Co-Designed Catchment Program for the

Dandenong Catchment Region

Working together for healthy waterways

VICTORIA
State Government

Acknowledgement of Country

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

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

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

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 Dandenong catchment region that takes into account variable climatic and development conditions and changing community needs.

Partners

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

Aquatic Systems Management Pty Ltd

Bayside City Council

Beveridge Williams

Casey City Council

Bunurong Land Council Aboriginal Corporation

Clearwater

DELWP

Down's Estate Community Project

Elsternwick Park Coalition

Environment Protection Authority Victoria

First Friends of Dandenong Creek

Frankston City Council

Friends of Edithvale-Seaford Wetlands

Friends of Glenfern Valley Bushlands

Friends of Hazel Vale Valley Tecoma

Friends of the Glenfern Green Wedge

Greater Dandenong City Council

Kananook Creek Association

Kingston City Council

Knox City Council

Knox Environment Society

Lilydale Community Food Gardeners

Long Island Residents Group

Maroondah City Council

Melbourne Water

Monash City Council

Municipal Association of Victoria

Parks Victoria

Port Phillip and Westernport CMA

Port Phillip City Council

Port Phillip EcoCentre

South East Water

Southern Dandenong Landcare Group

Southern Ranges Environment Alliance

Southern Rural Water

Spiire

University of Melbourne

VicRoads

VR Fish

Water Technology

Watqual Services

Whitehorse City Council

Yarra Ranges Council

Yarra Valley Water

Wurundjeri Tribe Land and Compensation Cultural Heritage Council Aboriginal Corporation

Overview

The Dandenong catchment, which covers an area of 870 square kilometres, consists of forested areas, farmland, reclaimed swampland and urban areas (Figure 1). Urban areas cover about 60 per cent of the catchment, 30 per cent is used for agriculture and about 10 per cent retains its natural vegetation.

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

Modifications to rivers and creeks for flood protection (such as piping, concrete lining and channel straightening) have been extensive. Most notably, the Carrum Carrum Swamp was drained in the late 1800s with the construction of Patterson River. This swamp previously covered about 45 square kilometres. However, the catchment has retained some natural features such as the Ramsar listed Edithvale-Seaford Wetlands (listed as a Ramsar site in 2001), the Pines Flora and Fauna Reserve, the Dandenong Ranges and parts of the middle Dandenong Creek. Closer to the city, waterways such as Elster Creek and Albert Park Lake provide critical habitat for flora and fauna within the constraints of the urban environment.

Despite the significant impacts from urban development and agriculture across the catchment, waterways continue to support multiple and varied uses and values, including flood mitigation, extensive recreational trials and parklands and significant plant and animal species (including platypus, dwarf galaxias, Latham's snipe and growling grass frogs).

The open space network throughout the Dandenong catchment, which includes sites such as Dandenong Valley, Hallam Valley and the main estuaries, provide important social value and offer recreational opportunities. Many of the beaches along the eastern shore of Port Phillip Bay show signs of impact – advisories against swimming occur at many of these beaches during the summer period. With increased discharges of stormwater, toxicants and litter the use of these waterways and beaches for swimming and boating activities will be further impacted.

Population modelling shows that the Dandenong catchment will increase from some 1.4 million people to over 1.7 million in the next 20 years, which will require an additional 7000 dwellings per year. This will result in continued development in growth areas outwards from Dandenong and increased density in the existing urban areas.

The Dandenong catchment also encompasses part of the Fisherman's Bend urban renewal area, which is planned to become home to approximately 80,000 residents and provide employment for up to 80,000 people by 2050.

A drier climate in an increasingly paved landscape poses a very real threat to the long-term values of the creeks, wetlands and estuaries while at the same time increasing the importance of those spaces as a green and cool respite from the urban landscape. If current policy and levels of investment are maintained, without improvement, then it is likely that the Dandenong catchment will experience declines in environmental and social values over the next 30 years. There is a real need to take action to avoid an otherwise inevitable decline in waterway health.

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

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 Bayside
2 Blind Creek
3 Corhanwarrabul, Monbulk and Ferny Creeks
4 Dandenong Creek Lower
5 Dandenong Creek Middle
6 Dandenong Creek Upper
7 Eumemmerring Creek
8 Kananook Creek

ESTUARIES

1 Elwood Canal
2 Kananook Creek
3 Mordialloc Creek
4 Patterson River

RIVERS – Jells Park, Dandenong Creek

Over 900,000 visitors a year enjoy Jells Park's 127 hectares of wide open space and in excess of nine kilometres of paths and trails.

WETLANDS – Edithvale Wetlands

Edithvale-Seaford Wetland Education Centre is a valuable educational resource for school groups and a popular spot for birdwatchers to enjoy this Ramsar listed wetland.

WETLANDS

1 Banyan Waterhole
2 Barnbam Swamp, Lynbrook
3 Braeside Park Wetlands
4 Dandenong Catchment stormwater treatment wetlands
5 Dwarf Galaxias Conservation Wetlands, Narre Warren
6 Dwarf Galaxias habitat ponds, Dandenong Creek
7 Eastern Treatment Plant Wetlands
8 Edithvale Wetlands
9 Hallam Valley Floodplain Wetlands
10 Seaford Wetlands
11 Tamarisk Waterway Reserve Wetlands
12 Tirhatuan Wetlands
13 Wannarkladdin Wetlands
14 Winton Wetlands

ESTUARY – Patterson Lakes, Patterson River

Patterson River precinct is highly valued by boaters, fishermen, canoeists and other paddlers, as well as local residents.

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

Collaborative design (co-design)

In August 2017, the *Catchment Collaborations* commenced to develop the refreshed *Healthy Waterways Strategy* for the Dandenong catchment region (Figure 2). The Co-Design process was piloted with the Maribyrnong catchment region and learnings from this process were expanded to the other catchments. Collaboration 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 pop-up listening posts were held in Berwick and Heathmont
- Four workshops were held with over 125 participants representing around 59 organisations attending at least one workshop
- The YourSay website provided details and updates on the process as well as opportunities to provide input and feedback.

Collaboration process

August 2017
Dandenong Catchment Collaborations commenced

September 2017
Vision, goals and waterways values defined

March 2018
Preliminary targets developed

March 2018
Feedback and discussion on preliminary targets

June 2018
Draft Strategy released

June 2018
Feedback and discussion on Draft Strategy

August 2018
Final Strategy

October 2018
Government approval

Figure 2 Collaboration process for Dandenong catchment region

"Showing current trajectory is good. But, do not set targets to maintain current trajectory. Set targets high. It will drive other organisations to commit resources to contribute to achieving targets."

– from discussion on Dandenong Creek Middle targets

VISION

A vibrant valued Dandenong catchment waterway and wetland network, whose ecological health and liveability attributes continue to improve through rehabilitated waterways and connected and secured biodiversity corridors.

GOALS

1. Management of the catchment is integrated and includes the whole water cycle.
2. Impacts from urban, peri urban, industrial and transport activities are mitigated to protect our waterways and the Bay.
3. Exemplary leadership enables informed, engaged and an empowered community who value and connect with waterways and tackle collaborative action.
4. Waterways, wetlands and floodplains provide biodiversity corridors that allow the key environmental values to move and adapt to changes in condition and climate.
5. Waterways, wetlands and floodplains are inviting places that are connected and accessible for public enjoyment and amenity.
6. Existing sustainable habitats and refugia for iconic fish, bird and frog species and platypus are secured and rehabilitated to meet the challenge of climate change impacts.
7. Remnant higher stream values and habitats are rehabilitated to ensure high quality elements remain in upper catchments.
8. Secure and enhance the Edithvale–Seaford Ramsar site and surrounding creeks and wetlands within the South-east Green Wedge.
9. Streamside vegetation zones and floodplains within the catchment continue to retain and expand Swamp Scrub and River Red Gum communities.

What we heard

Comments were received via discussions at the workshops, the YourSay webpage and follow-ups with stakeholders. For the Dandenong catchment region, a total of 253 formal comments were received on the preliminary targets with an additional 41 formal comments received on the draft Strategy.

The underlying theme was of strong support for setting targets and performance objectives at the sub-catchment scale. There was some concern that some targets were not sufficiently ambitious and would be unlikely to drive significant change from business as usual. There was strong support for engaging more of the community in raising awareness of waterway values and creating opportunities for involvement in management.

This feedback resulted in performance objectives being improved by providing additional context – to specify where works are needed, providing quantitative outcomes and making reference to related projects (e.g. Living Links).

Collaborators worked together to develop a list of potential actions across the Dandenong catchment Region. A sampling 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*. Following the fourth workshop 80% of participants responded that they are committed to working together towards implementation of the Strategy.

Collaborative implementation

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

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

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

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

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

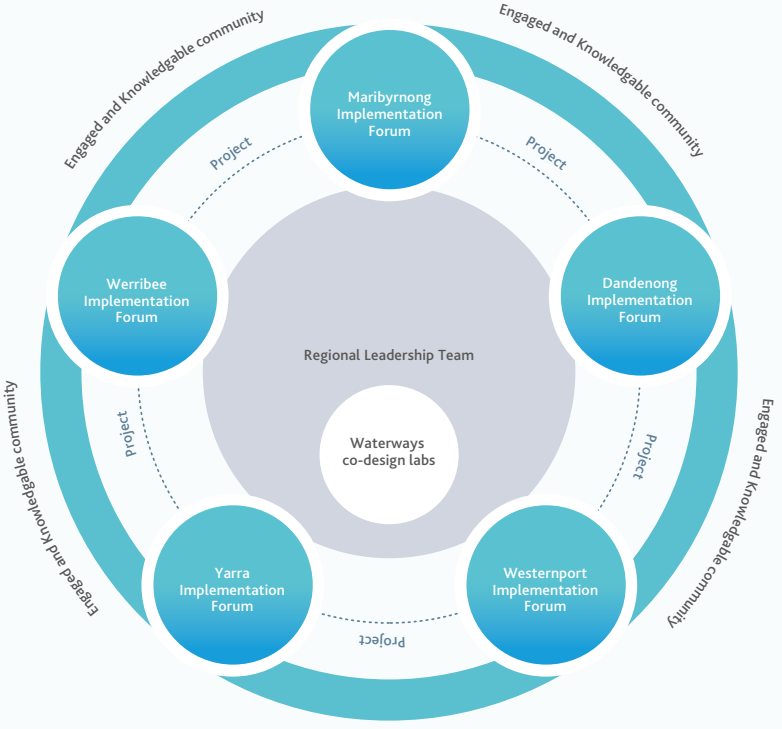


Figure 3 Collaborative Governance Model

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.

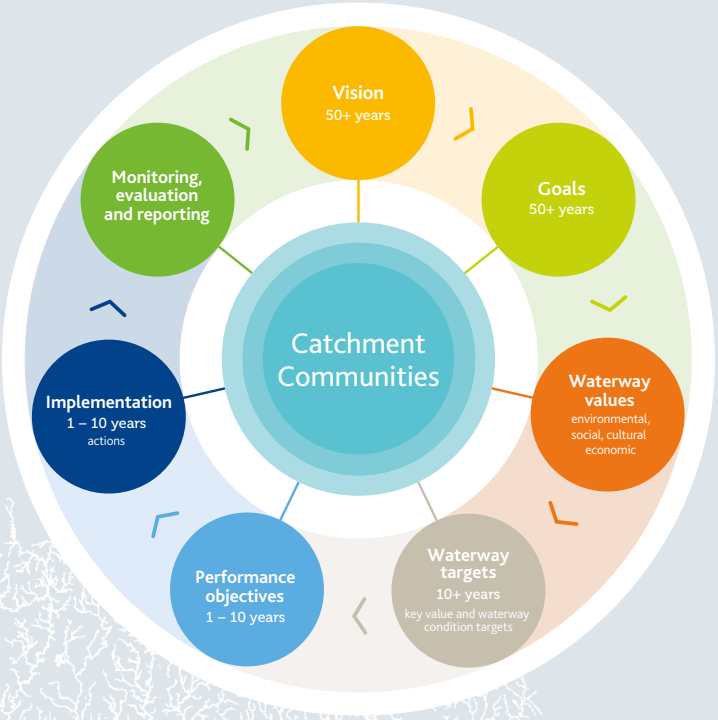


Figure 4 Program logic outlining process towards achieving the vision and goals.

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* and *Woi wurrung* language groups were the original occupants of this land, as evidenced by the thousands of cultural sites and places recorded in the catchment, including along the coast.

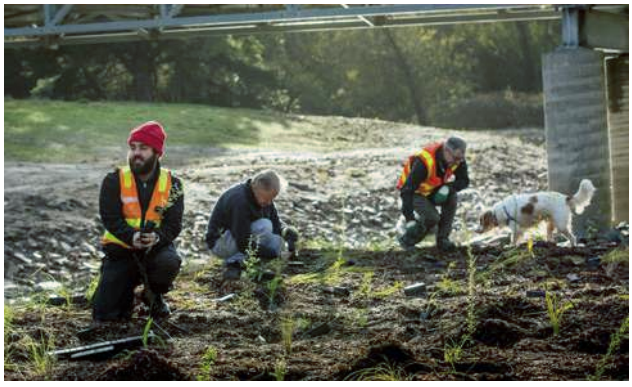
While European settlers and subsequent waves of migrants have a comparatively short history of a couple of hundred years, they too have forged cultural and spiritual connections which are important to them.

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.

Values vary across the Dandenong catchment region. In the upper and middle parts diversions for domestic, stock and agricultural uses, and 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 Dandenong catchment region there are 295 bird species recorded, of which 126 species are riparian specialists. The overall score for fish is low which is largely a reflection of the extent of barriers to fish movement throughout the catchment that prevent some species from reaching other parts of the catchment; nationally-significant species include the dwarf galaxias. Frogs across much of the catchment have been impacted by spreading urbanisation, land use intensification, introduced predators, and deteriorating water quality. However, recorded species include threatened growling grass frog and the southern toadlet.

Vegetation value varies greatly with much of the higher value areas being in the forested upper catchment and in the large regional parks and wetlands along the Dandenong Creek. Macroinvertebrate scores are very low as much of the catchment has been impacted by increasing expansion of urban and industrial areas.

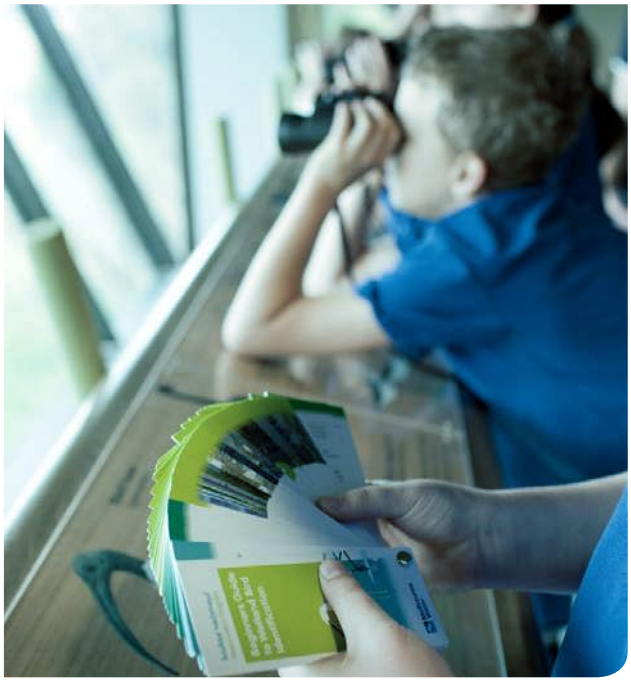
Platypus are known to occur in the upper parts of the catchment, however, recent targeted surveys suggest they may no longer be present in some of these known areas. Key threats to platypus in the catchment are urban and industrial stormwater (including litter), clearing of streamside vegetation, loss of instream habitat and fragmentation of populations from barriers to movement.

Social Values

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

In the Dandenong catchment region social values for streams are currently high. Social values for estuaries range from high to very high. Of note is the National Water Sports Centre on Patterson River and boating facilities in the estuaries of Mordialloc Creek, Patterson River and Kananook Creek.

