Co-Designed Catchment Program for the

Westernport and Mornington Peninsula 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.

Contents

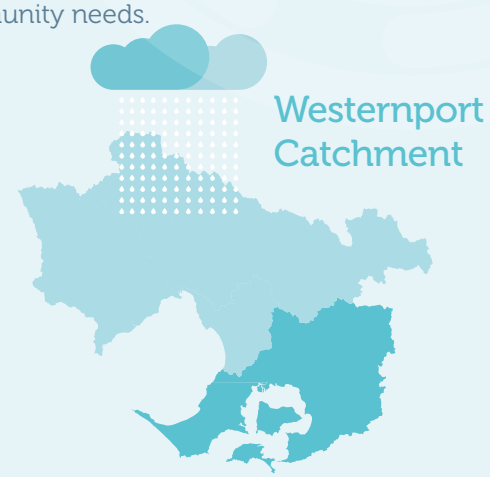
A shared Strategy

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 Westernport and Mornington Peninsula 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 Westernport and Mornington Peninsula region:

Aquatic Systems Management

Back Creek Landcare

Bass Coast Landcare Network

Bass Coast Shire Council

Berg Mt Martha

Blue Wedges

Bunurong Land Council Aboriginal Corporation

Cannibal Creek Landcare Group

CAPIM

Cardinia Catchment Landcare Group

Cardinia Environment Coalition

Cardinia Shire Council

Cardinia Victorian Farmers Federation Branch

Casey City Council

Clearwater

Defenders of the South East Green Wedge

Defenders of the Mornington Peninsula Green Wedge

DELWP

Dolphin Research Institute

Environment Protection Authority Victoria

Friends of Cardinia Creek Sanctuary

Friends of Leadbeater's Possum

GippsDairy

Grand Ridge Propagation

Healesville to Phillip Island Nature Link Committee

Healesville Environment Watch Inc (HEWI)

JB and AC Palmer

Labertouche Landcare

Loch/Nyora Landcare Group

Melbourne Water

Mornington Peninsula Landcare Network

Mornington Peninsula Shire Council

Mornington Peninsula Vignerons Association

Mt Lyall Landcare Group

Municipal Association Victoria

Neerim Landcare Group

Parks Victoria

Phillip Island Nature Parks

Poowong and District Group

Poowong Landcare

Port Phillip and Westernport CMA

Port Phillip Ecocentre

Resilience Project Services

Royal Botanic Gardens Victoria

Shoreham Foreshore Reserve

South East Water

South Gippsland Landcare Network

South Gippsland Shire Council

Southern Rural Water

Spiire

Toomuc Landcare Group

Tyabb and District Ratepayers Group

University of Melbourne

Upper Beaconsfield Association

VR Fish

Western Port Biosphere Reserve

Western Port Catchment Landcare Network

Western Port Seagrass Partnership

Westernport Swamp Landcare Group

Wurundjeri Tribe Land and Compensation Cultural Heritage Council Aboriginal Corporation

Overview

The Westernport and Mornington Peninsula region occupies an area of 3755 square kilometres and includes all the waterways within the catchment for Western Port, together with those on Phillip and French Islands and the Mornington Peninsula, including those that drain to Port Phillip Bay and Bass Strait (Figure 1). The landscape is varied and includes hilly regions near the Bunyip State Park and Strzelecki Ranges, the flat, undulating terrain of the former Koo Wee Rup Swamp, and the marine environment of Western Port and its islands.

People of the *Boon wurrung* language group were the original occupants of this land and their descendants place enormous cultural and spiritual importance on the region's land and waters.

Most of the catchment is modified to support rural and green wedge land uses, though there are still some significant areas of remnant vegetation. Primary industries in the catchment include dairy farming, beef production, poultry, horticulture and quarrying. Urban development, industrial zones, tourist development, lifestyle and hobby farms represent a smaller proportion of the area.

The catchment has experienced substantial changes in the past 200 years, including extensive clearing of catchment and coastal vegetation, draining of large areas of swampland and progressive agricultural, industrial and urban development. Despite the significant impacts associated with these changes, waterways continue to support multiple and varied uses and values, including water supply, flood mitigation, and significant plant and animal species. Significant features of the catchment include surface and groundwater springs, which support many streams and wetlands, and the Mornington Peninsula National Park, which was established in 1995.

The marine ecosystem within Western Port is of regional, national and international importance and supports a variety of critical habitats including mangrove, saltmarsh, mudflats, seagrass meadows and rocky reefs. These habitats are home to a diverse range of aquatic animals such as waterbirds (including migratory shorebirds), fish, marine invertebrates and mammals. Western Port was declared a Ramsar wetland of international importance in 1982 and is recognised under the East Asian-Australasian Flyway Network. The Marine National Parks of Mushroom Reef, Yaringa, French Island and Churchill Island were established in 2002.

Research over the past decade as part of Melbourne Water's Western Port Environment Research Program has significantly increased our understanding of the environmental values of the bay, threats to those values and opportunities to protect and improve the health of Western Port and its catchment into the future.

Key pressures on the health of the catchment and the bays in the coming decades include climate change, continued sediment loads from rivers and coasts (that particularly affects seagrasses) and urban growth outwards from Frankston, Cranbourne and Berwick, and in regional towns around the bays. Modelling shows that population in the catchment will increase from some 420,000 people to over 650,000 in the next 20 years, which will require an additional 5000 dwellings per year.

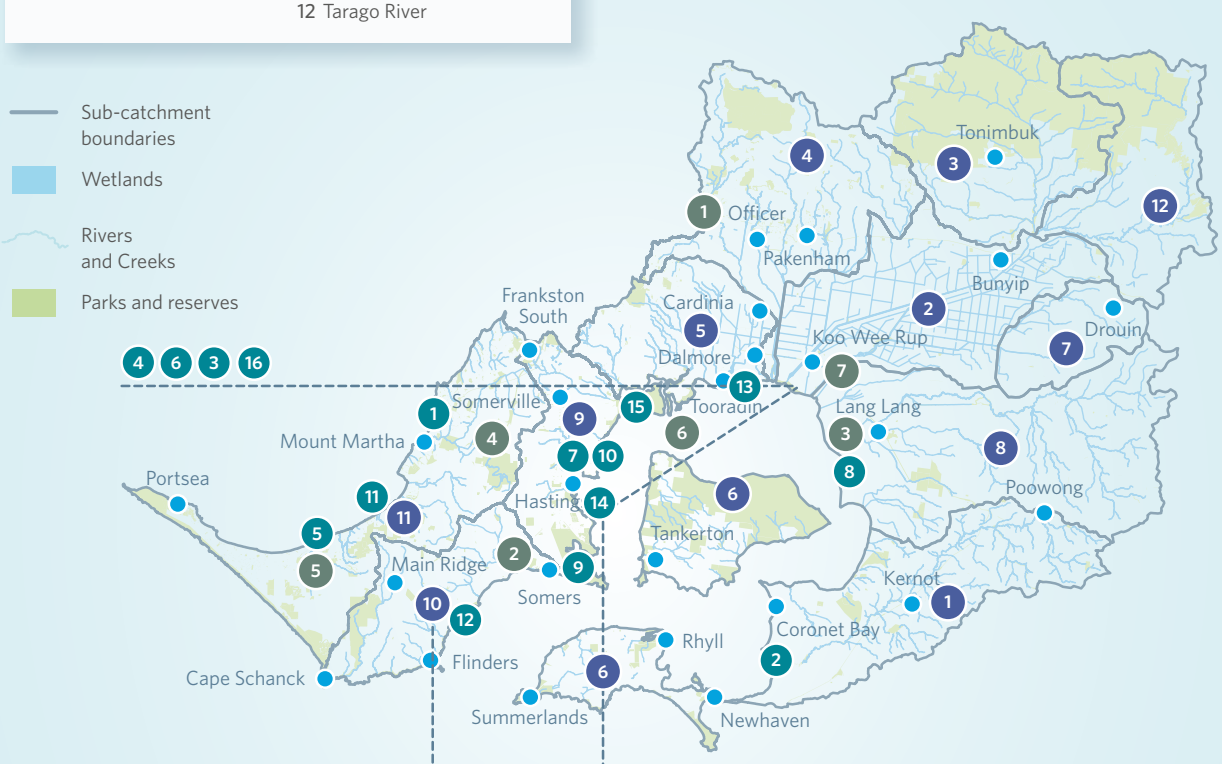
As the waterway manager for the region, Melbourne Water is committed to undertaking its share of this *Healthy Waterways Strategy*. However, it has been recognised that action by Melbourne Water alone is not sufficient to unlock the full value of the region's waterways, nor stem their decline due to 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 Bass River
2 Bunyip Lower
3 Bunyip River Middle and Upper
4 Cardinia, Toomuc, Deep and Ararat Creeks
5 Dalmore Outfalls
6 French and Phillip Islands
7 King Parrot and Musk Creeks
8 Lang Lang River
9 Mornington Peninsula North-Eastern Creeks
10 Mornington Peninsula South-Eastern Creeks
11 Mornington Peninsula Western Creeks
12 Tarago River

RIVER – Tarago River

Management of releases from the Tarago Reservoir have benefitted grayling and black fish populations in the Tarago and Bunyip rivers.



ESTUARY – Merricks Creek

Significant works at the entrance to Merrick's Creek Estuary have been undertaken to improve water quality in the creek.

ESTUARY – Bunyip River

Bunyip River and other creeks drain water from the former Koo Wee Rup Swamp, which has enabled the area to become a leading agricultural producer.

WETLANDS

1 Cardinia Creek Retarding Basin wetlands
2 Coolart Wetlands
3 Lang Lang floodplain wetlands
4 The Briars
5 Tootgarook Swamp
6 Westernport (including coastal wetlands)
7 Yallock Creek floodplain wetlands

ESTUARIES

1 Balcombe Creek
2 Bass River
3 Bunyip River
4 Cardinia Creek
5 Chinamans Creek
6 Deep Creek
7 Kings Creek
8 Lang Lang River
9 Merricks Creek
10 Olivers Creek
11 Sheepwash Creek
12 Stony Creek (WPB)
13 Tooradin Road Drain
14 Warringine Creek
15 Watson Creek
16 Yallock Creek

Figure 1 Sub-catchments and waterway assets including a sub-set of wetlands in the Westernport and Mornington Peninsula region.

Collaborative design (co-design)

In October 2017, the *Catchment Collaborations* commenced to develop the refreshed *Healthy Waterways Strategy* for the Westernport and Mornington Peninsula 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:

- A group of volunteers developed the vision and goals
- Two community listening posts were held in Rokeby and Mornington
- Four workshops were held with over 127 participants representing around 60 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

October 2017
Westernport Catchment Collaborations commenced

November 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 Westernport and Mornington Peninsula region

> Need strategy to drive environmental outcomes in planning controls for lower Cardinia growth corridor."
>
> – from discussion on Cardinia, Toomuc, Deep and Ararat Creeks stormwater targets

> "Pest animals are not highlighted in the strategy and supporting docs. Especially deer are an increasing problem in the Westernport Region and specific actions are needed to manage deer on MW and other land."
>
> – feedback on the Draft Strategy

VISION

Waterways and our bays are highly valued and sustained by an informed and engaged community working together to protect and improve their value.

GOALS

1. Stakeholders and the broader community are knowledgeable, engaged and working together in a transparent process creating a legacy of stewardship to value, protect and improve waterways.
2. Indigenous cultural and European historical legacy are celebrated in a respectful and open dialogue.
3. Waterways provide important biolinks that support indigenous plants and animals, are weed free, protected from feral animals (including deer), and connected to the wider landscape.
4. Natural and modified waterways across the catchment are managed for instream habitats, long term ecological resilience and fluvial processes; balancing the needs for flood mitigation, agriculture water diversion, and social values.
5. Waterways and their estuaries across the catchment are managed to maintain and improve coastal and marine ecosystems in Western Port and Port Phillip Bay.
6. Water re-use systems are established to benefit groundwater recharge, base flows, agriculture diversion and use, and to offset streamflow losses due to climate change.
7. Water quality and sediment impact from urbanisation, forestry, agriculture, industry and transport are mitigated to reduce impacts on waterways and the receiving ecosystem of Western Port.
8. Flow management of waterways are improved to protect groundwater dependent ecosystems, base flows and environmental flushing flows to sustain instream ecosystems.

What we heard

The underlying theme was of support for the strategy, and collaborators liked the idea of having targets and performance objectives at the sub-catchment scale. There was strong support for engaging more of the community in raising awareness of waterways generally and for creating opportunities for community involvement in management.

Collaborators worked together to develop a list of potential actions across the Westernport and Mornington Peninsula 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.* This list will also form the basis of where we start when implementation begins. As collaboration progressed participants became more willing to advocate for the Strategy with 19% strongly agreeing and 53% agreeing that they are committed to working together on implementation of the Strategy.

"Committed to working further in collaborations with ...agencies, landcare groups, etc"

– from participant Sensing Sheets following workshops

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 Westernport and Mornington Peninsula 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 3 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 4 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 *Boon wurrung* language group were the original occupants of this land, as evidenced by the thousands of cultural sites and places recorded with many found along the coast and on Phillip and French Islands.

Boon Wurrung words for waterways and animals include:

Frog = *Ngarret*

Pelican = *Wadjil*

Cockle, shellfish = *Muryuk*

Platypus = *Pudgyer/murrin moorroo*

Young eagle = *Winjeel*

Codfish = *Tjim'tjerrim*

Black duck = *Tooloom*

Waterfowl = *Korrung'un'un*

Perch/blackfish/fish = *Tuat*

Swan = *Gunna'warra*

Wood duck = *Bath'mun*

Tadpole = *Poorneet*

Eel = *Yoke*

Mutton Fish = *Mundgil*

Freshwater mussel = *Murbone*

Some *Boon wurrung* language has been included on the target pages for sub-catchments within the Bunurong Land Council Aboriginal Corporation's Registered Aboriginal Party Boundary.

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 Westernport and Mornington Peninsula region. In the upper and middle parts, diversions support domestic, stock and agricultural uses. On the floodplains, wetlands are being reinstated 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 Westernport and Mornington Peninsula region there are 249 species of bird recorded, of which 131 species are expected in riparian habitats. Important bird habitats includes Ramsar-listed Western Port with its extensive network of mangroves, saltmarshes and mudflats. Threatened species include Australasian bittern, hooded plover, eastern great egret and white-bellied sea-eagle, and important migratory species such as eastern curlew, red-necked stint and curlew sandpiper.

There are 18 native freshwater fish species and eight exotic fish species recorded in the region; nationally-significant species include dwarf galaxias, Australian grayling and Australian mudfish. Frog species include threatened species such as the growling grass frog and the southern toadlet.

Vegetation value varies, with much of the higher value areas being in the forested upper catchment Region, along the coast of Western Port, and in the large regional parks. Macroinvertebrates scores are also higher in forested headwaters and lower for streams exposed to urban runoff and with limited streamside vegetation and instream habitat.

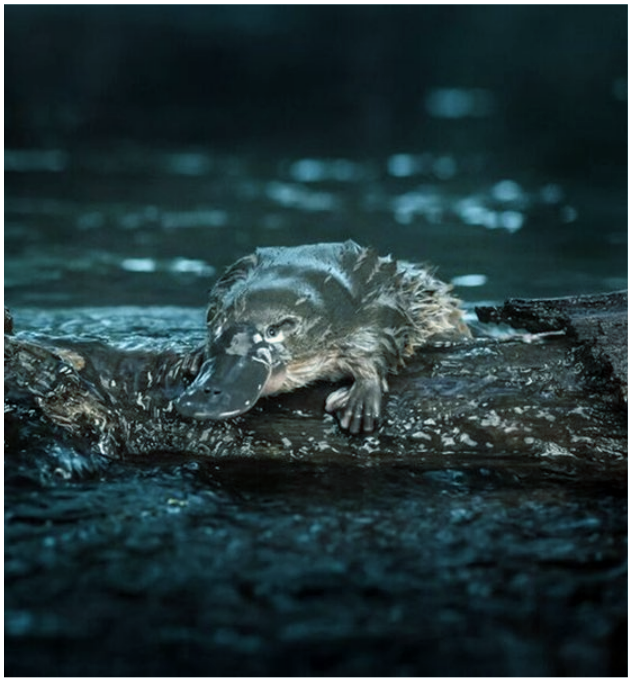
Platypus are known to occur in the north eastern parts of the Region, including rivers and creeks in the Bunyip, Tarago and Lang Lang river systems. There is also a reintroduced population in Cardinia Creek, with platypus released between 2004 and 2007. The Tarago River and Labertouche Creek in particular have been identified as important habitats for platypus, supporting the highest density of animals recorded anywhere around Melbourne since 2000. This result is likely to be linked to a large area of connected waterway reaches with steady stream flows and high-quality instream and streamside habitat.

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.

Social values for rivers are currently high. Social values for estuaries range from low to high. There is currently no data for social values of wetlands.

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 5). 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 5 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 6.

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 6 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

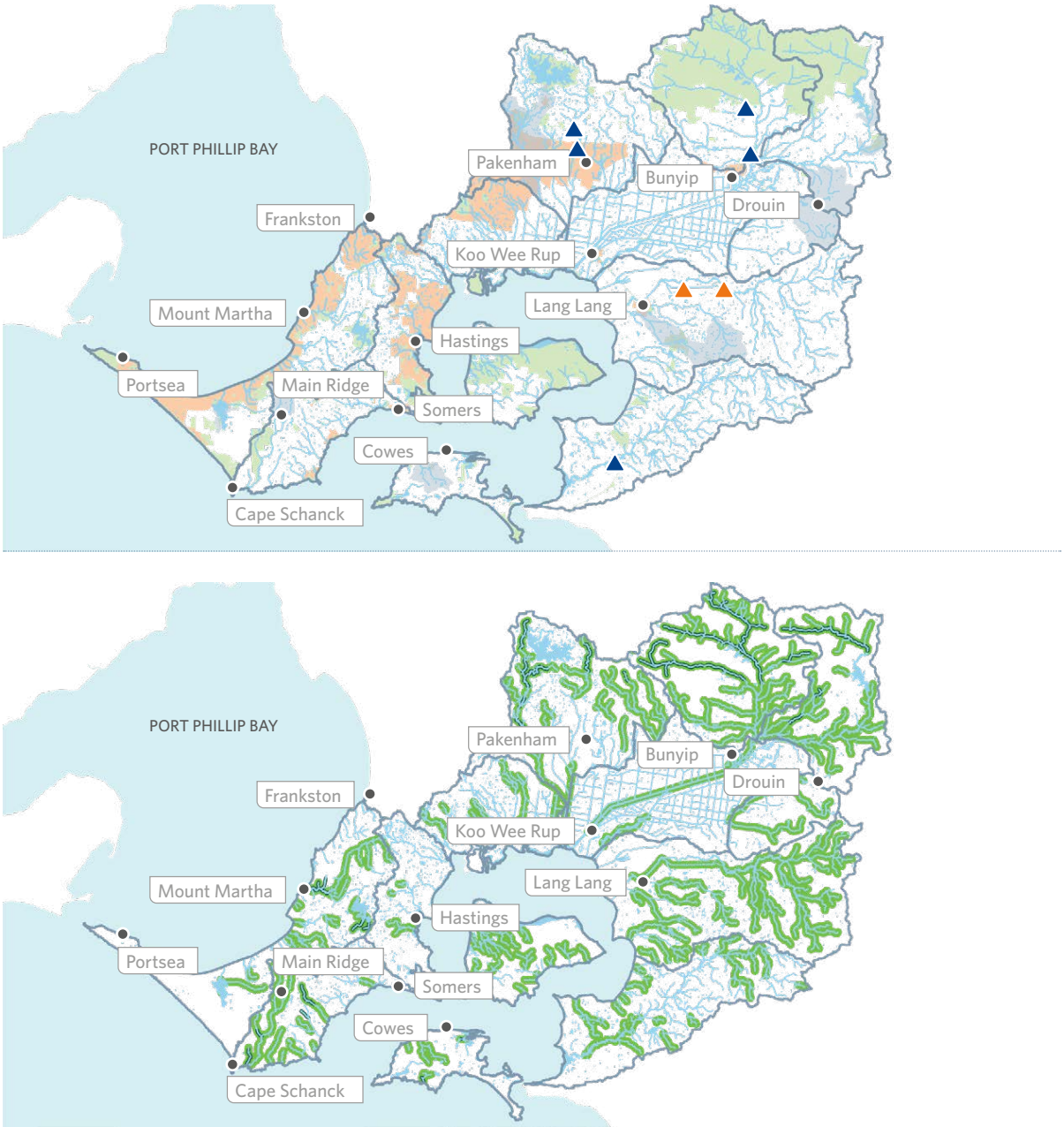


Figure 7 Summary of priorities in the Westernport and Mornington Peninsula region

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 Westernport and Mornington Peninsula region

This section provides:

- A summary of priorities in the Westernport and Mornington Peninsula region (Figure 7)
- Regional performance objectives that apply across all five major catchments in the *Healthy Waterways Strategy* including the Westernport and Mornington Peninsula 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 Westernport and Mornington Peninsula region
- Detailed information for all 12 sub-catchments, sub-set of seven wetlands and 16 estuaries in the Westernport and Mornington Peninsula 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.*

Westernport and Mornington Peninsula 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 Westernport and Mornington Peninsula Region.

Overview of Performance Objectives for Rivers
Progressively implement stormwater harvesting, focusing on Casey Clyde Growth Area and outer lying towns (for example, Drouin). Once this catchment has reached its anticipated long term urban footprint based on the current urban growth boundary, this will require around 11.8 GL/year of stormwater harvested and 4.4 GL/year infiltrated. Ensure 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 1 GL/year by 2028 to meet ecological watering objectives and cover projected shortfalls. This will benefit the lower Bunyip River. Any water recovery for the environment will be considered through Victorian Sustainable Water Strategies, markets and use of alternative water.
Identify opportunities to maintain or improve the flow regime in refuge reaches to support instream values, including platypus.
Identify opportunities to reduce the key threat of flow stress on waterways by addressing threats and other activities that impact waterways such as domestic, stock and agricultural uses, climate change, diversions or urbanisation.
Establish 621 km and maintain 776 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. In addition, increase vegetation cover in existing and planned urban areas by 1 km to support social values.
Maintain 325 km of high and very high quality vegetation (vegetation quality levels 4 and 5) through effective monitoring and management of threats.
Investigate and mitigate threats to physical form (eg erosion) and other high values in the Bunyip River Middle and Upper, Cardinia, Toomuc, Deep and Ararat Creeks, Dalmore Outfalls, French and Phillip Islands, Lang Lang River, Mornington Peninsula North-Eastern Creeks, Mornington Peninsula South-Eastern Creeks, Mornington Peninsula Western Creeks and Tarago River sub-catchments.
Increase access to and along waterways by 42 km by improving connections with existing path networks and extending paths into new urban areas. Investigate opportunities to improve access for on-water activities.
Reduce nutrient and sediment runoff from rural land through improved management of 16,000 ha of land including works to protect and increase vegetation along headwater streams. This will reduce sediment loads to Western Port.
Provide connectivity for fish along Lang Lang River through the removal of two barriers by 2028.
Conserve all currently listed water dependent species and communities (16 fauna species, 106 flora species and 37 EVCs) through habitat protection, research and monitoring.

Westernport and Mornington Peninsula 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.	mod.	mod.		Birds score for rivers is currently moderate overall, with 249 species recorded, of which 131 are expected in riparian habitats. Of note in the catchment is the Ramsar-listed Western Port, riparian areas in forested headwaters, Tootgarook Swamp on the Mornington Peninsula and bird colonies on Phillip Island. Target is to maintain moderate for rivers.
low	high	high		Fish score is currently low overall for rivers, with 18 native freshwater species and eight exotic species recorded in the catchment; includes nationally significant species dwarf galaxias, Australian grayling, Australian mudfish and pale mangrove goby. Target is to improve to high for rivers.
high	mod.	high		Frogs score is currently high, with up to 14 species of frogs expected to occur across the catchment; this includes threatened species such as the growling grass frog and the southern toadlet. The current trajectory is moderate, and target is to maintain at high for rivers.
mod.	low	high		Macroinvertebrates score is currently moderate, with scores higher in forested headwaters and lower in areas affected by urbanisation. The current trajectory is low; the target is to improve to high for rivers.
mod.	low	mod.		Platypus score is currently moderate, with populations occurring in rivers and creeks in the Bunyip, Tarago and Lang Lang river systems and a reintroduced population in Cardinia Creek. The current trajectory is low, but increased vegetation and environmental flows will maintain the value at moderate.
low	very low	mod.		Vegetation is currently low, but varies from very low to very high, with much of the high areas being in forested upper catchments, along the coast of Western Port and in the large regional parks. The current trajectory is very low; the target is to improve to moderate for rivers.
high	mod.	very high		Amenity 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.
high	mod.	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 maintain at high.
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.	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.	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	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.
mod.	mod.	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 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.
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	mod.	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.

