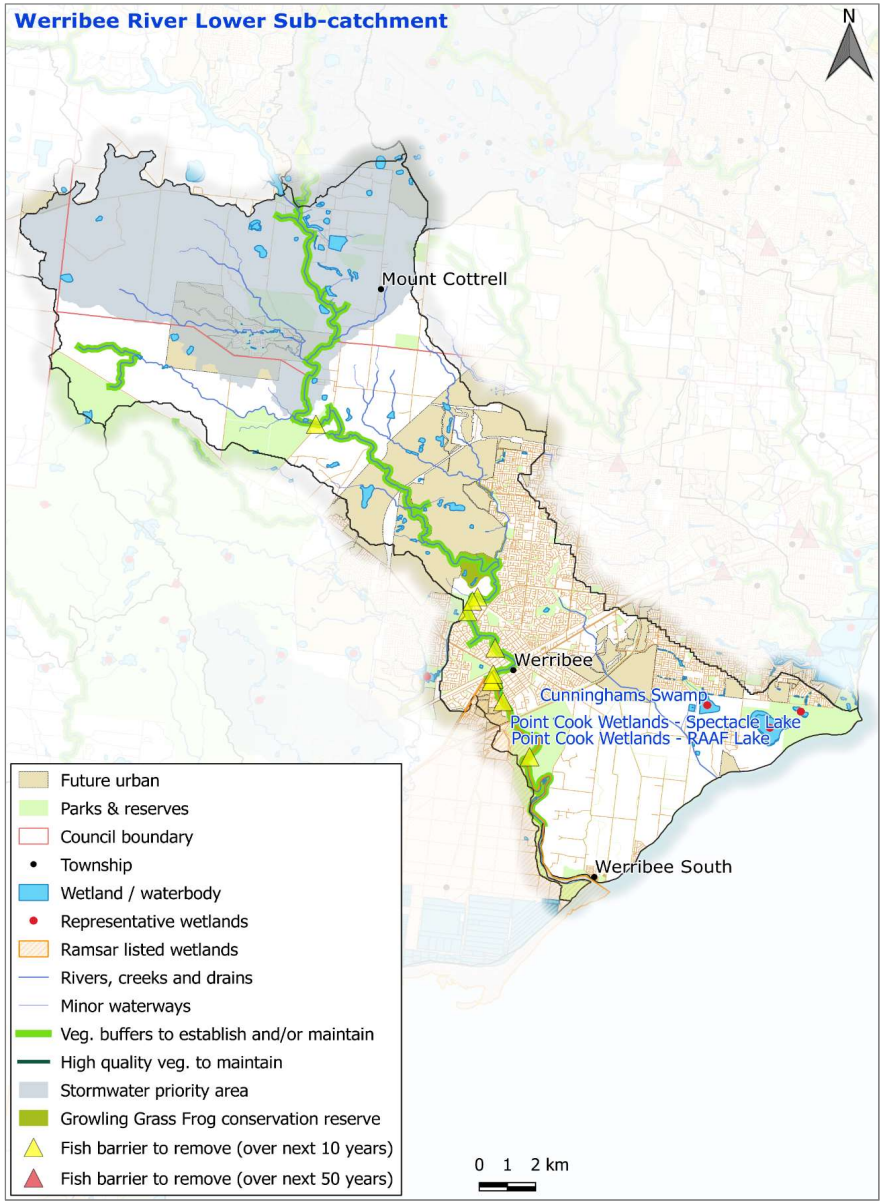
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	low	mod.	We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate.
very low	low	mod.	Fish are currently rated very low due to a lack of suitable habitat (instream and riparian), barriers to migration and stormwater impacts. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, improved management of stormwater, and removal fish barriers, is expected to benefit a number of less common species and increase the rating to moderate in the long term. There are no known threatened species found in the sub-catchment.
very high	low	very high	Frog score is very high since all, or almost all, species of frog were recorded there relative to those expected given the survey effort. With appropriate management the score should be maintained as very high. Significant species include brown (or Bibron's) Toadlet.
low	low	high	Macroinvertebrates are currently rated as low largely due to urban stormwater impacts and a lack of suitable instream and riparian habitat. There are no known listed species in this sub-catchment. With improvements to riparian vegetation and improved management of stormwater the rating is expected to increase to high in the long term.
very low	very low	low	Platypus are currently rated as very low as a result of a lack of instream and riparian habitat, as well as a lack of flows. With improvements to riparian habitat, the management of urban stormwater and provision of suitable flows, the rating it predicted to increase to low in the long term.
low	very low	mod.	Vegetation is rated as low due to large scale landuse change and is predicted to decline to very low with persistent threats and climate change. There are 7 listed water dependent species remaining and 7 bioregional conservation status (BCS) endangered EVCs. Improving the quality and extent of riparian vegetation will increase the rating to moderate in the long term.
mod.	mod.	high	Amenity, which is based on level of satisfaction, is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
high	high	very high	Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
high	high	very high	Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is very high.
low	low	mod.	Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is low and the target is moderate.
high	mod.	mod.	Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is moderate.
low	very low	mod.	Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
very low	very low	mod.	Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is moderate.
mod.	mod.	very high	Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is very high.
mod.	low	mod.	Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	mod.	Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is moderate.
high	mod.	very high	Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
high	low	high	Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	low	very high	Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Werribee River Lower Sub-catchment



Description

Werribee River originates in the Wombat State Forest on the Great Dividing Range, and flows for about 110km south-east via to the north-western shores of Port Phillip Bay. The lower reaches flow through market gardens in Werribee South, with considerable areas of the catchment also used for open space and recreation (such as golf courses) and housing. Land clearing, agriculture and urbanisation have contributed to widespread erosion, increased nutrient levels and salinity, and loss of habitat for aquatic life.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Identify who/what benefits from water harvestings and how funded. Community education on benefits."

"Create biolink – Werribee to Melton for environmental values (along river)"

"New community coming. Needs to be engaged – schools program – more awareness."