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

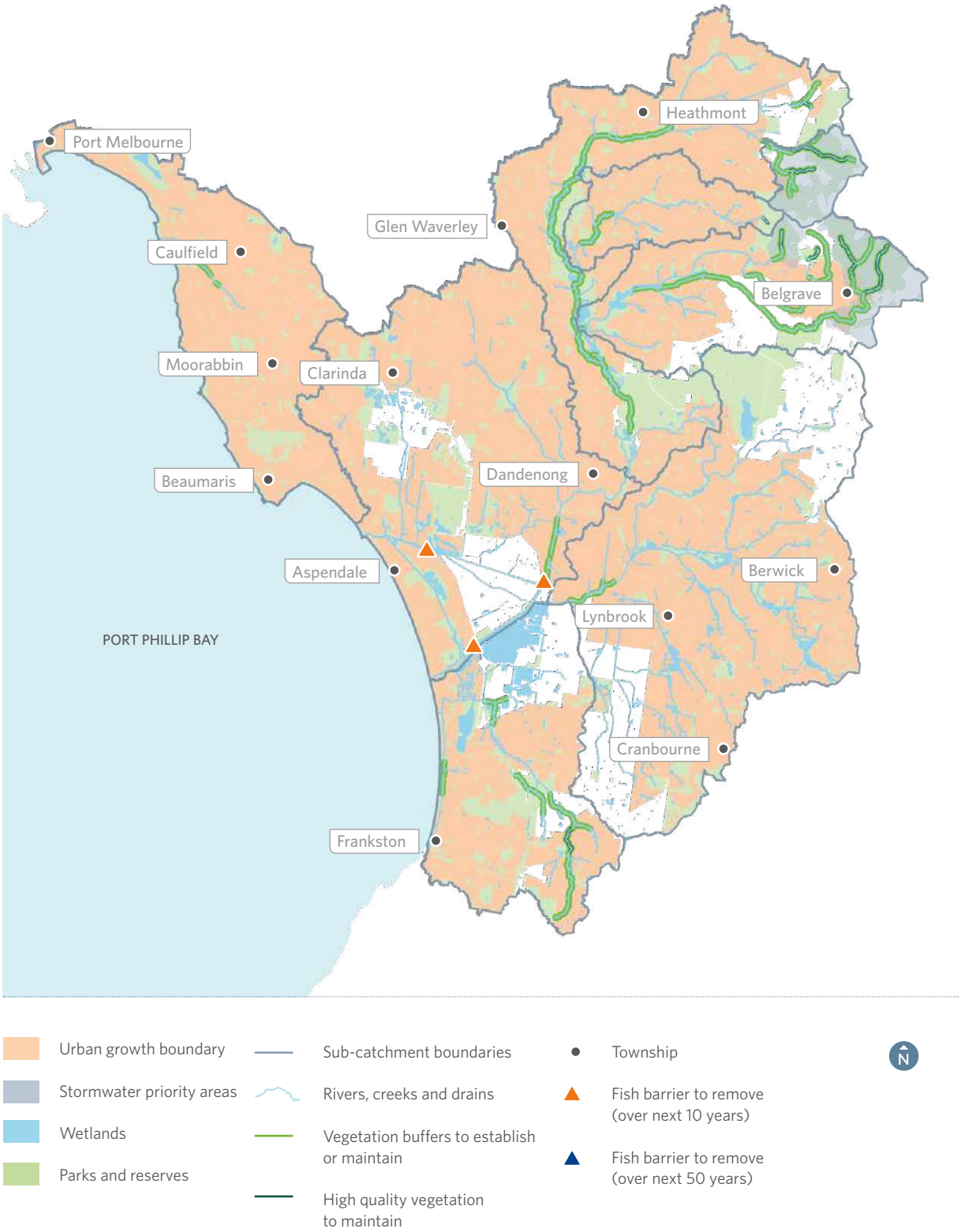


Figure 7 Summary of priorities in the Dandenong catchment region

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

Catchment Program for the Dandenong Catchment Region

This section provides:

- A summary of priorities in the Dandenong catchment region (Figure 7)
- Regional performance objectives that apply across all five major catchments in the *Healthy Waterways Strategy* including the Dandenong catchment region
- A summary of the performance objectives, key values and waterway conditions for all of the sub-catchments, a sub-set of wetlands and estuaries in the Dandenong catchment region
- Detailed information for all eight sub-catchments, sub-set of 14 wetlands and four estuaries in the Dandenong catchment region. Information on the wetlands and estuaries is listed immediately following its respective sub-catchment
- Further information about the key value and waterway condition metrics.

Regional Performance Objectives

Cultural Values

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

Economic Values

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

Regional Performance Objectives continued

Region-wide threats to waterway values

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

Regional Performance Objectives

Region-wide threats to waterway values

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

Supporting governance framework

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

Regional Performance Objectives continued

Engaged and knowledgeable community and stakeholders

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

Adaptive Management and Reporting

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

Knowledge Gaps and Research

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

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

Dandenong Catchment Region Overview

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

Overview of Performance Objectives for Rivers
Progressively implement stormwater harvesting, focusing on rural townships in the Dandenong Creek Upper and the Corhanwarrabul, Monbulk and Ferny Creek sub-catchments. Once this catchment has reached its anticipated long-term urban footprint based on the current urban growth boundary, this will require around 0.4 GL/year of stormwater harvested and 0.2 GL/year infiltrated. Ensure DCI levels in the above priority catchments do not increase beyond current levels and headwater streams are retained as features in the landscape for environmental and social benefits.
Establish 39 km and maintain 83 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.
Maintain 22 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 (including impacts of urbanisation) in the Corhanwarrabul, Monbulk and Ferny Creeks sub-catchment
Increase access to and along waterways by 26 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 through improved management of 10 hectares of rural land including works to protect and increase vegetation along headwater streams.
Provide connectivity for fish along major waterways through the removal of two barriers along lower Dandenong Creek, Mordialloc Creek and Patterson River by 2028. This will improve fish passage from the Mordialloc estuary and Patterson River to Dandenong.
Conserve all currently listed water dependent species and communities (16 fauna species, 33 flora species and 26 EVCs) through habitat protection, research and monitoring.
Identify opportunities to maintain or improve the flow regime in refuge reaches to support instream values, including platypus along Monbulk Creek.
Reduce the key threat of flow stress on waterways by addressing factors such as domestic, stock and agricultural uses, climate change, diversions or urbanisation.

Dandenong Catchment Region Overview - Rivers

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

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds score is currently moderate overall and likely to remain moderate over the long term. Parts of the catchment are of international significance for migratory shorebirds (includes Ramsar-listed Edithvale-Seaford wetlands) and there are critical wetlands along Dandenong Creek that provide drought refuge for many species. The target is to maintain as moderate.
low	mod.	mod.		Fish score is currently low overall, but can be improved to moderate through improved instream connectivity, streamside revegetation , stormwater management and provision of suitable stream flows. There are 12 freshwater species (including the nationally threatened dwarf galaxias), nine exotic species and several estuarine species (including black bream and yellow-eye mullet). The target is to improve from low to moderate.
low	mod.	mod.		Frogs score is currently low overall as a result of urbanisation, land use intensification, introduced predators and deteriorating water quality. The target is to improve from low to moderate.
very low	very low	low		Macroinvertebrates score for rivers is very low overall. Scores are higher in the forested headwaters, but much of the catchment is impacted by urbanisation that results in changes to stream flows, water quality and instream habitat. The target is to improve from very low to low.
very low	very low	very low		Platypus are known to currently occur in the Monbulk Creek system. However, with continued urbanisation and changes in climate, this population is likely to decline without intervention. The target is to retain this population.
low	very low	low		Vegetation score is currently low across the catchment. Vegetation varies, with forested areas of upper catchments having higher values. Extensive land clearing and drainage has resulted in low to moderate vegetation scores in many areas. The vegetation score trajectory is towards very low unless opportunities to improve vegetation are implemented. The target is to avoid further decline.
high	high	very high		Amenity score, which is based on level of satisfaction, is currently high and likely to remain high. The target is to improve to very high.
high	high	very high		Community connection score, which is based on level of satisfaction, is currently high and likely to remain high. The target is to improve to very high.
high	high	very high		Recreation score, which is based on level of satisfaction, is currently highand likely to remain high. The target is to improve to very high.

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

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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.
mod.	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 moderate and the target is moderate.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
low	low	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.
low	low	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is high.
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.
mod.	mod.	high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is high.
mod.	mod.	high		Litter Absense 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 moderate and the target is high.
mod.	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 moderate 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.

Dandenong Catchment Region Overview - Wetlands

Overview of Performance Objectives for Wetlands
Implement the Edithvale-Seaford Ramsar Site Management Plan and plan for climate change adaptation and resilience.
Reduce the threat of invasive animals such as dogs, cats and foxes to protect key wetland bird habitats.
Increase the buffer of native vegetation around key wetlands and reduce the threat of invasive plant species.
Protect and enhance water regimes in wetlands with significant fish species and other significant values.
Re-engage key floodplain wetlands to protect habitat for significant wetland fish species.
Reduce the threat of invasive fish species on significant wetland fish populations.
Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance these values.

Dandenong Catchment Region Overview - Wetlands

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

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	low	low		Wetlands bird score in the Dandenong catchment is on average currently low. In the long term the wetland bird score will be maintained at low. Improvements to wetland water regimes, habitat form, buffer and vegetation condition will help to mitigate the impacts of climate change and urbanisation, but will not result in significant improvements to the score. Significant bird values will remain at the Edithvale-Seaford wetlands.
	very high	very high	very high		Fish Very little data exists for wetland fish, and a metric for wetland fish in this region will be developed through the Strategy implementation. A number of wetlands in the Dandenong Catchment support the nationally-listed dwarf galaxias and more recently reintroduced Yarra pygmy perch. These wetlands will retain a fish status of very high due to the ongoing presence of these species.
	low	mod.	mod.		Frogs score is currently low with current and target trajectories of moderate. Many wetlands provide habitat for significant frog species and will be targeted to maintain their very high scores. Improvements to wetland water regime, wetland habitat form and vegetation condition will help to improve frog populations. However, increasing salinity associated with predicted climate change impacts may impact the score at some coastal wetland sites.
	low	low	mod.		Wetland vegetation score is currently considered low. However, there is potential to increase the vegetation score to moderate in the long term. Improvements to the wetland water regimes and wetland habitat form, along with actions to reduce the threat of invasive plant and animal species will improve the vegetation score.
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.
	low	low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is moderate.
	very low	very low	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	low	low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is moderate.
	low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is low and the target is low.

Dandenong Catchment Region Overview - Estuaries

Overview of Performance Objectives for Estuaries
Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
Undertake adaptation and resilience planning for estuaries to protect social and environmental values.
Investigate opportunities to improve access for on-water activities and improve connections with existing path networks.
Maintain existing high value opportunities for recreation (walking/cycling, boating, fishing etc.).
Maintain existing high value facilities that support passive enjoyment and recreation.

Dandenong Catchment 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		
very low	very low	very low		Estuary birds score is currently very low and is predicted to remain very low. The estuaries are fringed by highly urbanised areas and the predicted climate change impacts will further erode suitable bird habitat. The target is to avoid further decline.
high	high	high		Fish value score for estuaries in the Dandenong Catchment is high and predicted to remain high in the long term. A good diversity of estuarine dependent species inhabit the estuaries and are likely to remain. The target is to maintain as high.
low	very low	low		Estuarine vegetation score is currently considered low with a current trajectory of very low. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation; however, this will only allow the value to be maintained at low. The estuaries are fringed by highly urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions.
high	high	high		Amenity score is currently high and predicted to remain high. Existing facilities support the amenity value.
very high	very high	very high		Community connection score is currently very high with very active community groups.
high	high	very high		Recreation score is currently high and is predicted to improve to very high. The estuaries are hubs of recreational activity.

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.
low	mod.	mod.		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is low and the target is moderate.
high	low	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is high and the target is moderate.
very low	very low	low		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is low.
very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

"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 eight sub-catchments including 14 wetlands and four estuaries. Information on the wetlands and estuaries is listed immediately following the respective sub-catchment.

Bayside

- Elwood Canal Estuary

Blind Creek

Corhanwarrabul, Monbulk and Ferny Creeks

Dandenong Creek Lower

- Braeside Park
- Edithvale Wetland
- Wannarkladdin Wetlands
- Mordialloc Creek Estuary
- Patterson River Estuary

Dandenong Creek Middle

- Dandenong catchment stormwater treatment wetlands
- Tirhatuan Wetlands, Dandenong Creek
- Winton Wetlands, Dandenong Creek

Dandenong Creek Upper

Eumemmerring Creek

- Barnbam Swamp, Lynbrook
- Dwarf Galaxias Conservation Wetland, Cranbourne Road, Narre Warren
- Hallam Valley Floodplain wetlands

Kananook Creek

- Banyan Waterhole (aka Boundary Road Wetland)
- Dwarf Galaxias habitat ponds – created along Dandenong Creek
- Eastern Treatment Plant
- Seaford Wetland
- Tamarisk Waterway Reserve, Langwarrin
- Kananook Creek Estuary

Further information about the key value and waterway condition metrics.

Bayside Sub-catchment

Description

Bayside sub-catchment is the most urbanised sub-catchment in the Dandenong Catchment. Elster Creek, which drains into Elwood Canal and then into Port Phillip Bay is the main waterway. The other major waterway in this sub-catchment is Albert Park Lake, which is fed by stormwater drains. The Bayside sub-catchment also encompasses part of the Fisherman's Bend urban renewal area, which is planned to become home to approximately 80,000 residents and provide employment for up to 80,000 people by 2050.

Actions

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

No actions were provided for this sub-catchment. The following actions were developed for the whole Dandenong Catchment:

"Create natural barriers at Elster Creek estuary to Port Phillip Bay to increase biodiversity, sea surge and salt inundation into Elwood Creek. Refer to Cooperative Research Centre at Monash Uni- Water Sensitive City study of Elwood."

"Local Government and other agencies to look at partnerships to engage communities."

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

Bayside Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (2 km, 6 ha) and maintain existing vegetation (1 km, 2 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Access	Increase access to and along waterways from 65% to 80% (about 1 km) by filling gaps and improving connections to existing path networks.
3	Participation	Increase participation rates from very low to moderate; support community groups and promote participation in citizen science and Elsternwick Creek Working Group projects.

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

Notes:

Bayside 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 score should remain high. Significant species of riparian (or estuarine) bird occurring in this sub-catchment include the eastern curlew and eastern great egret.
low	low	low		Fish are currently rated as low due to lack of suitable instream and riparian habitat. This is largely due to a highly urbanised catchment and highly modified stream channels. Without substantial improvements to instream and riparian habitat and extensive management of urban stormwater, this rating is unlikely to change in the long term.
low	mod.	mod.		Frog score is low since only some of the expected species of frog were recorded. With appropriate management the score could be improved to moderate.
very low	very low	very low		Macroinvertebrates score is very low due high levels of urbanisation which impacted all the environmental conditions which support this value. While improvements to stormwater and vegetation over the long term may increase macroinvertebrates in some locations, score is unlikely to improve overall. There are no known listed species in this sub-catchment.
very low	very low	very low		Platypus are no longer expected to be found in this sub-catchment as a result of large-scale urbanisation, lack of suitable habitat and isolation from other populations.
low	very low	low		Vegetation is low overall as a result of large scale land use change. Without management of existing threats (e.g. pest plants and animals) and climate change associated impacts the score is likely to drop to very low. Target is to maintain at 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	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	high	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
low	very low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is low and the target is low.
very low	very low	low		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 low.
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.
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.
high	high	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is high and the target is very high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
very low	very 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 very low 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.

Elwood Canal Estuary

Description

Elwood Canal is the lower reach of Elster Creek which flows for approximately 15 to 20 km from Bentleigh through McKinnon, Brighton East, Gardenvale and Brighton to Elwood where it discharges into Port Phillip Bay. It is highly modified with levee banks and lined channel, mostly drain. There is a drop structure at Glenhuntly Road crossing that restricts upstream connectivity and tidal influence. There has been total loss of lateral connectivity with floodplain wetlands that have now been reclaimed for urban development.