Westernport and Mornington Peninsula Region Overview - Wetlands

Overview of Performance Objectives for Wetlands
Reduce threat of invasive animals such as dogs, cats and foxes to protect significant bird habitats.
Increase buffer of native vegetation around key wetlands.
Implement the Western Port Ramsar Site Management Plan and undertake planning for climate change adaptation and resilience.
Investigate opportunities to improve the water regime of key wetlands to meet ecological watering objectives, improve ecosystem services, and cultural and social value.
Reduce the threat of invasive plant species, including the impact of salt tolerant species in significant coastal wetlands.
Identify and assess management options for addressing risk to coastal wetland habitat from sea level rise and increasing coastal storm surge.
Prepare adaption pathways for climate change impacts, including opportunities to maintain water regime through prevention of activities that increase the altered wetland area and altered wetland form threats (e.g. construction of levees).
Reduce the threat of invasive fish species on significant wetland fish populations.
Protect wetland vegetation that provides habitat for significant wetland fish populations.

Westernport and Mornington Peninsula 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)	very low	very low	low		Wetlands bird value is on average very low and is likely to remain at this level. However, wetlands in the Western Port Ramsar site are recognised for their significance as bird habitat and this will be maintained in the long term. Bird habitat at coastal wetlands may be severely impacted by the predicted impacts of climate change to wetland watering regimes, salinity regimes and vegetation communities. Target is to improve from very low to low.
	high	low	very high		Fish score for wetlands is high, with a currently trajectory of low. However, a number of wetlands in the Westernport catchment support the nationally-listed dwarf galaxias and other significant species. Work to re-engage floodplain wetlands will further improve the fish status to protect these species in additional wetlands. Target is to improve from high to very high for wetlands.
	high	low	high		Frogs score is currently high with a significant decline to low predicted. However, actions to reduce the threats of water regime change, lack of wetland buffers and poor wetland vegetation condition may mitigate some of the risk posed by climate change and urbanisation. Target is to maintain at high for wetlands.
	mod.	low	high		Wetland vegetation is currently considered moderate with a current trajectory of low. Implementing programs to improve wetland buffers, vegetation condition and water regime is predicted to improve the vegetation value score to an average of high for wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	low	low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is low and the target is moderate.
	mod.	low	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.
	low	low	high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is high.
	low	low	high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is high.
	low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is low and the target is moderate.

Westernport and Mornington Peninsula Region Overview - Estuaries

Overview of Performance Objectives for Estuaries
Plan to enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaption to climate change risks.
Enhance estuarine vegetation condition and reduce the threat of invasive plant species to significant estuarine vegetation communities.
Reduce the threat of invasive animals such as foxes, cats and dogs to key estuarine habitats.
Identify opportunities and undertake planning to re-engage estuarine floodplains in the long-term.
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, swimming).
Enhance site appropriate facilities that support passive enjoyment and recreation.

Westernport and Mornington Peninsula Region Overview - Estuaries

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.	Estuary birds score is currently moderate overall, but is likely to decline due to predicted climate change impacts. These impacts can be somewhat mitigated so the long-term target is to maintain at moderate.
high	high	high	Fish score for estuaries is high and is predicted to remain high in the long term. A good diversity of estuarine dependent species inhabit the estuaries and are likely to remain. Target is to maintain at high for estuaries.
mod.	very low	mod.	Estuarine vegetation score is currently considered moderate, 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. Protection of significant coastal saltmarsh vegetation is a priority. Target is to maintain at moderate for estuaries.
mod.	mod.	mod.	Amenity score is currently moderate. In the long-term the amenity score will remain at moderate.
high	high	high	Community connection score is currently high with community groups actively working on the estuaries.
low	low	mod.	Recreation score is currently low and predicted to be maintained at low. The target is to improve to moderate. Fishing and boating are popular in this catchment, along with walking and passive recreation in some estuaries.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

mod.	very low	low	Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
very high	very high	very high	Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
very high	very high	very high	Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
low	very low	mod.	Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is low and the target is moderate.
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.
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 12 sub-catchments including seven wetlands and 16 estuaries. Information on the wetlands and estuaries is listed immediately following the respective sub-catchment.

Bass River

- Bass River Estuary

Bunyip Lower

- Yallock Creek floodplain wetlands
- Bunyip River Estuary
- Yallock Creek Estuary

Bunyip River Middle and Upper

Cardinia, Toomuc, Deep and Ararat Creeks

- Cardinia Creek Retarding Basin Wetlands
- Cardinia Creek Estuary
- Deep Creek Estuary

Dalmore Outfalls

- Western Port coastal wetlands
- Tooradin Road Drain Estuary

French and Phillip Islands

King Parrot and Musk Creeks

Lang Lang River

- Lang Lang floodplain wetlands
- Lang Lang River Estuary

Mornington Peninsula North-Eastern Creeks

- Kings Creek Estuary
- Olivers Creek Estuary
- Warringine Creek Estuary
- Watson Creek Estuary

Mornington Peninsula South-Eastern Creeks

- Coolart Wetlands
- Merricks Creek Estuary
- Stony Creek (WPB) Estuary

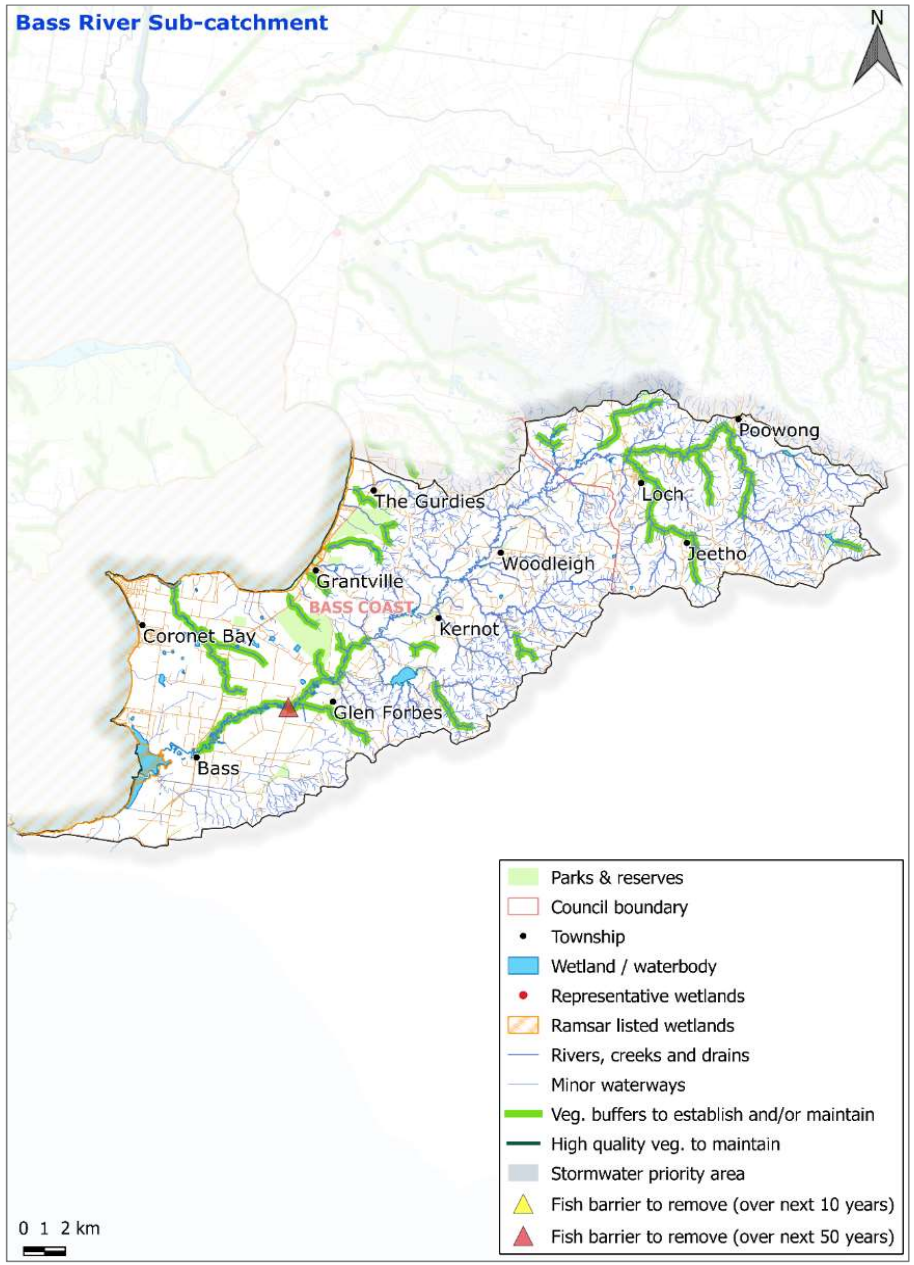
Mornington Peninsula Western Creeks

- Tootgarook Swamp
- The Briars Wetlands
- Balcombe Creek Estuary
- Chinamans Creek Estuary
- Sheepwash Creek Estuary

Tarago River

Further information about the key value and waterway condition metrics.

Bass River Sub-catchment



Description

The Bass River rises near Korumburra in the South Gippsland Highlands, flowing though Glen Forbes and Bass before entering Western Port north of San Remo. The Bass River has geological and geomorphic significance, featuring river terraces and alluvial deltas.

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 Co-Design Summary Report.

"Reduce agricultural toxicants through agricultural extension projects"

"Encourage knowledge sharing through demonstration / field days to benefit stakeholders and community"

"Revegetation in gullies in upper catchments to address sediment"

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

Bass River Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	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.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (54 km, 216 ha) and maintain existing vegetation (42 km, 167 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Vegetation Quality	Determine extent of and maintain high quality vegetation along Allsop Creek; Bass River upstream of Poowong; and Bass River downstream of Tennent Creek 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	Water Quality - Environmental	Protect water quality for environmental values, the Bass River estuary and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways.
5	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase citizen science through promotion of high value species (e.g. growling grass frog).
6	Water Quality - Environmental	Improve water quality for environmental values, the Bass River estuary and seagrass in Western Port by reducing nutrient and sediment run-off from rural land. This may include establishment of vegetated buffers in headwater streams.

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

Notes:

Bass River Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	low		We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. The current trajectory is expected to be low due to climate change. Significant species of riparian bird occurring in this sub-catchment include the intermediate and eastern great egrets.
low	high	high		Fish (tuat) are currently rated as low due to a lack of suitable instream and riparian habitat (largely resulting from catchment clearing and rural land use and barriers to fish movement). The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, rural land management, flow and removal of fish (tuat) barriers will benefit a number of species predicted to decline under climate change.
n/a	mod.	mod.		Insufficient data to calculate frog (ngarret) score. Undertaking all targeted management activities should ensure score is moderate in long term.
mod.	low	high		Macroinvertebrates are currently rated as moderate due to large scale landuse change resulting in a lack of instream and riparian habitat. The impact of climate change, particularly reduction of flows is likely to reduce the rating to low. Improving flows, water quality and riparian vegetation is expected to increase the rating to high in the long term.
very low	very low	very low		Platypus (pudgyer or murrin moorroo) are currently rated as very low due to a lack of instream and riparian habitat. There have been no recent records of platypus (pudgyer or murrin moorroo) found in the catchment and it is unlikely that the rating will improve in the long term.
low	very low	mod.		Vegetation is rated as low overall as a result of large scale landuse change. Without management of existing threats like stock access, pest plants and animals, and the long term threat of climate change, the rating is likely to drop to very low. Protecting high quality reaches, and improving priority reaches, is expected to 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	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep 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.
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.
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	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 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.
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.
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	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.

Bass River Estuary

Description

The Bass River estuary has a permanent, natural mouth opening to Western Port and extends up to the Bass Township. The estuary has a sinuous platform comprised of silts and clays, underlain by lagoon and swamp deposits. The estuary is surrounded by flat, open land and is well-mixed. The estuary provides important habitats for native fish and bird populations and as a fish nursery for shark and whiting.

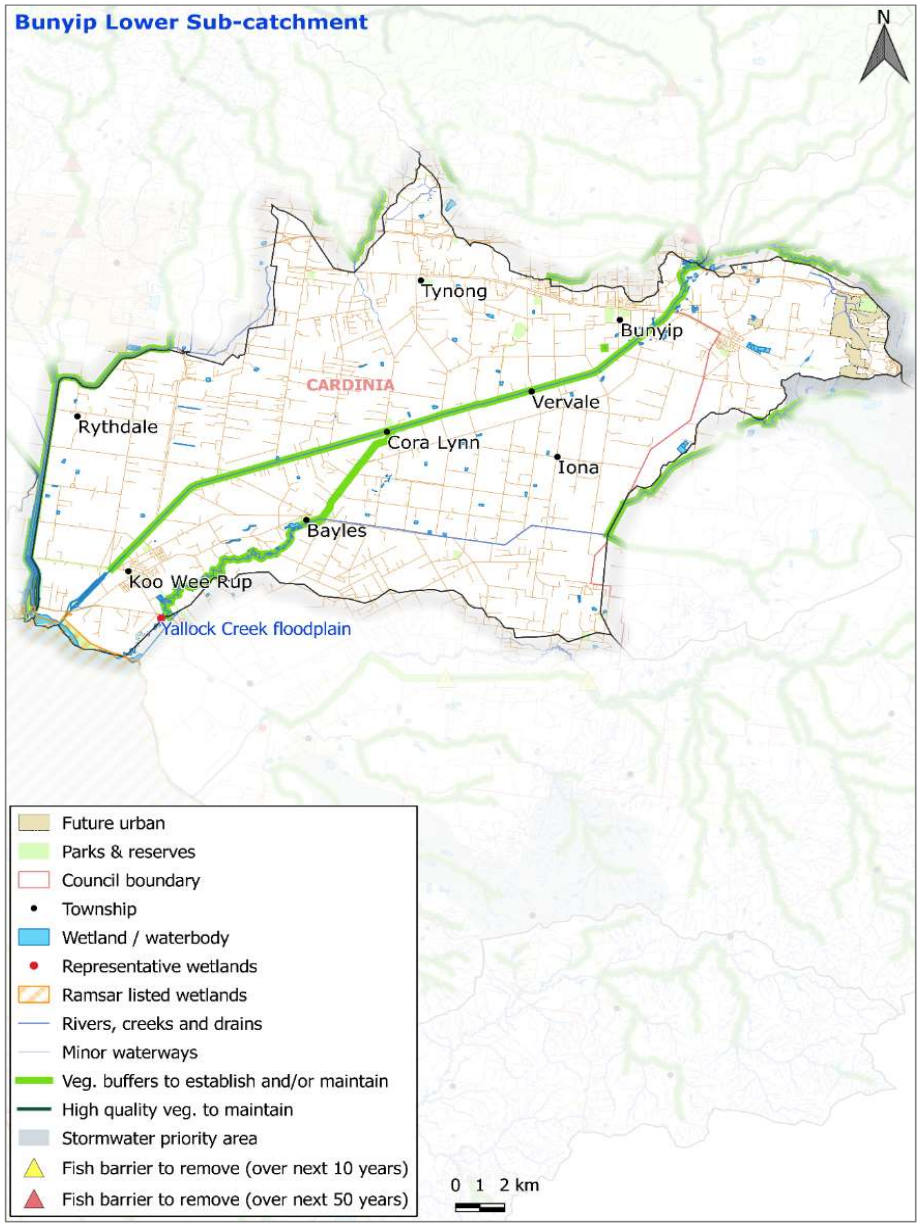
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
2	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
3	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage the estuarine floodplain and wetlands.
5	Estuarine Wetland Connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
6	Access & Recreation	Maintain and support existing opportunities for access and recreation including fishing.

Bass River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		The Bass estuary is listed as significant bird habitat and incorporated in the Westernport Ramsar site. The bird value is currently high, with a current trajectory of decline to moderate due to predicted climate change impacts. Improvement of estuarine vegetation condition to high is predicted to somewhat offset predicted climate change impacts and maintain the bird score at high.
	high	high	high		The fish (tuat) value score 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	high		The estuarine vegetation value of Bass estuary is currently moderate with a current trajectory of very low. Adaptation planning allowing landward migration of Endangered Saltmarsh communities, along with reducing the threat of salt tolerant invasive plants is predicted to improve the vegetation value to high. Improvements to estuarine wetland connectivity as a consequence of climate change impacts will also improve estuarine vegetation value.
	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.
	mod.	mod.	mod.		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 maintain at moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	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.
	low	mod.	high		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 high.

Bunyip Lower Sub-catchment



Description

The Bunyip River originates upstream of the forested Bunyip State Park. The middle and upper sections of the Bunyip River lie upstream of the Princes Freeway. The lower Bunyip River extends from the Princes Freeway through the former Koo Wee Rup Swamp and enters Western Port near Koo Wee Rup. Other waterways in this area include Yallock Creek and Monomeith Drain.

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 Co-Design Summary Report.

"Educate local landholders and alignment of interests"

"Model future water supply issues for agriculture, residential, industrial and environment"

"Improved diversion management to reduce direct pumping from Bunyip river and Tributaries i.e. Minnieburn / King Parrot"

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

Bunyip Lower Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Investigate options to increase the environmental water reserve by 1 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.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (87 km, 349 ha) and maintain existing vegetation (19 km, 76 ha) along priority reaches (ensuring no increase in flood levels).
3	Participation	Increase participation rates from low to high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science though promotion of high value species in the region (e.g. southern brown bandicoot).
4	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways.
5	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
6	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by reducing sediment run-off from rural land. Increase support for improved water stewardship.

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

Notes:

Bunyip Lower Sub-catchment

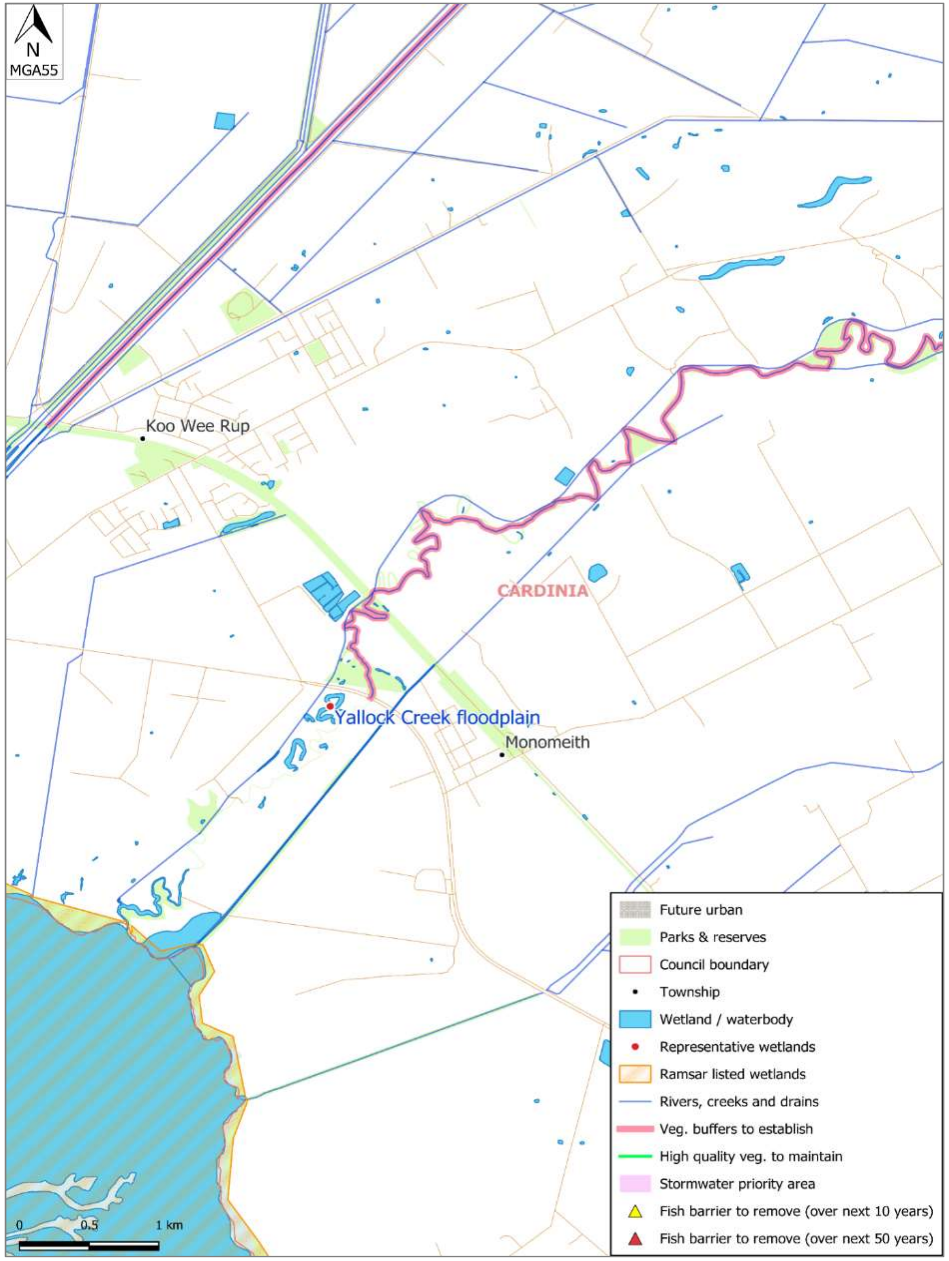
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	low		We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. The current trajectory is expected to be low due to climate change. Significant species of riparian (or estuarine) bird occurring in this sub-catchment include the powerful owl, eastern curlew and little egret.
mod.	high	very high		Fish are currently rated as moderate due to a lack of suitable instream and riparian habitat (largely resulting significant channelization and rural land use). The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, rural land management and flow will benefit a number of species predicted to decline under climate change and increase the rating to very high in the long term. Listed species include the Australian grayling and dwarf galaxias.
mod.	mod.	mod.		Frog score is moderate since not as many species of frog were recorded as expected given the survey effort. With appropriate management the score should be maintained as moderate. Significant species include endangered growling grass frog.
mod.	low	very high		Macroinvertebrates are currently rated as moderate due to large scale landuse change resulting in a highly modified channel and a lack of instream and riparian habitat. The impact of climate change, particularly reduction of flows is likely to reduce the rating to low. Improving flows, water quality and riparian vegetation is predicted to increase the rating to very high in the long term.
mod.	low	mod.		Platypus are currently rated as moderate due to a lack of instream and riparian habitat, resulting from large scale landuse and channel change, and are predicted to decline under climate change impacts. Improvements to flows and riparian vegetation are required to maintain the current rating.
low	very low	mod.		Vegetation is rated as low overall. The original swampy EVCs present when the area was a swamp have mostly gone and vegetation along the constructed channel is very fragmented. Without management of existing threats like stock access, pest plants and animals, and the long term threat of climate change, the rating is likely to drop to very low. Improving vegetation is important, particularly for instream values, however this is a significant challenge due to the drainage function the channel provides.
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	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very 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 very high and the target is very high.
high	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 high and the target is 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.
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.
high	high	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 high and the target is 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.
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.

Yallock Creek floodplain wetlands



Description

The Yallock Creek floodplain includes the original channel of the Yallock Creek, before it was channelised and straightened. The channel has been disengaged through flood mitigation works and the remnant channel is only filled by rainfall, rather than river flows.