"Clear and certain policies for developers for storm water – sometimes conflicting policies – big dollars are spent, want best outcomes."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Werribee River Lower Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (29 km, 114 ha) and maintain existing vegetation (22 km, 86 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Stormwater condition	To prevent decline in stormwater condition, treat urban development (e.g. Eynesbury and Melton), so directly connected imperviousness (DCI) of the Werribee River remains below 1.1% at Cobbledicks Ford. For every hectare of new impervious area, this requires harvesting around 3.5 ML/y and infiltrating 0.5 ML/y, which is about 2.9 GL/y and 0.4 GL/y for full development to the urban growth boundary.
3	Access	Increase access (about 5 km of path) to and along waterways by improving connections with existing path network and extending Werribee River trail (part of longer term project to have continuous trail from Melton Reservoir to the Bay). Investigate opportunities to improve access for on-water activities.
4	Participation	Increase participation rates from low to high; support community groups, connect with growth area communities and build capacity of land owners in upper catchment through rural programs. Increase support for community/environment groups as population increases.
5	Water Quality – Recreational	Protect recreational water quality in Werribee River to support existing recreational activities.
6	Instream Connectivity	Increase instream connectivity provide fish passage along the Werribee River between the mouth and Melton Reservoir by removing 10 barriers in the lower reaches and another at Cobbledicks Ford Reserve.
7	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
8	Water for Environment	Investigate options to increase the environmental water reserve by 7 GL by 2028 to meet ecological watering objectives and cover projected shortfalls. Environmental water recovery targets are captured at lowest downstream sub-catchment, which reflects targets for whole catchment.
9	Physical form	Investigate and mitigate threats to physical form and other high values.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Werribee River Lower Sub-catchment

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Several listed species of (estuarine) shorebird occur, which includes an internationally important Ramsar-listed wetland.
low	mod.	very high		Fish are currently rated low due to a lack of suitable habitat (instream and riparian), flow stress (including urban stormwater impacts) and several barriers to migration, such as the Werribee diversion weir. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, increased flow, and removal of fish barriers, is expected to benefit a number of less common species, and increase the rating to very high in the long term. Threatened Australian grayling have been recently recorded in the lower reaches.
mod.	very low	mod.		Frog score is moderate since not as many species of frog were recorded there as expected given the survey effort. With appropriate management the score should be maintained as moderate. Significant species include endangered growling grass frog.
low	low	mod.		Macroinvertebrates are currently rated as low largely due to a lack of suitable instream and riparian habitat and urban stormwater. There are no known listed species in this sub-catchment. With improvements to riparian vegetation and progressive treatment of urban stormwater, the rating is expected to increase to moderate in the long term.
low	low	mod.		Platypus is currently rated as low in the Werribee River as a result of lack of suitable instream and riparian habitat and being disconnected from populations further upstream. With improvements to riparian habitat and management of other key threats such as flow stress and urban stormwater (including litter), the rating is predicted to improve to moderate in the long term.
low	very low	mod.		Vegetation is rated as low. It is highly modified and fragmented as a result of large scale landuse change and persistent threats. There are 7 listed water dependent species remaining and 7 bioregional conservation status (BCS) endangered EVCs. Improving the quality and extent of riparian vegetation will increase the rating to moderate in the long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is moderate and the target is moderate.
mod.	low	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is high.
very low	very low	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very low and the target is high.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
low	low	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is low and the target is high.
low	low	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is very high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	mod.		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is moderate.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	low	high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is low and the target is high.

Point Cook Wetlands - RAAF Lake

Description

RAAF Lake is an ephemeral, shallow and naturally saline wetland. It is divided from the sea by a coastal sand barrier.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
2	Wetland habitat form	Reduce invasive fauna threat (cats, foxes and rabbits) to low focussing on orange-bellied parrot, shorebird and nesting bird habitats.
3	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.
4	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Point Cook Wetlands - RAAF Lake

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	low	high		RAAF Lake is formally recognised as significant bird habitat and is included in the Port Phillip Bay (Western Shoreline) & Bellarine Peninsula Ramsar Site. Many significant bird species have been recorded. The bird value is currently high, with a current predicted decline to low value. The predicted impacts of climate change on coastal wetlands in the region are significant, however, it is anticipated that these impacts may be somewhat mitigated with the bird value remaining high.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.		The frog value score for Werribee River Lower sub catchment has been applied to RAAF Lake. The value is currently moderate with climate change and urbanisation leading to a current long-term trajectory of very low. Reduction of threats may maintain the value at moderate.
	mod.	very low	mod.		The wetland vegetation value is currently moderate with a current trajectory of decline to very low. Predicted climate change and urbanisation impacts will increase risk to significant coastal wetland vegetation communities. It is anticipated that adaptation strategies could be applied, including allowing landward migration, to maintain vegetation value at high. Improvements to the wetland buffer, wetland habitat form and reducing the threat of invasive salt tolerate weeds species is predicted to assist with maintaining the vegetation value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Cunningham's Swamp

Description

Cunninghams Swamp is a remnant Cane Grass Lignum Swamp. It is likely to meet the criteria to be listed as a Seasonal Herbaceous Wetland.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Improve wetland connectivity and wetland area by linking Cunningham Swamp via conservation areas and or/open space to nearby Seasonal Herbaceous Wetlands and the Point Cook Coastal Park.
2	Unaligned	Ensure appropriate planning controls are in place (e.g. Environmental Significance Overlay).
3	Wetland buffer condition	Improve the wetland buffer to 100 per cent of the wetland perimeter.
4	Wetland habitat form	Ensure that use of Cunningham's Swamp as a stormwater retarding basin is not at the expense of the natural wetland form and Obligations of managing a Seasonally Herbaceous Wetland.
5	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.

Cunningham's Swamp

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The bird value of this wetland is currently very low and is expected to remain very low. Existing and predicted threats associated with climate change will continue to limit the value of the wetland as bird habitat. The site does not have formally recognised significance as bird habitat.
	n/a	n/a	n/a	Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.	The wetland frog value is currently moderate with a current trajectory of decline to very low. Improvements to wetland conditions are predicted to somewhat offset the risks associated with climate change and urbanisation and the frog value is predicted to be maintained at moderate in the long-term.
	very low	very low	mod.	The wetland vegetation value is currently very low. Predicted drying and warming associated with climate change, along with urbanisation in the catchment will be somewhat mitigated through improvements to wetland habitat form, buffer condition and wetland vegetation condition. Therefore it is predicted that the vegetation value can improve to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	low	very low	low	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
	very low	very low	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Point Cook Wetlands - Spectacle Lake

Description

Spectacle Lake is listed in the Directory of Important Wetlands Australia.