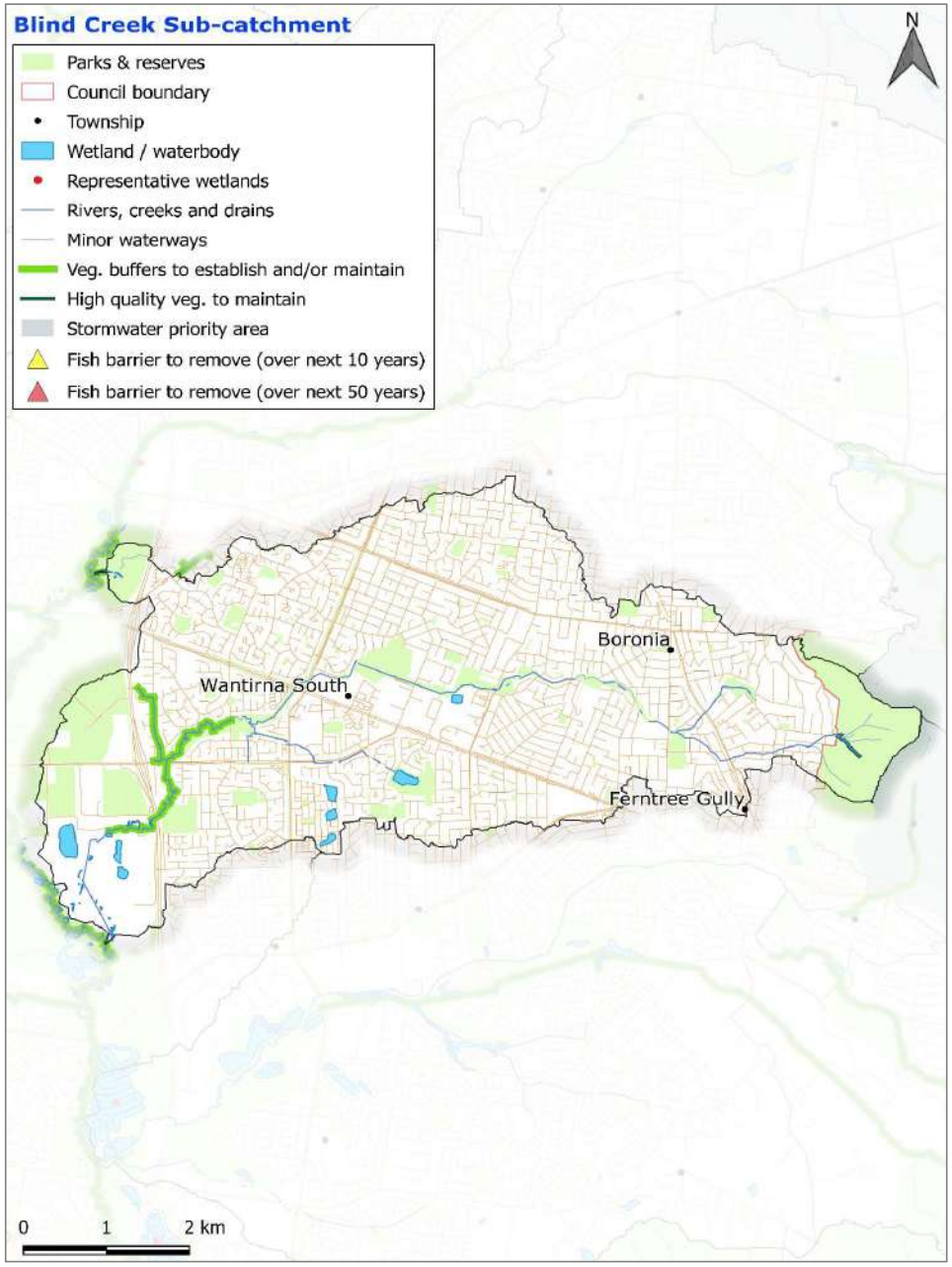
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Unaligned	Climate change adaptation plans in place for social and environmental values associated with the estuary.
2	Estuarine vegetation	Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
3	Access & Recreation	Maintain and support existing opportunities for access and recreation, including walking and cycling.
4	Amenity	Enhance appropriate access and facilities that support passive enjoyment.

Elwood Canal 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 the Elwood Canal. The estuary is not formally recognised as bird habitat, has very low current and low predicted estuarine vegetation condition and is fringed by a highly urbanised environment. The predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		The fish value score for the Elwood Canal is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabit the estuary and are likely to remain.
	very low	very low	very low		The estuarine vegetation value in Elwood Canal is currently very low. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation, however, the estuary is fringed by highly urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions.
	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	high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently low and is expected to remain low in the long-term if supply keeps up with population growth; target is to improve to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is low.
	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 low	low	low		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very low and the target is low.
	very high	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very high and the target is low.
	very low	very low	low		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is low.
	very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

Blind Creek Sub-catchment



Description

Blind Creek flows from headwaters in the Dandenong Ranges National Park through Ferntree Gully and Wantirna South, under High Street Road, before entering Dandenong Creek at Scoresby.

Actions

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

"Progressively increase indigenous canopy cover to achieve a fully connected canopy corridor. (connectivity metric? KM?)"

"Strengthen riparian corridors and nodes - Add value to vegetation corridors through EVC enhancement – Swamp scrub and Riparian forest"

"Community education to help community to better understand the issues. Involve community in the Knox projects on the ground e.g. MW funded Golden Grove WSUD swales and raingarden. Residents come to plant and it is an opportunity to educate."

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

Blind Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 4 ha) and maintain existing vegetation (3 km, 14 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	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality level 4 and 5 - currently < 1 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	Access	Increase access to and along waterways from 58% to 68% (about 2 km) by filling gaps in existing path networks and improving connections to Dandenong Creek Trail.
4	Participation	Increase participation rates from very low to moderate; support community groups, waterway education programs and connect with growth area communities. Increase citizen science through promotion of high value species in the region (e.g. dwarf galaxias).

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

Notes:

Blind Creek Sub-catchment

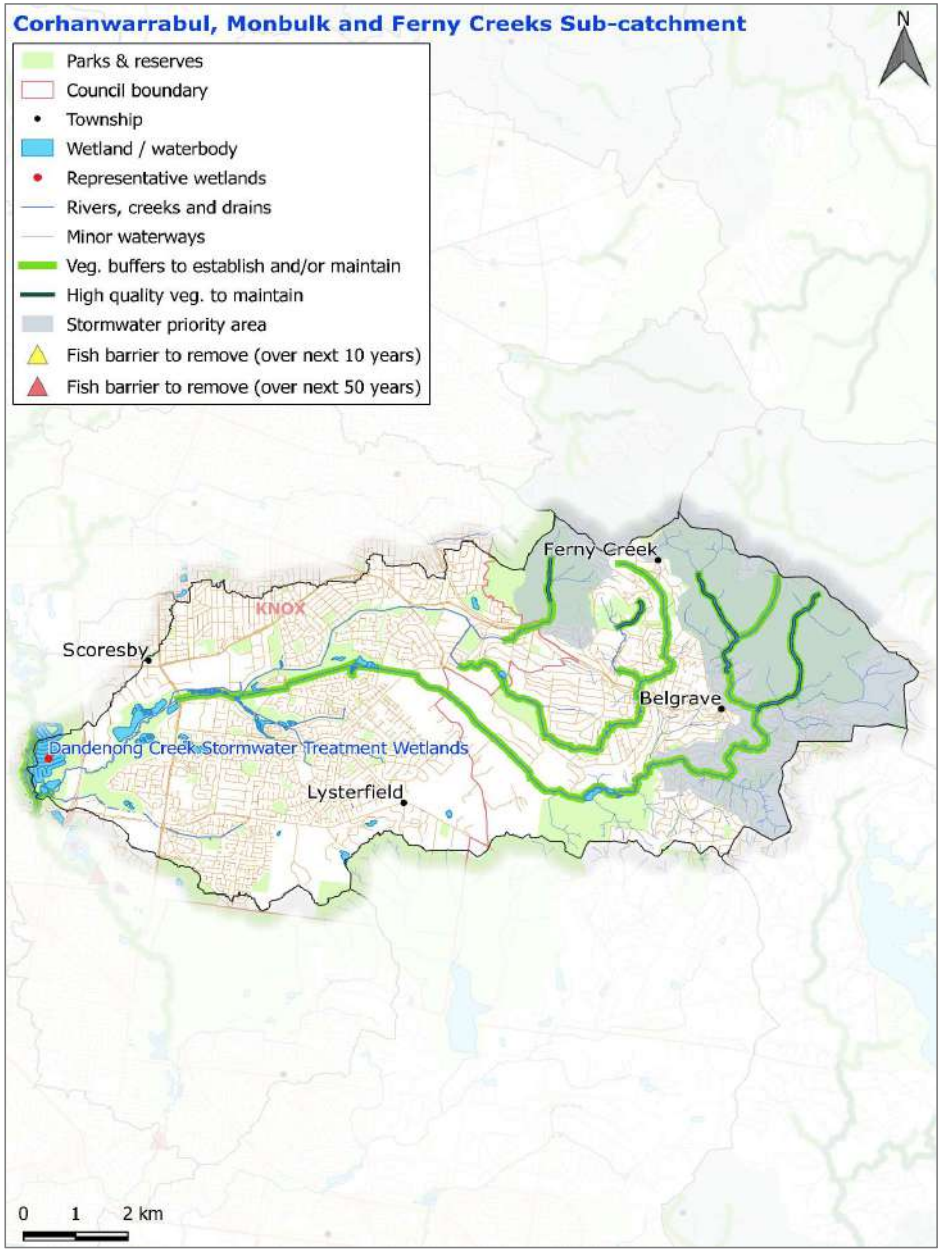
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure score is maintained at moderate. Significant species include the powerful owl, eastern great egret and little egret.
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 extensive urbanisation, stormwater, channel modification 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, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to moderate score in 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.
very low	very low	very low		Macroinvertebrates score is very low largely as a result of urban stormwater impacts and will remain very low unless the impacts of urbanisation are mitigated. There are no known listed species in this sub-catchment. Improvements to instream and riparian habitat through revegetation and stormwater management are projected to improve condition, but not so much to move from the very low score.
n/a	n/a	n/a		Platypus are no longer expected to be found in this sub-catchment as a result of large-scale urbanisation, lack of suitable habitat and isolation from other populations. For this reason, there is no assessment or setting of targets.
low	very low	low		Vegetation is low as much of the riparian vegetation is degraded from extensive land use modification. Without management of existing threats like pest plants and animals and in the face of climate change score is likely to drop to very low. Increasing the cover of riparian vegetation and management of threats to existing vegetation will maintain score at 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	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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.
low	very low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is low and the target is low.
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.	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 moderate and the target is moderate.
very low	very 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 very low and the target is moderate.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
mod.	high	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is very high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
very low	very 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 very low 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.

Corhanwarrabul, Monbulk and Ferny Creeks Sub-catchment



Description

Corhanwarrabul Creek is a major tributary joining Dandenong Creek near the Police Road Wetlands. Monbulk Creek rises near Kallista in the Dandenong Ranges National Park and flows through Belgrave to Rowville. Ferny Creek originates in the Yarra Ranges near Sherbrooke and flows through Upwey and Ferntree Gully before joining Monbulk Creek in Rowville to become Corhanwarrabul Creek.

Actions

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

"Sub surface infiltration to rehydrate the soils and recharge springs."

"Visitor litter is an issue (10,000 steps opportunity to educate). Tourism needs to be well managed. Ferntree gully National Park Picnic area."

"Reduce high turbidity arising from tracks and roads"

"Refuge for platypus and fish along Monbulk Creek-riparian vegetation, large wood, pools"

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

Corhanwarrabul, Monbulk and Ferny Creeks Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime along Monbulk Creek and other refuge reaches to support platypus populations. And identify opportunities to reduce key threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, climate change, diversions and urbanisation.
2	Stormwater Condition	To improve stormwater condition, and to protect the threatened Dandenong amphipod, disconnect stormwater flows, including from roads and septic systems, draining to Ferntree Gully Creek from Tremont and Ferny Creek townships. For every hectare of impervious area, this requires harvesting around 6.4 ML/y and infiltrating 3.0 ML/y.
3	Stormwater Condition	To improve stormwater condition, and to protect the threatened Dandenong burrowing crayfish, disconnect stormwater flows from roads, carparks and buildings draining to Clematis, Monbulk and Hardys creeks from Sassafras, Kallista and Sherbrooke townships. For every hectare of impervious area, this requires harvesting around 6.3 ML/y and infiltrating 2.8 ML/y.
4	Stormwater Condition	To prevent decline in stormwater condition, and to protect platypus habitat, treat urban development (eg Belgrave Heights), so that upstream of Mt Morton Road, directly connected imperviousness remains below 2% along main stem of Monbulk Creek. For every hectare of new impervious area, this requires harvesting around 6.3 ML/y and infiltrating 2.9 ML/y.
5	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (including impacts of urbanisation).
6	Vegetation Extent	Establish a continuous riparian vegetated buffer (9 km, 38 ha) and maintain existing vegetation (30 km, 119 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.
7	Vegetation Quality	Maintain or achieve high and very high quality vegetation along priority reaches (Vegetation Quality level 4 and 5 - currently 7 km) through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
8	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity impacts from rural land, urban growth and unsealed roads as well as nutrient inputs from rural land and septic tanks in Monbulk creek between Birdsland and Lysterfield Rd.
9	Access	Increase access to and along waterways from 40% to 44% (about 2 km) by filling gaps in existing path networks and improving connections to Dandenong Creek Trail and Monbulk Creek.
10	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. Engage with schools and environment groups (e.g. Community Weed Alliance of the Dandenongs) to increase participation in citizen science.

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

Corhanwarrabul, Monbulk and Ferny Creeks Sub-catchment

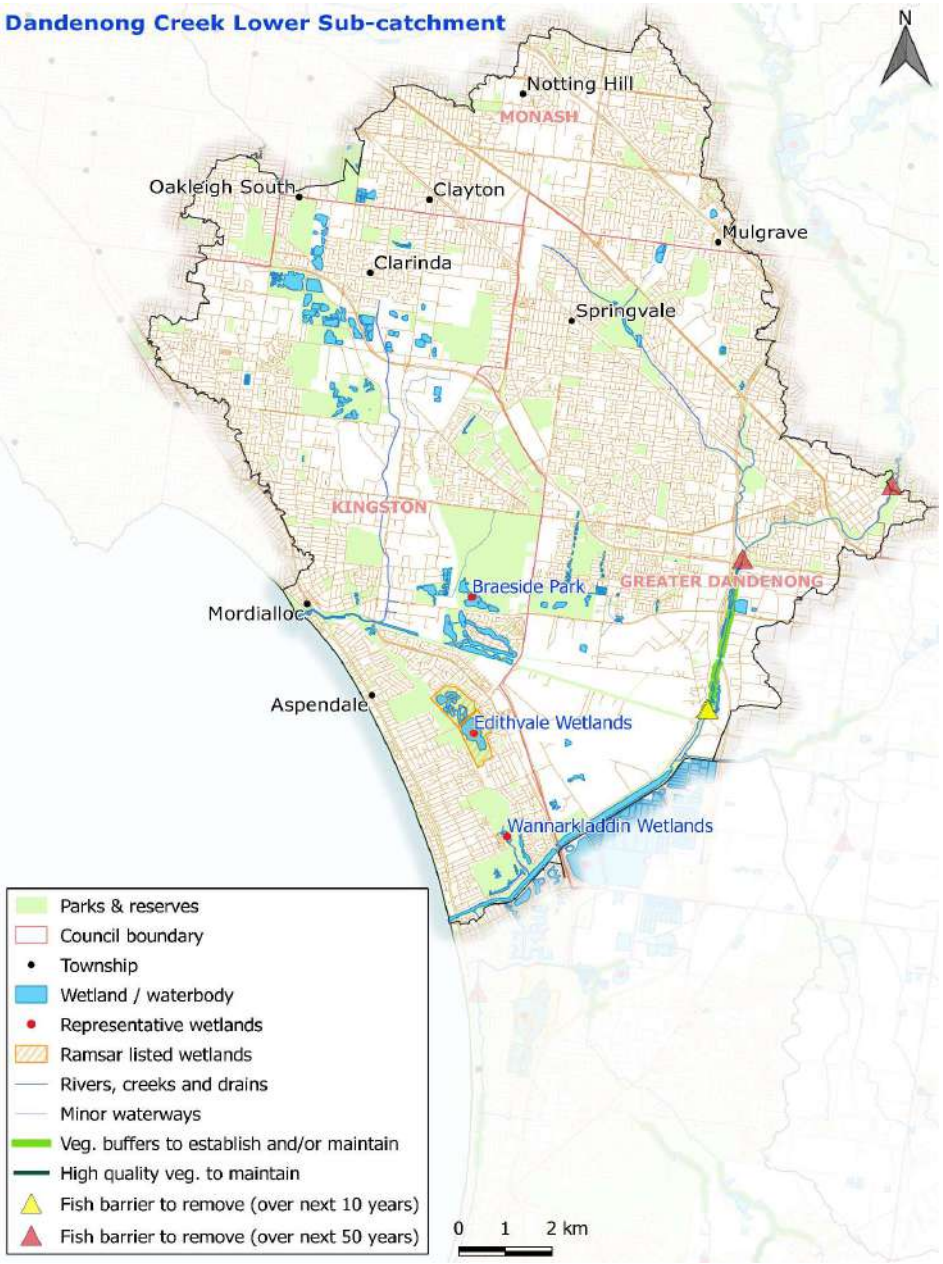
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl and eastern great egret.
low	mod.	mod.		Fish are currently rated as low due to barriers to fish movement, channel modifications (particularly along Ferny Creek) and lack of suitable instream and riparian habitat (which is largely a result of extensive urbanisation and the impacts of stormwater). The increased current trajectory score is due to climate change increasing habitat suitability common and widespread species. Improvements to riparian vegetation, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to the moderate rating in the long term.
high	mod.	high		Frog score is high since most of the expected species of frog were recorded. With dedicated management the score should be maintained at high. Significant species include endangered growling grass frog.
low	low	mod.		Macroinvertebrates score is low largely as a result of urban stormwater impacts resulting in a lack of suitable riparian and instream habitat and altered flow regimes. The listed tubercle burrowing crayfish has been found. Improvements to instream and riparian habitat through revegetation and stormwater management is expected to increase score to moderate.
mod.	very low	mod.		Platypus score is moderate. There is a small vulnerable population in the upper reaches of Monbulk Creek. Improvements to stormwater, stream flows and riparian and instream habitat are required to ensure this population persists in the long term.
low	very low	mod.		Vegetation is low as much of the riparian vegetation is degraded from extensive land use modification, although there are high quality sections in the upper reaches. Without management of existing threats like pest plants and animals and in the face of climate change score is likely to drop to very low. Protecting the best areas and improving priority reaches is expected to increase score to moderate in the long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
mod.	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
high	mod.	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.
mod.	mod.	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is high.
low	low	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is high.
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.
mod.	mod.	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is very high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	low	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is low and the target is very high.