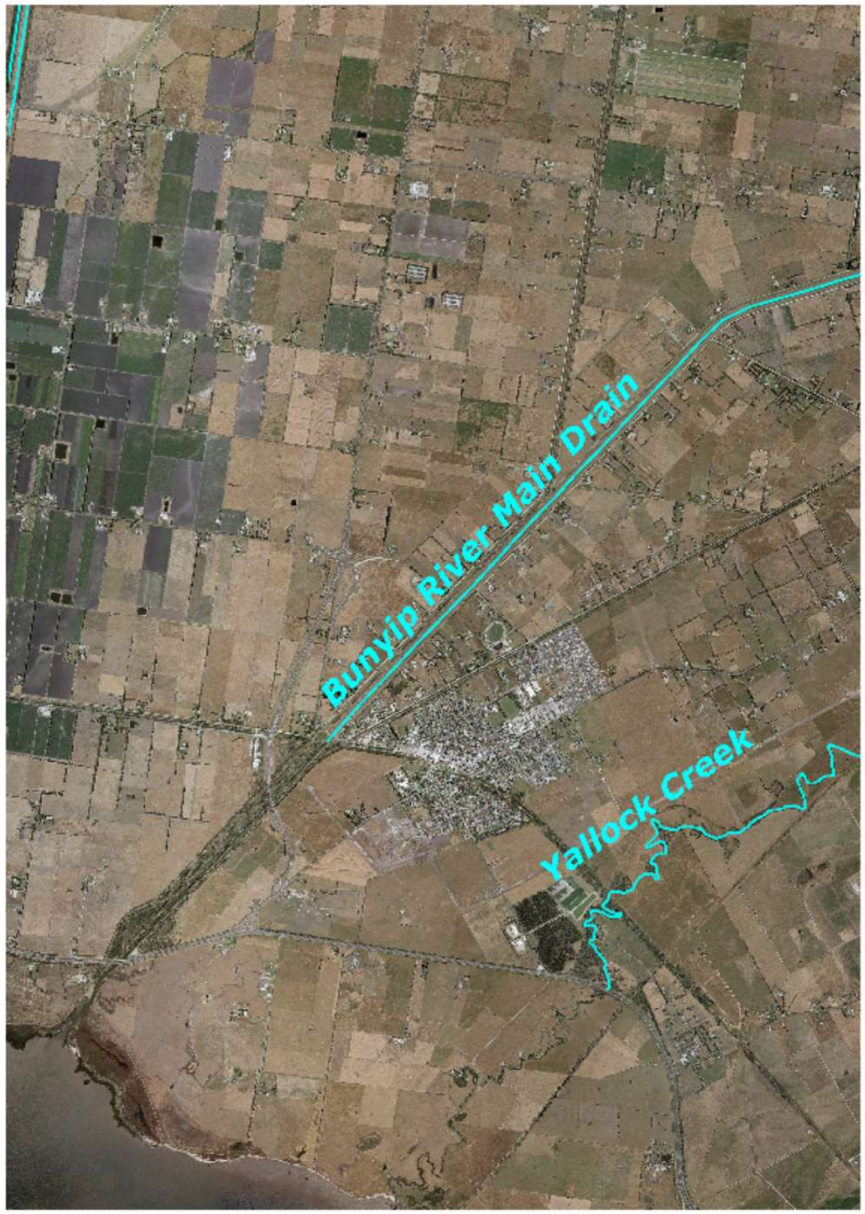
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland Habitat Form	Protect, improve and/or create wetland habitat along the Yallock Creek floodplain for birds, frogs and fish.
2	Wetland Buffer Condition	Improve floodplain, riparian and wetland buffers to cover 50 per cent of the perimeter.
3	Wetland Habitat Form	Monitor threat levels from invasive species on growling grass frogs and mitigate risks if required.
4	Water Regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Yallock Creek floodplain wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	mod.		The wetland bird value score for Yallock Creek floodplain wetlands is currently very low. With improvement to wetland vegetation condition the bird value score is predicted to improve to moderate.
	n/a	n/a	very high		Although data gaps exist for fish in this wetland the nearby stream supports a population of dwarf galaxias. In the long-term improvements to the floodplain wetlands are predicted to support these fish leading to a very high fish value score.
	mod.	mod.	mod.		The frog value score for Bunyip River lower has been applied to the Yallock Creek floodplain wetlands. The frog value is moderate and is predicted to remain at moderate as improvements to wetland conditions, somewhat offset the predicted climate change impacts.
	very low	low	high		The vegetation value score is currently very low, with a current trajectory of improvement to low. With improvements to wetland water regime, buffer condition, vegetation condition and water quality it is predicted that the vegetation value score could reach high.
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.
	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.
	mod.	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is moderate and the target is very high.
	very low	low	high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is high.
	very low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Bunyip River Estuary



Description

The Bunyip River estuary is continuously open to Western Port and discharges near Koo Wee Rup. The area of the estuary can be up to 194 m2 and the upper extent is limited by the Water Tower weir. Prior to European settlement, the Bunyip Estuary area was part of the Koo-Wee-Rup Swamp, but is now a heavily modified channelised estuary - trapezoidal drain with levees upstream of highway, more natural downstream. The estuary is generally well-mixed but can be stratified close to high tide. The riparian vegetation is commonly coastal saltmarsh, estuarine wetland and swamp scrub.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine Vegetation	Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
2	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage the estuarine floodplain and wetlands.
5	Estuarine Wetland Connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
6	Amenity	Enhance appropriate opportunities for access and facilities that support passive enjoyment.
7	Access & Recreation	Maintain and support existing opportunities for access and recreation including fishing.

Bunyip River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		The Bunyip estuary is listed as significant bird habitat and incorporated in the Westernport Ramsar site. The bird value is currently high, with a current trajectory of decline to moderate due to predicted climate change impacts. Improvement of estuarine vegetation condition to high is predicted to somewhat offset predicted climate change impacts and maintain the bird score at high.
	very high	very high	very high		The fish value score is very high and is predicted to remain very high. A good diversity of fish species included listed species and estuarine dependent species inhabit the estuary.
	mod.	very low	high		The estuarine vegetation value is currently moderate with a current trajectory of very low. Adaptation planning allowing landward migration of endangered saltmarsh communities, along with reducing the threat of salt tolerant invasive plants is predicted to improve the vegetation value to high.
	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.
	low	low	mod.		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 moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	low	mod.	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is low and the target is very high.
	n/a	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is no data and the target is moderate.
	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.
	very low	mod.	high		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 high.

Yallock Creek Estuary

Description

The Yallock Creek estuary is permanently open to Western Port and discharges near Monomeith. Lower areas partially channelized with lateral connectivity restricted to a narrow saltmarsh zone.

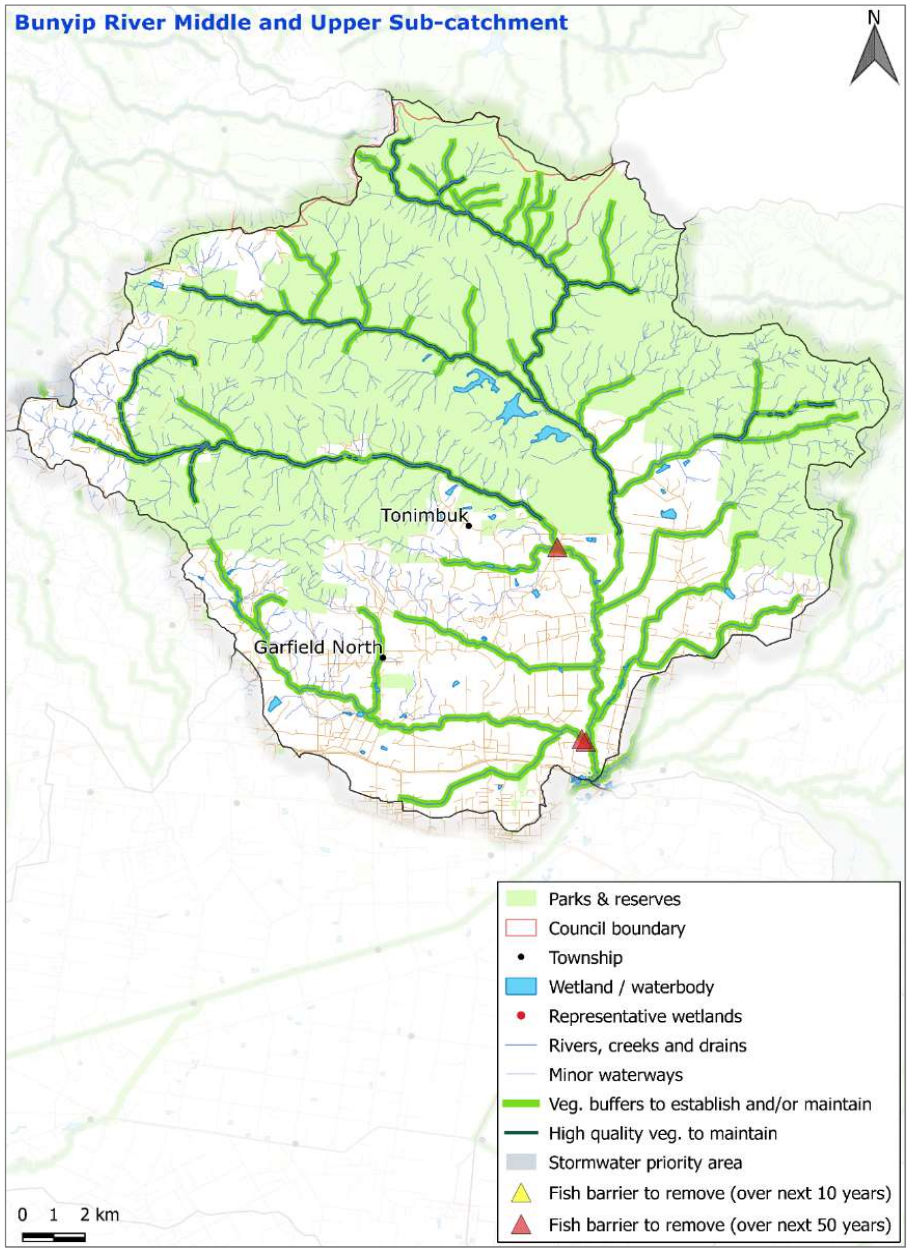
Performance Objectives

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	Estuarine Wetland Connectivity	Identify opportunities to re-engage the estuarine floodplain and wetlands.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
5	Estuarine Vegetation	Enhance estuarine vegetation communities to moderate by reducing threats from invasive plant species.

Yallock Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		The Yallock Creek estuary is listed as significant bird habitat and incorporated in the Westernport Ramsar site. The bird value is currently high, with a current trajectory of decline to moderate due to predicted climate change impacts. Improvement of estuarine vegetation condition to high is predicted to somewhat offset predicted climate change impacts and maintain the bird score at high.
	very high	very high	very high		The fish value score is very high and is predicted to remain very high. A good diversity of fish species included listed species and estuarine dependent species inhabit the estuary.
	mod.	very low	high		The estuarine vegetation value for Yallock Creek estuary is currently moderate with a current trajectory of very low. Adaptation planning allowing landward migration of Endangered Saltmarsh communities, along with reducing the threat of salt tolerant invasive plants is predicted to improve the vegetation value to 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 low	very low	very low		Community connection, which is based on the presence of community groups active in the estuary area, is currently very low due to limited accessibility and highly modified nature of the estuary. Community connection is expected to remain very low in the future.
	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 and highly modified nature of the estuary. Recreation is expected to remain very low in the future.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	low	mod.	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is low and the target is very high.
	very low	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	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.
	very low	mod.	high		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 high.

Bunyip River Middle and Upper Sub-catchment



Description

The Bunyip River originates upstream of the forested Bunyip State Park. The middle and upper sections of the Bunyip River lie upstream of the Princes Freeway. Much of the catchment is within the State Park, and major tributaries include Back, Diamond, Two Mile Cannibal, Diamond and Tea Tree creeks.

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 Co-Design Summary Report.

"Address erosion in Upper Bunyip"

"Reduce nutrient run off from Two Mile Creek East through active farm management program"

"Protect Galaxia habitat upstream from Bren Road"

"Work with Gumuyar World to reduce stormwater runoff entering Brev Road and then Cannibal Creek"

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

Bunyip River Middle and Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (44 km, 174 ha) and maintain existing vegetation (156 km, 626 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 100 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	Water Quality - Environmental	Improve water quality for environmental values and seagrass in Western Port by reducing nutrient and sediment run-off from rural land as well as sediment run-off from forested areas. This may include establishment of vegetated buffers in headwater streams.
5	Access	Increase access to waterways (about 1 km of path) by improving connections with existing path networks around townships and existing parks and reserves.
6	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 in lower catchment. Increase participation in citizen science through promotion of high value areas (e.g. Bunyip State Park).
7	Physical form	Investigate and mitigate threats (e.g. erosion) to physical form and other high values.
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:

Bunyip River Middle and Upper Sub-catchment

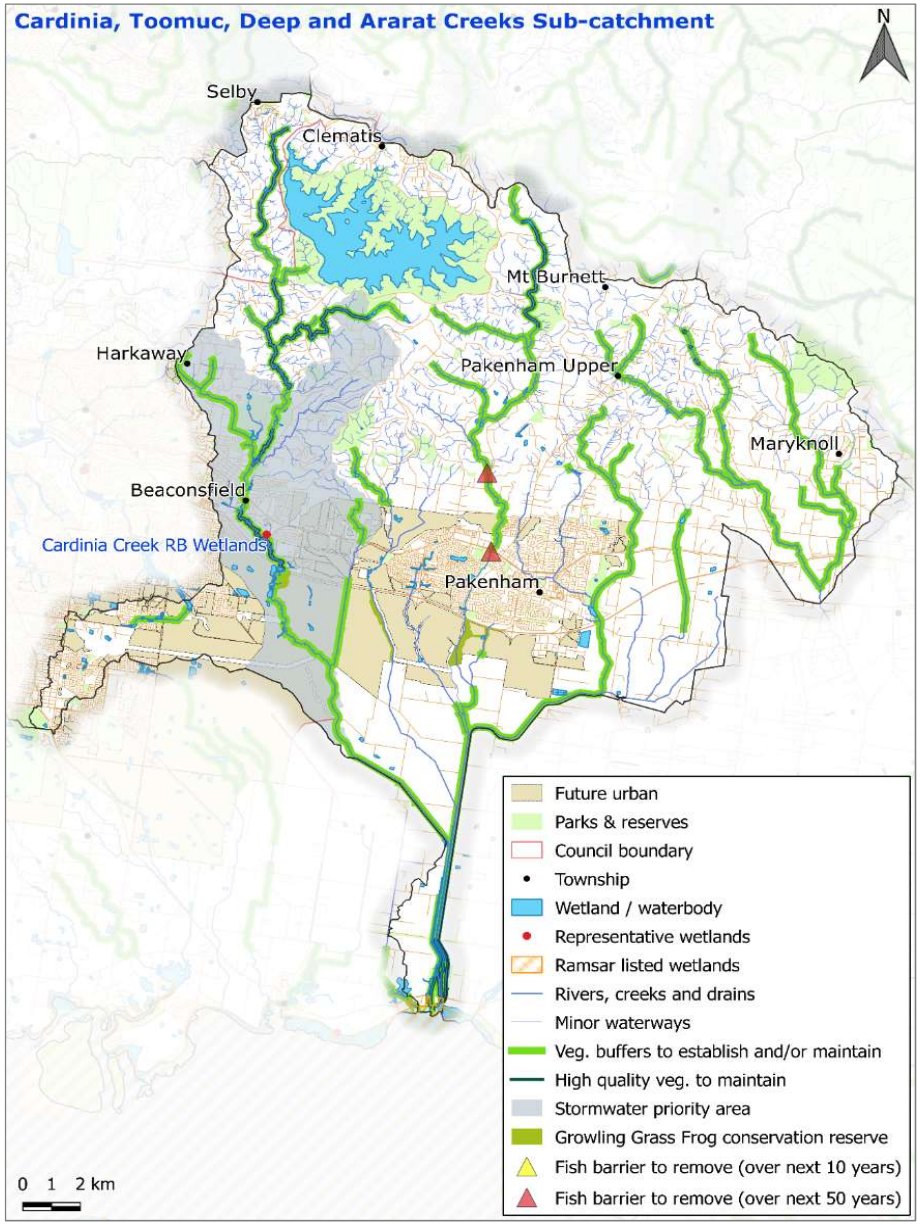
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	high	high		Birds (riparian) score is moderate, meaning most expected species were recorded, but some infrequently. With targeted management we see the score rising to high. Significant species include the helmeted honeyeater, powerful owl and eastern great egret.
mod.	very high	very high		Fish are currently rated as moderate. This is due to very high richness along the middle reaches, very low richness along degraded sections and very low richness in the intact headwaters (which is expected due to lack of flow). The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species; however, some species, including river blackfish and mountain galaxias, are predicted to decline. Improvements to riparian vegetation, flow and water quality will benefit a wider range of species, ensuring a very high rating in the long term.
mod.	mod.	mod.		Frog score is moderate since not as many species of frog were recorded 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 as the catchment is largely forested with good instream and riparian habitat. Monitoring and maintenance of existing high quality habitats including ensuring vegetation condition does not decline will ensure the rating remains as very high.
high	mod.	high		Platypus are currently rated as high due to good instream and riparian habitat, however are predicted to decline with climate change. Improvements to flows and riparian vegetation are required to protect the existing population and maintain the current rating.
mod.	low	mod.		Vegetation is rated as moderate which is largely due to a low uniqueness score. Naturalness scores are however very high as the catchment is largely forested with high quality intact riparian vegetation. Threats including pest plants and animals, recreational access and climate change are predicted to reduce the rating to low if not adequately addressed. The long term outcome is to maintain the current rating with a focus on protecting the best areas.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at 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	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep 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.	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	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 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.
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.
low	low	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 low and the target is moderate.
high	mod.	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 high 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.
very high	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.

Cardinia, Toomuc, Deep and Ararat Creeks Sub-catchment



Description

Cardinia, Toomuc and Deep Creeks rise in the Dandenong Ranges. Ararat Creek lies to the east of the system, rising north of Pakenham. The catchment includes the townships of Upper Beaconsfield, Pakenham, Nar Nar Goon and Dalmore. The system historically flowed into the Koo Wee Rup Swamp before the swamp was drained in the late 1800s, and a straight channel was excavated through the area to create an outlet for the creeks to Western Port near Koo Wee Rup.

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 Co-Design Summary Report.

"Widespread Stormwater Harvesting Schemes. Encourage water harvesting at sporting complexes."

"Create precinct structure plans"

"Protect biolinks from pressures of urbanisation"

"Engaging Primary School students in cultural and environmental change programs"

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

Cardinia, Toomuc, Deep and Ararat Creeks Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support key values including vulnerable platypus populations.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (74 km, 297 ha) and maintain existing vegetation (121 km, 485 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 38 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	Stormwater Condition	Prevent decline in stormwater condition by treating new development (e.g. Officer) so directly connected imperviousness (DCI) of Cardinia Creek remains below 3% upstream of Cardinia Rd. For every hectare of new impervious area, this requires harvesting about 5.5 ML/y and infiltrating 1.9 ML/y. This is about 6.3 GL/y and 2.2 GL/y for full development to the urban growth boundary.
5	Water Quality - Environmental	Improve water quality for environmental values and seagrass in Western Port by reducing turbidity and nutrient run-off from rural land in Deep Creek, Stoney Creek and Toomuc Creek. This may include establishment of vegetated buffers in headwater streams.
6	Water Quality - Environmental	Protect water quality for Ramsar values, seagrass and mangrove communities in Western Port by reducing pesticide threat to low.
7	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways. Increase support for improved water stewardship.
8	Access	Increase access to and along waterways (about 20 km of path) by improving connections with existing path network and extending paths into new urban areas. Includes improvements to linear trails along Cardinia and Toomuc Creeks.
9	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 support for community/environment groups as population increases.
10	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.
11	Physical form	Investigate and mitigate threats to physical form (particularly at the change in slope at the top of the old swamp) and other high values.

Cardinia, Toomuc, Deep and Ararat Creeks Sub-catchment

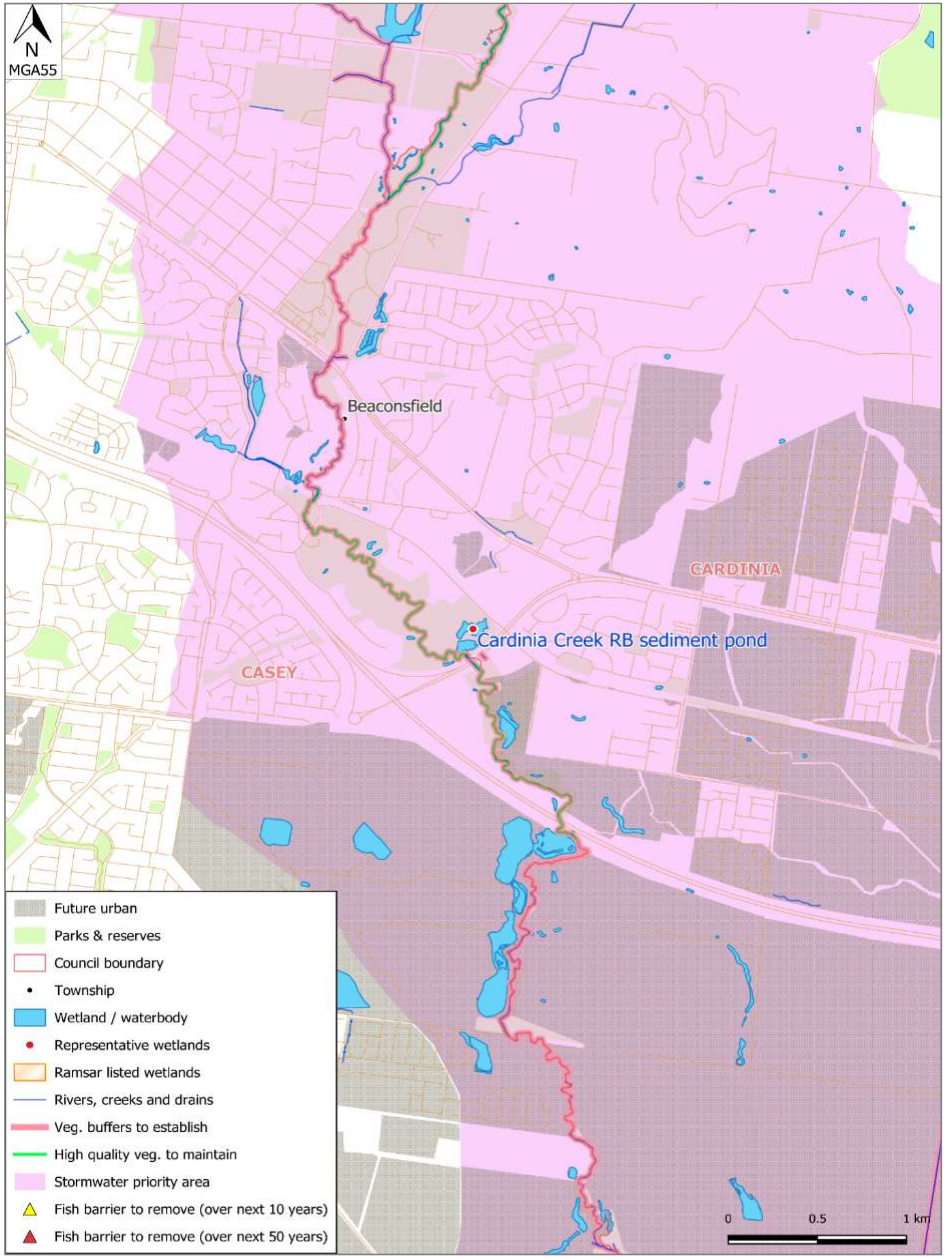
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds (riparian) score is moderate, meaning most expected species were recorded, but some infrequently. The current trajectory is low due to climate change. However, with adequate investment in targeted management (such as riparian revegetation) the score should be maintained at moderate. Significant species include the powerful owl and eastern great egret, and the estuarine common and marsh sandpipers.
low	high	high		Fish are currently rated low due to lack of suitable instream and riparian habitat. This is largely a result of rural and urban land use impacts, and barriers to fish movement. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, stormwater management, flows and removal of fish barriers will benefit a wider range of species and will ensure to a high long term rating. Listed species include Australian grayling and dwarf galaxias.
mod.	low	mod.		Frog score is moderate since not as many species of frog were recorded as expected given the survey effort. With appropriate management the score should be maintained as moderate. Significant species include the growling grass frog and southern toadlet.
mod.	low	high		Macroinvertebrates are currently rated as moderate due to large scale landuse change resulting in a highly modified channel in the lower reaches and a lack of instream and riparian habitat. The impact of urbanisation and climate change is likely to reduce the rating to low. Mitigating urban stormwater impacts and improving riparian vegetation is predicted to increase the rating to high in the long term.
mod.	low	mod.		Platypus are currently rated as moderate due to a lack of instream and riparian habitat, resulting from large scale landuse and channel change, and are predicted to decline under climate change and urbanisation impacts. Mitigating urban stormwater impacts, reducing other flow stresses and improving riparian vegetation is required to ensure the current rating is maintained.
low	very low	mod.		Vegetation is rated as low overall as a result of large scale landuse change, with few remaining high quality sections in the upper reaches. Without management of existing threats like stock access, pest plants and animals, and long term threats of climate change and urbanisation, the rating is likely to drop to very low. Protection of high quality reaches and improving priority reaches is expected to increase the rating to moderate in the long term.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at 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	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		
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	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	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.
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.
mod.	mod.	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 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.
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	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.