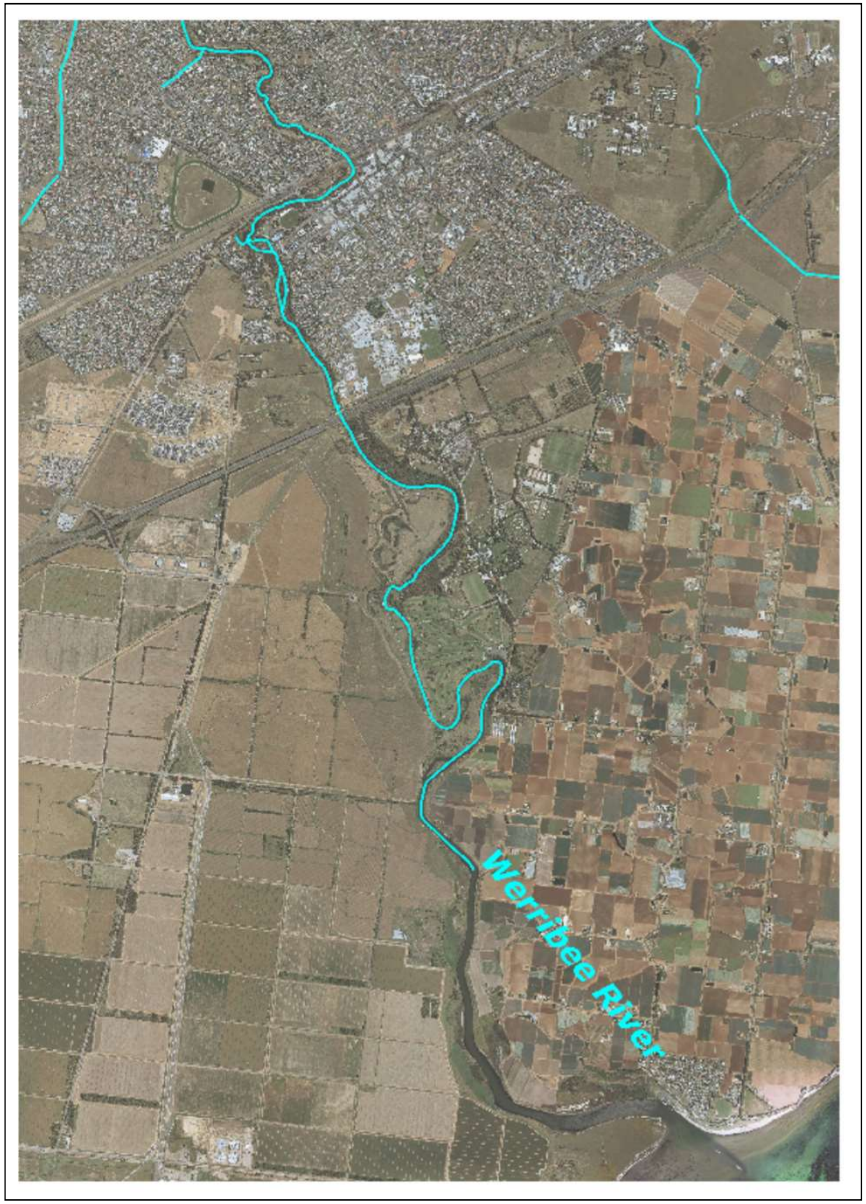
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce threat of dogs, cats and foxes to moderate.
2	Wetland buffer condition	Increase wetland buffer to 50 per cent of the wetland perimeter.

Point Cook Wetlands - Spectacle Lake

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very high	mod.	very high		Spectacle Lake is formally recognised as significant bird habitat and is included in the Port Phillip Bay (Western Shoreline) & Bellarine Peninsula Ramsar Site. Many significant bird species have been recorded. The bird value is currently very high, with a current predicted decline to moderate value. The predicted impacts of climate change on coastal wetlands in the region are significant, however, it is anticipated that these impacts may be somewhat mitigated with the bird value remaining very high.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.		The frog value score for Werribee River Lower sub catchment has been applied to Spectacle Lake. The value is currently moderate with climate change and urbanisation leading to a current long-term trajectory of very low. Reduction of threats may maintain the value at moderate.
	very high	very low	high		The vegetation value is currently very high with listed species and communities being recorded. However, the current trajectory is a decline to very low. Improvements to wetland habitat form, wetland buffer and maintenance of the vegetation condition at high is predicted to somewhat offset the predicated impacts of climate change and maintain the vegetation value at high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very high	very low	high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very high and the target is high.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Werribee River Estuary



Description

The Werribee River Estuary is 8.25 km long with an upstream limit defined by a ford constructed in the 1860s near Werribee Park. The estuary, has high social and environmental values and is adjacent to the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site.