Dandenong Creek Lower Sub-catchment



Description

Dandenong Creek is the major waterway in the Dandenong catchment, flowing from the foothills of Mount Dandenong into Patterson River and then Port Phillip Bay. The Lower Dandenong Creek, Patterson River and Mordialloc Creek were all created to drain the Carrum Carrum Swamp that existed prior to European settlement.

Actions

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

No actions were provided for this sub-catchment. The following actions were developed for the whole Dandenong Catchment:

"Suitable refugia and habitats continue to be developed for key threatened fish and significant bird species."

"Transparent dialogue and education be provided to community to allow gauging of progress on the goals"

"Addressing sea level rise, storm surge and salt water incursion at estuaries and drains"

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

Dandenong Creek Lower Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Instream Connectivity	Increase instream connectivity to provide fish passage between the mouth of Mordialloc Creek and Patterson River to Dandenong.
2	Vegetation Extent	Establish and maintain a continuous riparian vegetated buffer (3 km, 11 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Water Quality – Recreational	Maintain recreational water quality at National Water Sports Centre (suitable for secondary contact).
4	Access	Increase access to and along waterways from 57% to 65% (about 3 km) by filling gaps and improving connections to existing path networks.
5	Participation	Increase participation rates from low to high; support community groups and connect with growth area communities. Increase participation through cultural engagement and citizen science as population grows.

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

Notes:

Dandenong Creek Lower Sub-catchment

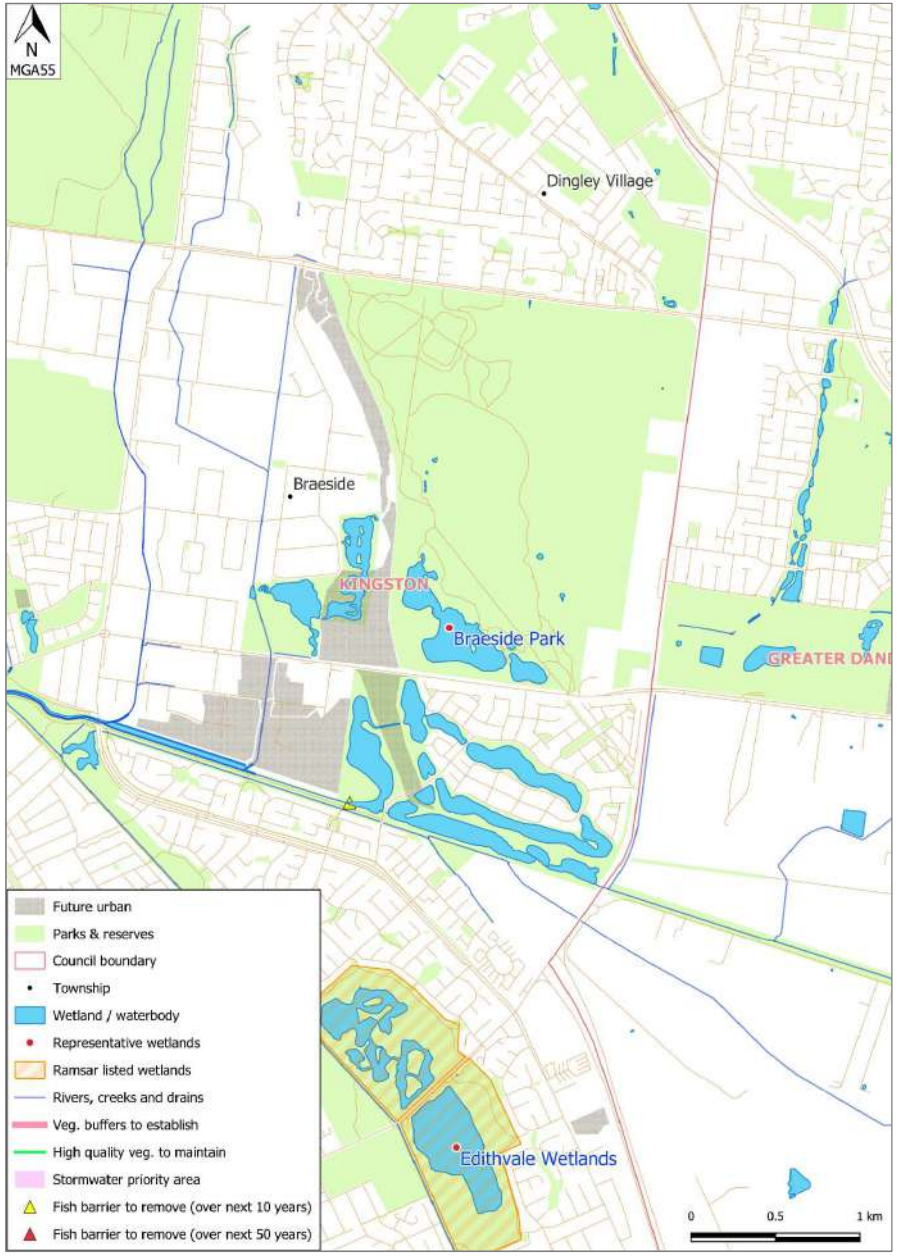
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Several listed species of (estuarine) shorebird occur in this area together with three listed species of egret: eastern great, little and intermediate.
low	mod.	mod.		Fish are currently rated as low due to lack of suitable instream and riparian habitat. This is largely a result of extensive urbanisation, stormwater, barriers to fish movement and channel modifications. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to a moderate rating 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. Significant species include endangered growling grass frog.
very low	very low	very low		Macroinvertebrates score is very low due to high levels of urbanisation which have impacted all the environmental conditions which support this value. While improvements to stormwater and vegetation over the long term may increase macroinvertebrates in some locations, score is unlikely to improve.
very low	very low	very low		Platypus score is very low as a result of large-scale urbanisation which has resulted in a lack of suitable instream and riparian habitat. It is unlikely for platypus to recolonise this sub-catchment in the long term.
low	very low	low		Vegetation is low as much of the riparian vegetation is degraded from extensive land use modification. Without management of existing threats (e.g. pest plants and animals) and climate change associated impacts the score is likely to drop to very low. Target is to maintain at 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	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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.
low	low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is low and the target is low.
very low	very low	low		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 low.
very low	very low	low		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is low.
mod.	mod.	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.
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.
mod.	high	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is very high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	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.

Braeside Park



Description

Braeside Park is a formally recognised Important Bird Area. Over 235 bird species have been recorded in the park, including the New Holland honeyeater, blue-billed duck and Latham's snipe.

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	Unaligned	Reduce threat to native birds from foxes, cats and dogs to moderate.
3	Wetland buffer condition	Improve wetland buffer to 50 per cent of wetland perimeter.

Braeside Park

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	low	low		The bird value score at Braeside Park wetlands is currently low. It is not formally recognised as significant bird habitat and currently has moderate wetland vegetation condition. The long-term bird score will remain low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	mod.		The frog value score for the Dandenong Creek lower sub-catchment has been applied to Braeside Park Wetlands. The frog value is currently very low and is predicted to increase to moderate with proper management.
	mod.	mod.	high		The wetland vegetation value is currently moderate. Improvements to the wetland buffer and reengagement of the natural wetland area is predicted to improve the wetland vegetation value to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very high	very high		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 very high.
	low	low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
	very low	very low	low		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very 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.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Edithvale Wetland

Description

Edithvale-Seaford Wetlands represent remnant ecosystems of the once extensive Carrum Carrum Swamp , separated from the sea by a beach ridge-dune barrier system. The wetlands have long been recognised as supporting important habitat for birds. The significance of the wetlands was acknowledged by their inclusion in the Directory of Important Wetlands in Australia in 2006 and listing as wetlands of international significance in 2001 under the Ramsar Convention. While the wetlands form one Ramsar site, they have slightly different values, hydrological function and sensitivity to threats.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Reduce the threat of foxes and domestic cats and dogs to moderate.
2	Unaligned	Implement priority actions from the Edithvale Seaford Ramsar Wetlands Site Management Plan, 2016
3	Wetland habitat form	Ensure acid sulfate soils disturbance is kept to a minimum and that if there is any disturbance appropriate management techniques are employed.
4	Vegetation condition	Reduce the threat of salt tolerant weeds (e.g. spiny rush) to low.
5	Water regime	Maintain critical water regime components in Edithvale wetlands to protect wetland environmental values.
6	Wetland buffer condition	Prepare the wetland buffer to include likely area of wetland migration and infill existing areas of the current wetland buffer with native vegetation.
7	Unaligned	Continue to implement Ramsar monitoring program in accordance with the new Guidelines for Ramsar site monitoring and evaluation to inform performance against the limits of acceptable change.

Edithvale Wetland

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	high	high	high	The wetland bird value score is currently high at Edithvale Wetlands. The site is formally recognised for its bird habitat value and the bird habitat value is supported by moderate vegetation condition.
	n/a	n/a	n/a	Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very low	The frog value score at Edithvale wetlands is currently very high with listed frog species recorded. In the long term, increases to the salinity of the wetland associated with climate change are predicted to limit the frog population reducing the frog value to very low.
	mod.	very low	mod.	The vegetation value score is currently moderate, with a current trajectory of very low due to predicted climate change impacts. In the long-term the vegetation value could be maintained at moderate through protection of the wetland water regime, improving wetland buffer condition and maintaining wetland vegetation condition through controlling the threat of weeds,
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very low	mod.	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is moderate.
	mod.	very 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.
	very low	very low	mod.	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	mod.	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	very low	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Wannarkladdin Wetlands

Description

Wannarkladdin Wetlands are a site of biodiversity significance, located in Chelsea. They are a remnant of the former Carrum Carrum Swamp and provide an important link between Edithvale and Seaford wetlands, which are Ramsar listed. The site has been reserved primarily for drainage and flood protection purposes for the surrounding residential area. However, they also provide waterbird, shorebird and frog habitat. Species recorded include blue-billed duck, masked lapwing, Australian pelican, Latham's snipe and great egret, and four frog species - southern brown tree frog, common froglet, striped marsh frog and spotted marsh frog. There is a shared trail system that runs through the site, which links further north and south with other reserves and wetlands. The site is used as a recreational open space by local residents for walking, dog-walking and bird-

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Maintain the stormwater treatment design intent of the Wannarkladdin Wetlands, with consideration of the cultural and biodiversity values and actions identified in the Melbourne Water Sites of Biodiversity Significance Management Plan.

Wannarkladdin Wetlands

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	low	low	The bird value score at Wannarkladdin wetlands is currently low. It is not formally recognised as significant bird habitat and currently has moderate wetland vegetation condition. The long-term bird score will remain low.
	n/a	n/a	n/a	Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	very low	mod.	The frog value score for the Dandenong Creek lower sub-catchment has been applied to Wannarkladdin Wetlands. The frog value is currently very low and is predicted to increase to moderate.
	mod.	mod.	mod.	The vegetation value score is currently moderate and is predicted to remain moderate in the long-term based on maintenance of the vegetation condition.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	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.
	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.
	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.

Mordialloc Creek Estuary

Description
The entrance to the Mordialloc Creek estuary is approximately 15 metres wide and it is continuously open to Port Phillip Bay. The banks of the lower estuary are artificially constructed and the upper estuary is fully lined. Sediment deposition as a result of longshore drift requires the entrance to be dredged to maintain safe navigation by vessels.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine vegetation	Protect remnant estuarine vegetation communities, through targeting key invasive plant species.
2	Unaligned	Climate change adaptation plans in place for social and environmental values associated with the estuary.
3	Access & Recreation	Maintain and support existing high value opportunities for access and recreation, including walking, cycling, boating and fishing.
4	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Mordialloc 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 the Mordialloc Creek. The estuary is not formally recognised as bird habitat, has very low current and low predicted vegetation condition and is fringed by a highly urbanised environment. The predicted climate change impacts will further erode suitable bird habitat.
	high	high	high	The fish value score for the Mordialloc Creek is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabit the estuary and are likely to remain.
	mod.	very low	mod.	Mordialloc Creek currently has an estuarine vegetation value of moderate, with predicted climate change impacts likely to cause a decline to very low. Reducing the threat to remaining vegetation from invasive plant species and adopting some climate change adaptation strategies may maintain the vegetation value at 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.
	very high	very high	very high	Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently very high and is expected to remain very high in the long-term if supply keeps up with population growth; target is to maintain at very high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	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.
	low	mod.	mod.	Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is low and the target is moderate.
	very high	high	high	Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very high and the target is high.
	very low	very low	low	Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is low.
	very low	very low	low	Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

Patterson River Estuary

Description

Patterson River Estuary is an artificial opening to Port Phillip Bay near Patterson Lakes, which was created in 1879 by cutting through sand dunes to drain Carrum Carrum Swamp. Sediment deposition as a result of longshore drift requires the entrance to be dredged to maintain safe navigation by vessels. The southern side of the estuary is characterised by a system of lakes and canals with water frontage and private boat mooring.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Unaligned	Climate change adaptation plans are in place for social and environmental values associated with the estuary.
2	Estuarine vegetation	Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
3	Access & Recreation	Maintain and support existing high value opportunities for access and recreation, including walking, cycling, boating and fishing.
4	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Patterson River 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 the Patterson River. The estuary is not formally recognised as bird habitat, has very low current and low predicted vegetation condition and is fringed by a highly urbanised environment. The predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		The fish value score for the Patterson River is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabit the estuary and are likely to remain.
	very low	very low	very low		The estuarine vegetation value in Patterson River is currently very low. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation, however, the estuary is fringed by highly urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions. Vegetation value will remain very low in the long-term.
	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.
	very high	very high	very high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently very high and is expected to remain very high in the long-term if supply keeps up with population growth; target is to maintain at very high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	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.
	low	mod.	mod.		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is low and the target is moderate.
	very low	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is low.
	very low	very low	low		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is low.
	very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

Dandenong Creek Middle Sub-catchment

Description

Dandenong Creek rises through a series of springs on the western slopes of the forested Dandenong Ranges National Park. The Dandenong Creek Middle sub-catchment includes the section of Dandenong Creek between the National Park and township of Dandenong. It includes tributaries such as Dobsons and Bungalook creeks, Taralla Creek (Croydon Main Drain) and Old Joe's Creek.