Cardinia Creek Retarding Basin Wetlands



Description

Cardinia Creek Retarding Basin is located in Beaconsfield and plays an important role in flood mitigation. The retarding basin contains significant biodiversity values.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Unaligned	Maintain the flood retention design capacity and function of the wetlands, with consideration of the biodiversity values and actions identified in the Melbourne Water Sites of Biodiversity Significance Management Plan.
2	Water Regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Cardinia Creek Retarding Basin Wetlands

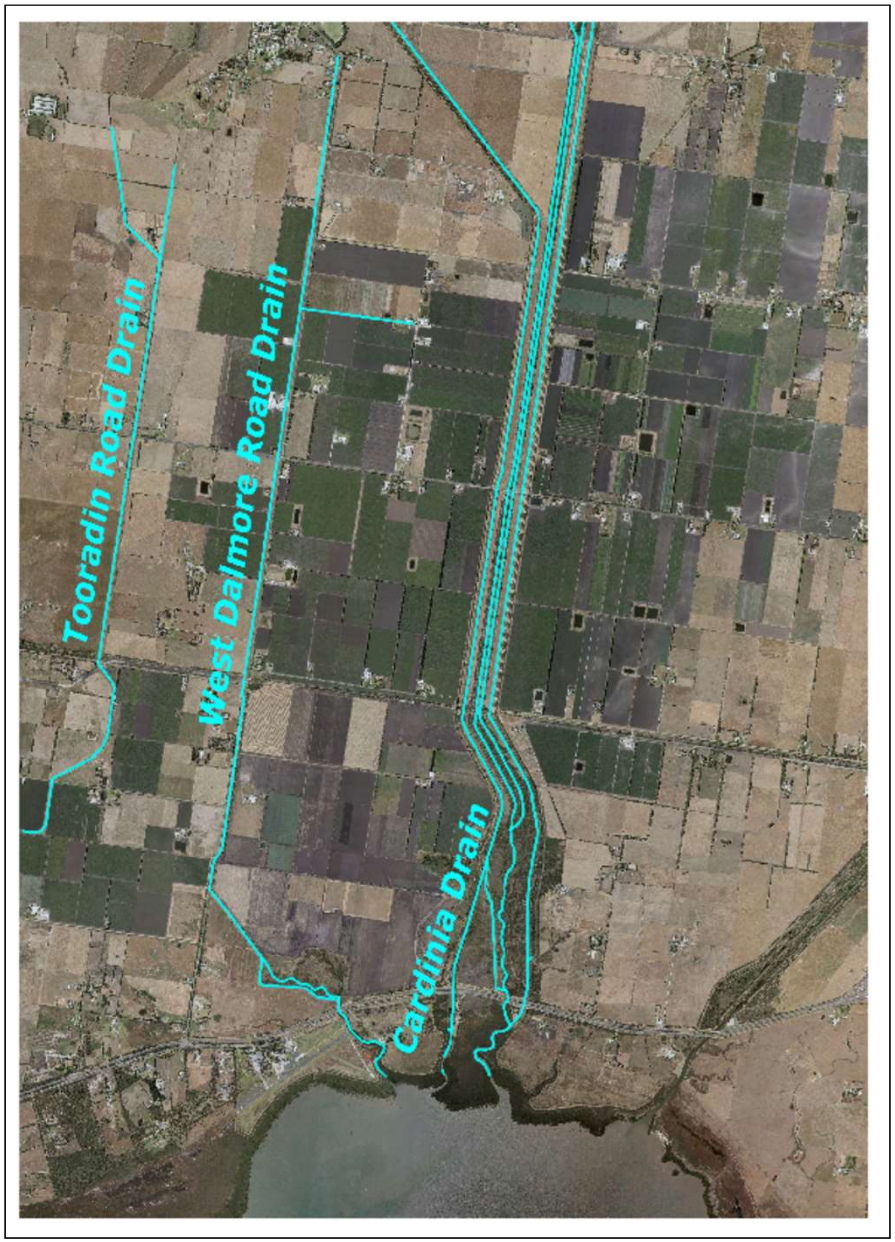
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
very low	very low	very low	The bird value score is currently very low and is predicted to remain very low. Although some significant species have been recorded, the sites are not formally recognised as bird habitat and generally will support moderate vegetation condition in the long-term.
high	high	high	The fish value score is currently high and is predicted to remain high in the long-term.
mod.	low	mod.	The frog value score for Cardinia, Toomuc, Deep and Ararat Creeks Sub Catchment has been applied to the Cardinia Creek Retarding Basin wetlands. The frog value is currently moderate, with a current trajectory of low. Site management for specific biodiversity values may somewhat impact the predicted climate change and urbanisation impacts and is predicted to maintain the frog value at moderate.
mod.	mod.	mod.	The vegetation value score is currently moderate and is expected to remain moderate in the long-term. Some sites have records of significant vegetation species and communities. Vegetation condition is expected to be retained at 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.
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.
low	low	low	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is low.
mod.	mod.	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.

Cardinia Creek Estuary



Description

The Cardinia Creek estuary flows into Western Port near Dalmore. Its straightened channel form is indicative of a constructed drain, created within what historically would have been part of the Koo-Wee-Rup Swamp. There are patches of coastal saltmarsh, swamp scrub and mangroves near the entrance of the estuary, and some tidal channels remain intact allowing tidal inundation of wetlands and saltmarsh.

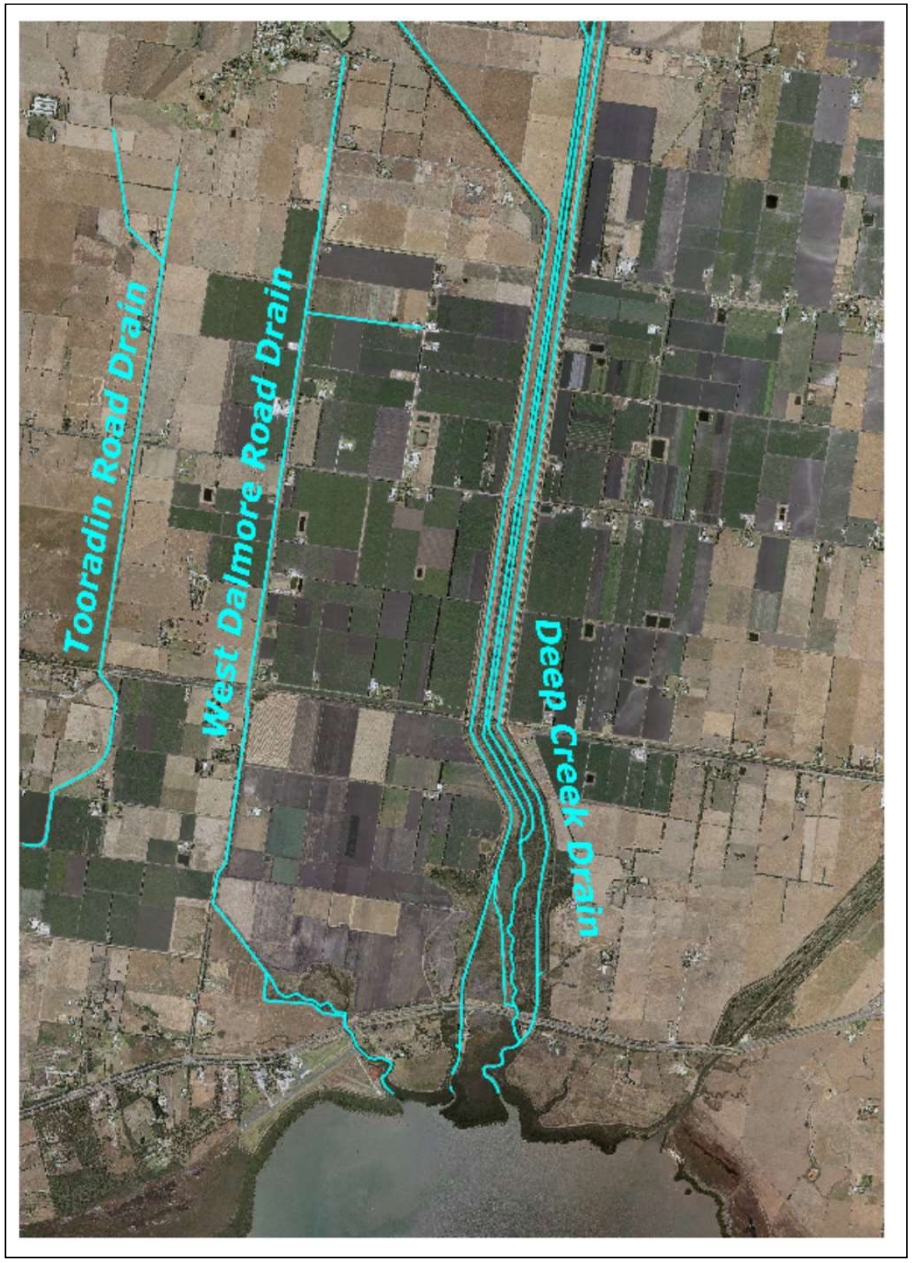
Performance Objectives

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	Estuarine Wetland Connectivity	Identify opportunities to re-engage the estuarine floodplain and wetlands.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
5	Estuarine Vegetation	Enhance estuarine vegetation condition to moderate by reducing threats from invasive plant species.
6	Access & Recreation	Enhance appropriate access and recreation opportunities, including walking and boating.

Cardinia Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	mod.	mod.		The estuary of Cardinia Creek is incorporated within the boundary of the Westernport Ramsar site and is recognised as important bird habitat. The current bird value score is moderate, limited by estuarine vegetation condition. The long-term bird value score will be maintained at moderate as predicted climate change impacts are somewhat offset by improvements to vegetation condition and wetland connectivity.
	very high	very high	very high		The fish value score is very high and is predicted to remain very high. A good diversity of fish species included listed species and estuarine dependent species inhabit the estuary.
	very low	very low	mod.		The wetland vegetation value is currently very low. In the long term, improvements to estuarine vegetation conditions and wetland connectivity, supported by climate change adaptation strategies including landward migration, is predicted to improve the value score to moderate for Cardinia Creek estuary.
	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.
	mod.	mod.	mod.		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 maintain at moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	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.
	very low	mod.	high		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 high.

Deep Creek Estuary



Description

The Deep Creek estuary discharges into Western Port near Dalmore. Its straightened channel form is indicative of a constructed drain, created within what historically would have been part of the Koo-Wee-Rup Swamp. There are patches of coastal saltmarsh, swamp scrub and mangroves near the entrance of the estuary, and some tidal channels remain intact allowing tidal inundation of wetlands and saltmarsh.

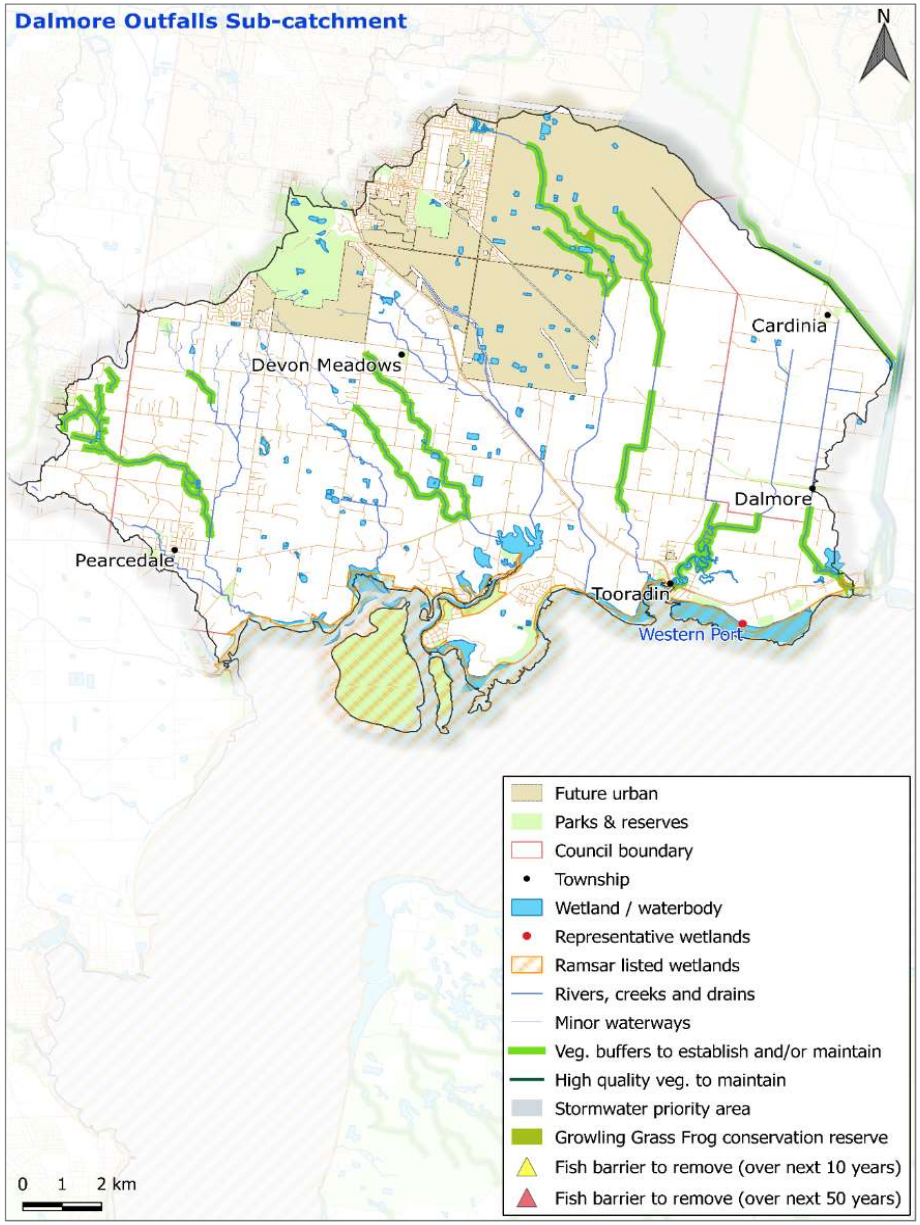
Performance Objectives

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	Estuarine Wetland Connectivity	Identify opportunities to re-engage the estuarine floodplain and wetlands.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
5	Estuarine Vegetation	Enhance estuarine vegetation condition to moderate by targeting key invasive plant species.
6	Recreation	Enhance recreation opportunities including fishing and boating.

Deep Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	mod.	mod.		The estuary of Deep Creek is incorporated within the boundary of the Westernport Ramsar site and is recognised as important bird habitat. The current bird value score is moderate, limited by estuarine vegetation condition. The long-term bird value score will be maintained at moderate as predicted climate change impacts are somewhat offset by improvements to vegetation condition and wetland connectivity.
	high	high	high		The fish value score 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	mod.		The wetland vegetation value for Deep Creek estuary is currently very low. In the long term, improvements to estuarine vegetation conditions and wetland connectivity, supported by climate change adaptation strategies including landward migration, is predicted to improve the value score to moderate.
	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 low	very low	very low		Community connection, which is based on the presence of community groups active in the estuary area, is currently very low due to limited accessibility and highly modified nature of the estuary. Community connection is expected to remain very low in the future.
	mod.	mod.	mod.		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 maintain at moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	very low	very low	mod.		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 moderate.
	very low	mod.	mod.		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 moderate.

Dalmore Outfalls Sub-catchment



Description

The Dalmore Outfalls consist of a number of waterways that flow into Western Port via the townships of Pearcedale, Devon Meadows, Clyde and Tooradin. The waterways include Langwarrin Creek, Christies Drain, Wylies Drain, Western Outfall Drain and Tooradin Road Drain.

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 Co-Design Summary Report.

"Manage sedimentation in northern Western Port to protect significant Ramsar areas (internationally significant wetlands)"

"Revegetate corridors along waterways to support riparian biodiversity"

"Manage pest animals including rabbits"

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

Dalmore Outfalls Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (44 km, 175 ha) and maintain existing vegetation (9 km, 35 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.
2	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
3	Water Quality - Environmental	Protect water quality for environmental values, coastal vegetation and seagrass in Western Port by managing runoff from agricultural and urban areas, including sediment loads from construction activities, to ensure no pollutant or sediment laden run-off enters drains and waterways. Increase support for improved water stewardship.
4	Participation	Increase participation rates from very low to moderate; 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	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:

Dalmore Outfalls Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
mod.	low	mod.	Birds (riparian) score is moderate, meaning most expected species occurred, but some infrequently. The current trajectory is low due to climate change. However, with adequate investment in targeted management (such as riparian revegetation) the score should be maintained at moderate. Significant species of riparian (or estuarine) bird occurring in this sub-catchment include the powerful owl, eastern great egret and common sandpiper.
very low	mod.	mod.	Fish are currently rated as very low due to lack of suitable instream and riparian habitat. This is largely a result of rural and urban land use impacts and substantial channel modification. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation and stormwater management will contribute to a moderate rating in the long term. Listed species include the pale mangrove goby.
mod.	low	mod.	Frog score is moderate since not as many species of frog were recorded as expected given the survey effort. With appropriate management the score should be maintained as moderate.
low	very low	mod.	Macroinvertebrates are currently rated as low due to large scale landuse change and highly modified channels. The impact of urbanisation and climate change is likely to reduce the rating to very low. Mitigating urban stormwater impacts over the long term and improving riparian vegetation is predicted to increase the rating to moderate.
n/a	n/a	n/a	Small streams and artificial drains, such as those connected to the Dalmore Outfalls, 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 and channel modification. Without management of existing threats like stock access, pest plants and animals, and long term threats of climate change and urbanisation, the rating is likely to drop to very low. The long term target outcome is to increase the rating to moderate.
high	mod.	high	Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at 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	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		
mod.	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 moderate and the target is moderate.
high	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 high and the target is high.
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	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.
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	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.
very 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 very low and the target is high.

Western Port coastal wetlands

Description

Western Port Ramsar Site comprises a large proportion of the Western Port embayment to the north of Phillip Island. The site consists of large shallow intertidal areas, dissected by deeper channels and covers approximately 60,000 hectares. The Western Port Ramsar Site contains one of the largest expanses of saltmarsh in Victoria, covering an area of just over 1,100 hectares within the Ramsar site boundary.

A total of 115 waterbird species have been recorded within the Western Port Ramsar Site, and it regularly supports 12 species listed under international migratory bird agreements JAMBA, CAMBA and ROKAMBA. The Western Port Ramsar Site provides significant foraging area for a variety of shorebird species as well as important roosting (nesting) sites.

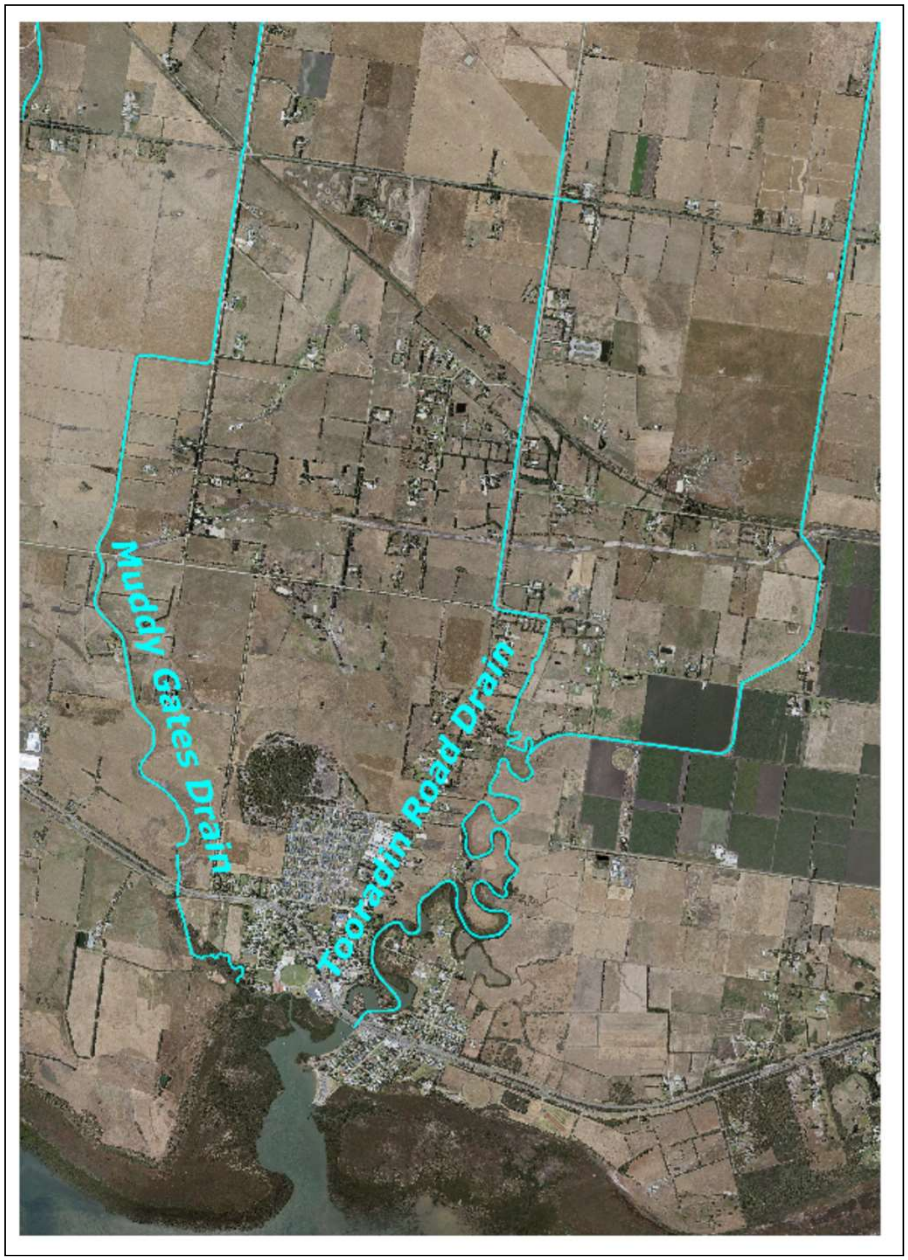
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland Habitat Form	Ensure that risks to environmental values are considered through a strategic approach to the management and future adaptation of the existing shoreline protection works.
2	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.
3	Wetland Habitat Form	Identify opportunities and risks for habitat creation and migration of environmental values in land adjacent to the Ramsar boundary to mitigate habitat loss due to climate change risks (as per Western Port Local Coastal Hazard Assessment).
4	Water Regime	Prepare adaption pathway for climate change impacts, including opportunities to maintain water regime through prevention of activities that increase the altered wetland area and altered wetland form threats (e.g. construction of levees).
5	Wetland Water Quality	Implement stormwater management activities in the Westernport Catchment as identified (Refer Westernport sub-catchment summaries).
6	Wetland Water Quality	Implement rural land management program to reduce nutrient and sediment inflow to the wetlands as identified for each sub-catchment (Refer Westernport sub-catchment summaries).
7	Vegetation Condition	Reduce invasive flora threat to low focussing on salt tolerant weeds in saltmarsh communities.
8	Wetland Buffer Condition	Increase wetland buffer to 50 per cent of the wetland perimeter, including areas adjacent to the Ramsar boundary.
9	Wetland Habitat Form	Reduce invasive fauna threat (cat, fox, rat, dog, pig) to low in priority waterbird roosting and nesting sites.
10	Vegetation Condition	Reduce rabbit threat to salt marsh community to low.

Western Port coastal wetlands

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	high	very low	high	Western Port Ramsar (coastal wetlands) are formally recognised as significant bird habitat. The bird value is currently high and is predicted to remain high with proper management. This score is also supported by increasing vegetation condition providing habitat.
	high	low	high	Wetland fish value is currently high and supports good diversity of estuarine and marine and freshwater species. The predicted impacts of climate change can be somewhat mitigated, therefore, in the long term, the fish value is predicted to remain high.
	high	very low	high	The high frog value for Mornington Peninsula North-Eastern Creeks Sub-Catchment has been applied. The current trajectory is to decline to very low. Adaption planning and improvements to some environmental conditions will maintain the frog value at high.
	high	low	high	The Western Port vegetation value is currently high, with a current trajectory of decline to low. Significant wetland vegetation communities including coastal saltmarsh are present and are predicted to improve to high condition. Although predicted climate change impacts are significant, the impact may be somewhat offset through adaptation planning, particularly allowing landward migration of key vegetation communities in the long-term. The long-term target for vegetation is to maintain at high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	mod.	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 high	very low	very high	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very high and the target is very high.
	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.	low	high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is high.
	mod.	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Tooradin Road Drain Estuary



Description

Tooradin Road Drain flows into Western Port near Tooradin. The drain has been straightened and channelised and would have historically been part of the Koo-Wee-Rup Swamp. Reduced lateral connectivity due to floodgate designed to protect areas from tidal inundation. Some connectivity on lower eastern banks to small patches of saltmarsh; western banks and upstream areas little to no connectivity due to levee banks and elevated landfill.

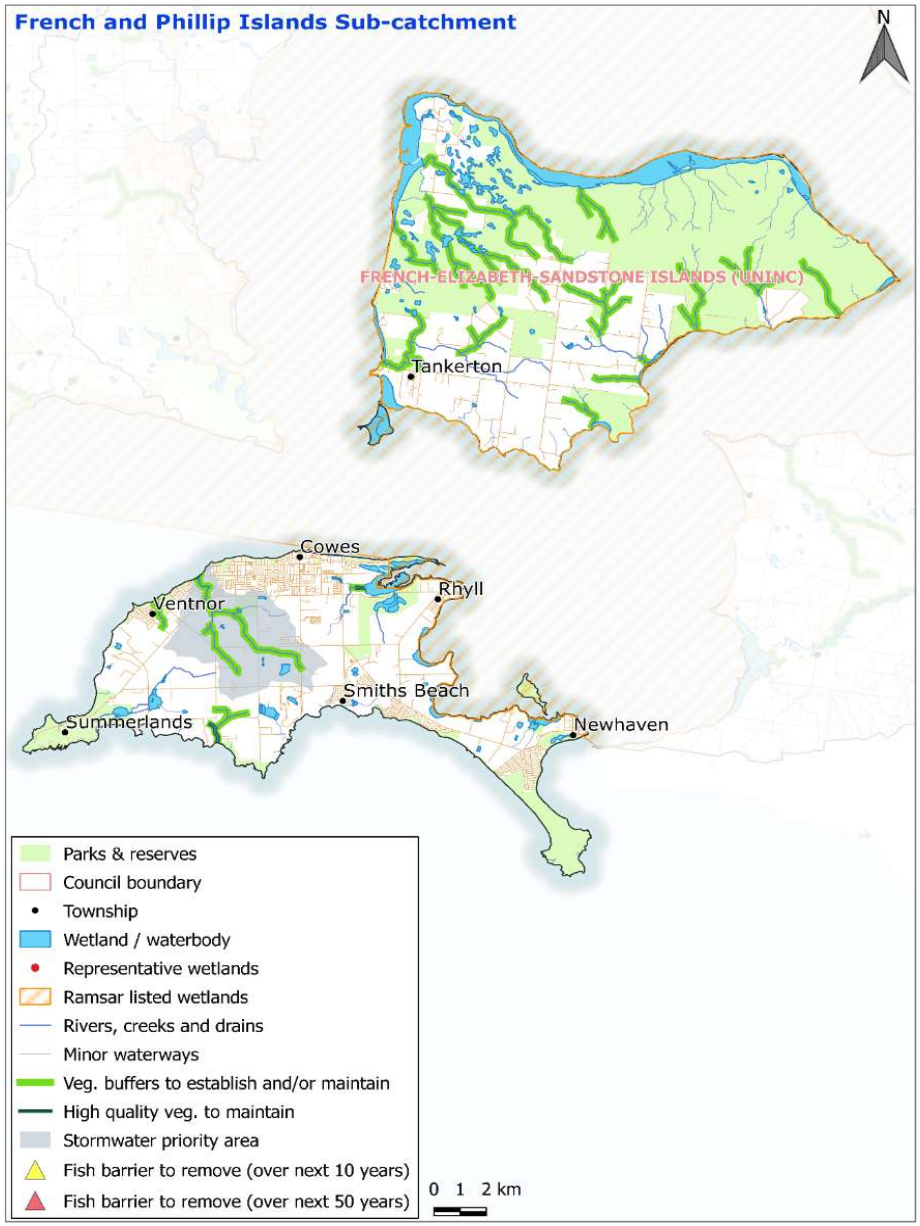
Performance Objectives

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	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
3	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains and wetlands.
4	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
5	Access & Recreation	Enhance appropriate access and recreation opportunities including walking.
6	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Tooradin Road Drain Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		Tooradin Road Drain (estuary) falls within the boundary of the Westernport Ramsar site and is formally recognised as bird habitat. The bird value is currently high, with a current trajectory of decline to moderate. Maintenance of estuarine vegetation and estuarine wetland connectivity is predicted to maintain the bird value at high. Climate change adaptation strategies including landward migration of estuarine vegetation communities and reconnection with the estuarine floodplain in the long term will be required to maintain the bird value.
	high	high	high		The fish value score 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	high		The vegetation value is currently moderate with a current trajectory of very low. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation. Predicted improvements to estuarine vegetation condition and connectivity with the floodplain may improve the vegetation value score to high.
	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.	mod.		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)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very high	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very high and the target is moderate.
	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.
	very low	mod.	high		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 high.