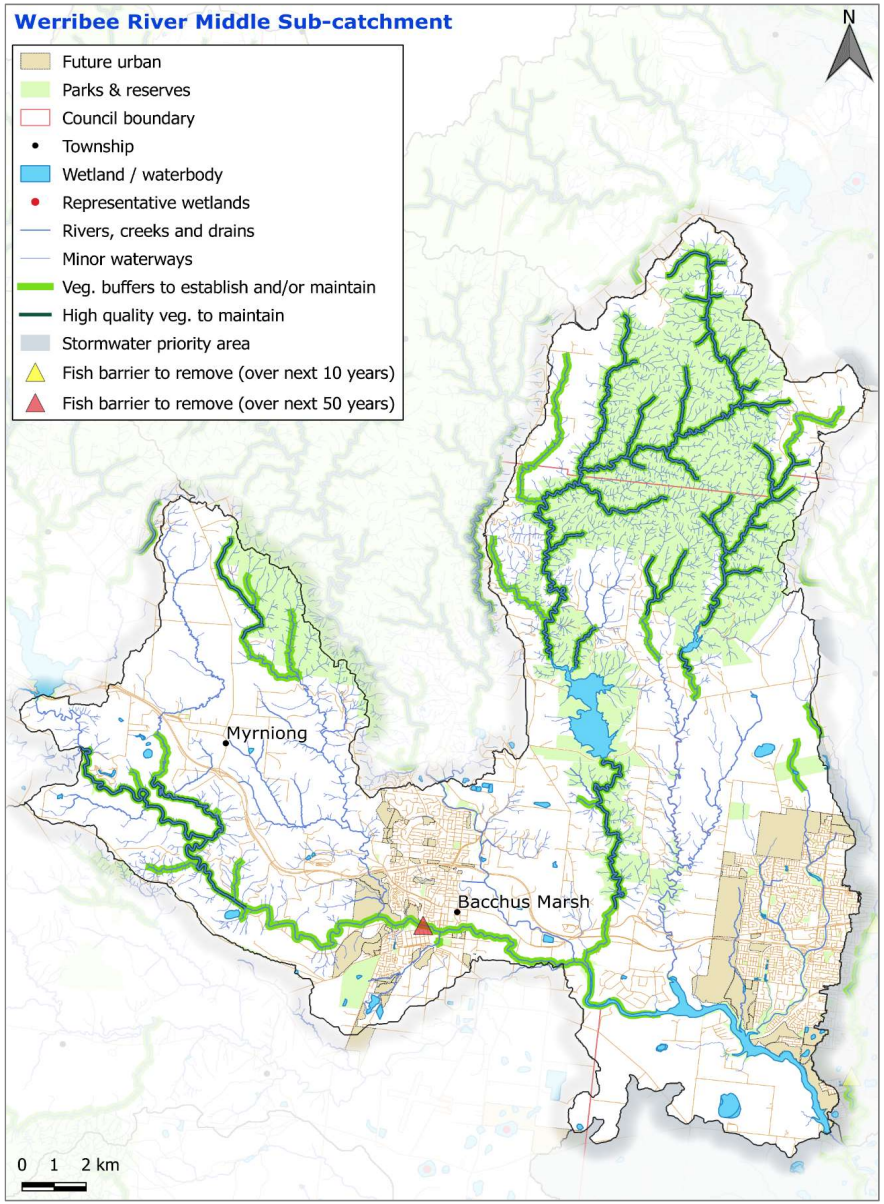
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine vegetation	Improve estuarine vegetation condition to high by reducing threats from salt tolerant weed species in saltmarsh communities.
2	Estuarine wetland connectivity	Investigate opportunities to mitigate climate change impacts to significant estuarine vegetation communities by facilitating lateral or longitudinal migration on the floodplain.
3	Flow regime	Investigate opportunities to increase the environmental water reserve is increased by 7 GL by 2028 to meet ecological watering objectives and cover projected shortfalls.
4	Flow regime	Identify opportunities to maintain and improve the flow regime in the Werribee River downstream of the Werribee diversion weir to support platypus populations.
5	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
6	Access & Recreation	Maintain and support existing high value opportunities for access and recreation, such as boating and fishing.
7	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Werribee River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	mod.	high		The estuarine bird score is currently moderate for the Werribee River as the estuary is formally recognised for its value as bird habitat (through Ramsar, East Australasian Flyway Site, Important Bird Area and Important Bird Habitat) however, vegetation condition is currently in very low condition. With appropriate climate change adaptation planning, allowing migration of estuarine vegetation communities, improving wetland vegetation condition and reducing the threat of invasive fauna, the long-term bird value score could be maintained at high.
	high	mod.	high		The estuarine fish value score is currently high. A good diversity of estuarine dependent species inhabit the estuary. However, the current trajectory would lead to a decline to moderate due to a decline in freshwater mixing with the salt water in the estuary as a result of predicted shortfalls in environmental water in the catchment. Improvement in environmental flow condition through recovery of water for the environment could maintain the fish value score at high.
	low	very low	high		The estuarine vegetation value score is currently low with a current trajectory of very low. However, with appropriate climate change adaptation planning allowing migration of estuarine vegetation communities, improvement in the environmental flow condition and control of invasive plant species, the long-term value score could be maintained at high.
	very high	very high	very high		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary , is currently very high and is expected to remain very high in the long-term; target is to maintain at very high.
	very high	very high	very high		Community connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	very high	very high	very high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently very high and is expected to remain very high in the long-term if supply keeps up with population growth; target is to maintain at very high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	high		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is high.
	high	high	high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is high and the target is high.
	high	high	high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is high and the target is high.
	mod.	very low	high		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is high.
	very low	very low	high		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is high.
	mod.	very low	mod.		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is moderate and the target is moderate.

Werribee River Middle Sub-catchment



Description

Werribee River rises in the Wombat State Forest and flows through Ballan, Werribee Gorge State Park, Bacchus Marsh, Melton South, Werribee and the Western Treatment Plant before entering Port Phillip at Werribee South. The middle reaches lie between the Pykes Creek confluence and the Melton Reservoir. Other tributaries in this area include Myrniong, Korkuperimmul, Pyrites, Djerriwarrh and Toolern creeks and the lower reach of Lerderderg River. Water storages in the Middle Werribee River sub-catchment include the Pykes Creek, Djerriwarrh, Merrimu and Melton reservoirs.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Landscape connectivity plus sustainable agriculture. Forrest – biolink – reduce nutrient and pollution to Waterways. Stream frontage revegetation."

"Planting according to EVC's and existing intact reference sites."

"Work with Grow West to connect Lerdederg, Werribee Gorge to Brisbane Ranges - CMA, State Government, Federal Government, Melbourne Water, Shire."

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Werribee River Middle Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (50 km, 199 ha) and maintain existing vegetation (120 km, 480 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 111 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	Access	Increase access to and along waterways (about 2 km of path) by improving connections with existing path network and extending paths into new urban areas. Investigate opportunities to improve access for on-water activities.
4	Participation	Increase participation rates from low to high; support community groups, connect with growth area communities and build capacity of land owners through rural programs. Increase participation though promotion of high value areas (e.g. Werribee Gorge State Park).
5	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land in the Djerriwarrh catchment. This may include establishment of vegetated buffers in headwater streams.
6	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land in the Pyrites Creek catchment downstream of Merrimu. This may include establishment of vegetated buffers in headwater streams.
7	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land around Bacchus Marsh.
8	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Werribee River Lower), which reflects targets for whole catchment.
9	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches in Werribee Gorge and surrounds to support platypus populations and instream environmental values.
10	Physical form	Investigate and mitigate threats to physical form and other high values.
11	Vegetation Quality	Improve understanding of the extent, composition and condition of high and very high quality vegetation, and effectively monitor and manage both values and threats.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Werribee River Middle Sub-catchment