Actions

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

"Create platypus 'playgrounds'"

"Expand vegetation parkland and wetland corridor and connection to floodplain along the creek above Eastlink (build wetlands along reserve)"

"Raising water related safety / flooding and environmental issues awareness. Make it similar to fire safety and prevention concerns."

"Regular weeding to enhance habitat."

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

Dandenong Creek Middle 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	Identify and implement opportunities to reduce the key threat of flow stress on waterways by addressing causal factors such as water for domestic and stock use, climate change, diversions or urbanisation.
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation along priority reaches (Vegetation Quality level 4 and 5 - currently < 1km) through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
4	Vegetation Extent	Establish a continuous riparian vegetated buffer (12 km, 47 ha) and maintain existing vegetation (29 km, 114 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
5	Bird (value)	Protect those parts of Dandenong Creek that are important for bird nesting, moulting, roosting and foraging from disturbing activities such as dog exercising.
6	Frog (value)	Target three riparian areas for habitat improvement works to support Pseudophryne semimarmorata (southern toadlet).
7	Access	Increase access to and along waterways from 51% to 58% (about 5 km) by extending and filling gaps in path network and improving crossings of major roads, and along Bungalook Creek and tributaries.
8	Participation	Increase participation rates from low to high; support community groups and connect with growth area communities. Increase participation in citizen science and capacity building programs as population grows.

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

Notes:

Dandenong Creek Middle Sub-catchment

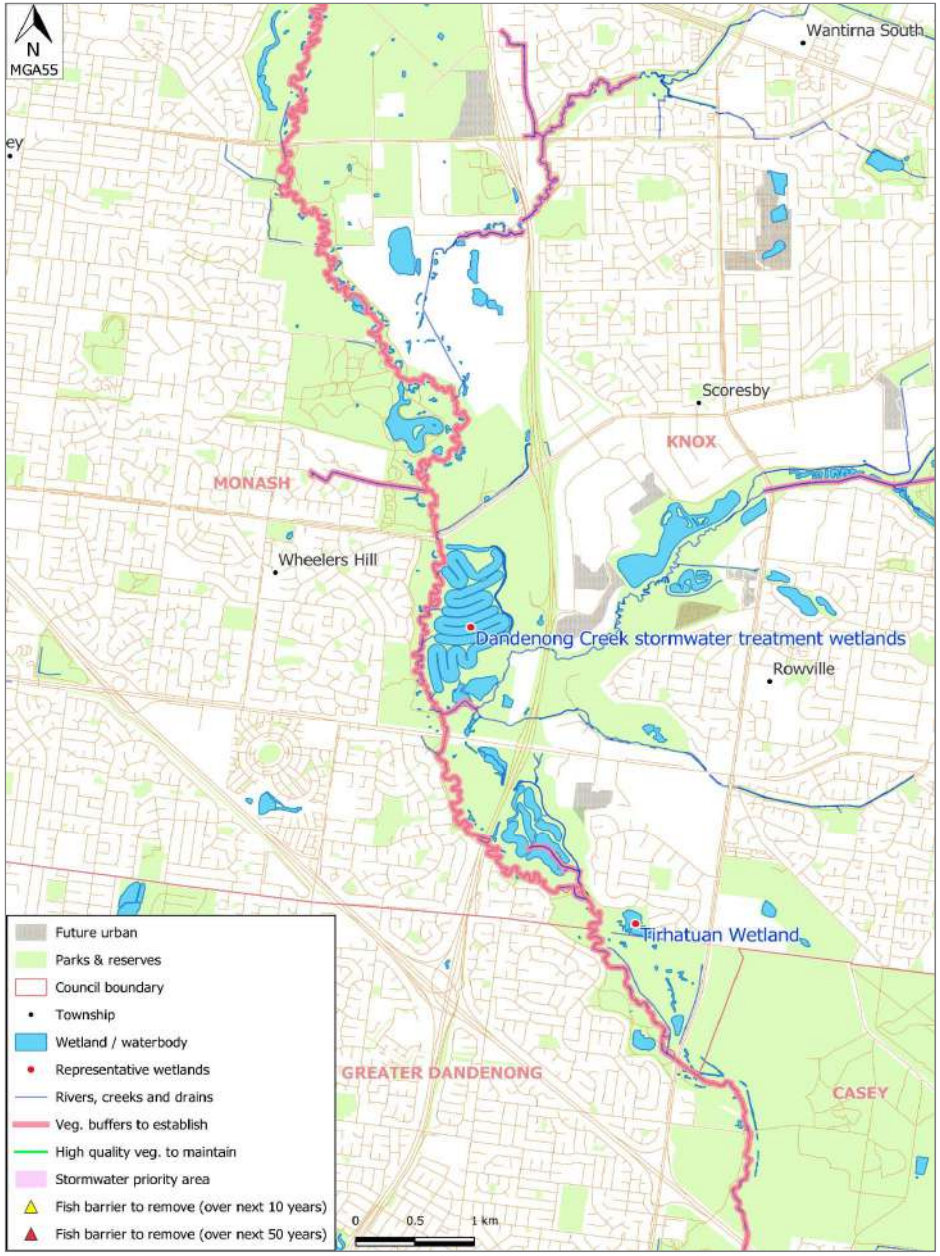
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl and eastern great egret.
low	mod.	mod.		Fish are currently rated as low due to lack of suitable habitat (instream and riparian). This is largely a result of extensive urbanisation, stormwater 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, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to a moderate rating in the long term. Threatened dwarf galaxias are known to occur in the sub-catchment.
high	mod.	high		Frog score is high since most of the expected species of frog were recorded. With dedicated management the score should be maintained at high.
very low	very low	very low		Macroinvertebrates score is very low due high levels of urbanisation which have impacted all the environmental conditions which support this value. While improvements to stormwater and vegetation over the long term may increase macroinvertebrates in some locations, score is unlikely to improve.
very low	very low	very low		Platypus score is very low as a result of large-scale urbanisation which has resulted in a lack of suitable instream and riparian habitat. If conditions improve and the population within the Corhanwarrabul Creek sub-catchment also improves then the population may expand back into middle Dandenong Creek in the long term.
low	very low	mod.		Vegetation is low as much of the riparian vegetation is degraded from extensive land use modification. Without management of existing threats like pest plants and animals and in the face of climate change score is likely to drop to very low. Improvements along priority reaches are expected to increase score to moderate in the long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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 low	very low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very low and the target is low.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
mod.	mod.	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is high.
low	low	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is high.
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.
mod.	mod.	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is very high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is 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	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.

Dandenong Catchment stormwater treatment wetlands



Description

Significant investment has been made to build stormwater treatment wetlands in the Dandenong Creek Catchments. Stormwater treatment wetlands in the catchment include Boggy Creek, Dandenong Valley, Eumemerring Creek, Golf Links Road, Heatherton Road, Karoo Road, Mordialloc Creek and Rivergum Creek wetlands. While these wetlands support some significant environmental and social values, their primary function is to trap suspended solids, phosphorus and nitrogen.

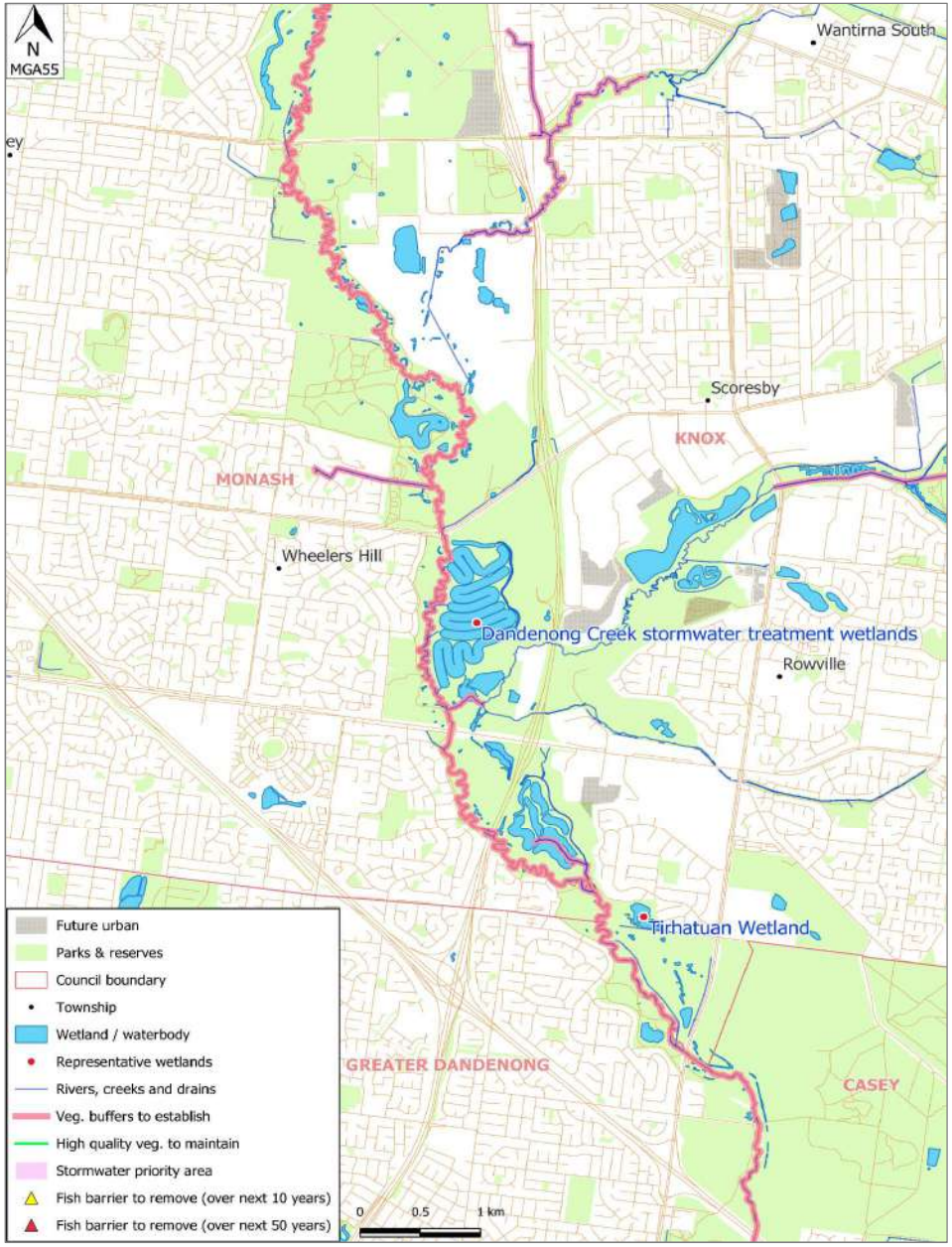
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Maintain the stormwater treatment design intent of new and existing Stormwater wetlands within the Dandenong catchment.
2	Wetland water quality	Implement opportunities to enhance social and environmental values of Stormwater wetland sites through the Living Links program.
3	Wetland water quality	Maintain the stormwater treatment design intent of the Boggy Creek stormwater wetland within the Dandenong catchment, whilst considering its formally recognised significance as an Important Bird Area.

Dandenong Catchment stormwater treatment wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird score is currently very low for the stormwater wetlands. They are not formally recognised as significant bird habitat and their vegetation condition is generally very low. The wetland bird score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	high	mod.	high		Many stormwater treatment wetlands in the Dandenong Catchment have high frog value. These are predicted to decline as a result of climate change impacts to moderate value, however, it is predicted that stormwater treatment wetlands known as sites of biodiversity significance could maintain the frog value at high with careful management.
	low	low	low		Wetland vegetation value is currently low and it is expected to remain low. Stormwater wetlands are managed primarily for their water quality treatment function.
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.
	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.
	low	low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is low.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Tirhatuan Wetlands, Dandenong Creek



Description

Tirhatuan wetlands are located with Tirhatuan Park and have significant social and environmental values. Tirhatuan Wetlands are a nationally significant Seasonally Herbaceous Wetland. The endangered Plains Grassy Wetland vegetation community provides habitat for many species of frogs and birds including the endangered migratory species, Latham's snipe. The wetlands also support dwarf galaxias.

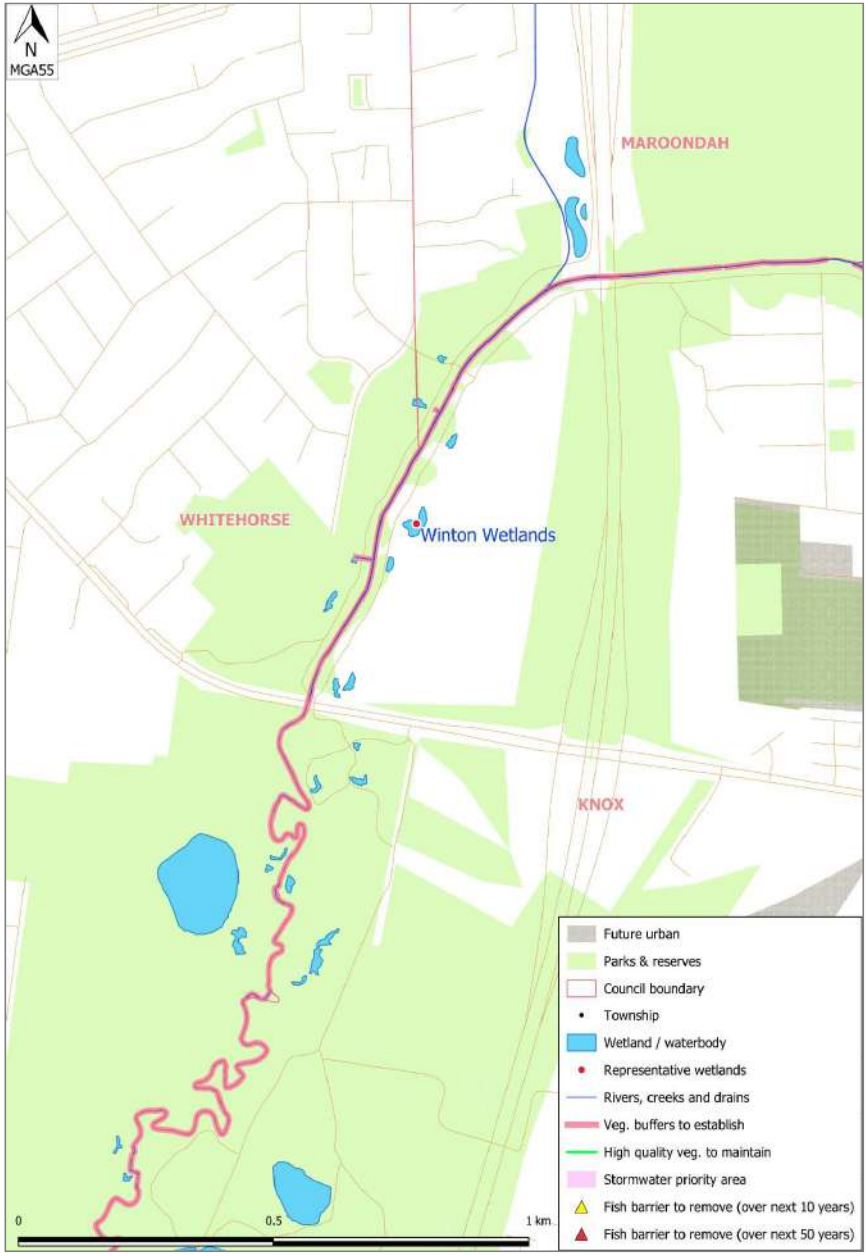
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Investigate opportunities to increase the wetland area for environmental values, while maintaining existing social values.
2	Wetland buffer condition	Improve the wetland buffer to cover 50% of the wetland perimeter.
3	Water regime	Establish water regime to ensure protection of Seasonally Herbaceous wetland character, dwarf galaxias and Latham's snipe habitat.
4	Vegetation condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.
5	Unaligned	Monitor threat levels from invasive fish species on dwarf galaxias and mitigate risks if required.
6	Unaligned	Reduce the threat of dogs, foxes and cats to moderate.