French and Phillip Islands Sub-catchment



Description

The French and Phillip Islands sub-catchment includes the two largest islands in Western Port. The major waterways within French Island are Tankerton, Redhill and Mosquito creeks. Waterways on Phillip Island include Saltwater Creek and Swan Lake Drain. Swan Lake is a permanent freshwater lake that provides habitat for numerous species of waterbirds. Rhyll Inlet and other estuaries support internationally listed wetlands, habitat and animals, especially migratory wading birds.

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 Co-Design Summary Report.

"Better management and regulation of boat and fishing activity around the Islands - improved access and litter education"

"Identify critical habitat for bird roosting and critical life stages - ensure appropriate planning protection from urban development and tourism"

"Continue to invest in feral animal (cats, goats, deer) controls on both islands to improve management of native species"

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

French and Phillip Islands Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (42 km, 167 ha) and maintain existing vegetation (39 km, 157 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 any new development (e.g. Cowes and Ventnor) in the Saltwater Creek catchment so directly connected imperviousness (DCI) remains below 0.8%. For every hectare of new impervious area, this requires harvesting 5.0 ML/y and infiltrating 1.5 ML/y.
3	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways.
4	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation through promotion of high value areas (e.g. French Island National Park, Phillip Island Nature Park).
5	Physical form	Investigate and mitigate threats to physical form and other high values (including impacts of urbanisation).
6	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:

French and Phillip Islands Sub-catchment

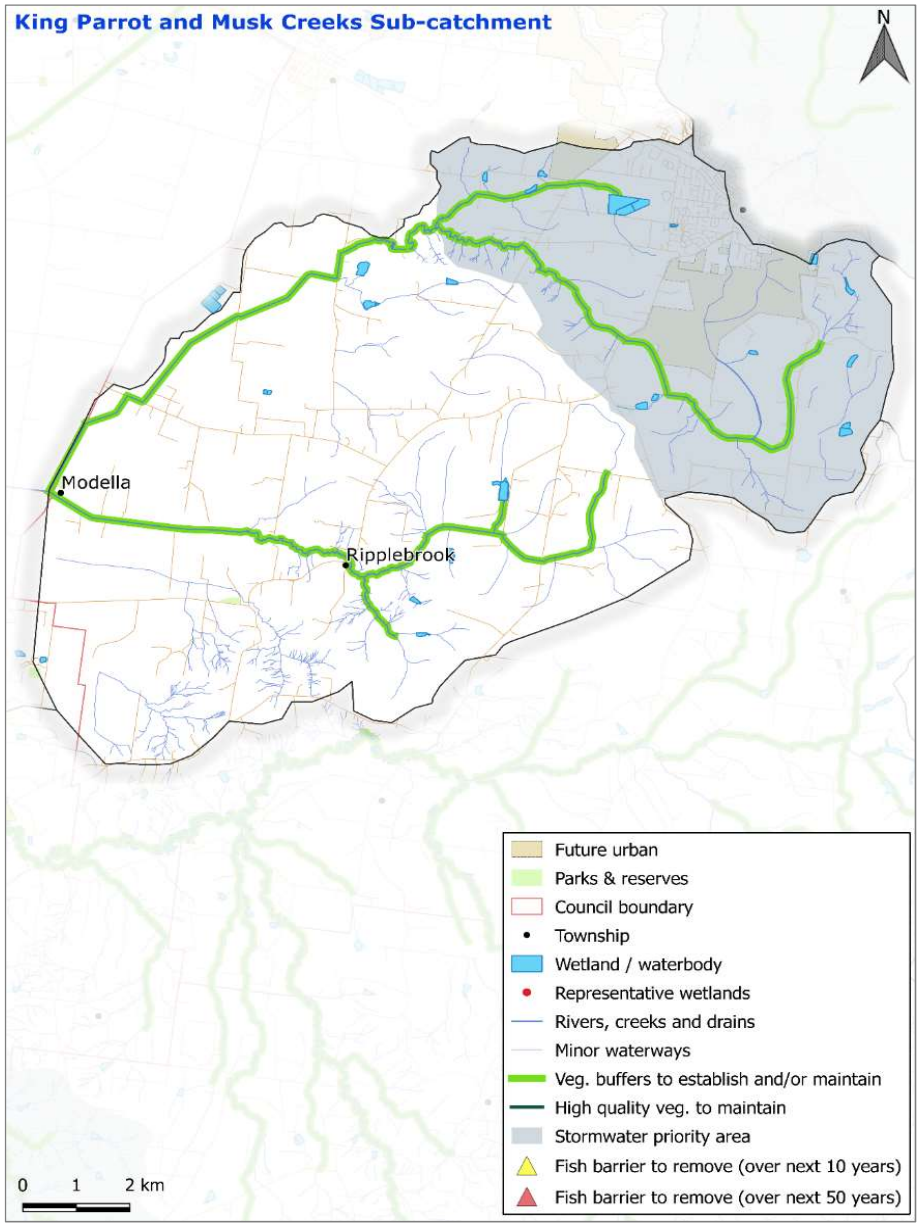
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	high	high		Birds (riparian) score is moderate, meaning most expected species occurred, but some infrequently. With targeted management we see the score rising to high. Significant riparian species of bird occurring in this area include the powerful owl and several listed species of (estuarine) shorebird also occur in the surrounding Ramsar listed wetland.
mod.	very high	very high		Fish (tuat) are currently rated as moderate. This is partly expected in these small streams with lower richness in degraded reaches. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to instream and riparian habitats will contribute to a very high rating in the long term.
high	mod.	high		Frog (ngarret) score is high since most of the expected species of frog (ngarret) were recorded. With dedicated management the score should be maintained at high.
high	high	very high		Macroinvertebrates are currently rated as high as a result of good instream and riparian habitat. With improvements to riparian vegetation the rating is expected to increase to very high in the long term.
n/a	n/a	n/a		French and Phillip Islands are assumed to have never supported platypus (pudgyer or murrin moorroo) populations due to small size of the streams, and disconnection from other major river systems such as the Bunyip, Lang Lang and Bass rivers. For this reason, there is no assessment or setting of targets.
mod.	low	mod.		Vegetation is rated as moderate overall, however much of the vegetation has not been assessed and is potentially higher as it in in parkland. Future threats include stock access, pest plants and animals, and climate change. The long term target outcome is to maintain the rating at 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	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep 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.	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	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 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.	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.
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.

King Parrot and Musk Creeks Sub-catchment



Description

King Parrot and Musk Creeks, which are tributaries of Bunyip River, flow from the hills on the western slopes of the Strzelecki Ranges, between the townships of Drouin and Poowong.

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 Co-Design Summary Report.

No actions were provided for this sub-catchment. The following actions were developed for the whole Westernport and Mornington Peninsula Region:

"Bring clarity to the community on how all the strategies fit together and how strategies will address access to open space and urban greening / cooling."

"Ensure the strategy is not only focused on outcomes for humans. Ensure ecosystem needs are captured through partnerships with industry environment teams (e.g. Fontera)."

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

King Parrot and Musk Creeks Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (40 km, 161 ha) and maintain existing vegetation (14 km, 57 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Stormwater Condition	Prevent decline in stormwater condition by treating any new development (e.g. Drouin) so directly connected imperviousness (DCI) remains below 0.5% along King Parrot Creek and tributaries. For every hectare of new impervious area, this requires harvesting about 5.7 ML/y and infiltrating 2.1 ML/y. This is about 2.0 GL/y and 0.8 GL/y for full urban development.
3	Participation	Increase participation rates from low to high; support community groups and build capacity of land owners through rural programs. Increase support for community/environment groups as population increases.

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

Notes:

King Parrot and Musk Creeks Sub-catchment

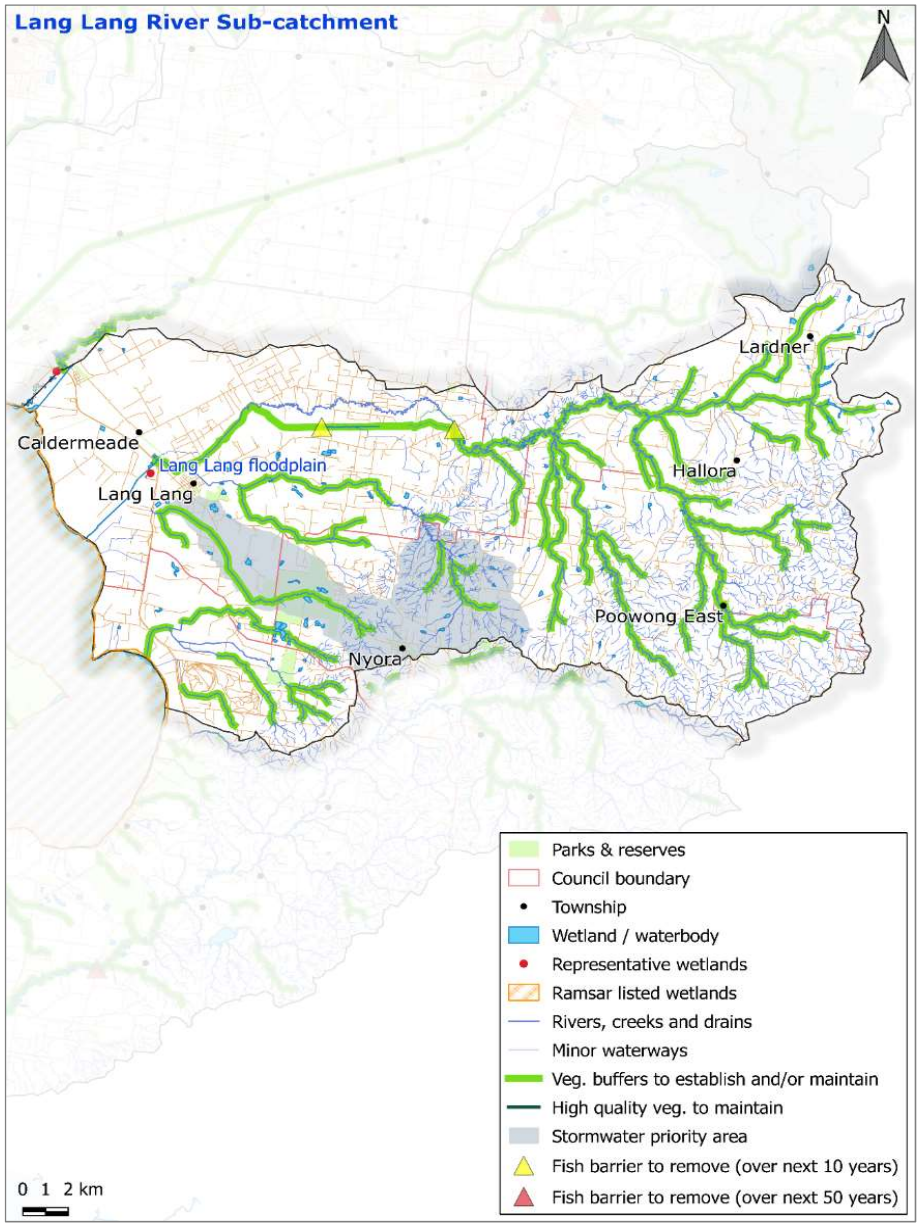
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	low		We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. With effects of climate change, adequate investment in targeted management such as riparian revegetation should maintain the likely score of low.
low	mod.	high		Fish are currently rated as low due to lack of suitable instream and riparian habitat. This largely results from rural and urban land use impacts and substantial channel modification. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation and stormwater management is predicted to increase the rating to high in the long term.
very low	mod.	mod.		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 moderate.
mod.	very low	high		Macroinvertebrates are currently rated as moderate as a result of poor instream and riparian habitat. The impact of urbanisation and climate change is likely to reduce the rating to very low. Mitigating urban stormwater impacts and improving riparian vegetation is predicted to increase the rating to high in the long term.
low	very low	low		Platypus are currently rated as low due to a lack of instream and riparian habitat. There have been no recent records of Platypus found in the catchment. The impacts of urbanisation and climate change are predicted to reduce suitable habitat to very low unless adequately managed.
low	very low	mod.		Vegetation is rated as low, largely as a result of large scale landuse change and draining of the Koo Wee Rup swamp. On-going and emerging threats include stock access, pest plants and animals, and climate change. The long term target outcome is to increase 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	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very 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 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.
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.
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.
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.
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.
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.
low	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 low 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.

Lang Lang River Sub-catchment



Description

The headwaters of the Lang Lang River rise in the Strzelecki Ranges near Poowong. The river flows north initially until it meets O'Mahoneys' Creek, then flows west before entering Western Port near the Lang Lang township. Other tributaries include Minnieburn Creek, Pheasant Creek, Adams Creek, Red Bluff Creek, Little Lang Lang River and Eliza 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 Co-Design Summary Report.

"Support nutrient reduction and whole farm planning programs run by Agriculture Victoria to reduce nutrient and sediment flows to waterways and port"

"Maintain support and encourage closer connection with Landcare groups"

"Manage sediment and flows from expanding townships of Lang Lang, Nyora, Poowang - Loch"

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

Lang Lang River Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus (pudgyer or murrin moorroo) populations.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (100 km, 768 ha) and maintain existing vegetation (195 km, 780ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Stormwater Condition	Prevent decline in stormwater condition by treating any new development (e.g. Nyora) so directly connected imperviousness (DCI) remains below 0.2% along Little Lang Lang River and tributaries. For every hectare of new impervious area, this requires harvesting about 5.7 ML/y and infiltrating 2.1 ML/y.
4	Stormwater Condition	Prevent decline in stormwater condition by treating any new development (e.g. Nyora) so directly connected imperviousness (DCI) of Adams Creek remains below 0.1%. For every hectare of new impervious area, this requires harvesting about 5.6 ML/y and infiltrating 2.0 ML/y.
5	Water Quality - Environmental	Improve water quality for environmental values and seagrass in Western Port by reducing turbidity and nutrient run-off from rural land. Increase support for improved water stewardship.
6	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways.
7	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 rural population increases.
8	Instream Connectivity	Increase instream connectivity provide fish passage along the Lang Lang River from the mouth to the headwaters by removing barriers at Heads Rd and Western Port Rd.
9	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.
10	Physical form	Investigate and mitigate threats to physical form and other high values (particularly along the lower reaches).

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

Lang Lang River Sub-catchment

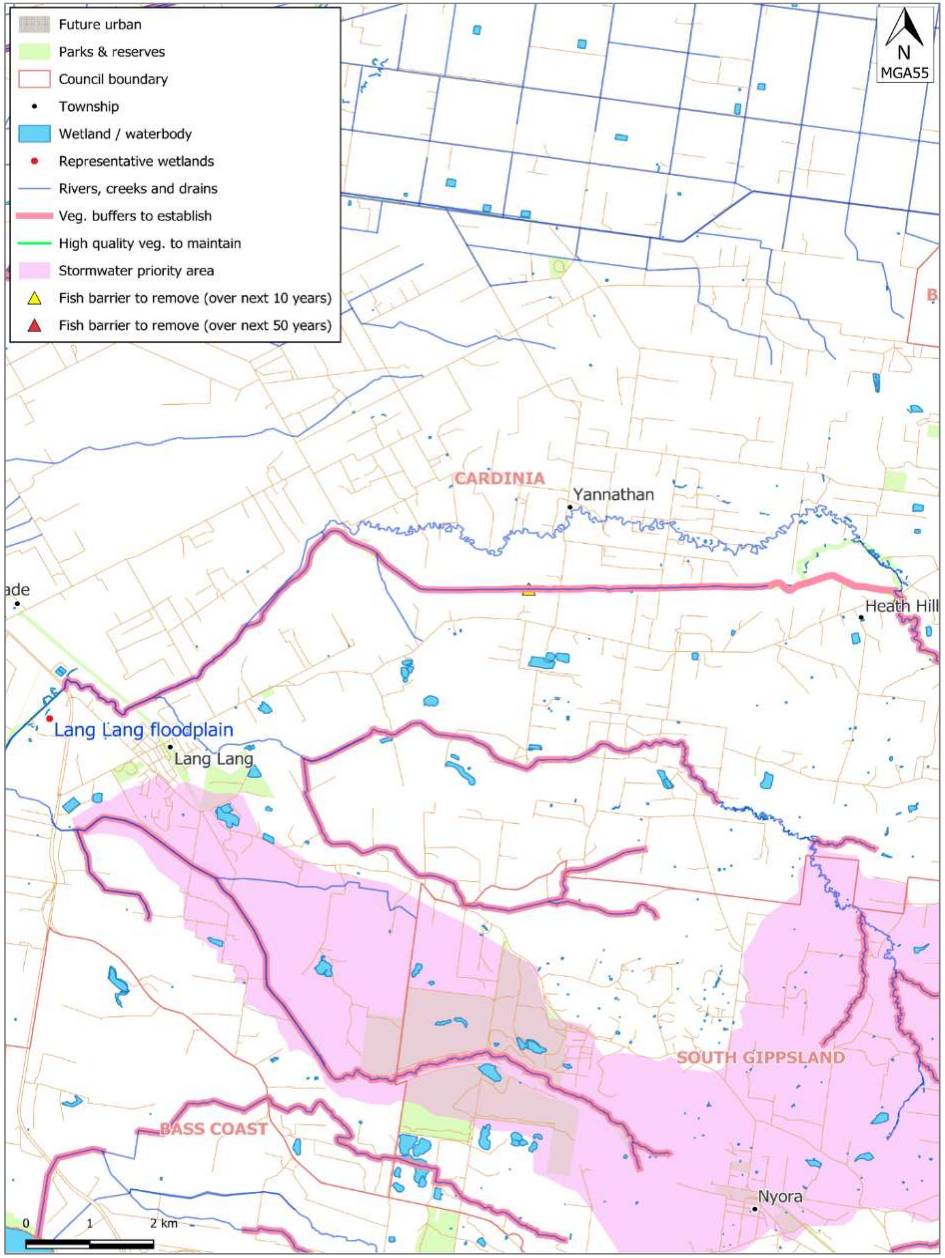
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	low	low	We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. With effects of climate change, adequate investment in targeted management such as riparian revegetation should maintain the likely score of low. Significant species include migratory shorebirds, such as the common greenshank.
low	high	very high	Fish (tuat) are currently rated as low due largely to a significant fish (tuat) barrier in the lower reach. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species; although some species, including river blackfish, are predicted to decline. Improvements to fish passage, riparian vegetation, water quality and flow is predicted to increase the rating to very high in the long term. Listed species include Australian grayling and dwarf galaxias.
n/a	mod.	mod.	Insufficient data to calculate frog (ngarret) score. Undertaking all targeted management activities should ensure score is moderate in long term. Significant species include southern toadlet.
mod.	low	very high	Macroinvertebrates are currently rated as moderate, as a result of poor instream and riparian habitat. The impact of climate change is likely to reduce the rating to low. Mitigating urban stormwater impacts from developing townships and improving water quality from rural land, along with substantial improvement to riparian vegetation, is predicted to increase the rating to very high in the long term.
low	very low	low	Platypus (pudgyer or murrin moorroo) are currently rated as low due to a lack of instream and riparian habitat and as such capture rates of platypus (pudgyer or murrin moorroo) are generally low. The impacts of climate change on flows are likely to add extra stress the population. Managing flows and improving riparian vegetation are required to protect and enhance the current population.
low	very low	mod.	Vegetation is rated as low, largely as a result of large scale landuse change and channel modification in the lower reaches. On-going and emerging threats include stock access, pest plants and animals, and climate change. The long term target outcome is to increase 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	mod.	high	Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep 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.
low	very 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.
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.
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.
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.
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.
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.

Lang Lang floodplain wetlands



Description

The Lang Lang floodplain includes the original channel of the Lang Lang River, before it was channelised and straightened. The channel has been disengaged through flood mitigation works and the remnant channel is only filled by rainfall, rather than river flows.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland Habitat Form	Protect, improve and/or create wetland habitat along the Lang Lang River floodplain for birds, frogs (ngarret) and fish (tuat) including the listed dwarf galaxias.
2	Water Regime	Water regime implemented to meet ecological watering objectives including dwarf galaxias habitat protection, improve ecosystem services, cultural and social value.
3	Wetland Buffer Condition	Improve floodplain, riparian and wetland buffers to moderate.
4	Wetland Habitat Form	Monitor threat levels from invasive fish (tuat) species on dwarf galaxias and mitigate risks if required.
5	Vegetation Condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.

Lang Lang floodplain wetlands

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	mod.	The bird value at Lang Lang floodplain wetlands is currently very low. Improvements to wetland vegetation condition is predicted to improve bird habitat resulting in a bird value score of moderate.
	very high	very low	very high	The Lang Lang floodplain wetlands support dwarf galaxias and have a very high wetland fish (tuat) value. Predicted climate change and urbanisation impacts may be mitigated by improvements to wetland water regime, buffer and vegetation condition which is predicted to maintain the fish (tuat) value at very high.
	mod.	mod.	mod.	The frog (ngarret) value score for Lang Lang Sub Catchment has been applied to the wetlands. The frog (ngarret) value is currently moderate. Improvements to conditions may somewhat impact the predicted climate change impacts and is predicted to maintain the frog (ngarret) value at moderate.
	mod.	low	high	The wetland vegetation value is currently moderate, with moderate vegetation buffer and condition. However, increases in these conditions to very high and high, along with improvements to wetland water regime are predicted to improve the vegetation value to high.
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.
	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.
	mod.	mod.	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is moderate and the target is very high.
	mod.	low	high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is high.
	very low	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Lang Lang River Estuary

Description

The Lang Lang River estuary is permanently open to Western Port, and has an entrance width of approximately 20 m. Heads Road is the upper extent of estuary. The Lang Lang River including the estuary reach has been straightened and channelised with very little vegetation remaining. It originally flowed into Koo Wee Rup swamp with Lang Lang River constructed to drain the swamp (along with Bunyip River).

