Co-Designed Catchment Program for the

Maribyrnong Catchment Region (including Moonee Ponds Creek)

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 Maribyrnong catchment region including Moonee Ponds Creek (Maribyrnong 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 Maribyrnong catchment region:

Australian Ecosystems
Australian Plant Society, Keilor Plains
Avondale Heights Community Garden
Brimbank City Council
Bunurong Land Council
Calibre Consulting
City of Melbourne
City West Water
Clearwater
Dalton Consulting Engineers
DELWP
E2Designlab
Environment First
Environment Protection Authority Victoria
Federation Horticulture and Environment Macedon Ranges
Friends of Holden Flora Reserve
Friends of Maribyrnong Valley
Friends of Moonee Ponds Creek
Friends of Steele Creek
Glenelg Hopkins CMA
Hive architecture
Hume City Council
Jacksons Creek EcoNetwork
Jacobs
Kensington Association
Kensington Community Children's Cooperative
Kororoit Institute
Macedon Ranges Shire Council
Maribyrnong City Council
Maribyrnong River Cruises
Melbourne Water
Moonee Valley Bicycle Users Group
Moonee Valley City Council
Moreland City Council
Municipal Association of Victoria
Office of Danny Pearson MP Member for Essendon
Parks Victoria
Port Phillip and Westernport CMA
Port Phillip EcoCentre
Resilient Melbourne
Spiire
Southern Rural Water
St. Albans Historical Society
Stanley Park Committee of Management
Stormwater Victoria
UDIA
University of Melbourne
Upper Deep Creek Landcare Network
VicRoads
Victorian Planning Authority
Villawood Properties
VR Fish
Maribyrnong Riverkeeper Association
Western Water
Wurundjeri Tribe Land and Compensation Cultural Heritage Council Aboriginal Corporation

Overview

The catchment includes the 41-kilometre long Maribyrnong River – the second major river in the Port Phillip and Westernport Region – which begins on the southern slopes of the Great Dividing Range, in the Cobaw Ranges. The Moonee Ponds Creek sub-catchment (which flows into the Yarra River) has also been included in this section, as it was part of the pilot sub-catchments for the development of this Strategy together with all sub-catchments in the Maribyrnong (Figure 1).

The joint catchments cover an area of around 1408 square kilometres. About 10 per cent of the Catchment retains its natural vegetation, 80 per cent is used for agriculture and 10 per cent is urban (confined to greater Melbourne and larger townships).

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

Population modelling shows that the Catchment will increase from some 600,000 people to over 800,000 in the next 20 years, which will require an additional 5000 dwellings per year. A drier climate in an increasingly paved landscape poses a very real threat to the long-term values of the rivers and creeks, wetlands and estuaries while at the same time increasing the importance of those spaces as a green and cool respite from the urban landscape.

Many wetlands are encroached by urban development reducing the wetland area and losing the protection of a buffer of native vegetation. Groundwater-fed wetlands in this catchment are predicted to be most likely impacted by climate change.

Predicted sea level rise will impact the future condition of the region's estuaries and the values that they can support. Without planning for landward migration of estuarine vegetation, existing ecological values may be lost due to an increasingly saline environment.

If current policy and levels of investment are maintained, without improvement, then it is likely that the Maribyrnong catchment region 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.

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.

Figure 1 Sub-catchments and waterway assets including a sub-set of wetlands.

Collaborative design (co-design)

In April 2017, the *Catchment Collaborations* commenced to develop the refreshed *Healthy Waterways Strategy* for the Maribyrnong 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:

- Three pop-up listening posts were held in Essendon, Lancefield and Keilor West
- Seven workshops were held with over 131 participants representing around 64 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

April 2017
Maribyrnong Catchment Collaborations commenced

December 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 Maribyrnong catchment

> "Targets should aim for improvement – don't just expect it to remain 'Very Low', want to see improvement (especially from pollution)"
>
> – from discussion on Stony Creek targets

> "Major waterway challenges – strategy would benefit from a section or sections identifying what the strategy considers to be the major waterway challenges. For example: population increase, development pressures, climate change, major planned infrastructure (e.g. outer metro ring road)"
>
> – from discussion on the Draft Strategy from workshop seven

VISION

A Maribyrnong (and Moonee Ponds Creek) whose ecological health has significantly improved since 2018. It is accessible, used and valued by the community. Its collaborative management reflects the contributions of Traditional Owners and the broader community.

GOALS

1. **Environmental:** Management is helping create a preferred future for the Maribyrnong and Moonee Ponds Creek's environments by assisting species and habitats to change, adapt, move or be replaced as the catchment and climate change. The Maribyrnong River, Moonee Ponds creek and their tributaries are important bio-links – corridors of secure, high quality habitats that allow plants and animals to move and adapt to changes in catchment conditions and climate. Water quality and flows provide for healthy and diverse populations of plants and animals. Stormwater is managed to enhance rather than destroy waterway health.
2. **Social:** Waterways across the Catchment are places that provide continuous, connected and accessible open spaces for public enjoyment and recreation.
3. **Education:** Public authorities, community groups and hundreds of individuals across the catchment share their knowledge of the Maribyrnong and take regular action to help pursue this strategy's goals. Education programs are resourced and coordinated across many organisations that are working or involved within the catchment.
4. **Decision-making and action:** Long-term monitoring supports adaptive management by tracking progress towards this strategy's goals. Urban planning decisions make explicit reference to their potential impacts on waterway environments. Victorian planning schemes include overlays to protect the river, its tributaries, floodplains and escarpments. Effects of planning decisions are monitored to support evaluation and learning. Melbourne Water is seen by all parties to the strategy as a successful facilitator, enabler, coordinator and leader.