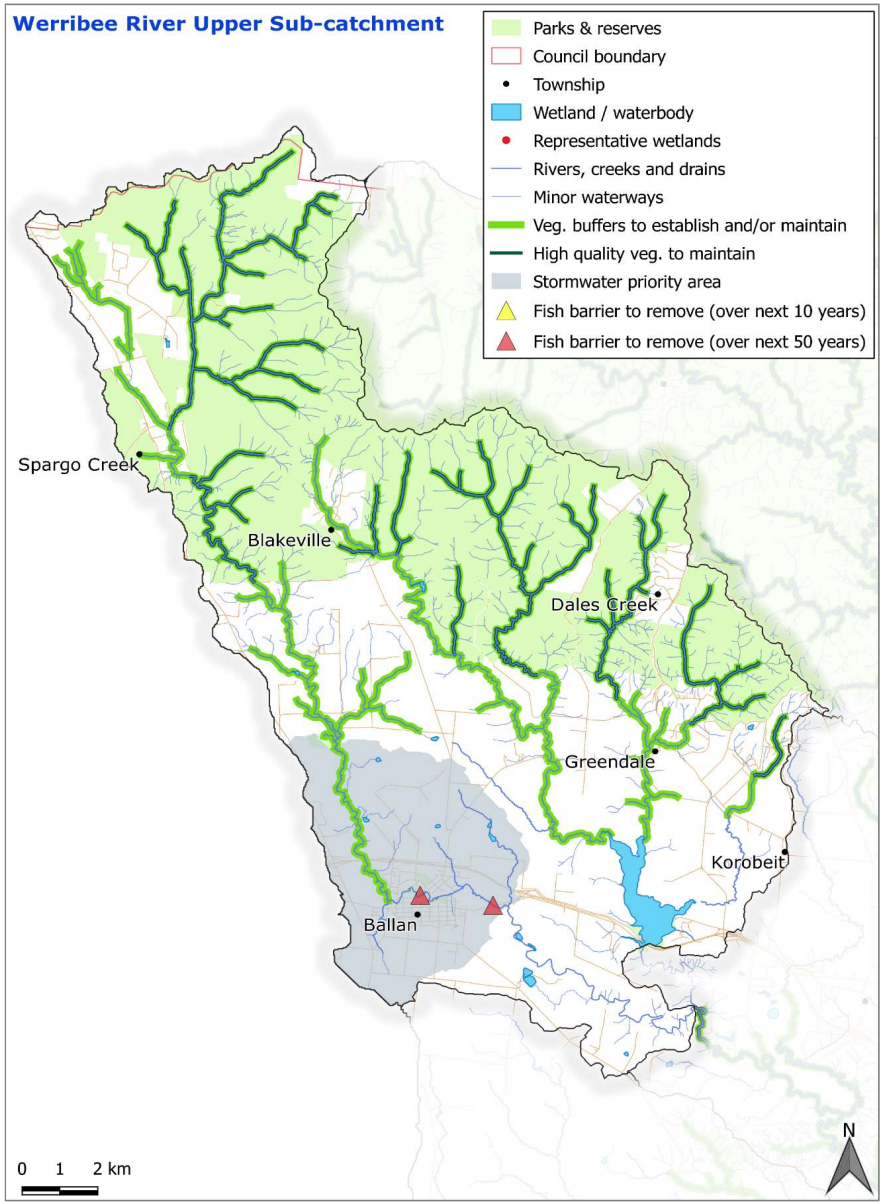
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	low	mod.	We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species of riparian bird include the powerful owl and eastern great egret.
very low	low	mod.	Fish are currently rated very low, largely due to flow stress and barriers to fish migration, such as Melton Reservoir. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to flow, including stormwater management in townships such as Ballan, is expected to benefit a number of less common species and increase the rating to moderate in the long term.
mod.	low	mod.	Frog score is moderate since not as many species of frog were recorded there as expected given the survey effort. With appropriate management the score should be maintained as moderate. Significant species include endangered growling grass frog.
high	high	very high	Macroinvertebrates are currently rated as high with good instream and riparian habitat along many reaches within the sub-catchment. There are no known listed species in this sub-catchment. With further improvements to riparian vegetation and appropriate management of future stormwater impacts the macroinvertebrate rating is expected to increase to very high in the long term.
low	low	low	Platypus is currently rated as low largely as a result flow stress and disconnection from populations further upstream and downstream. Improvements to key threats such as flow stress including urban stormwater and litter is predicted to maintain platypus in this sub catchment in the face of future urban growth and climate change.
mod.	low	mod.	Vegetation is rated as moderate however there are areas of high quality particularly around the Werribee Gorge park and along Pyrites Creek and Djerriwarrh Creeks. The rating is predicted to decline to low without adequate management of existing emerging threats such weeds, pest animals and the impacts of climate change. There are 34 listed water dependent species remaining and 14 bioregional conservation status (BCS) endangered EVCs. Protection of the best areas and targeted revegetation to improve some areas will ensure the rating remains moderate overall.
mod.	mod.	high	Amenity, which is based on level of satisfaction, is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
high	high	very high	Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	mod.	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is very high.
mod.	low	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is high.
mod.	low	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is high.
mod.	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is moderate.
mod.	mod.	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is high.
very low	very low	low		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is low.
mod.	low	high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is high.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	very low	high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is low and the target is high.

Werribee River Upper Sub-catchment



Description

Werribee River rises in the Wombat State Forest and flows through Ballan, Bacchus Marsh, Melton South, Werribee and the Western Treatment Plant before entering Port Phillip Bay at Werribee South. The upper reaches lie upstream of the Pykes Creek confluence, between Ballan and Bacchus Marsh. Korweinguboora Creek, Dale Creek and Stony Hut Creek are within this area although theses creeks do not join the Werribee River until its middle reaches.

Actions

The quotes below are a snapshot of actions that were brainstormed during the co-design process. These actions are provided to help spark creative thinking towards achieving the Performance Objectives. A full list of actions is available in the Collaborative Design Report.

"Protect headwater streams from recreational impacts – weeds for the Bay (nutrient processing) and stream health"

"External corridor along Werribee from State Park to Moe (20 meters each side)"

"Storm water harvesting to protect stream health and mitigate urban growth"

"Maintain good water quality through vegetation buffer and management of storm water/septic – Blakeville"

How to read the scores

Current state - current score of waterway key values and waterway conditions

Current trajectory - long-term scores if current policies and effort continue

Target trajectory - targets for the long-term scores to be achieved through implementing the Strategy

Score key: Very Low | Low | Moderate (mod.) | High | Very High

For description of scores see metrics tables at end of document

Werribee River Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Stormwater condition	To prevent decline in stormwater condition, treat urban development (e.g. Ballan), so directly connected imperviousness (DCI) of the Werribee River (and its tributaries) remains below 0.2% upstream of Bacchus Marsh. For every hectare of new impervious area, this requires harvesting around 5.1 ML/y and infiltrating 1.6 ML/y, which is about 0.8 GL/y and 0.3 GL/y for full development to the urban growth boundary.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (53 km, 213 ha) and maintain existing vegetation (135 km, 539 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality). In addition, maximise multiple benefits from vegetation management for social values in existing and planned urban areas.
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 92 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
4	Participation	Increase participation rates from moderate to very high; support community groups, Landcare projects and citizen science. Build capacity of land owners through rural programs.
5	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land and septic tanks upstream of Ballan. This may include establishment of vegetated buffers in headwater streams.
6	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Werribee River Lower), which reflects targets for whole catchment.
7	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
8	Vegetation Quality	Improve understanding of the extent, composition and condition of high and very high quality vegetation, and effectively monitor and manage both values and threats.

* Please also refer to the regional Performance Objectives that apply to all sub-catchments.