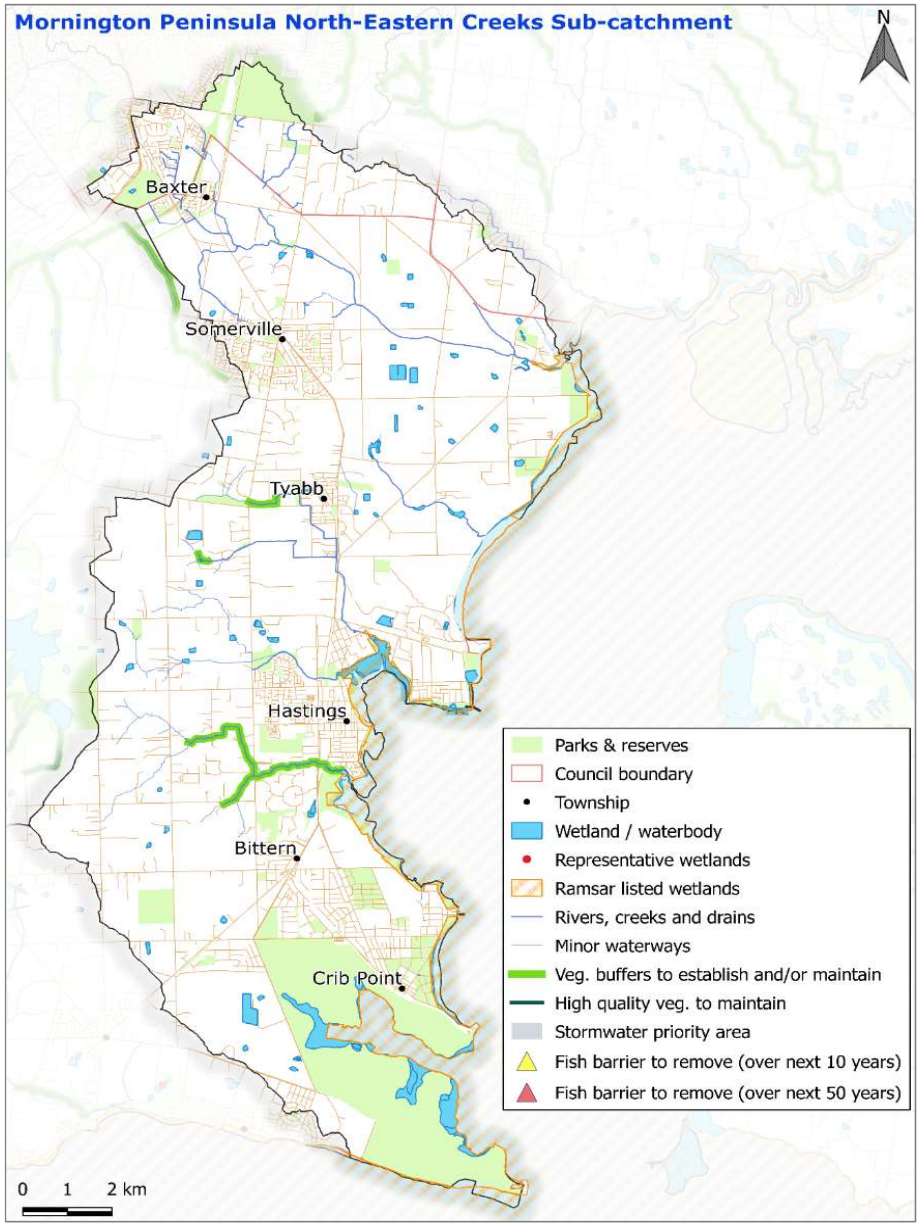
Performance Objectives

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	Estuarine Vegetation	Improve estuarine vegetation condition to moderate.
3	Estuarine Wetland Connectivity	Identify opportunities to re-engage the estuarine floodplain and wetlands.
4	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
5	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
6	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
7	Amenity	Enhance appropriate opportunities for access and facilities that support passive enjoyment.
8	Access & Recreation	Maintain and support existing opportunities for access and recreation including fishing.

Lang Lang River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	low	mod.		Lang Lang estuary is formally recognised as bird habitat and the moderate bird value is limited by moderate estuarine vegetation condition. The current trajectory is a decline to low value, however predicted improvements to estuarine vegetation condition and wetland connectivity should maintain the bird value at moderate.
	very high	very high	very high		The fish (tuat) value score is very high and is predicted to remain very high. A good diversity of fish (tuat) species included listed species and estuarine dependent species inhabit the estuary.
	mod.	very low	high		The estuarine vegetation value is currently moderate with a current trajectory of very low. Adaptation planning allowing landward migration of Endangered Saltmarsh communities, along with reducing the threat of salt tolerant invasive plants is predicted to improve the vegetation value to high.
	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.
	low	low	low		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 maintain at low.
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.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	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.
	very low	mod.	high		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 high.

Mornington Peninsula North-Eastern Creeks Sub-catchment



Description

The Mornington Peninsula North-Eastern Creeks sub-catchment abuts the north western section of Western Port – from Pearcedale around to the Cerberus Naval base. Watson Creek originates in Baxter and flows through predominantly rural land before entering Western Port via Watson Inlet. Watson Inlet forms part of the Yaringa Marine National Park. Olivers, Kings and Warringine Creeks all flow east from the peninsula to enter Westernport around Hastings.

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 Co-Design Summary Report.

"Controls to minimise directly connected imperviousness and impacts on industrial zoning in Port of Hastings area on Ramsar values."

"Work with other agencies towards integrated approach to behaviour change around agricultural chemicals"

"Provide indigenous plants to landowners to facilitate revegetation (support re-veg along Warringah Creek)"

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

Mornington Peninsula North-Eastern Creeks Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support instream values.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (3 km, 11 ha) and maintain existing vegetation (7 km, 28 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	Water Quality - Environmental	Protect Yaringa Marine National Park and coastal wetlands by improving rural land management to reduce impacts from pesticides, sediment and nutrients for the catchments extending from Sawtells Inlet to Watsons Creek Estuary. Increase support for improved water stewardship.
4	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new areas.
5	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 support for community/environment groups as population increases.
6	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways.
7	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:

Mornington Peninsula North-Eastern Creeks Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most expected species occurred, but some infrequently. The score is expected to be maintained at moderate with adequate investment in targeted management (such as riparian revegetation). This is despite the adverse effects of climate change. Significant species of riparian (or estuarine) bird occurring in this sub-catchment include the powerful owl, eastern curlew and eastern great egret.
low	mod.	high		Fish (tuat) are currently rated as low due to lack of suitable instream and riparian habitat (largely resulting from rural and urban land use impacts). The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, water quality and flows through improved rural and urban management is predicted to increase the rating to high in the long term.
very high	mod.	very high		Frog (ngarret) score is very high since all, or almost all, species of frog (ngarret) were recorded relative to those expected given the survey effort. With appropriate management the score should be maintained as very high. Significant species include the growling grass frog and southern toadlet.
low	low	low		Macroinvertebrates are currently rated as low from urban and intensive rural landuses which has resulted in poor instream and riparian habitat. While some reaches will improve from revegetation, better land management and stormwater practices, the overall score is predicted to remain low.
n/a	n/a	n/a		The Mornington Peninsula is assumed to have never supported permanent platypus (pudgyer or murrin moorroo) populations due to the small size of the streams. For this reason, there is no assessment or setting of targets.
low	very low	low		Vegetation is rated as low, largely as a result of large scale landuse change. Unless adequately managed, on-going and emerging threats such as stock access, pest plants and animals, and climate change are predicted to reduce the rating to very low.
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	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 low and the target is low.
high	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 high and the target is high.
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.
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.
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.
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.
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	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	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	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.

Kings Creek Estuary

Description

The Kings Creek estuary discharges to Western Port near Hastings. The estuary has natural lateral connectivity to floodplain through Westernport Coastal Reserve but is limited in upper reaches on northern banks by steeper slopes.

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 Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
3	Estuarine Wetland Connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.
5	Amenity	Maintain existing high value facilities that support passive enjoyment.

Kings Creek Estuary

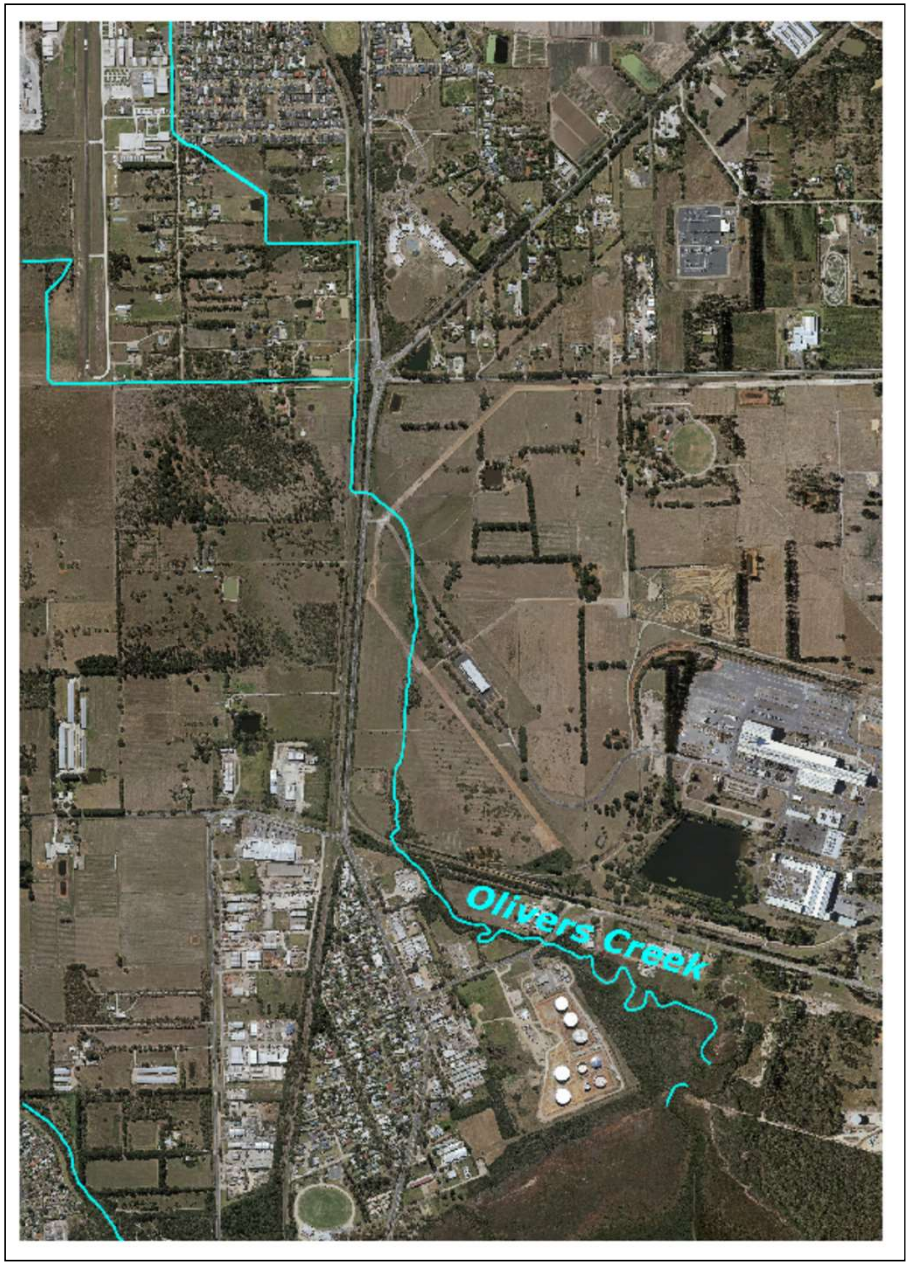
KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	mod.	high		The Kings Creek estuary falls within the boundary of the Westernport Ramsar site and is formally recognised as bird habitat. The bird value is currently very high, supported by very high estuarine vegetation condition, however the current trajectory is a decline to moderate. Maintenance of estuarine vegetation and estuarine wetland connectivity is predicted to maintain the bird value at high. Climate change adaptation strategies including landward migration of estuarine vegetation communities will be required to maintain the bird value.
high	high	high		The fish (tuat) value score 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.
high	low	mod.		The estuarine vegetation value is currently high, with a current trajectory of low. Predicted climate change impacts will threaten the Endangered Saltmarsh community. Adaptation strategies will be required to protect the saltmarsh, along with reduction of the threat of salt tolerant weeds. The vegetation value is predicted to decline to moderate in the long-term.
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 low	very low	very low		Community connection, which is based on the presence of community groups active in the estuary area, is currently very low due to limited accessibility and is expected to remain very low in the future.
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)

mod.	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
mod.	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is moderate.
very high	very low	very high		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very high and the target is very 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.

Olivers Creek Estuary



Description

The Olivers Creek estuary discharges to Western Port near Hastings. The estuary has natural lateral connectivity to floodplain through Westernport Coastal Reserve.

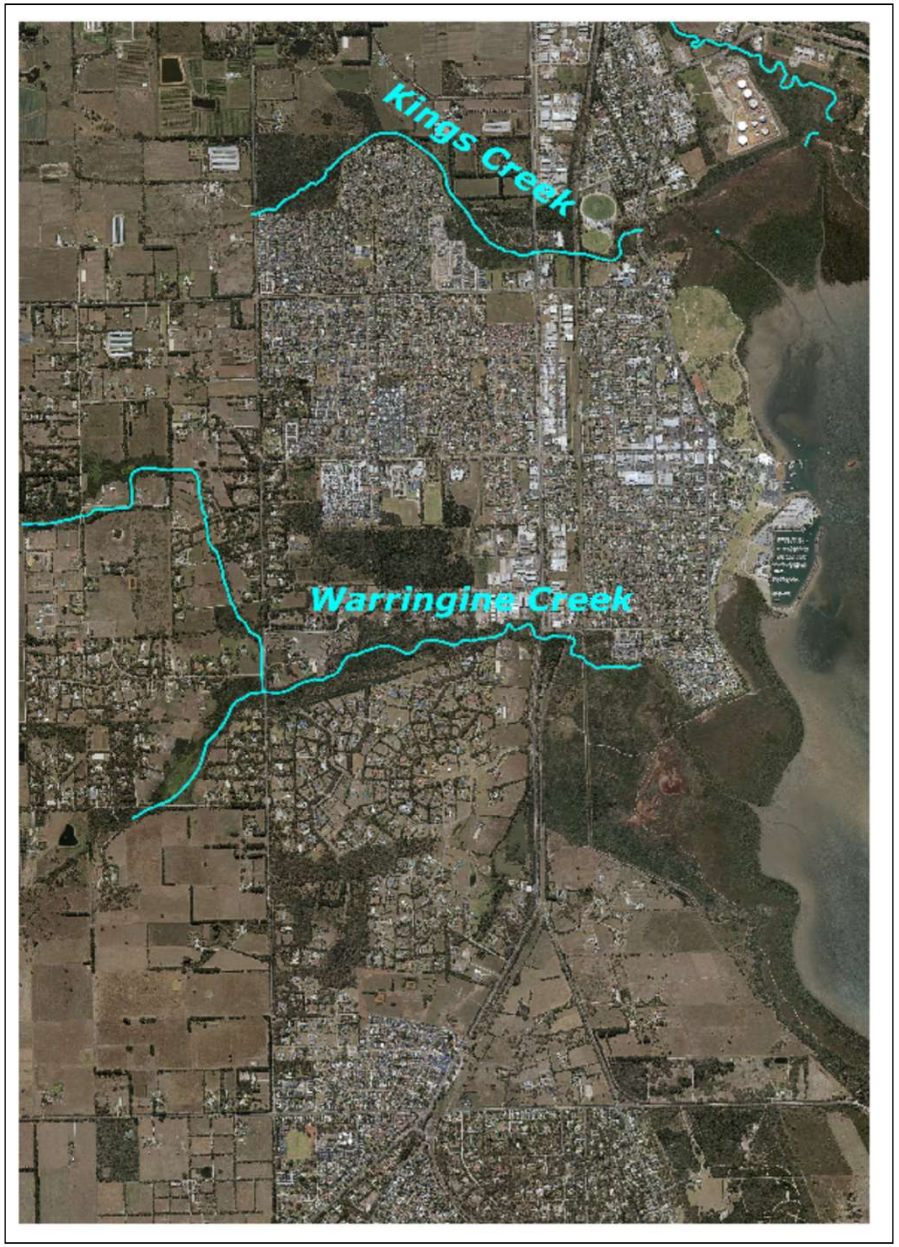
Performance Objectives

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	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
3	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.
5	Access & Recreation	Maintain and support existing opportunities for access and recreation, including walking and jogging.
6	Amenity	Enhance appropriate opportunities for access and facilities that support passive enjoyment.

Olivers Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		Olivers Creek estuary falls within the boundary of the Westernport Ramsar site and is formally recognised as bird habitat. The bird value is currently high, with a current trajectory of decline to moderate. Maintenance of estuarine vegetation and estuarine wetland connectivity is predicted to maintain the bird value at high. Climate change adaptation strategies including landward migration of estuarine vegetation communities will be required to maintain the bird value.
	high	high	high		The fish (tuat) value score 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 vegetation value score is currently moderate with a current trajectory of very low. Maintaining estuarine vegetation condition is predicted to maintain the vegetation value score 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.
	low	low	mod.		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 moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	mod.	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is moderate.
	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.
	n/a	very low	high		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. There is currently insufficient data to determine the current state and the target is high.

Warringine Creek Estuary



Description

The Warringine Creek estuary enters Western Port near Hastings. Seaward half of estuary has natural connectivity to floodplain and extensive areas of saltmarsh and mangroves. The remnant vegetation is in good condition and includes a range of macrophyte species. This is part of the Ramsar site. There are no barriers to estuarine extent or fish passage.

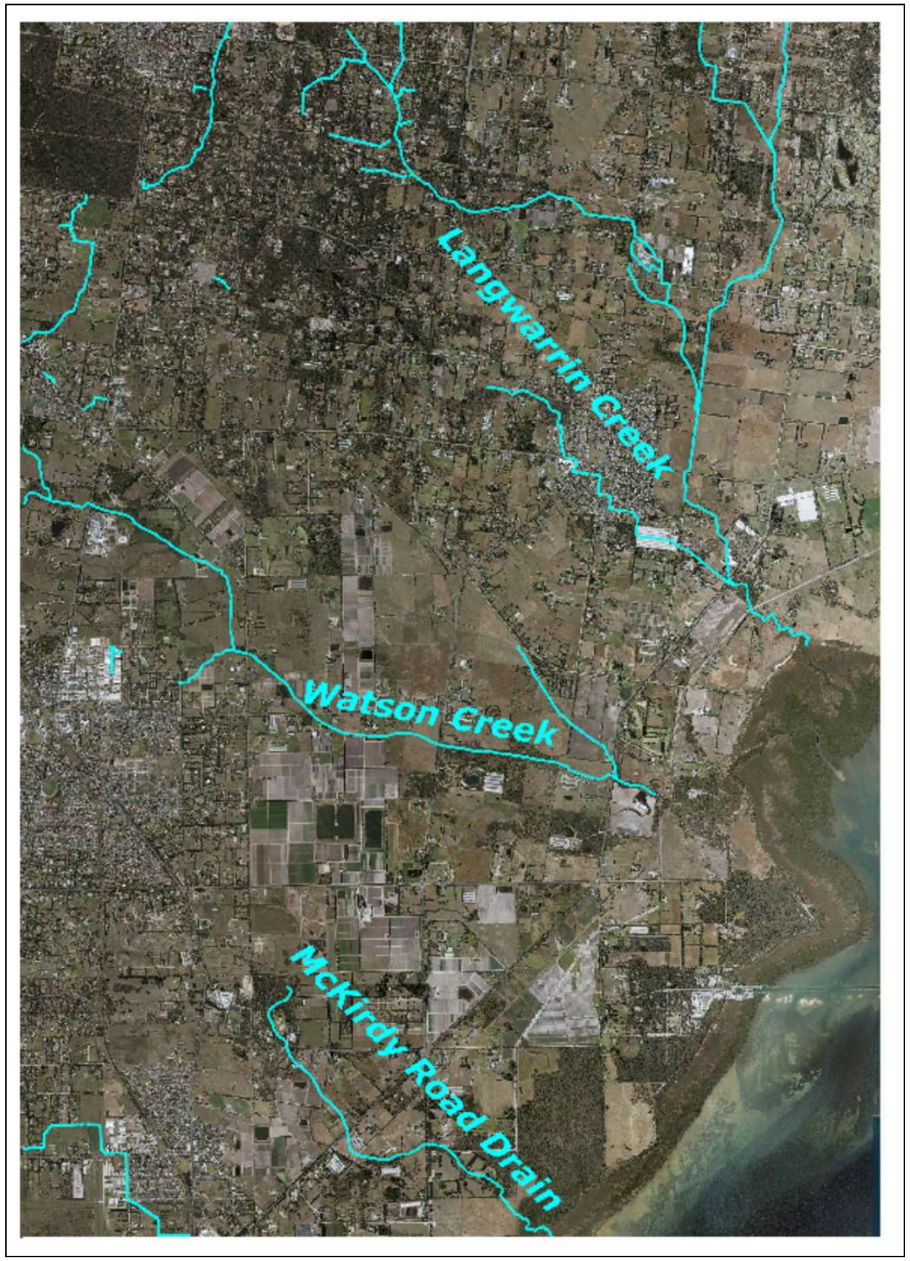
Performance Objectives

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	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.
5	Access & Recreation	Enhance appropriate opportunities for access and recreation including walking and fishing.
6	Amenity	Enhance appropriate opportunities for access and facilities that support passive enjoyment.

Warringine Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	low	mod.		The estuarine bird score is currently moderate with a current trajectory of low. The estuary is listed as having formal significance for birds, however habitat availability is limited now and into the future by estuarine vegetation condition. The bird value score will remain at moderate.
	high	high	high		The fish (tuat) value score 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 vegetation value score is currently moderate with a current trajectory of very low. Maintaining estuarine vegetation condition is predicted to maintain the vegetation value score 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)	mod.	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	mod.	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is moderate.
	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 high	very low	mod.		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very high and the target is moderate.

Watson Creek Estuary



Description

The Watson Creek estuary enters Western Port at Watsons Inlet near Somerville and flows into Yaringa Marine National Park. The channel of upper estuary well defined; limited connectivity to floodplain under high fluvial flows. Watson Inlet has relatively undisturbed mangrove (Avicennia marina) and saltmarsh habitats of State geomorphological significance. Proximity to Ramsar site. Areas of vegetation with high environmental significance occur in the estuary and adjacent floodplain to the shore of Western Port.

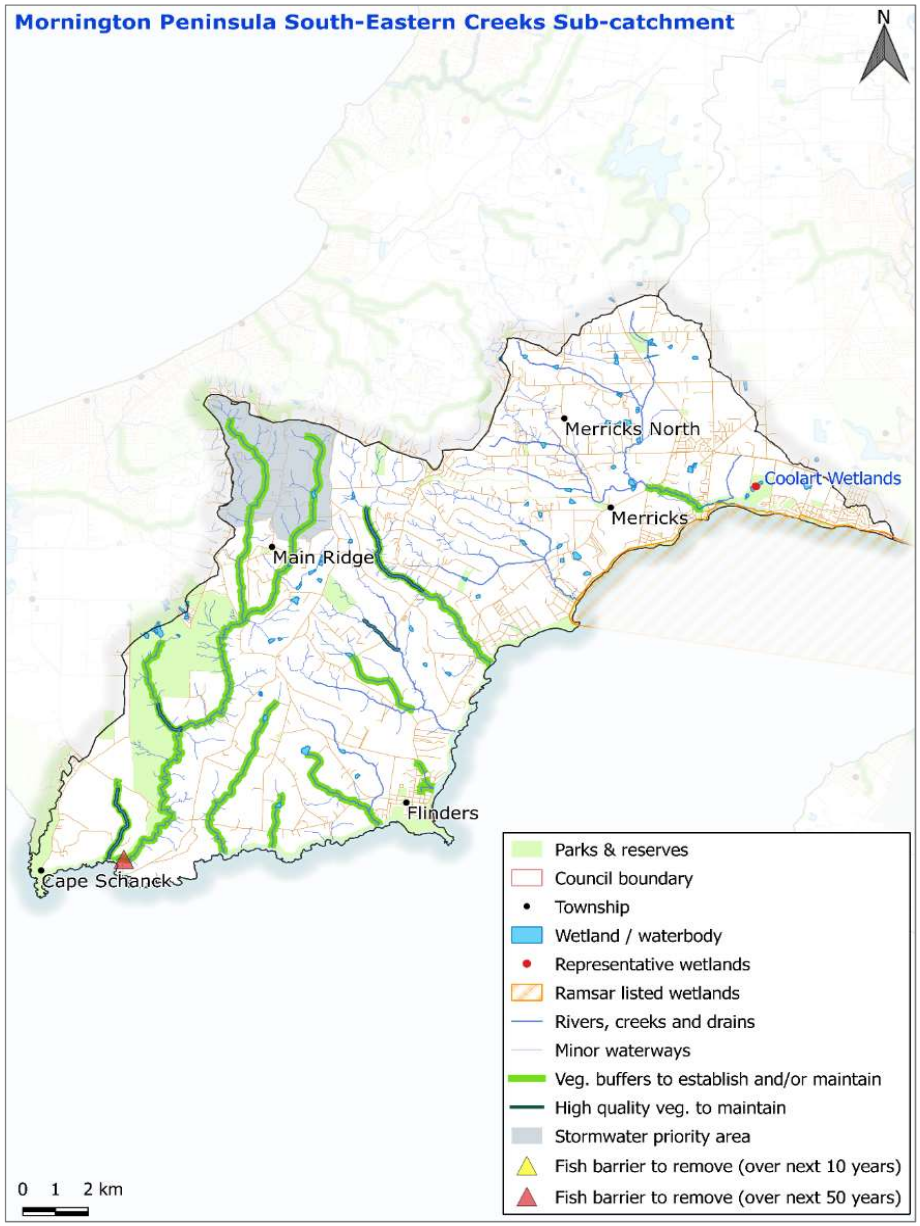
Performance Objectives

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	Water Quality	Implement rural land program in catchment to minimise sediment and nutrient loads to the estuary.
3	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
4	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
5	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.

Watson Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	low	mod.		The estuarine bird score is currently moderate with a current trajectory of low. The estuary is listed as having formal significance for birds, however habitat availability is limited now and into the future by estuarine vegetation condition. The bird value score will remain at moderate.
	very high	very high	very high		The fish (tuat) value score is very high and is predicted to remain very high. A good diversity of fish (tuat) species included listed species and estuarine dependent species inhabit the estuary.
	mod.	very low	mod.		The vegetation value score is currently moderate with a current trajectory of very low. Maintaining estuarine vegetation condition is predicted to maintain the vegetation value score at moderate.
	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. Recreation is expected to remain very low in future.
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.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	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 high	very low	mod.		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very high and the target is moderate.