Tirhatuan Wetlands, Dandenong Creek

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird score is currently very low. The wetlands are not formally recognised as significant bird habitat and their vegetation condition is expected to be maintained at moderate. The wetland bird score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	high	mod.	high		The frog value score is currently high, with a predicted current trajectory of decline to moderate condition. With the predicted improvements to conditions the frog value can be maintained at high despite ongoing risks associated with urbanisation.
	mod.	mod.	high		The vegetation value score is currently moderate. Maintenance of vegetation condition and water regime, and improvements to wetland habitat form and buffer condition should improve the vegetation value to high.
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.
	mod.	mod.	high		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 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.	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.

Winton Wetlands, Dandenong Creek



Description

Winton Wetlands are a chain of wetland depressions, partly natural and partly excavated, lying on the Dandenong Creek floodplain. The largest of these wetlands is the original channel of Dandenong Creek. The Winton Wetlands have been identified as a site of regional and state significance because the 29 hectare site contains a series of remnant billabongs and is characterised by manna gum, two different types of wetlands and the regionally rare lady's-tresses orchid. The site also provides important habitat for frogs and birds.

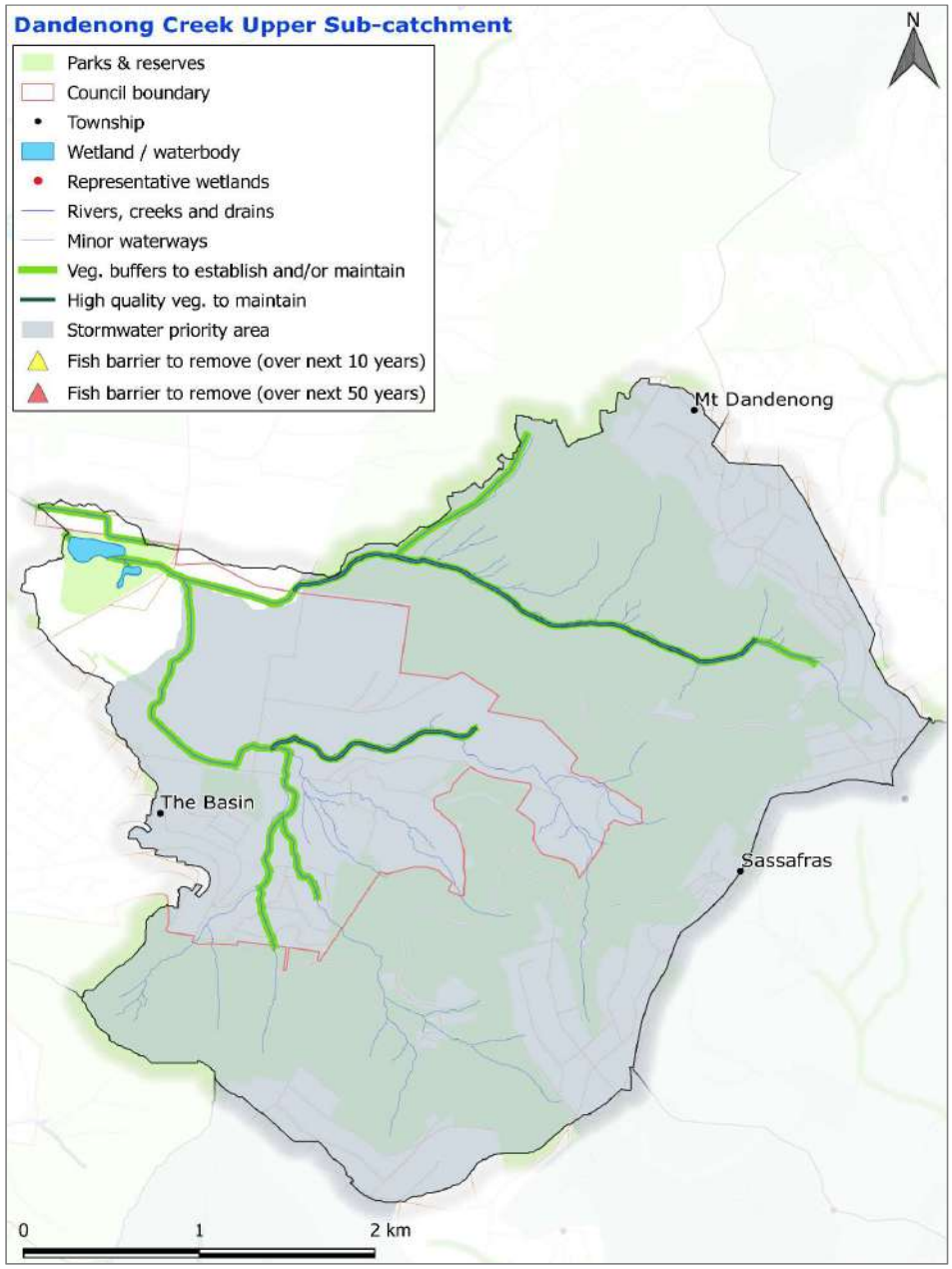
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Reduce invasive weed threat to moderate.
2	Water regime	Investigate the feasibility of improving the wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
3	Wetland buffer condition	Improve the wetland buffer to cover 50% of the wetland perimeter.
4	Wetland habitat form	Identify opportunities to re-engage the natural wetland area.
5	Water regime	Maintain water regime to meet ecological water needs and design intent for dwarf galaxias and Yarra pygmy perch needs.
6	Unaligned	Monitor threat levels from invasive fish species on dwarf galaxias and mitigate risks if required.
7	Vegetation condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.

Winton Wetlands, Dandenong Creek

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird score is currently very low. The wetlands are not formally recognised as significant bird habitat and their vegetation condition is currently very low. The wetland bird score is expected to remain very low.
	very high	very high	very high		The wetland fish value is currently very high with significant fish species present. In the long-term, the fish value is predicted to remain very high supported by improvements to wetland water regime, habitat form, buffer condition and vegetation condition.
	high	mod.	high		The frog value score is currently high, with a predicted current trajectory of decline to moderate condition. With the predicted improvements to conditions the frog value can be maintained at high despite ongoing risks associated with urbanisation.
	very low	very low	mod.		The wetland vegetation value is currently very low, however, improvements to environmental conditions including improvement to wetland vegetation condition from very low to very high, are predicted to improve the vegetation value to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	very high		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 very high.
	mod.	mod.	high		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 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.
	very low	very low	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is very 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.

Dandenong Creek Upper Sub-catchment



Description

Dandenong Creek rises through a series of springs on the western slopes of the forested Dandenong Ranges National Park.

Actions

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

"Advocate and plan road maintenance regimes that can address excess [stormwater] volume and sediment loads"

"Protect existing intact vegetation from pest species such as Deer"

"Undertake reveg program for Healesville Fwy interface of Dandenong Creek"

"Maintain and improve the social connectivity along the creek corridors to the National Parks"

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

Dandenong Creek Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Maintain critical flow components in refuge reaches in streams in the Dandenong Ranges National Park to protect instream environmental values.
2	Stormwater Condition	To improve stormwater condition, and to protect the threatened Dandenong amphipod, disconnect stormwater drainage from roads and carparks draining to Upper Dandenong Creek through Doongalla forest. For every hectare of impervious area, this requires harvesting approximately 6.3 ML/y and infiltrating 2.9 ML/y.
3	Stormwater Condition	To improve stormwater condition, treat new and existing development (i.e. The Basin and Sassafras) to reduce directly connected imperviousness (DCI) of Dobsons Creek to less than 1% at the confluence with Dandenong Creek. To disconnect a hectare of impervious area requires harvesting approximately 6.0 ML/y and infiltrating 2.4 ML/y. To disconnect the entire catchment would require approximately 0.4 GL to be harvested, and 0.2 GL to be infiltrated.
4	Vegetation Quality	Maintain or achieve high and very high quality vegetation along priority reaches (Vegetation Quality level 4 and 5 - currently 4 km) through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
5	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.
6	Vegetation Extent	Establish a continuous riparian vegetated buffer (2 km, 10 ha) and maintain existing vegetation (12 km, 49 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
7	Access	Increase access to and along waterways from 23% to 32% (about 1 km) by improving access to Dobsons Creek.
8	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science through promotion of high value areas (e.g. Dandenong Ranges National Park).

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

Notes:

Dandenong Creek Upper Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		We have insufficient data to estimate a riparian bird score for the period 2012 to 2017. The current trajectory is likely to be moderate and should be maintained as moderate. Significant species include the powerful owl and eastern great egret.
low	mod.	mod.		Fish are currently rated as low due to a lack of suitable habitat (instream and riparian). This is largely a result of extensive urbanisation, stormwater 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, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to a moderate rating in the long term.
high	mod.	high		Frog score is high since most of the expected species of frog were recorded. With dedicated management the score should be maintained at high.
very high	high	very high		Macroinvertebrates score is very high as there is good instream and riparian habitat particularly in the upper forested reaches. Impacts from urbanisation and climate change are predicted to reduce score if not adequately addressed. Managing stormwater and improving riparian vegetation will ensure score remains very high.
low	low	low		Platypus score is low, largely as a result of habitat fragmentation which has led to isolation from platypus in the Corhanwarrabul Creek. There have been very few records of platypus in recent years and it is likely that the population has been lost within this sub-catchment. Without substantial expansion of suitable habitat and connectivity to other populations, it is unlikely that platypus can be sustained in the sub-catchment in the long term.
mod.	low	mod.		Vegetation is moderate as much of the riparian vegetation is degraded from urbanisation impacts; however there are some higher quality reaches in the forested headwaters. Without management of existing threats like pest plants and animals and in the face of climate change score is likely to drop to low. Protecting the best areas and improving priority reaches is expected to maintain score as moderate in the long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is very high.
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.
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.
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.
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.
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.
low	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 low and the target is moderate.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
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.
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.

Eumemmerring Creek Sub-catchment

Description

Eumemmerring Creek originates in the Mt Morton and Lysterfield Park area and flows through Endeavour Hills and Dandenong South before joining Patterson River. Tributaries include Troups and Tea-Tree Creek as well as a number of highly modified drains.

Actions

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

Renaming of any wetland/creek that doesn't have an inviting name e.g. drain/ swamp"

Vegetate upper Eumemmering Creek Corridor- Duicker to Wellington Road"

Opportunities for the community to connect to the waterway through path system connecting into others"

Seek to mitigate flow decline in Eumemmerring Creek though bypass arrangements on storages and diversions across the catchment"

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

Eumemmerring Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to reduce the key threat of flow stress on waterways by addressing causal factors such as water for domestic and stock use, climate change, diversions or urbanisation.
2	Vegetation Extent	Establish and maintain a continuous riparian vegetated buffer (3 km, 13 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Frog (value)	Target three riparian areas for habitat improvement works to support Pseudophryne semimarmorata (southern toadlet).
4	Access	Increase access to and along waterways from 23% to 30% (about 10 km) by improving access in conjunction with urban development and along upper parts of Eumemmerring Creek.
5	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. Engage the community through promotion of WSUD projects (e.g. Lynbrook Estate).

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

Notes:

Eumemmerring Creek Sub-catchment

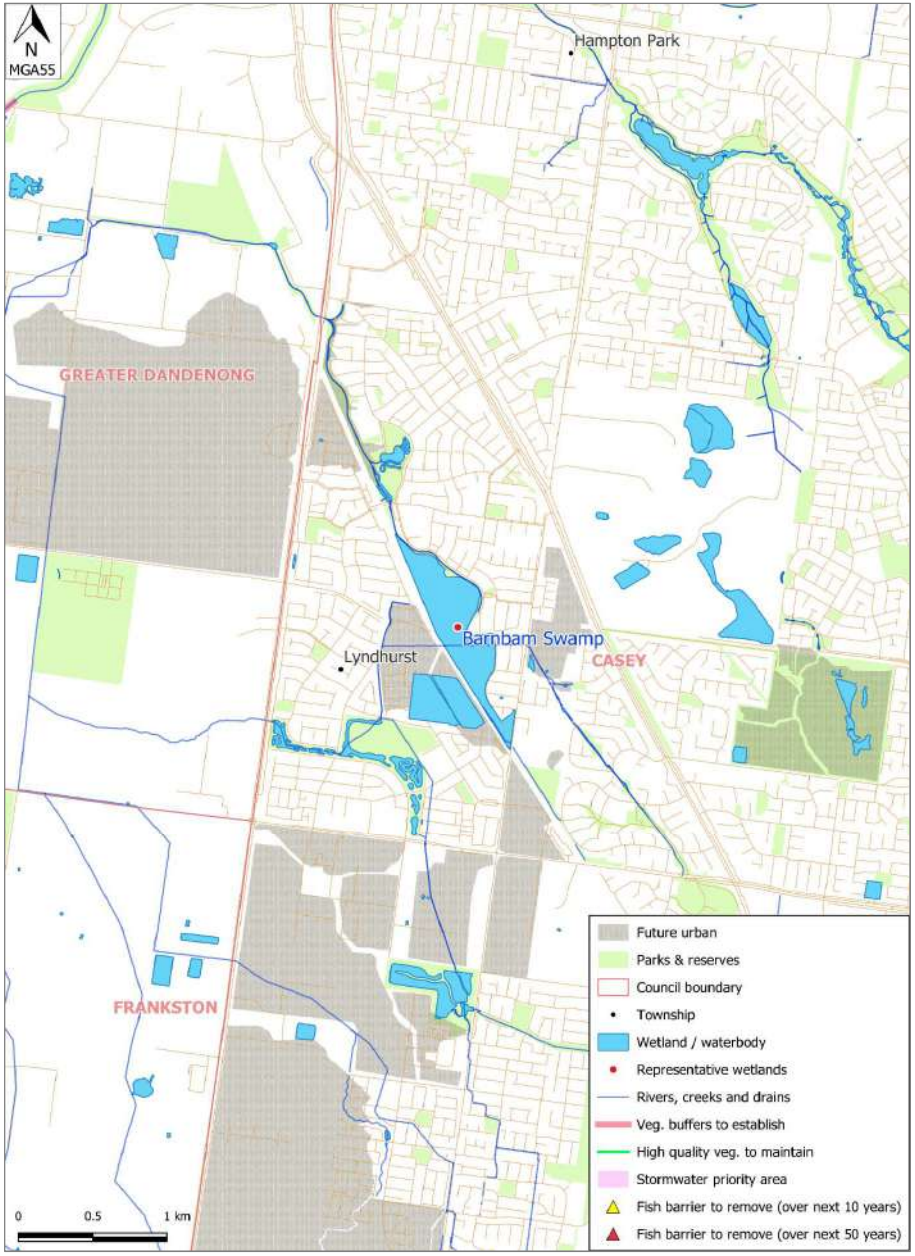
KEY VALUES (10 - 50 YEAR TARGETS)

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 score should remain high. Significant species include the powerful owl, eastern great egret and little egret.
very low	mod.	mod.		Fish are currently rated as very low due to a lack of suitable habitat (instream and riparian). This is largely a result of extensive urbanisation, stormwater, channel modifications 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, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to a moderate rating in the long term. Threatened dwarf galaxias are known to occur in this sub-catchment.
low	mod.	mod.		Frog score is low since only some of the expected species of frog were recorded. With appropriate management the score could be improved to moderate. Significant species include the growling grass frog and southern toadlet.
very low	very low	very low		Macroinvertebrates score is very low due high levels of urbanisation which have impacted all the environmental conditions which support this value. While improvements to stormwater and vegetation over the long term may increase macroinvertebrates in some locations, score is unlikely to improve.
very low	very low	very low		Platypus score is very low as a result of large-scale urbanisation which has resulted in a lack of suitable instream and riparian habitat and isolation from other populations. Given a lack of suitable habitat and isolation, it is unlikely that platypus will recolonise this sub-catchment in the long term.
low	very low	low		Vegetation is low as much of the riparian vegetation is degraded from urbanisation impacts. Without management of existing threats like pest plants and animals and in the face of climate change score is likely to drop to very low. Protecting the best areas, preventing further decline and improving priority reaches will ensure current score is maintained.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
very low	very low	low	Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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.
mod.	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 moderate and the target is moderate.
low	very low	low	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 low.
very low	very low	low	Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is low.
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.
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.
low	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 low and the target is moderate.
mod.	mod.	high	Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	low	high	Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
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.