Notes:

Werribee River Upper Sub-catchment

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	mod.		We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species of riparian bird include the powerful owl.
low	very low	low		Fish are currently rated as low, primarily due to the low richness expected in headwater systems; however fish barriers are also limiting diversity. There are a number of species which are predicted to decline with impacts from climate change. Improvements to riparian vegetation and removal fish barriers in the long term are expected to prevent decline and maintain the existing fish rating.
mod.	low	mod.		Frog score is moderate since not as many species of frog were recorded there as expected given the survey effort. With appropriate management the score should be maintained as moderate.
very high	very high	very high		Macroinvertebrates are currently rated as very high with much of the sub catchment forested with good instream and riparian habitat, particularly in the upper reaches. There are no known listed species in this sub-catchment. Monitoring and maintenance of existing high quality habitats and improvements to areas where riparian and instream habitat is lacking is expected to maintain the very high rating in the long term.
mod.	low	mod.		Platypus are currently rated as moderate which is largely due to isolation from downstream populations. Management of flows in the face of climate change, as well as improvements to riparian vegetation in priority areas is expected to maintain the rating as moderate.
mod.	low	mod.		Vegetation is rated as moderate, however with this may be limited due to a lack of data for the forested areas which are likely to be very high quality. The rating is predicted to decline to low without adequate management of existing emerging threats such weeds, pest animals and the impacts of climate change. There are 7 listed water dependent species remaining and 10 bioregional conservation status (BCS) endangered EVCs. Protection of the best areas and targeted revegetation to improve some areas will ensure the rating remains moderate overall.
mod.	mod.	high		Amenity, which is based on level of satisfaction, is currently moderate and likely to remain moderate in the long-term; target is to improve to high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
high	high	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
very high	high	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is high.
mod.	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is moderate.
high	high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is high and the target is very high.
very low	very low	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is high.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
very high	very high	very high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is very high and the target is very high.
mod.	mod.	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Metrics

Key values metrics for rivers

Key Value	Description	Rating	Explanation
 Amenity	Based on data from Melbourne Water community perceptions of waterways research on 'satisfaction with waterways' in relation to amenity related activities	Very High	Very high level of satisfaction that waterways provide amenity
		High	High level of satisfaction that waterways provide amenity
		Moderate	Moderate level of satisfaction that waterways provide amenity
		Low	Low level of satisfaction that waterways provide amenity
		Very Low	Very low level of satisfaction that waterways provide amenity
 Community connection	Based on data from Melbourne Water community perceptions of waterways research on 'satisfaction with waterways' in relation to community connection activities	Very High	Very high level of satisfaction that waterways support community connection
		High	High level of satisfaction that waterways support community connection
		Moderate	Moderate level of satisfaction that waterways support community connection
		Low	Low level of satisfaction that waterways support community connection
		Very Low	Very low level of satisfaction that waterways support community connection
 Recreation	Based on data from Melbourne Water community perceptions of waterways research on 'satisfaction with waterways' in relation to recreation activities	Very High	Very high level of satisfaction that waterways support recreation
		High	High level of satisfaction that waterways support recreation
		Moderate	Moderate level of satisfaction that waterways support recreation
		Low	Low level of satisfaction that waterways support recreation
		Very Low	Very low level of satisfaction that waterways support recreation

Key values metrics for rivers continued

Key Value	Description	Rating	Explanation
 Birds	Summed reporting rate of riparian bird species expected in that sub-catchment (from minimum of 40 appropriate surveys)	Very High	Almost all expected species are frequently recorded
		High	Many expected species are recorded often
		Moderate	Most expected species occur but some of these are only infrequently recorded
		Low	Few of the expected riparian bird species are recorded
		Very Low	Very few of the expected species are recorded and these in only low numbers
 Fish	Based on habitat suitability models for native freshwater species and survey data	Very High	All or almost all native freshwater species recorded in the catchment likely to be present
		High	Most native freshwater species recorded in the catchment likely to be present
		Moderate	About half the native freshwater species recorded in the catchment likely to be present
		Low	Few freshwater native species recorded in the catchment likely to be present
		Very Low	Very few or no native freshwater species recorded in the catchment likely to be present
 Frogs	Species richness (observed to expected) modified to reflect survey effort	Very High	All, or most, of the expected species of frog are found
		High	Many of the expected species of frog are found
		Moderate	Not many of the expected species of frog are found
		Low	Few of the expected species of frog are found
		Very Low	Very few of the expected species of frog are found

Key values metrics for rivers continued

Key Value	Description	Rating	Explanation
 Macroinvertebrates	Land Use Macroinvertebrate Response (LUMaR) index. LUMaR is an observed to expected ration index, that weights the observations of macroinvertebrate families by their sensitivity to forest loss and urbanisation	Very High	All or almost all macroinvertebrate families are predicted to be present, indicating very good stream health
		High	Most macroinvertebrate families are predicted to be present, indicating good stream health
		Moderate	Some macroinvertebrate families are predicted to be present indicating moderate stream health
		Low	Low number of macroinvertebrate families are predicted to be present, indicating poor stream health
		Very Low	Very low likelihood of sensitive aquatic macroinvertebrate families being found
 Platypus	Based on habitat suitability models that indicate likelihood that waterways will support platypus	Very High	Very high likelihood that waterways will support platypus
		High	High likelihood that waterways will support platypus
		Moderate	Moderate likelihood that waterways will support platypus
		Low	Low likelihood that waterways will support platypus
		Very Low	Very low likelihood that waterways will support platypus
 Vegetation	Based on vegetation quality and uniqueness derived from available surveys	Very High	High or very high naturalness and high or very high uniqueness
		High	Very high naturalness with very low to medium uniqueness or high naturalness and medium to high uniqueness
		Moderate	Medium to high naturalness and very low to low uniqueness, or medium naturalness and medium to high uniqueness, or very low naturalness and medium uniqueness
		Low	Low naturalness and very low to medium uniqueness
		Very Low	Very low naturalness and very low uniqueness

Waterway condition metrics for rivers

Waterway condition	Description	Rating	Explanation
 Stormwater condition	Directly connected imperviousness (DCI) is the proportion of the impervious surface that is directly connected to a stream through a conventional drainage connection	Very High	DCI <0.5% minimal or no threat from stormwater
		High	DCI 0.5-2% minor impacts to stream health from stormwater
		Moderate	DCI 2-5% stream health is impacted from stormwater
		Low	DCI 5-10% stream health is significantly impacted from stormwater
		Very Low	DCI >10% stream health is severely impacted from stormwater
 Water for environment	Compliance with environmental flow components identified through FLOWS method. The FLOWS method is a state-based approach for assessing flow requirements of fresh water river systems	Very High	Flow recommendations frequently achieved across all climate years, overall hydrological condition is considered excellent (81-100%)
		High	Flow recommendations often achieved across all climate years, overall hydrological condition is considered good (61-80%)
		Moderate	Flow recommendations often achieved in wet and average climate years and occasionally achieved in dry climate years. Overall hydrological condition is considered moderate (41-60%)
		Low	Flow recommendations occasionally achieved, mostly in wet and average climate years but not in dry climate years. Overall hydrological condition is considered poor (21-40%)
		Very Low	Flow recommendations rarely achieved, overall hydrological condition is considered very poor (<20%)
 Vegetation quality	Description of quality of vegetation relative to Ecological Vegetation Classes (EVCs)	Very High	Riparian vegetation is intact with all structural components present and very high connectivity
		High	Riparian vegetation is relatively intact with structural elements present with high connectivity
		Moderate	Riparian zone consists of fragmented relevant EVC vegetation
		Low	Riparian vegetation is highly modified, fragmented
		Very Low	Riparian vegetation is highly modified, predominantly comprising exotic species