Mornington Peninsula South-Eastern Creeks Sub-catchment



Description

The Mornington Peninsula South-Eastern Creeks sub-catchment includes the waterways that flow into Western Port and Bass Strait between Sandy Point and Cape Schanck, and the corridor of the Mornington Peninsula National Park running north-west from Cape Schanck. Major waterways in the region include Main Creek, Splitters Creek, Spring Creek, Stockyard Creek, Manton Creek, Stony Creek, East Creek, Coolart Creek and Merricks 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 Co-Design Summary Report.

"Investigate reasons for fish die off / kills at Merricks"

"Preserve water values of Lightwood Creek"

"Follow up with South East Water farm dam management - a lot of mega dams being constructed and having flow on impacts"

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

Mornington Peninsula South-Eastern Creeks Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support instream values.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (22 km, 87 ha) and maintain existing vegetation (42 km, 166 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 9 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	Stormwater Condition	Prevent decline in stormwater condition by treating any new development (e.g. Main Ridge) so directly connected imperviousness (DCI) along main stem of Main Creek and Splitters Creek remains below 0.5%. For every hectare of new impervious area, this requires harvesting 5.4 ML/y and infiltrating 1.8 ML/y. This is about 100 ML/y and 30 ML/y for full development to urban growth boundary.
5	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new areas.
6	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 and promote citizen science as population increases.
7	Water Quality - Environmental	Protect water quality for environmental values and seagrass in Western Port by managing sediment loads from construction activities to ensure no pollutant or sediment laden run-off enters drains and waterways. Increase support for improved water stewardship.
8	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:

Mornington Peninsula South-Eastern Creeks Sub-catchment

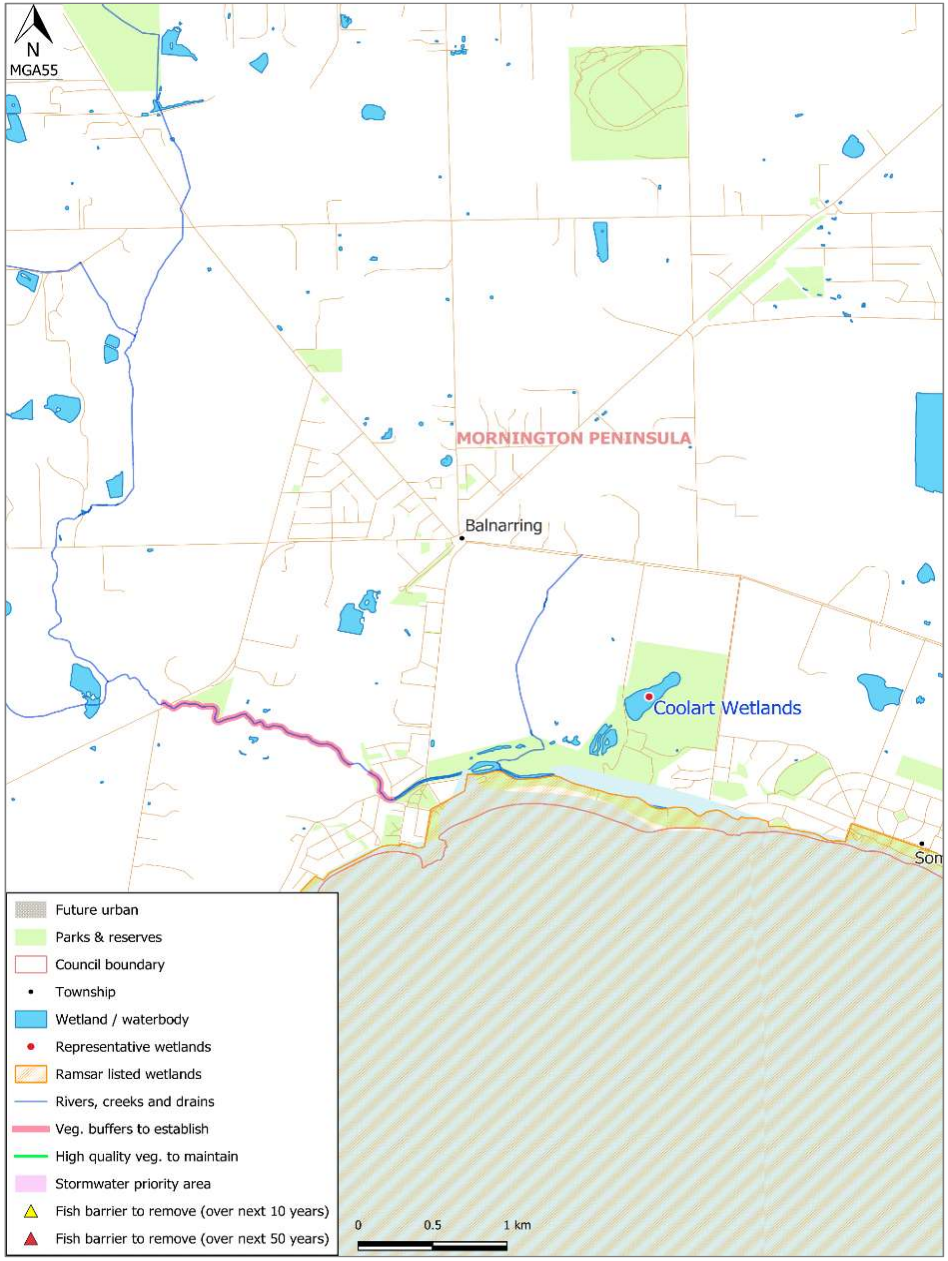
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	mod.	high		Birds (riparian) score is high, meaning many of the expected species were recorded often. With targeted management we see the score remaining high. Significant species of riparian bird occurring in this sub-catchment include the powerful owl, eastern great egret and little egret.
mod.	high	high		Fish (tuat) are currently rated as moderate due to lack of suitable instream and riparian habitat (largely resulting from rural and urban land use impacts). The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, water quality and flows through improved rural and urban management is predicted to increase the rating to high in the long term.
high	mod.	high		Frog (ngarret) score is high since most of the expected species of frog (ngarret) were recorded. With dedicated management the score should be maintained at high. Significant species include the growling grass frog and southern toadlet.
mod.	mod.	very high		Macroinvertebrates are currently rated as moderate as a result of poor instream and riparian habitat. Improvements to riparian vegetation and stormwater management are predicted to increase the rating to very high over the long term.
n/a	n/a	n/a		The Mornington Peninsula is assumed to have never supported permanent platypus (pudgyer or murrin moorroo) populations due to the small size of the streams. For this reason, there is no assessment or setting of targets.
low	very low	mod.		Vegetation is rated as low, although there are some high quality reaches along Main Creek. On-going and emerging threats such as stock access, pest plants and animals, and climate change are predicted to reduce the rating to very low. Protecting the best areas and improving priority areas will increase the rating to moderate over 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 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.	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.
mod.	mod.	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 moderate and the target is very high.
mod.	mod.	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 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.
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.
low	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 low and the target is high.
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.

Coolart Wetlands



Description

Coolart Wetlands are located at Somers. They are part of a historic farming property managed by Parks Victoria for its historical and wetland significance. The wetlands include part of a natural waterway and a number of artificial wetlands.

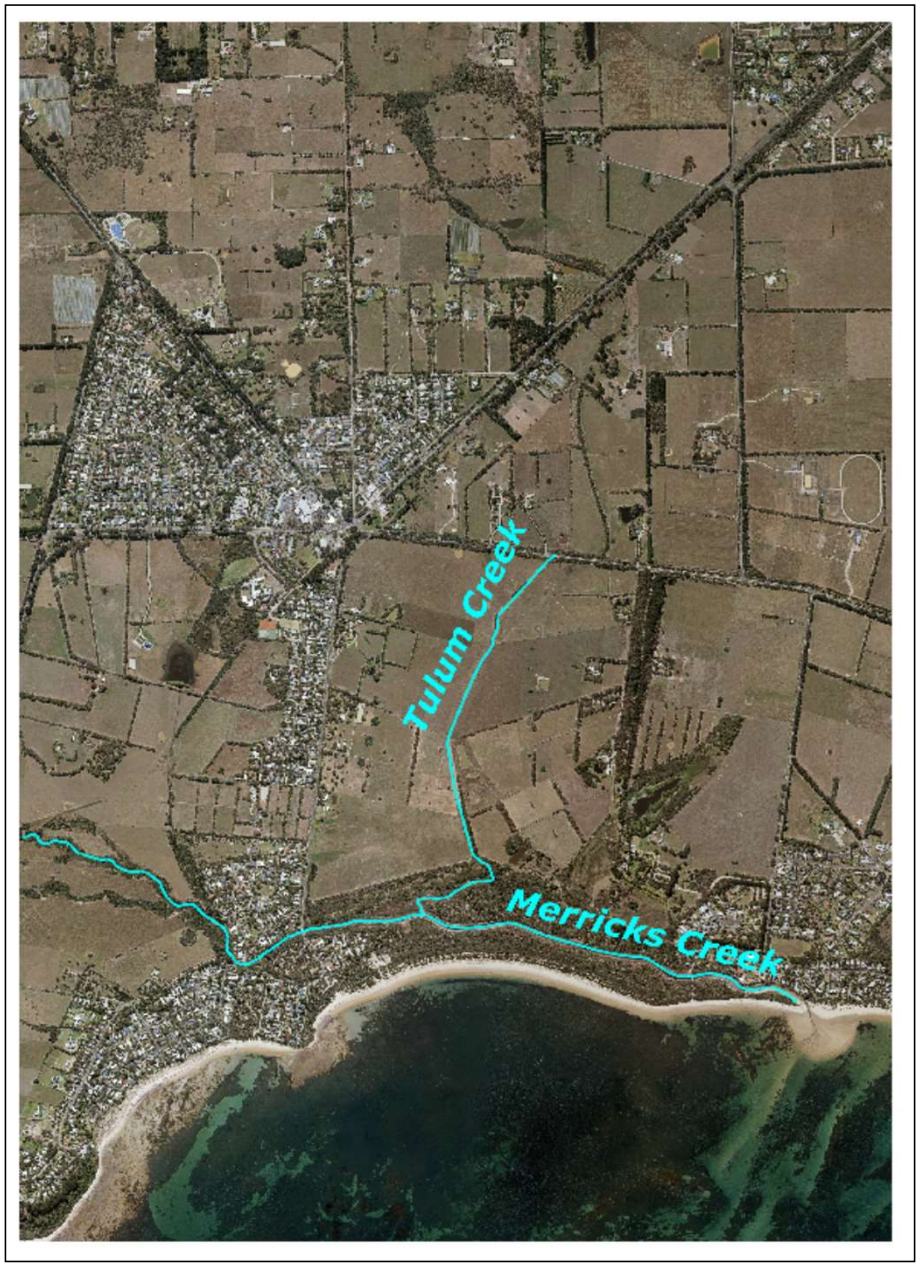
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland Habitat Form	Reduce threat to birds from invasive fauna such as cats and foxes.
2	Wetland Buffer Condition	Improve wetland buffer to 50 per cent of wetland perimeter.
3	Vegetation Condition	Reduce invasive flora threat to low.

Coolart Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value score is currently very low and is predicted to remain very low. The site is not formally recognised as bird habitat. The existing and predicted high vegetation condition will continue to provide bird habitat, but the bird value score will remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish (tuat) and a metric for wetland fish (tuat) in this catchment will be developed through the strategy implementation.
	high	mod.	high		The high frog (ngarret) value for Mornington Peninsula South-Eastern Creeks Sub-Catchment has been applied. The current trajectory is to decline to moderate. However, with maintenance of water regime, habitat form and vegetation condition the frog (ngarret) value at this site will be maintained at high.
	high	high	high		The vegetation value at Coolart wetlands is currently high, with the site having recorded significant flora species and vegetation communities. High vegetation condition in the long-term will continue to support high vegetation value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	mod.	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.
	high	high	high		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is high and the target is high.
	low	low	low		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is low.
	very high	high	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	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Merricks Creek Estuary



Description

Merricks Creek estuary enters Western Port near Somers, and has an entrance width that ranges from 0 to 20 m. Areas on seaward side maintain a more natural connection between the floodplain and the waterway, however flows in Merricks Creek have been reduced from water for domestic and stock use. The estuarine reach is subject to sediment deposition, both along its length and at the creek mouth where the mouth often becomes blocked during periods of low flow, fish kills are not uncommon.

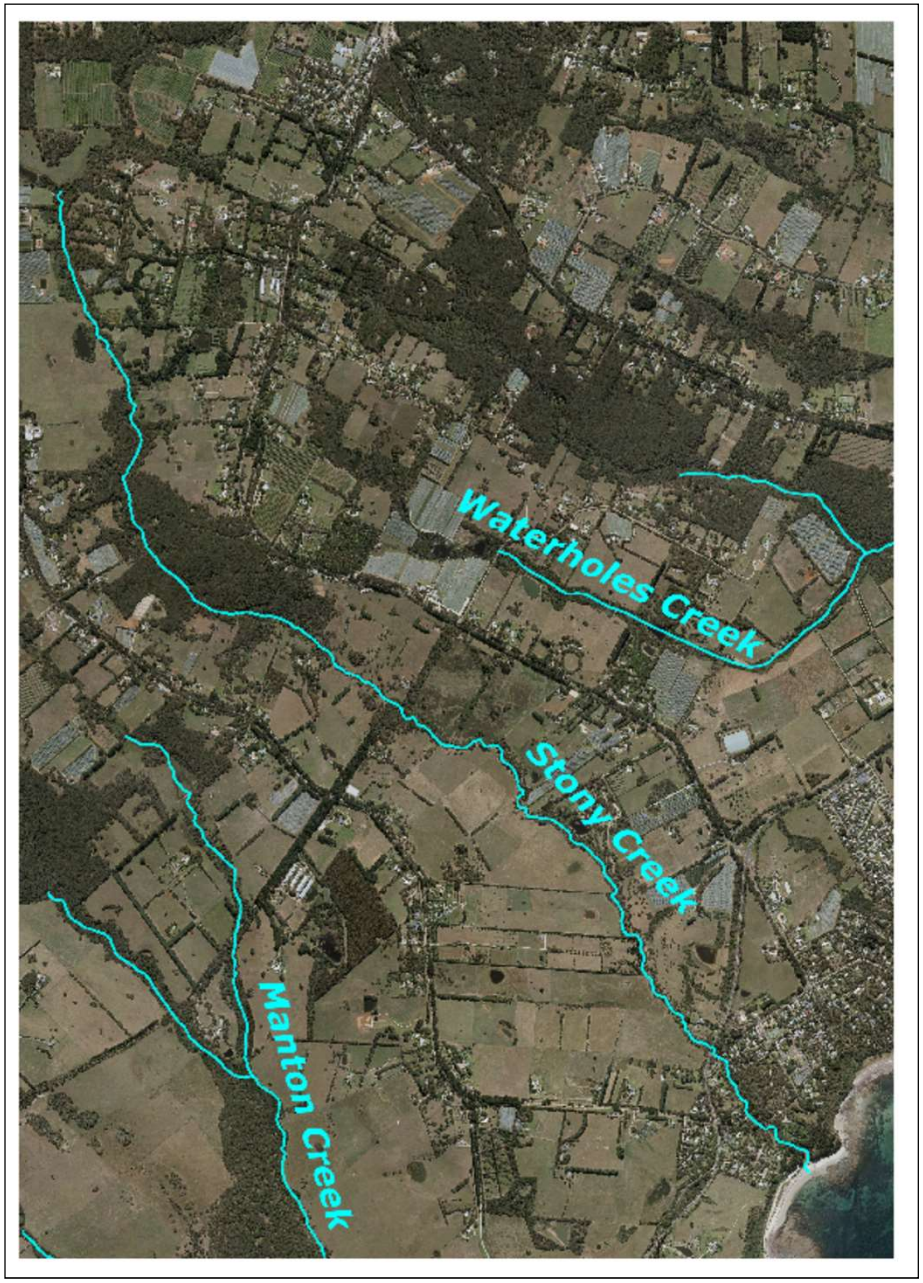
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Tidal Exchange	Artificial estuary mouth openings are only undertaken when a risk assessment concludes that opening conditions are low risk for the environment.
2	Water Quality	Monitor estuary water quality through the EstuaryWatch program.
3	Estuarine Wetland Connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks .
4	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
5	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
6	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.
7	Amenity	Maintain existing high value access and facilities that support passive enjoyment.
8	Access & Recreation	Maintain existing high value opportunities for access and recreation including walking, cycling, boating, camping and fishing.

Merricks Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	very low	high		The Merricks Creek estuary falls within the boundary of the Westernport Ramsar site and is formally recognised as bird habitat. The bird value is currently high, with a current trajectory of decline to very low. Maintenance of estuarine vegetation and improved estuarine wetland connectivity is predicted to maintain the bird value at high. Climate change adaptation strategies including landward migration of estuarine vegetation communities will be required to maintain the bird value.
	high	high	high		The fish (tuat) value score 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.
	high	low	high		The vegetation value score is currently high with a current trajectory of decline to low. Maintaining estuary wetland connectivity, estuarine vegetation condition and improving estuarine tidal exchange will maintain the vegetation value 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)	mod.	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is moderate.
	very low	very low	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very low and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	mod.	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is moderate.
	very high	very low	high		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very high 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.

Stony Creek (WPB) Estuary



Description

The Stony Creek estuary enters Western Port near Shoreham. The entrance is intermittently open and can be up to 5 m wide. There is some dispute as to whether it meets the definition of an estuary, given it is less than 180m in length.

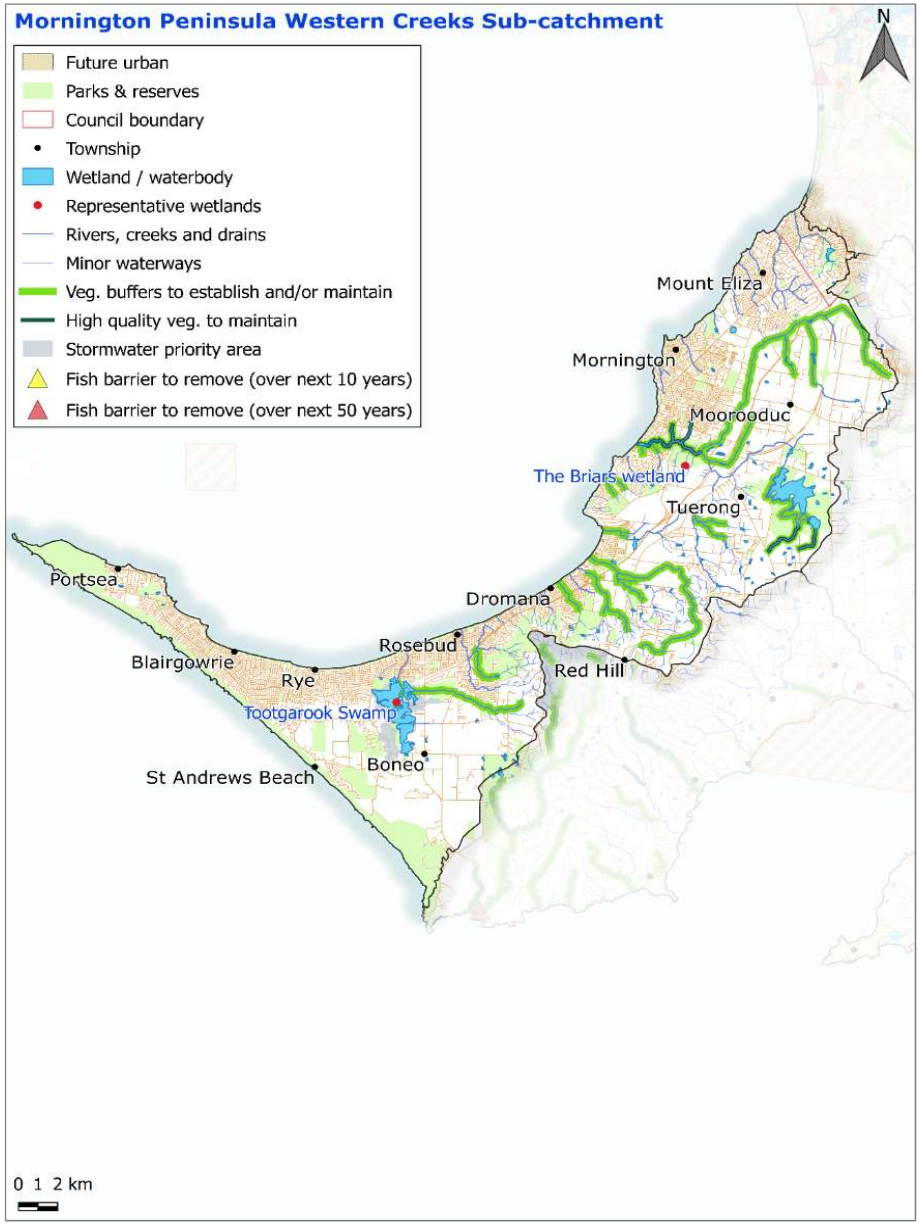
Performance Objectives

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	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.
5	Amenity	Enhance facilities that support passive enjoyment.

Stony Creek (WPB) Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	mod.	high		The estuarine bird value is currently high. The estuary is formally recognised as significant bird habitat, is listed as a Nationally Significant Wetland (DIWA) and supports significant bird species. Maintenance of estuarine vegetation and improved estuarine wetland connectivity is predicted to maintain the bird value at high. Climate change adaptation strategies including landward migration of estuarine vegetation communities will be required to maintain the bird value.
	very high	very high	very high		The fish (tuat) value score is very high and is predicted to remain very high. A good diversity of fish (tuat) species included listed species and estuarine dependent species inhabit the estuary.
	mod.	very low	mod.		The vegetation value is currently moderate with a current trajectory of 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.
	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.
	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)	mod.	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	n/a	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. There is currently insufficient data to determine the current state and the target is moderate.
	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.
	mod.	very low	high		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 high.

Mornington Peninsula Western Creeks Sub-catchment



Description

The Mornington Peninsula Western Creeks sub-catchment extends from Mount Eliza to Point Nepean. Major waterways in this area include Balcombe, Kackeraboite, Devilbend, Brokil, Dunns, Sheepwash and Drum Drum Alloc Creeks, all of which flow into Port Phillip Bay. The area also includes the Tootgarook Swamp and Devilbend Reservoir.

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 Co-Design Summary Report.

"Improve rabbit control to reduce impacts on riparian vegetation"

"Produce educational materials on best practice management in weeding & revegetation for community groups"

"Protect Balcombe Creek Estuary and Tootgarook 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

Mornington Peninsula Western Creeks Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support instream values.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (46 km, 184 ha) and maintain existing vegetation (48 km, 193 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Stormwater Condition	Prevent decline in stormwater condition by treating any new development (e.g. Main Ridge, Rosebud) so directly connected imperviousness (DCI) remains below 0.2% along Drum Drum Alloc Creek. For every hectare of new impervious area, this requires harvesting 5.1 ML/y and infiltrating 1.6 ML/y.
4	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 11 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	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new 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 through rural programs. Increase support for community/environment groups and promotion of high value areas (e.g. Tootgarook Swamp) as population increases.
7	Physical form	Investigate and mitigate threats to physical form and other high values (particularly valley fill reaches).