Barnbam Swamp, Lynbrook



Description

Barnbam Swamp located in Lynbrook, is a nationally significant Seasonally Herbaceous Wetland. The area is managed under the Crown Lands Act by Parks Victoria. It includes 'core wetland' of the most diverse and high quality wetland vegetation plus a surrounding buffer of lesser quality vegetation in the order of 50 metres width.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Maintain WSUD infrastructure to design intent to ensure continued water quality benefit to Barnbam Swamp.
2	Unaligned	Reduce threat to native birds from foxes, cats and dogs to moderate.
3	Wetland buffer condition	Improve wetland buffer to 50 per cent of wetland perimeter.
4	Vegetation condition	Reduce weed threat to moderate.
5	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Barnbam Swamp, Lynbrook

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird score is currently very low. The wetland is not formally recognised as significant bird habitat and their vegetation condition is currently very low. The wetland bird score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	low	mod.	mod.		The frog value score for the Eumemmerring Creek Sub Catchment has been applied to Barnbam Swamp. The frog value is currently low with a current trajectory of moderate. Due to ongoing threats associated with urbanisation the target frog score for this wetland is also moderate.
	very low	very low	mod.		This Seasonal Herbaceous Wetland supports significant wetland EVCs and flora species. The vegetation value is currently very low, however it is predicted to improve to moderate value through improvements to habitat form, wetland buffer and vegetation condition. Reduction of the threat from invasive flora species will also help to improve the vegetation value.
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.	high		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 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.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Dwarf Galaxias Conservation Wetland, Cranbourne Road, Narre Warren

Description

The dwarf galaxias Conservation Wetlands were built to assist with conservation of the Federal Environment Protection and Biodiversity Conservation Act and the Victorian Flora and Fauna Guarantee Act listed species. The wetlands hold populations of both Yarra pygmy perch (also listed) and dwarf galaxias. The ponds contain populations of the fish used in efforts to translocate and protect the species.

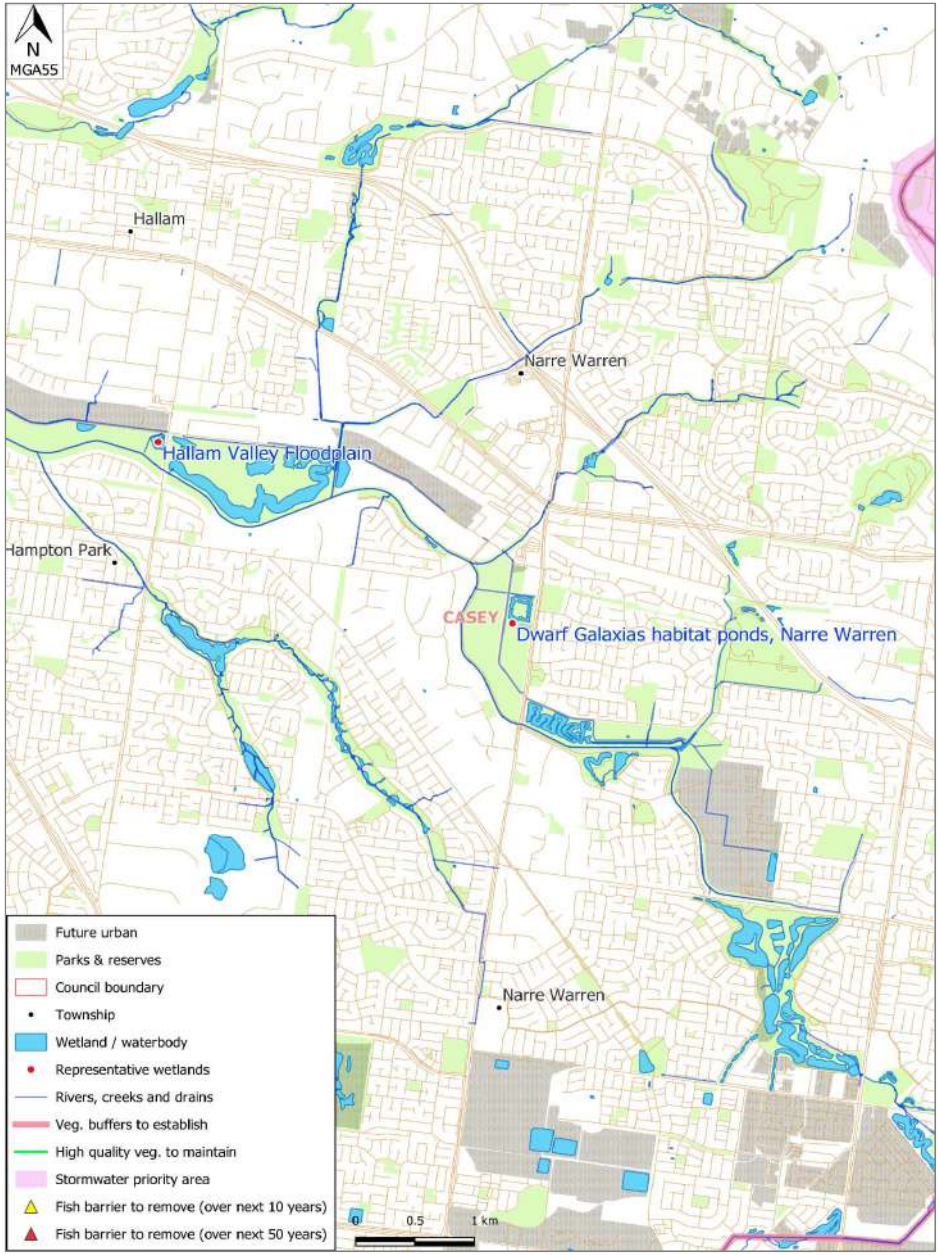
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Maintain critical water regime components in wetlands along Eumemmerring Creek to protect wetland environmental values, Yarra pygmy perch and dwarf galaxias.
2	Unaligned	Monitor threat levels from invasive fish species on dwarf galaxias and Yarra pygmy perch and mitigate risks if required.
3	Vegetation condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.

Dwarf Galaxias Conservation Wetland, Cranbourne Road, Narre Warren

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The wetland bird score is currently very low. The wetlands are not formally recognised as significant bird habitat and their vegetation condition is expected to remain low. The wetland bird score is expected to remain very low.
	very high	very high	very high	The fish value is currently very high and is predicted to remain very high. This site is managed specifically for the protection of the listed dwarf galaxias. Maintenance of the water regime and ensuring the threat from invasive fish species remains low is predicted to maintain the fish value.
	low	mod.	mod.	The frog value score for the Eumemmerring Creek Sub Catchment has been applied to Dwarf Galaxias Conservation Wetland. The score is currently low with a current trajectory of moderate. The frog value score for this wetland is predicted to improve to moderate in the long term.
	low	low	mod.	The vegetation value score is currently low. With proper management, the target is to improve to moderate in the long-term.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	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.
	low	low	low	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is low.
	very low	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Hallam Valley Floodplain wetlands



Description

The Hallam Valley floodplain comprises a series of floodplain depressions which provide significant habitat for birds, frogs and fish, including the dwarf galaxias.

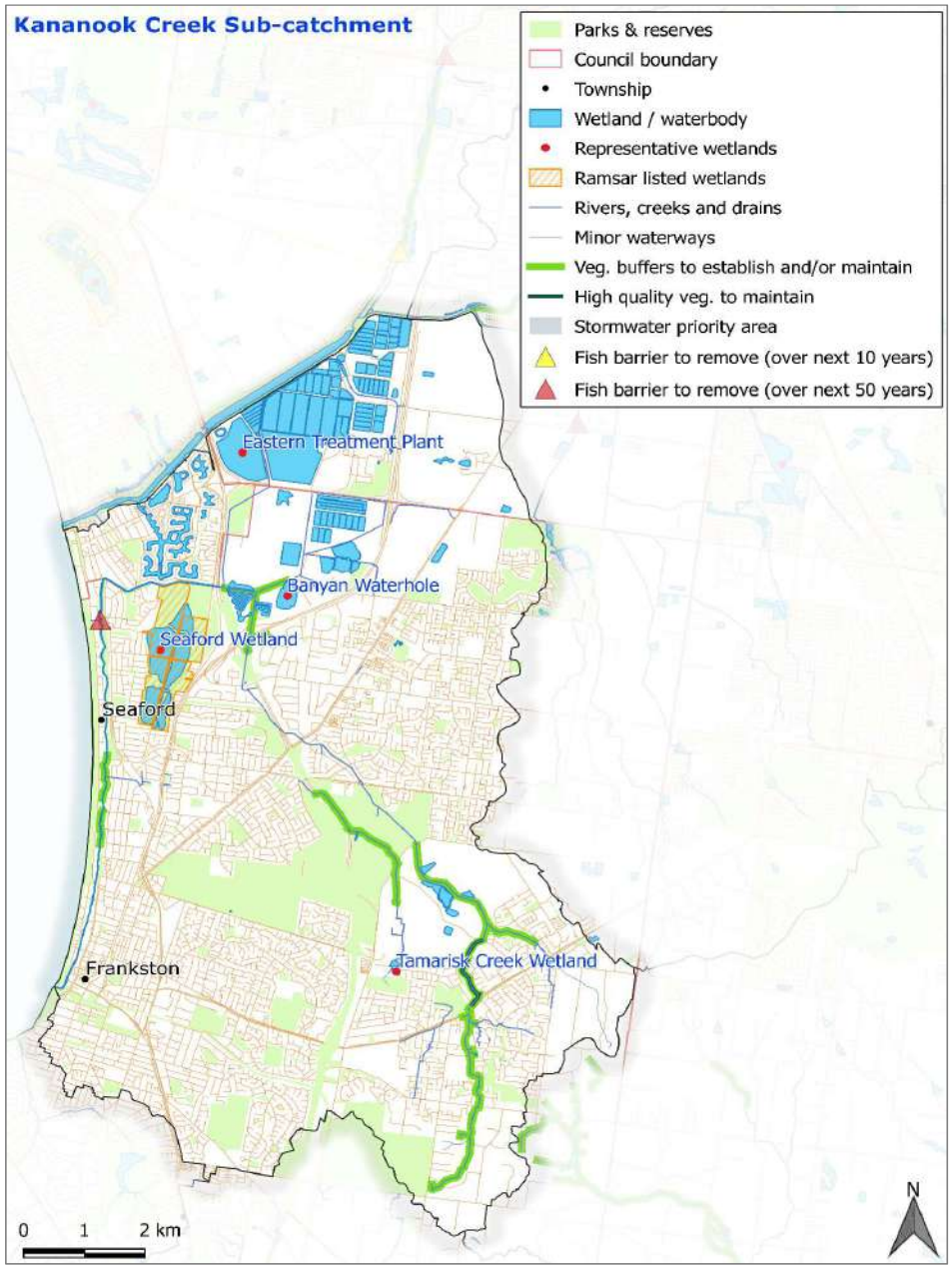
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Protect, improve and/or create wetland habitat along the Hallam Valley floodplain for birds, frogs and fish including the listed dwarf galaxias. This may include securing land for habitat creation.
2	Water regime	Maintain water regime to meet ecological water needs and design intent for birds, frogs and fish including the nationally threatened species dwarf galaxias and Yarra pygmy perch.
3	Wetland buffer condition	Improve floodplain, riparian and wetland buffers to cover 50 per cent of the perimeter.
4	Unaligned	Monitor threat levels from invasive fish species on dwarf galaxias and mitigate risks if required.
5	Vegetation condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.

Hallam Valley Floodplain wetlands

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	low	low	The wetland bird score for Hallam Valley Floodplain wetlands is currently low. The floodplain wetlands are not formally recognised as significant bird habitat and their vegetation condition is currently very low. The wetland bird score is expected to remain low.
	very high	very high	very high	The fish value is currently very high and is predicted to remain very high. Improvements to wetland habit form, water regime and vegetation condition will further enhance the habitat available for dwarf galaxias.
	low	mod.	mod.	The frog value score for the Eumemmerring Creek Sub Catchment has been applied to Hallam Valley floodplain wetlands. The score is currently low with a current trajectory of moderate. The frog value score for this wetland is predicted to improve to moderate in the long term.
	very low	very low	high	The vegetation value at Hallam Valley Floodplain Wetlands is currently very low. Significant improvement is predicted as the threats associated with changed water regime, poor wetland buffer condition, poor wetland vegetation condition and poor wetland habitat form are reduced. The vegetation value is predicted to improve to high.
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.
	high	high	very 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 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.
	very low	very low	mod.	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Kananook Creek Sub-catchment



Description

Kananook Creek sub-catchment lies to the south of Patterson River and includes the suburbs of Frankston, Seaford and Carrum Downs. The creek extends from the lower section of Eel Race Drain and runs alongside the foreshore before entering Port Phillip Bay at Frankston. Tributaries include Boggy and Tamarisk creeks, which retain good vegetation in the higher reaches but are heavily modified and channelised in their lower reaches.

Actions

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

"Edithvale Wetlands. Local government, surrounding businesses need to be sympathetic to values of wetland and expanding these."

"Integrate weed management strategies with adjoining rail network to ensure weed species are controlled."

"Improved communication of the science that underpins the waterway prioritisation with the community. Frog census - keep doing it!"

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

Kananook Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Maintain critical flow components in refuge reaches in streams in Boggy Creek to protect instream environmental values.
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation along priority reaches (Vegetation Quality level 4 and 5 - currently 1 km) through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (7 km, 28 ha) and maintain existing vegetation (8 km, 32 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Water Quality – Recreational	Maintain recreational water quality in lower reaches of Kananook Creek (suitable for secondary contact).
5	Access	Increase access to and along waterways from 30% to 34% (about 2 km) by filling gaps in existing path networks, improving connections to foreshore trails and maintain access for on-water activities.
6	Participation	Increase participation rates from low to high; support community groups and capacity building programs for business/industry. Engage with schools to increase citizen science participation.

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

Notes:

Kananook Creek Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) score is moderate, meaning most of the expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant riparian species of bird occurring in this area include the powerful owl and several listed species of (estuarine) shorebird.
low	mod.	mod.		Fish are currently rated as low due to a lack of suitable habitat (instream and riparian). This is largely a result of extensive urbanisation, stormwater, channel modification 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, stormwater and fish passage will provide suitable habitat for a wider range of species and contribute to a moderate rating in the long term. Threatened dwarf galaxias are known to occur in this sub-catchment.
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. Significant species include southern toadlet.
very low	very low	low		Macroinvertebrates score is very low due high levels of urbanisation and channel modification which has impacted many of the environmental conditions. Improvements to stormwater and riparian and instream habitat through vegetation management over the long term are predicted to increase score to low.
n/a	n/a	n/a		Platypus are no longer expected to be found in this sub-catchment as a result of large-scale urbanisation, lack of suitable habitat and isolation from other populations. For this reason, there is no assessment or setting of targets.
low	very low	low		Vegetation is low as much of the riparian vegetation is degraded from urbanisation impacts. Without management of existing threats like pest plants and animals and in the face of climate change score is likely to drop to very low. Protecting the best areas, preventing further decline and improving priority reaches will ensure current score is maintained.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
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	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.
low	very low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is low and the target is low.
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.
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.
low	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 low and the target is moderate.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	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.

Banyan Waterhole (aka Boundary Road Wetland)

Description

Banyan Waterhole is a formally recognised Important Bird Area. The site is adjacent to Boundary Road, Carrum Downs and is part of the Eastern Treatment Plant land. The wetland is an ephemeral freshwater wetland which is a remnant of the formerly much larger Carrum Carrum Swamp. It is comprised of a large body of open water, with a well-vegetated shoreline and floodplain, dominated by graminoids, grasses and herbs.