Waterway condition metrics for rivers continued

Waterway condition	Description	Rating	Explanation
 Physical form	Potential of channels to erode (deepen and/or widen). Score is an 'on average' assessment across the sub-catchment	Very High	Very low erosion potential – geomorphically 'intact' channels, bedrock control or no known triggers for instability. Primarily source headwater streams.
		High	Low erosion potential – waterways with no known active erosion, some minor impacts from land use, local disturbance etc. Also includes waterways that have been substantially modified.
		Moderate	Moderate erosion potential – waterways with no known active deepening, however susceptible to widening and bank erosion due to local land use and disturbance.
		Low	High erosion potential – waterways with known active deepening and widening, and will continue to be susceptible to erosion processes.
		Very Low	Very high erosion potential – waterways with known active deepening and widening, in highly erodible soils, ongoing disturbance from adjacent land use and susceptible to erosion processes.
 Water quality – environmental	Compliance with SEPP (Waters) environmental water quality objectives. EPA Water Quality Index	Very High	Near natural – high quality waterways. Meets SEPP water quality standards
		High	Meets SEPP water quality standards
		Moderate	Some evidence of water quality stress.
		Low	Under considerable stress
		Very Low	Under severe stress
 Water quality – recreational	Compliance with SEPP (Waters) recreational water quality objectives (swimming is considered as primary contact)	Very High	Meets primary contact objectives (good)
		High	Meets secondary contact objectives (fair)
		Moderate	Not applicable
		Low	Does not meet secondary contact objectives (poor)
		Very Low	Not applicable

Waterway condition metrics for rivers continued

Waterway condition	Description	Rating	Explanation
 Litter absence	Clean Communities Assessment Tool (CCAT) methodology provides a systematic assessment of littering behaviour, litter and key features of public places, including waterfronts	Very High	Very high proportion of waterways have an absence of litter. Very unusual for people to do the wrong thing with litter
		High	High proportion of waterways have an absence of litter, majority of people do the right thing
		Moderate	Moderate proportion of waterways impacted by litter, but normally people do the right thing
		Low	Some waterways impacted by litter, low expectation for people to do the right thing
		Very Low	Most waterways highly littered, no expectation for people to do the right thing
 Vegetation extent	Percentage or reach which has continuous vegetation canopy cover within 20m either side of the stream	Very High	80-100%
		High	60-80%
		Moderate	40-60%
		Low	20-40%
		Very Low	0-20%
 Instream connectivity	Proportion of waterway length within the sub-catchment which is free from barriers to fish movement	Very High	80-100%
		High	60-80%
		Moderate	40-60%
		Low	20-40%
		Very Low	0-20%

Waterway condition metrics for rivers continued

Waterway condition	Description	Rating	Explanation
 Access	Proportion of stream corridors that have accessible waterways (paths) on at least one side	Very High	80-100%
		High	60-80%
		Moderate	40-60%
		Low	20-40%
		Very Low	0-20%
 Participation	Percentage of population involved in grants and citizen science (related to waterways) over previous 3 years as a proportion of population within sub-catchment	Very High	> 2%
		High	1-2%
		Moderate	0.5-1%
		Low	0.1-0.5%
		Very Low	< 0.1%

Key value metrics for wetlands

Key Value	Description	Rating	Explanation
 Birds	Incorporated formally recognised significance as bird habitat, presences of significant species and condition of vegetation Ramsar site = Yes /Listed East Asian-Australasian = Yes / Listed Nationally Important Wetlands (DIWA) = Yes / Listed Wetland vegetation condition – adjusts score up or down	**Very High**	If 5 metrics meet criteria
		High	If 4 metrics meet criteria
		Moderate	If 2 or 3 metrics meet criteria
		Low	If 1 metric meets criteria
		Very Low	If no metrics meet criteria and/or vegetation condition is very poor
 Fish	Wetland fish metric will be developed through the Strategy implementation. Significant fish = 5	**Very High**	Significant fish species (5)
		High	To be developed
		Moderate	To be developed
		Low	To be developed
		Very Low	To be developed
 Frog	Key value status of the sub-catchment applied and adjusted for significant amphibians score	**Very High**	All, or most, of the expected species of frog are found
		High	Many of the expected species of frog are found
		Moderate	Not many of the expected species of frog are found
		Low	Few of the expected species of frog are found
		Very Low	Very few of the expected species of frog are found

Key value metrics for wetlands continued

Key Value	Description	Rating	Explanation
 Vegetation	Based on vegetation condition and uniqueness derived from available surveys	Very High	If all 3 metrics meet criteria (Score 5)
		High	If condition = 5 and one other metric meets criteria
		Moderate	If condition = 3 and one other metric meets criteria or condition is 5
		Low	If condition = 3 (moderate) and meets one significance metric
		Very Low	If condition = 1 (very poor or poor)

Waterway condition metrics for wetlands

Waterway condition	Description	Rating	Explanation
 Flow regime	Simplified AVIRA threat metric – Changed water regime	Very High	Minimal or no threat. Minor or no change
		High	Not applicable
		Moderate	Moderate change
		Low	Not applicable
		Very Low	Significant change
 Wetland habitat form	AVIRA threat metrics – Reduced wetland area and altered wetland form	Very High	to 5% reduction in wetland area
		High	>5 to 25% reduction in wetland area
		Moderate	>25 to 50% reduction in wetland area
		Low	>50 to 75% reduction in wetland area
		Very Low	>75% reduction in wetland area