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

Notes:

Mornington Peninsula Western Creeks Sub-catchment

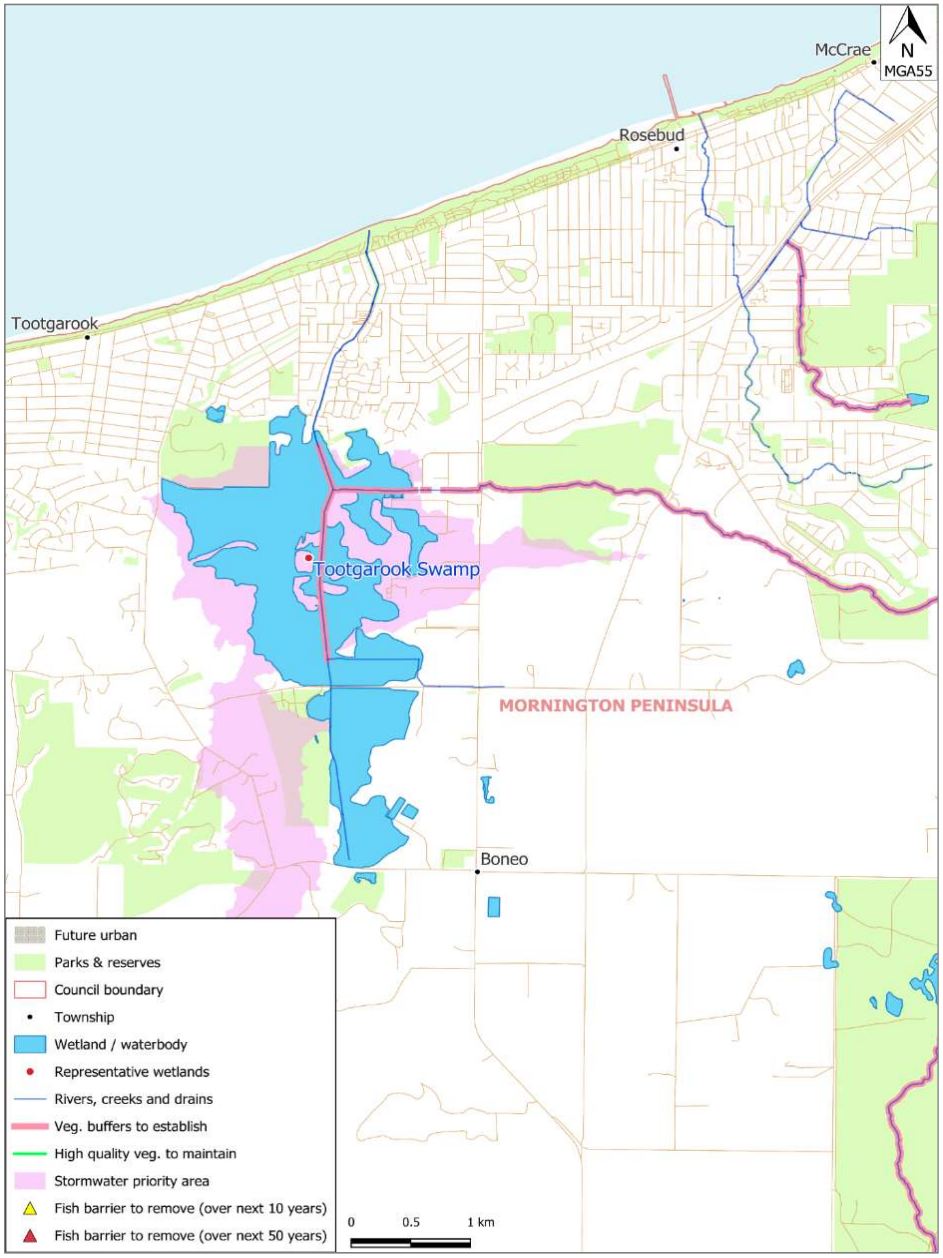
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most expected species were recorded, but some infrequently. The score is expected to be maintained at moderate with adequate investment in targeted management (such as riparian revegetation). This is despite the adverse effects of climate change. Significant species of riparian bird occurring in this sub-catchment include the powerful owl and the little, intermediate and eastern great egrets.
low	mod.	high		Fish (tuat) are currently rated as low due to lack of suitable instream and riparian habitat, largely resulting from rural and urban land use impacts. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, water quality and flows through improved rural and urban management is predicted to increase the rating to high in the long term.
very high	mod.	very high		Frog (ngarret) score is very high since all, or almost all, species of frog (ngarret) were recorded relative to those expected given the survey effort. With appropriate management the score should be maintained as very high. Significant species include southern toadlet.
low	low	mod.		Macroinvertebrates are currently rated as low as a result of poor instream and riparian habitat. Existing and emerging threats include urbanisation and climate change. Mitigating urban stormwater impacts and improving riparian vegetation is predicted to increase the rating to moderate in the long term.
n/a	n/a	n/a		The Mornington Peninsula is assumed to have never supported permanent platypus (pudgyer or murrin moorroo) populations due to the small size of the streams. For this reason, there is no assessment or setting of targets.
low	very low	mod.		Vegetation is rated as low. On-going and emerging threats such as stormwater, stock access, pest plants and animals, and climate change are predicted to reduce the rating to very low. Protecting the best areas and improving priority areas will increase the rating to moderate over 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.
low	very 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.
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.
high	high	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 high and the target is high.
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	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.
low	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 low 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.

Tootgarook Swamp



Description

The Tootgarook Swamp (also known as Boneo Swamp) once covered 800 hectares. About half the wetland area still remains. The swamp is a Shallow Freshwater Marsh. Significant wetland vegetation communities and species have been recorded at the site.

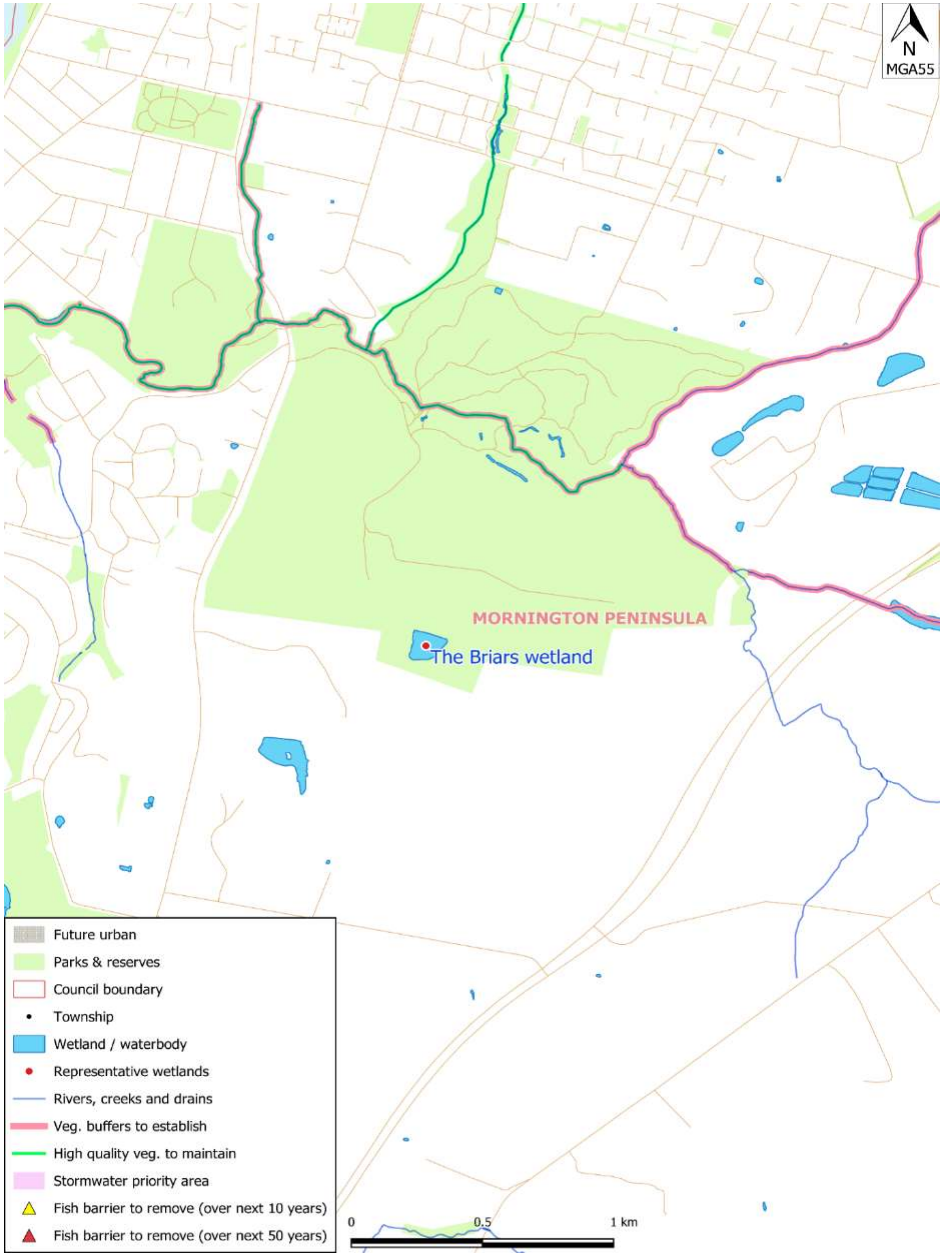
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water Regime	Identify opportunities to further re-engage the natural wetland area.
2	Vegetation Condition	Reduce threat from weeds to low.
3	Wetland Habitat Form	Identify opportunities for habitat creation and migration to mitigate habitat loss due to climate change risks.
4	Water Regime	Water regime implemented (considering stormwater and groundwater) to meet ecological watering objectives, improve ecosystem services, cultural and social value.
5	Wetland Water Quality	Mitigate and minimise water quality threat from nutrient input from surrounding land uses through best practice land management and planning controls.
6	Wetland Habitat Form	Reduce threat from invasive fauna to moderate.
7	Wetland Buffer Condition	Improve wetland buffer to 100 per cent of wetland.

Tootgarook Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The bird value score is currently very low and is predicted to remain very low. This is due to the site not being formally recognised as bird habitat (which is a criteria for the bird value score). Furthermore, the bird value score is influenced by vegetation condition; given this will only reach moderate in the long-term, it is not sufficient to increase the bird value score.
	n/a	n/a	n/a		Very little data exists for wetland fish (tuat) and a metric for wetland fish (tuat) in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog (ngarret) value score is currently very high with listed species present. Climate change and urbanisation impact are likely to lead to a very low value score, however, these impacts can be somewhat offset through improvements to wetland habitat form, buffer and vegetation condition, along with wetland water quality improvement.
	mod.	very low	high		The wetland vegetation value score is currently moderate, however the current trajectory is a decline to very low value. With the predicted improvements to condition, the wetland value score is predicted to improve to high 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.
	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 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	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

The Briars Wetlands



Description

The Briars wetlands are located at Mt Martha, adjacent to Balcombe Creek. They have a mix of natural and artificial features.

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.
2	Wetland Buffer Condition	Improve wetland buffer to 50 percent of wetland perimeter.

The Briars Wetlands

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The bird value score is currently very low and is predicted to remain very low. This is due to the site not being formally recognised as bird habitat (which is a criteria for the bird value score). Furthermore, the bird value score is influenced by vegetation condition; given this will only reach moderate in the long-term, it is not sufficient to increase the bird value score.
	n/a	n/a	n/a	Very little data exists for wetland fish (tuat) and a metric for wetland fish (tuat) in this catchment will be developed through the strategy implementation.
	very high	mod.	very high	The frog (ngarret) value at this wetland is currently very high with listed species being present. Climate change predictions are likely to lead to a moderate value score, however, these impacts can be somewhat offset at through improvements to wetland vegetation condition.
	mod.	mod.	mod.	The vegetation value is currently moderate and is predicted to remain 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	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	low	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is low.
	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	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Balcombe Creek Estuary

Description

The Balcombe Creek estuary is in Mt Martha. The entrance is downstream of the Nepean Highway and is open intermittently to Port Phillip Bay. The concrete spillway at Briars Park Wildlife Sanctuary limits upstream connectivity and extent. The estuary maintains a more natural connection between the floodplain and the waterway. The riparian area has dense covers of swamp paperbark.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine Vegetation	Protect remnant estuarine vegetation communities and habitat by reducing threats from invasive plant species.
2	Water Quality	Continue to monitor estuary water quality through the EstuaryWatch program and Melbourne Water monitoring sites.
3	Tidal Exchange	Artificial estuary mouth openings are only undertaken when a risk assessment concludes that opening conditions are low risk for the environment.
4	Estuarine Wetland Connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
5	Access & Recreation	Enhance appropriate opportunities for access and recreation including walking, boating and fishing.
6	Amenity	Maintain existing high value access and facilities that support passive enjoyment.
7	Water Quality	Monitor and reduce the threat of catchment sediment impacts on the estuary.

Balcombe Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	mod.		The bird value score at Balcombe Creek estuary is currently very low. Although significant bird species have been recorded the estuary, the estuary is not formally recognised as bird habitat. Predicted improvements to estuarine vegetation and estuarine wetland connectivity are predicted to improve the bird value score to moderate.
	high	high	high		The fish (tuat) value score for Balcombe Creek estuary 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 vegetation value score at Balcombe Creek estuary is currently moderate with a current trajectory of decline to very low. The predicted impacts of climate change, along with the ongoing pressure from urbanisation will be somewhat offset through maintenance of estuarine water quality and estuarine vegetation condition.
	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.
	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)	mod.	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
	very high	very low	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	mod.	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is moderate.
	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.

Chinamans Creek Estuary

Description

The Chinamans Creek estuary flows through the township of Rosebud and discharges into Port Phillip Bay near Tootgarook. When the estuary is open the entrance is approximately 5 m wide but can extend up to approximately 15 m wide further upstream. The creek was constructed to drain Tootgarook Swamp and does not follow a natural drainage line. The riparian vegetation is primarily swamp marsh with some coastal alkaline scrub and patchy coast banksia woodland near the coast.

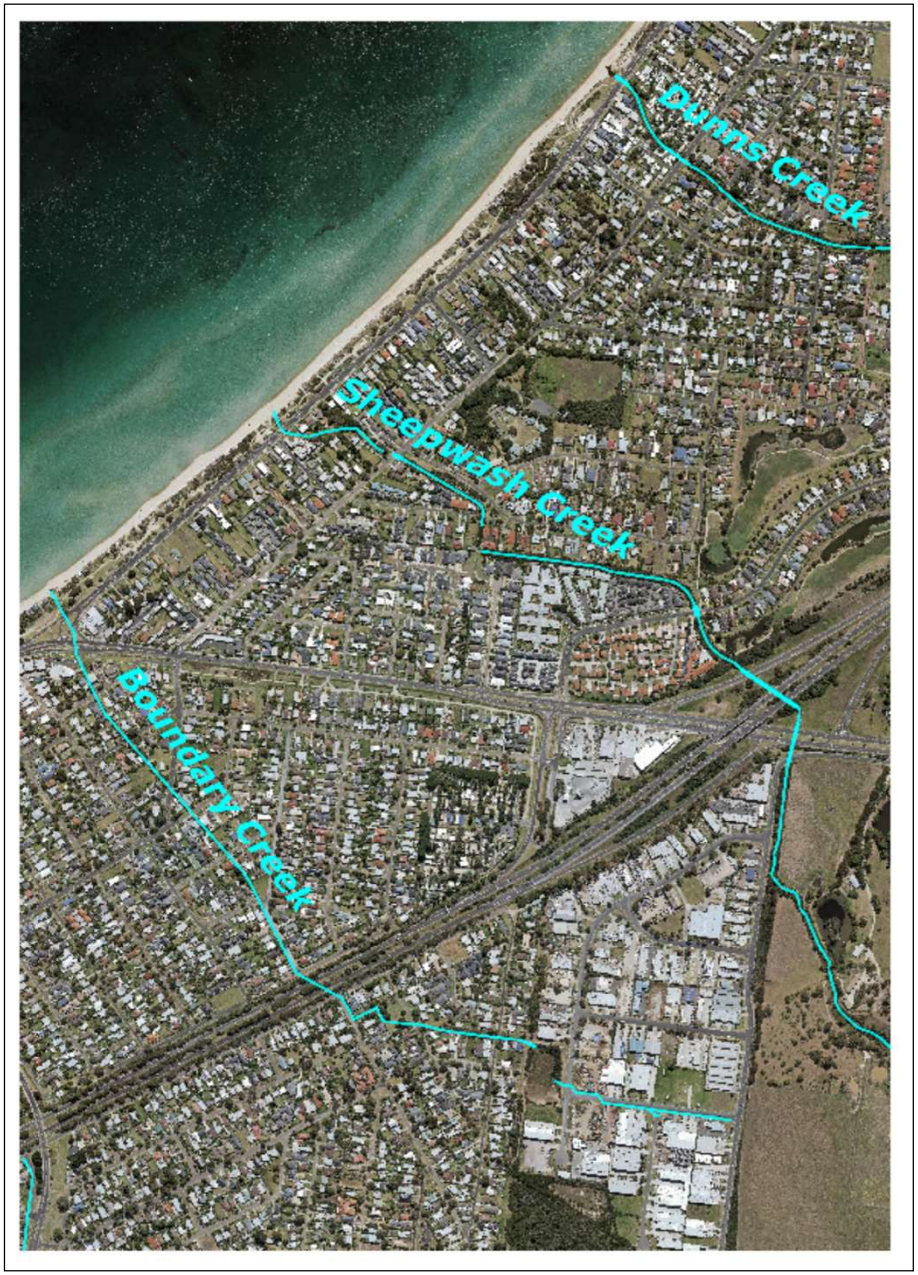
Performance Objectives

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	Estuarine Vegetation	Improve estuarine vegetation condition to moderate by reducing threats from invasive plant species.
3	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
4	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.
5	Access & Recreation	Maintain and support opportunities for access and recreation including walking and camping.
6	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Chinamans Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	low		The bird value is currently very low. Improvements to estuarine vegetation are predicted to improve the bird value to low in the long-term.
	mod.	mod.	mod.		The fish (tuat) value score is currently moderate and is predicted to remain moderate. The fish (tuat) population is made up of non-estuarine dependent species (marine and freshwater species).
	very low	very low	mod.		The vegetation value score is currently very low. With improvements to estuarine vegetation condition and estuarine wetland connectivity, the vegetation value score could increase to moderate.
	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)	mod.	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is moderate and the target is low.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	mod.	very low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is moderate.
	very low	very low	mod.		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 moderate.
	n/a	very low	mod.		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. There is currently insufficient data to determine the current state and the target is moderate.

Sheepwash Creek Estuary



Description

Sheepwash Creek estuary is located on the Mornington Peninsula and joins Port Phillip Bay between Dromana and Safety Beach.

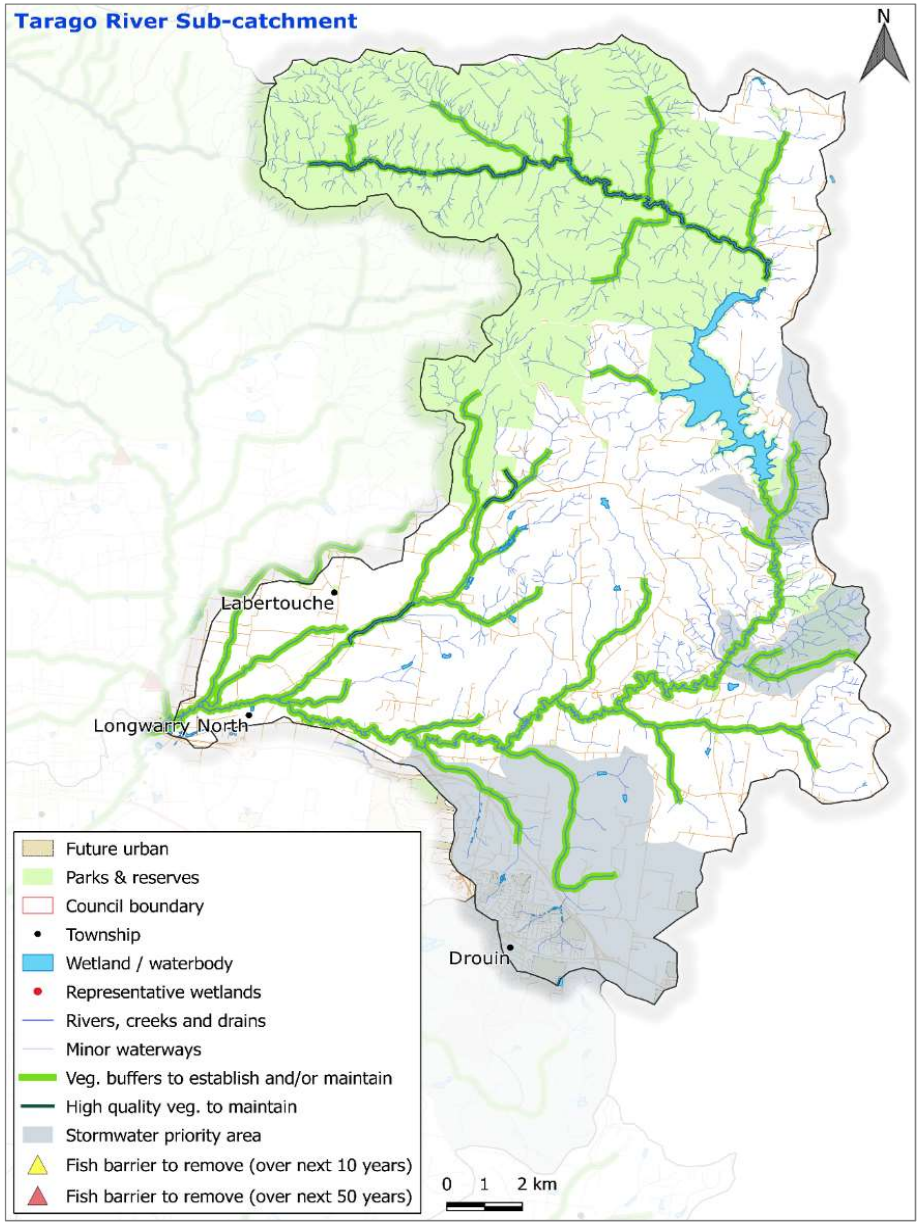
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine Vegetation	Protect remnant estuarine vegetation communities by reducing threats from invasive plant species.
2	Estuarine Vegetation	Protect significant remnant vegetation and improve estuarine vegetation condition to moderate.
3	Estuarine Wetland Connectivity	Enable lateral and longitudinal migration of estuarine vegetation communities on the floodplain to allow adaptation to climate change risks.
4	Bird (value)	Protect estuary roosting sites from excessive disturbance from humans, vehicles, dogs, foxes and cats.
5	Estuarine Wetland Connectivity	Identify opportunities to re-engage estuarine floodplains.

Sheepwash 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 Sheepwash Creek. The estuary is fringed by a urbanised environment and the predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		The fish (tuat) value score 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	mod.		The vegetation value score is currently very low. Improvements to estuarine vegetation condition is predicted to improve the vegetation value to moderate.
	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 the small size and surrounding landuse of the estuary. Recreation is expected to remain very low in the future.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	n/a	very low	low		Flow regime relates to the degree of change from 'natural conditions'. There is currently insufficient data to determine the current state and the target is low.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	very 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 very low.
	very low	very low	mod.		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 moderate.
	very low	very low	very 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 very low.

Tarago River Sub-catchment



Description

The Tarago River rises in the Tarago State Forest. The Tarago East Branch rises near Nayook and flows through predominantly rural land before joining the Tarago West Branch just upstream of the Tarago Reservoir at Neerim. Downstream of the reservoir, the river flows through Rokeby and Robin Hood before joining the Bunyip River at Longwarry North. Tributaries of the Tarago River include Labertouche, Whiskey, Gum Scrub and Spion Kopje creeks.

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 Co-Design Summary Report.

"Work with landholders to develop programs to stop nutrient run-off"

"Improve / increase riparian vegetation in urban areas"

"Improve flows in Tarago River"

"Street level stormwater management and infiltration for Drouin's stormwater run-off"

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

Tarago River Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
2	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Bunyip lower), which reflects targets for whole catchment.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (65 km, 260 ha) and maintain existing vegetation (84 km, 338 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Stormwater Condition	Prevent decline in stormwater condition by treating any new development (e.g. Drouin) so directly connected imperviousness (DCI) remains below 1.5% along Whiskey and Gum Scrub creeks. For every hectare of new impervious area, this requires harvesting 6.0 ML/y and infiltrating 2.5 ML/y. This is about 2.9 GL/y and 1.2 GL/y for full urban development.
5	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently 161 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.
6	Water Quality - Environmental	Improve water quality for environmental values and seagrass in Western Port by reducing sediment and nutrient run off from rural land and sediment run off from forested areas in the Tarago River catchment and Labertouche Creek. This may include establishment of vegetated buffers in headwater streams.
7	Access	Increase access to and along waterways (about 1 km of path) by improving connections with existing path networks around townships and existing parks and reserves.
8	Participation	Increase participation rates from low to high; support community groups and build capacity of land owners through rural programs. Increase participation through promotion of high value areas (e.g. Tarago State Forest).
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:

Tarago River Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	high	high	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 vegetation, should ensure a riparian bird score of high. Significant species of riparian bird occurring in this sub-catchment include the powerful owl.
mod.	high	high	Fish are currently rated as moderate, largely resulting from flow stress and the Tarago Reservoir which is a significant barrier to migration. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species; although some species including river blackfish are predicted to decline. Improvements to flow and riparian vegetation is predicted to benefit key species and contribute to an overall rating of high in the long term.
very high	mod.	very high	Frog score is very high since all, or almost all, species of frog were recorded relative to those expected given the survey effort. With appropriate management the score should be maintained as very high.
very high	high	very high	Macroinvertebrates are currently rated as very high resulting from good instream and riparian habitat along the majority of the waterway. Climate change and urbanisation are likely to reduce the rating unless adequately managed. Monitoring and maintenance of existing high quality habitats, improving flows, including managing stormwater and riparian vegetation will ensure the rating remains very high in the long term.
high	mod.	high	Platypus are currently rated as high, with highest scoring reaches above Tarago Reservoir. Existing flow stress and future climate change impacts are predicted to reduce the rating if not adequately managed.
mod.	low	mod.	Vegetation is rated as moderate although there are very high quality reaches in the headwaters above the reservoir. Threats including pest plants and animals, recreational access and climate change are predicted to reduce the rating to low if not adequately addressed. The long term outcome is to maintain the current rating with a focus on protecting the best areas.
high	mod.	high	Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at 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	mod.	high	Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at 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.	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.
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.	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 moderate and the target is very high.
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.
high	mod.	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 high 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	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.

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 Westernport and Mornington Peninsula Region – October 2018 | Version 1

978-1-925541-30-4 (Print)
978-1-925541-23-6 (Online)

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

Image acknowledgements (remaining images featured in the Program are credited to Melbourne Water)

Page 10 Cultural heritage midden site located in the Port Phillip Bay - Dan Turnbull, Bunurong Land Council Aboriginal Corporation