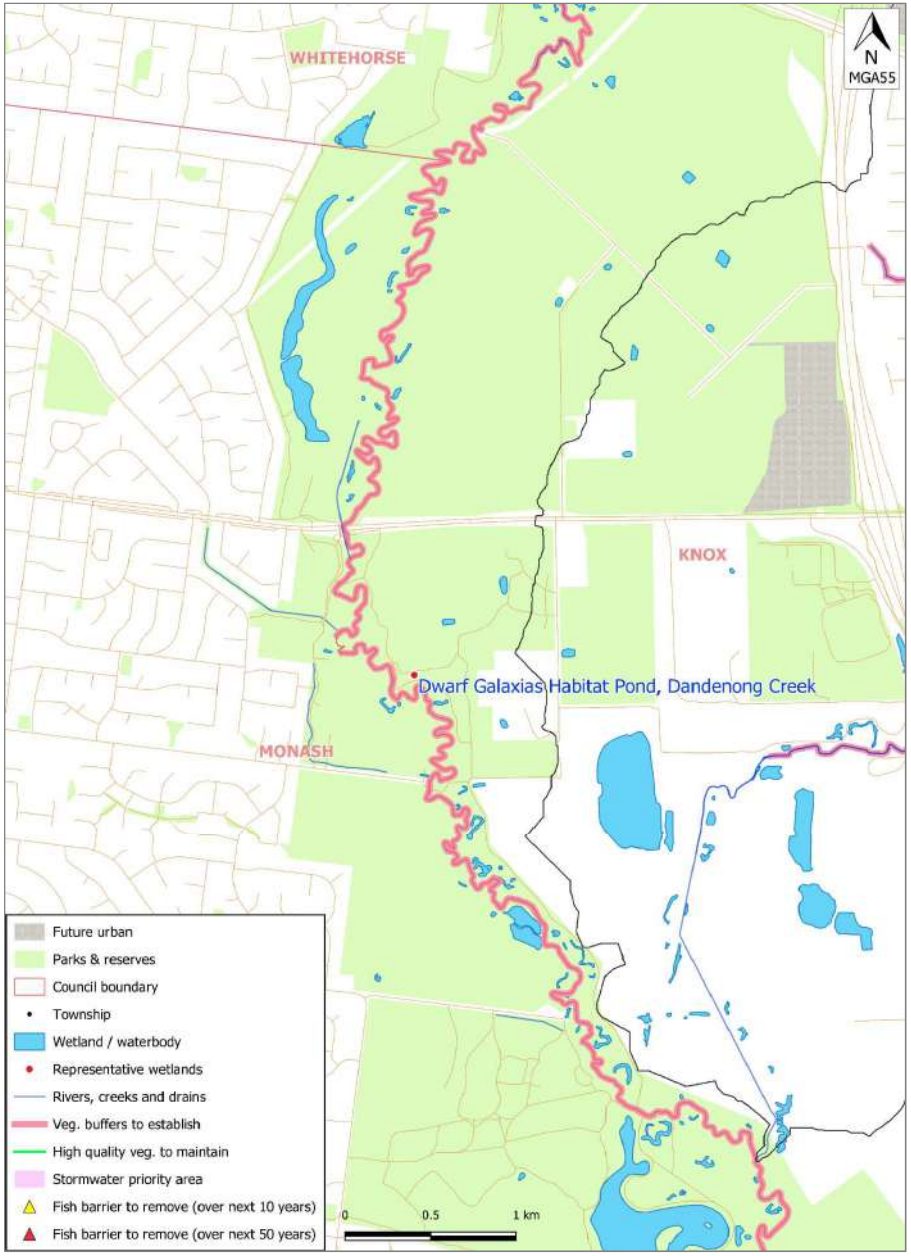
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Improve the wetland buffer to cover 50% of the wetland perimeter.
2	Unaligned	Reduce the threat of foxes and domestic cats and dogs to moderate.

Banyan Waterhole (aka Boundary Road Wetland)

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		The wetland bird score is currently very low. The wetlands currently have very low vegetation condition. The wetland bird score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	mod.	mod.		The frog value score for Kananook Creek Sub Catchment is currently very low with a current trajectory of improvement to moderate. Improvements to the environmental conditions will continue this positive trajectory to moderate value.
	very low	very low	mod.		The wetland vegetation value is currently very low, however, improvements to environmental conditions including wetland vegetation condition, wetland habitat form and wetland buffer are predicted to improve the vegetation value to moderate.
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.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Dwarf Galaxias habitat ponds - created along Dandenong Creek



Description

The dwarf galaxias habitat ponds were built to assist with conservation of the Federal Environment Protection and Biodiversity Conservation Act and the Victorian Flora and Fauna Guarantee Act listed species. They are a series of 20 ponds providing significant refuge habitat for the species, which are particularly sensitive to drainage and channelisation of floodplain wetlands. The ponds provide significant habitat for many of our environmental values.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Maintain critical water regime components in wetlands along Dandenong Creek to protect wetland environmental values, Yarra pygmy perch and dwarf galaxias.
2	Unaligned	Monitor threat levels from invasive fish species on dwarf galaxias and mitigate risks if required.
3	Vegetation condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.

Dwarf Galaxias habitat ponds - created along Dandenong Creek

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	low	low	The wetland bird score is currently low. The wetlands are not formally recognised as significant bird habitat and their vegetation condition is expected to remain low. The wetland bird score is also expected to remain low.
	very high	very high	very high	The fish value is currently very high and is predicted to remain very high. This site is managed specifically for the protection of the listed dwarf galaxias. Maintenance of the water regime and ensuring the threat from invasive fish species remains low is predicted to maintain the fish value.
	high	mod.	high	The frog value score is currently high and is predicted to remain high in the long-term.
	low	low	mod.	The vegetation value score is currently low. It is predicted to improve to moderate in the long-term through maintenance of the water regime, leading to improvements in vegetation value.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	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.
	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.
	low	low	low	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is low.
	mod.	very low	low	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Eastern Treatment Plant

Description

While the primary function of Eastern Treatment Plant is to treat sewage from Melbourne's East and South East, the site also provides habitat for environmental values. Along with the nearby Edithvale-Seaford Wetlands, the ETP is part of the Carrum Wetlands Important Bird Area (IBA) and supports many bird species of regional, state, national and international conservation significance. Species for which the IBA is globally important are the sharp-tailed sandpiper, blue-billed duck, chestnut teal and Australasian bittern.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Identify opportunities to further re-engage the natural wetland area including the Golden Triangle.
2	Unaligned	Reduce threat from invasive fauna to moderate.
3	Buffer	Improve wetland buffer to 50 per cent of wetland perimeter, where possible without interfering with operational requirements.

Eastern Treatment Plant

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	mod.	mod.	mod.		Although significant bird species have been recorded at the site and the site is listed as important bird habitat, low vegetation condition limits the value of the site as bird habitat. The wetland bird value score is currently moderate and is expected to be maintained at moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	mod.	mod.		The frog value score for Kananook Creek Sub Catchment has been applied to the Eastern Treatment Plant. The score is currently very low with a current trajectory of improvement to moderate. Improvements to the environmental conditions will continue this positive trajectory to moderate value.
	low	low	mod.		The wetland vegetation value is currently low and is predicted to remain low under the current trajectory scenario. With improvements to wetland habitat form, buffer and vegetation condition at some wetlands within the site, the vegetation value is predicted to improve to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	low		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is low.
	low	low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is moderate.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Seaford Wetland

Description

Edithvale-Seaford Wetlands represent remnant ecosystems of the once extensive Carrum Carrum Swamp , separated from the sea by a beach ridge-dune barrier system. The wetlands have long been recognised as supporting important habitat for birds. The significance of the wetlands was acknowledged by their inclusion in the Directory of Important Wetlands in Australia in 2006 and listing as wetlands of international significance in 2001 under the Ramsar Convention. While the wetlands form one Ramsar site, they have slightly different values, hydrological function and sensitivity to threats.

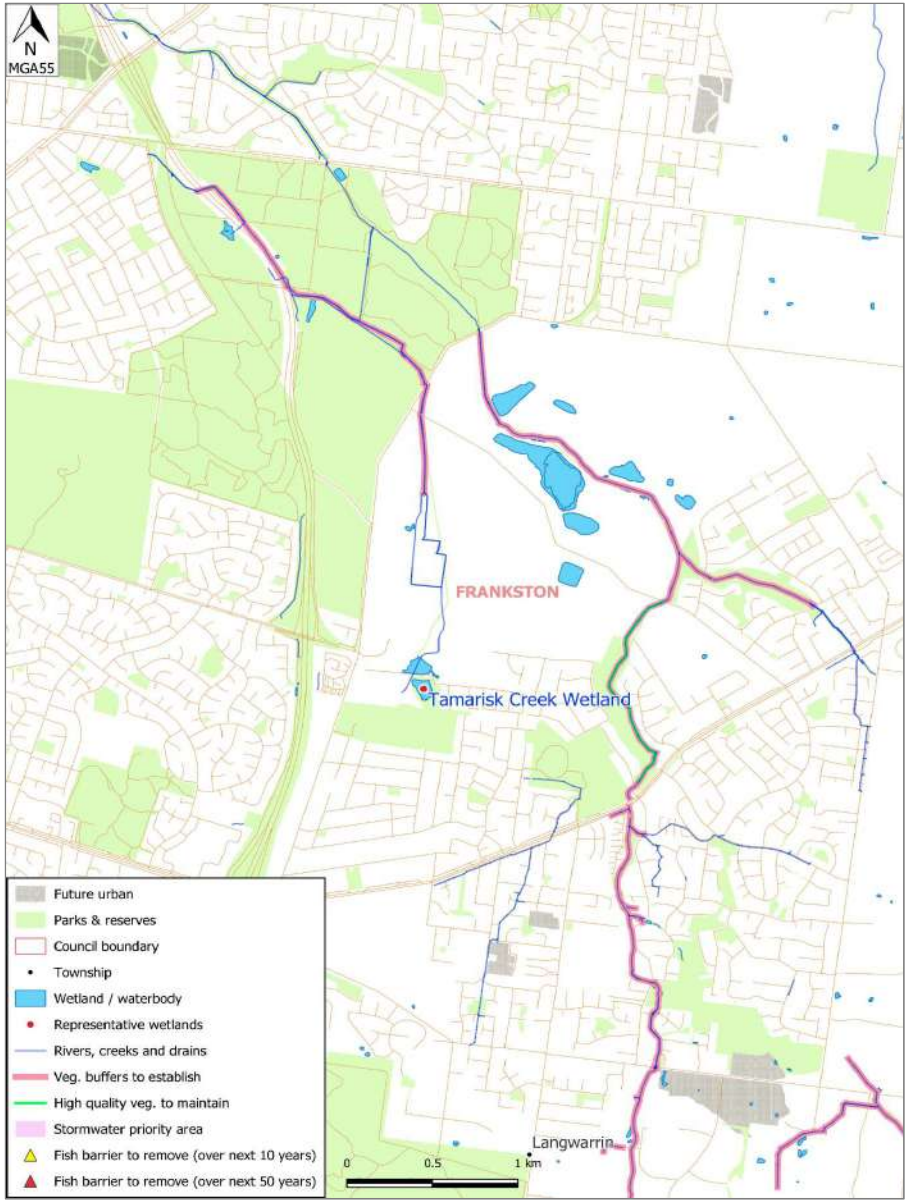
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Unaligned	Reduce the threat of rabbits, foxes, pigs and domestic cats and dogs to moderate.
2	Unaligned	Continue to implement Ramsar monitoring program in accordance with the new Guidelines for Ramsar site monitoring and evaluation to inform performance against the limits of acceptable change.
3	Unaligned	Implement priority actions from the Edithvale Seaford Ramsar Wetlands Site Management Plan, 2016.
4	Wetland buffer condition	Scope and prepare for the migration of wetland values to the wetland buffer zone on public land at Downs Estate to the North East of the current site.
5	Unaligned	Incorporate the Downs Estate in the Ramsar Site Boundary.
6	Wetland water quality	Ensure acid sulfate soils disturbance is kept to a minimum and that is there is any disturbance appropriate management techniques are employed.
7	Vegetation condition	Reduce the threat of salt tolerant weeds (e.g. spiny rush) to low.
8	Wetland water quality	Maintain critical water regime components in Edithvale wetlands to protect wetland environmental values.
9	Wetland buffer condition	Prepare the wetland buffer to include likely area of wetland migration and infill existing areas of the current wetland buffer.

Seaford Wetland

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	high	high		Seaford wetland is internationally recognised under the Ramsar Convention for its wetland bird habitat. The wetland bird value score is currently high and is supported by maintenance of the moderate vegetation condition.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	mod.	mod.		The current frog value score for Kananook Creek Sub Catchment has been applied due to a data gap. The frog value score at Seaford wetland is currently very low. Predicted improvements to environmental conditions are likely to improve the frog value to moderate.
	mod.	very low	mod.		The vegetation value score is currently moderate, with a current trajectory of very low due to predicted climate change impacts. In the long-term the vegetation value could be maintained at moderate through protection of the wetland water regime, improving wetland buffer condition and maintaining wetland vegetation condition through controlling the threat of weeds. Climate change adaptation strategies are required to mitigate key predicted impacts.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	low	very low	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.
	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.

Tamarisk Waterway Reserve, Langwarrin



Description

Tamarisk Waterway Reserve is an ephemeral wetland in Langwarrin that provides habitat for dwarf galaxias and swamp skink. The 2.6 ha site owned by Melbourne Water has adjacent properties with native vegetation; Studio Park (managed by Frankston Council) to the south and west and Tamarisk Wetland to the North (managed by Hanson).

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation condition	Ensure appropriate aquatic macrophyte habitat is protected in the habitat ponds.
2	Water regime	Maintain water regime to meet ecological water needs for dwarf galaxias needs.
3	Unaligned	Monitor threat levels from invasive fish species on dwarf galaxias and mitigate risks if required.
4	Unaligned	Reduce threat from foxes, and domestic cats and dogs.
5	Wetland buffer condition	Improve wetland buffer to 50 per cent of wetland permitter.

Tamarisk Waterway Reserve, Langwarrin

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	The wetland bird score is currently very low. The wetlands are not formally recognised as significant bird habitat and their vegetation condition is moderate. The wetland bird score is expected to remain very low.
	very high	mod.	very high	The wetland fish value is currently very high with significant fish species present, however, the current trajectory is predicted to result in a decline to moderate. In the long-term, the fish value is predicted to remain very high supported by improvements to habitat form, buffer condition and maintenance of moderate vegetation condition.
	very low	mod.	mod.	The current frog value score for Kananook Creek Sub Catchment has been applied due to a data gap. The frog value score at Tamarisk Waterway Reserve is currently very low. Predicted improvements to environmental conditions are likely to improve the frog value to moderate.
	mod.	mod.	high	The vegetation value score is currently moderate. In the long-term the vegetation value at Tamarisk Waterway Reserve Wetlands is predicted to improve to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	very high	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 very high.
	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.
	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.

Kananook Creek Estuary

Description

Kananook Creek estuary is in Frankston and was one of the original outlets for the Carrum Carrum Swamp to Port Phillip Bay. It is about 7.5 km long and limited by the Eel Race Drain outfall. The entrance, at Frankston, is about 10 metres wide and is dredged so that it is continuously open. A pumping station transfers seawater from Patterson Lakes into the estuary to maintain flows.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine vegetation	Maintain remnant estuarine vegetation communities at moderate through targeting key invasive plant species.
2	Estuarine wetland connectivity	Improve floodplain connectivity to moderate.
3	Water quality	Ensure that estuary mouth management considers acid sulfate soil risk.
4	Unaligned	Climate change adaptation plans in place for social and environmental values associated with the estuary.
5	Access & Recreation	Maintain and support existing high value opportunities for access and recreation, including walking, cycling, boating and fishing activities.
6	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Kananook 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 the Kananook Creek. The estuary is not formally recognised as bird habitat, has very low current and low predicted estuarine vegetation condition and is fringed by a highly urbanised environment. The predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		The fish value score for the Kananook Creek is high and is predicted to remain high in the long-term. A good diversity of estuarine dependent species inhabit the estuary and are likely to remain.
	very low	very low	very low		The estuarine vegetation value in Kananook Creek is currently very low. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation, however, the estuary is fringed by highly industrialised and urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions.
	very high	very high	very high		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary, is currently very high and is expected to remain very high in the long-term; target is to maintain at very high.
	very high	very high	very high		Community Connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	very high	very high	very high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently very high and is expected to remain very high in the long-term if supply keeps up with population growth; target is to maintain at very high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	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 low	low	low		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very low and the target is low.
	mod.	very low	low		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is moderate and the target is low.
	very low	very low	low		Estuarine vegetation is associated with the extent to which estuarine vegetation extent and condition is modified. The current state is very low and the target is low.
	very low	very low	low		Estuarine wetland connectivity relates to the proportion of the estuary that is connected to its fringing wetlands. The current state is very low and the target is low.

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.

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