Waterway condition metrics for wetlands continued

Waterway condition	Description	Rating	Explanation
 Wetland buffer condition	AVIRA threat metric – Degraded buffer vegetation	Very High	IWC Wetland Buffer Assessment Score: >17 - 20
		High	IWC Wetland Buffer Assessment Score: >13 - 17
		Moderate	IWC Wetland Buffer Assessment Score: >9 - 13
		Low	IWC Wetland Buffer Assessment Score: >5 - 9
		Very Low	IWC Wetland Buffer Assessment Score: 0 - 5
 Vegetation condition	AVIRA value metric – Wetland vegetation condition	Very High	EVCs present intact, site near reference condition (vegetation condition excellent)
		High	Not applicable
		Moderate	EVCs present show some displacement, site moderately modified (vegetation condition moderate to good)
		Low	Not applicable
		Very Low	EVCs present completely displaced and site highly modified/or no EVCs mapped
 Wetland water quality	Wetland threat metrics – Changed water properties salinity, Changed water properties nutrients and disturbance of acid sulphate soils	Very High	No change, low to very low land use intensity class. Adjacent land does not contain Coastal Acid Sulphate Soils or inland waterway is not at high risk from acid sulphate soils
		High	Not applicable
		Moderate	Medium land use intensity class
		Low	Not applicable
		Very Low	Changed salinity of wetland, high to very high land use intensity class, adjacent land has the potential to contain Coastal Acid Sulphate Soils or inland waterway is at high risk from acid sulphate soils

Key value metrics for estuaries

Key Value	Description	Rating	Explanation
 Amenity	Based on assessment of the presence of facilities and activities that support passive enjoyment of the site.	Very High	Very high presence of facilities and activities that support passive enjoyment of the estuary
		High	High presence of facilities and activities that support passive enjoyment of the estuary
		Moderate	Moderate presence of facilities and activities that support passive enjoyment of the estuary
		Low	Low presence of facilities and activities that support passive enjoyment of the estuary
		Very Low	Very low presence of facilities and activities that support passive enjoyment of the estuary
 Community connection	Based on assessment of the presence of active community groups.	Very High	Very high presence of active community groups in the estuary area
		High	High presence of active community groups in the estuary area
		Moderate	Moderate presence of active community groups in the estuary area
		Low	Low presence of active community groups in the estuary area
		Very Low	Very low presence of active community groups in the estuary area
 Recreation	Based on assessment of the presence of facilities and activities that support active recreation.	Very High	Very high presence of facilities and activities that support active recreation in the estuary
		High	High presence of facilities and activities that support active recreation in the estuary
		Moderate	Moderate presence of facilities and activities that support active recreation in the estuary
		Low	Low presence of facilities and activities that support active recreation in the estuary
		Very Low	Very low presence of facilities and activities that support active recreation in the estuary

Key value metrics for estuaries continued

Key Value	Description	Rating	Explanation
 Birds	Based on formally recognised significance (Ramsar, East Asian-Australasian Fly-way Site, Nationally Important (DIWA)), supports significant bird species, Listed Important Bird Area and wetland vegetation condition. If vegetation condition is moderate, status reduces by one category	Very High	If 5 metrics meet criteria
		High	If 4 metrics meet criteria
		Moderate	If 2 or 3 metrics meet criteria
		Low	If 1 metric meets criteria
		Very Low	If no metrics meet criteria and/or vegetation condition is very poor
 Fish	Incorporates significant fish, drought refuge and the Estuary Entrance Management Support System for Fish As-set Score	Very High	Records include listed fish species
		High	Records include estuarine dependent (Seasonal faculta-tive and Seasonal obligate) species
		Moderate	Records of only non-estuarine dependent fish (marine or freshwater) species
		Low	Not applicable
		Very Low	No records of fish
 Vegetation	Incorporates condition and rarity data Significant flora = 5 Significant EVC = 5 Vegetation condition	Very High	If all 3 metrics meet criteria (Score 5)
		High	If condition = 5 and one other metric meets criteria
		Moderate	If condition = 3 and one other metric meets criteria or condition is 5
		Low	If condition = 3 (moderate) and meets one significance metric
		Very Low	If condition = 1 (very poor or poor)

Waterway condition metrics for estuaries

Waterway condition	Description	Rating	Explanation
 Flow regime	AVIRA threat metric: based on level of alteration to flow regimes – magnitude and monthly and seasonal variability	Very High	Index score 8-10
		High	Index score 6-8
		Moderate	Index score 4-6
		Low	Index score 2-4
		Very Low	Index score 0-2
 Tidal exchange	AVIRA threat metric: based on characteristics of estuary opening, manipulation required, and potential impact on ecology	Very High	No artificial openings or regular dredging or training walls
		High	< 25% artificial openings or regular dredging or training walls
		Moderate	Not applicable
		Low	25-50% artificial openings or regular dredging or training walls
		Very Low	> 50% artificial openings or regular dredging or training walls
 Longitudinal extent	AVIRA threat metric: based presence/absence of a barrier and distance of barrier downstream from the 'natural' head of the estuary	Very High	No artificial barriers exist
		High	1-25% of estuary affected by artificial barrier
		Moderate	25-50% of estuary affected by artificial barrier
		Low	>50% of estuary affected by artificial barrier
		Very Low	Artificial barrier can completely block movement of water

Waterway condition metrics for estuaries continued

Waterway condition	Description	Rating	Explanation
 Water quality	AVIRA threat metric: EPA water quality guidelines for estuaries, frequency of algal blooms and excessive macrophyte growth	Very High	Very high level water quality – minimal stress
		High	High level of water quality – some stress
		Moderate	Moderate level of water quality and stress
		Low	Poor water quality
		Very Low	Very poor water quality
 Estuarine vegetation	AVIRA threat metric: based on condition of fringing vegetation and extent of invasive plants	Very High	Vegetation is intact with all structural component present and very high connectivity
		High	Vegetation is relatively intact, most structural component present and high connectivity
		Moderate	Vegetation consists of fragmented relevant EVCs
		Low	Vegetation is highly modified and fragmented
		Very Low	Vegetation is highly modified, predominantly comprising invasive species
 Estuarine wetland connectivity	AVIRA threat metric: based on level of restriction for estuarine biota that require connection with adjacent wetlands and floodplains	Very High	No restrictions – very high level of naturalness
		High	Minimal level of restriction – high level of naturalness
		Moderate	Moderate level of restriction
		Low	High level of restriction – low level of naturalness
		Very Low	Significant level of restriction – very low level of naturalness

Note: The Aquatic Values Information and Risk Assessment Framework has been applied (AVIRA).

Macroinvertebrates – Value considered significant for wetlands. Appropriate metric to be developed during Strategy implementation.

Frog and Platypus – Values not considered estuarine dependent, although it is noted that they opportunistically inhabit these environments.

Co-Designed Catchment Program for the Werribee Catchment Region – October 2018 | Version 1

ISBN 978-1-925541-27-4 (print)
ISBN 978-1-925541-20-5 (online)

All actions in this strategy will be delivered subject to funding.