Waterways of the West

A new Ministerial Advisory Committee (MAC) for Waterways of the West will work with communities and Traditional Owners to develop a set of recommendations for government consideration. These may further support the achievement of this strategy's vision. These recommendations may draw on the lessons from the Stony Creek investigation following the 2018 fire in Footscray.

What we heard

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

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

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

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 Maribyrnong 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.

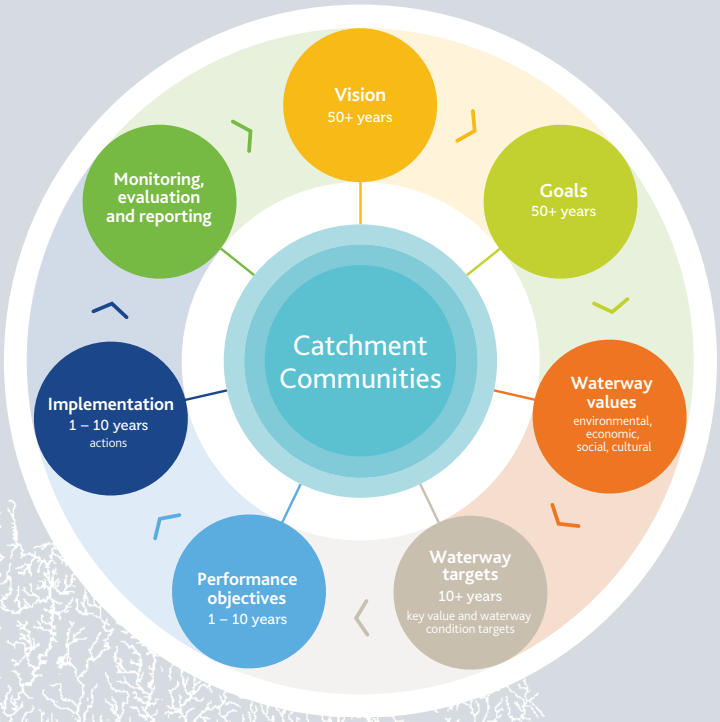


Figure 4 Program logic outlining process towards achieving the vision and goals.

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 land and waters of this region hold deep spiritual and cultural significance for Aboriginal Peoples. The people of the *Woi wurrung* language group were the original occupants of this land, as evidenced by the thousands of cultural sites and places recorded, most near watercourses. Ancient and very rare sites with earthen rings can be found in the hills near Sunbury.

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.

Streams and reservoirs in the upper and middle parts of the catchment provide water supply for a range of agricultural enterprises.

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 Maribyrnong catchment region there are over 350 bird species recorded of which 95 species are riparian specialists. The overall score for fish is low with threatened freshwater species including Australian grayling, Yarra pygmy perch and the Australian mudfish. Threatened frog species include the growling grass frog, Bibron's toadlet and the southern toadlet.

Much of the higher vegetation and macroinvertebrate value areas are in the forested upper catchment with degradation increasing towards the lower reaches.

Platypus have been observed in the lower reaches of Jacksons Creek near Sunbury, Deep Creek Upper and Lower, and in the Maribyrnong River near the junctions with these creeks with likely presences in other streams.

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 Maribyrnong catchment region social values for streams are currently high. Social values for estuaries range from moderate to very high. There is currently no data for social values of wetlands. Social values are based on data from a Melbourne Water survey, Community Perceptions of Waterways. Participants from the greater Melbourne area gave feedback on how and why they use waterways and their level of satisfaction. Social values are threatened by inappropriate urban development, poor environmental condition, poor access to waterways, and pollution.

Waterway Targets

Key Values

A sub-set of nine key values have been chosen in this Strategy as representative measures of waterway values (Figure 5). Not all features of waterways can be effectively assessed and tracked, so these nine were chosen by science and collaborative teams on the basis of:

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

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

Assumptions and limitations:

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

Figure 5 Nine key values of this Strategy

Waterway Conditions

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

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

Rivers, wetlands and estuaries have a different set of conditions that support their specific environmental values, and these are summarised in Figure 6.

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

Stormwater condition:
The impact of stormwater on waterways.

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

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

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

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

Instream connectivity:
Ability of uninhibited fish passage.

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

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

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

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

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

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

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

Rivers and Creeks Performance Objectives

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

- **Flow regime:** Changes from 'natural conditions' to the flow regime.
- **Tidal exchange:** The ability of sea water and fresh water to mix in the estuarine environment.
- **Longitudinal extent:** Considers the proportion of estuary affected by constructed barriers that interfere with the movement of water **(in a typical year).**
- **Water quality:** Water quality indicators such as nutrients, water clarity (turbidity), dissolved oxygen, pH and metals.
- **Estuarine vegetation:** The extent to which estuarine vegetation extent and condition is modified.
- **Estuarine wetland connectivity:** The proportion of the estuary that is connected to its fringing wetlands.

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

- **Access:** Accessibility to and along waterways and corridors.
- **Recreational water quality:** The waterway water quality suitable for primary and secondary contact recreation.
- **Vegetation extent:** Extent of continuous indigenous vegetation cover within a defined width either side of the river.
- **Litter absence:** Litter detracts from people's enjoyment of waterways and can be detrimental to wildlife.
- **Participation:** Amount of participation in waterway stewardship activities.

Figure 6 Waterway conditions that underpin key values

Assumptions and limitations:

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

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

Performance Objectives

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

Performance objectives:

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

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

Trajectories

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

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

Current Trajectory

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

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

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

Target Trajectory

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

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

Understanding the trajectories

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

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

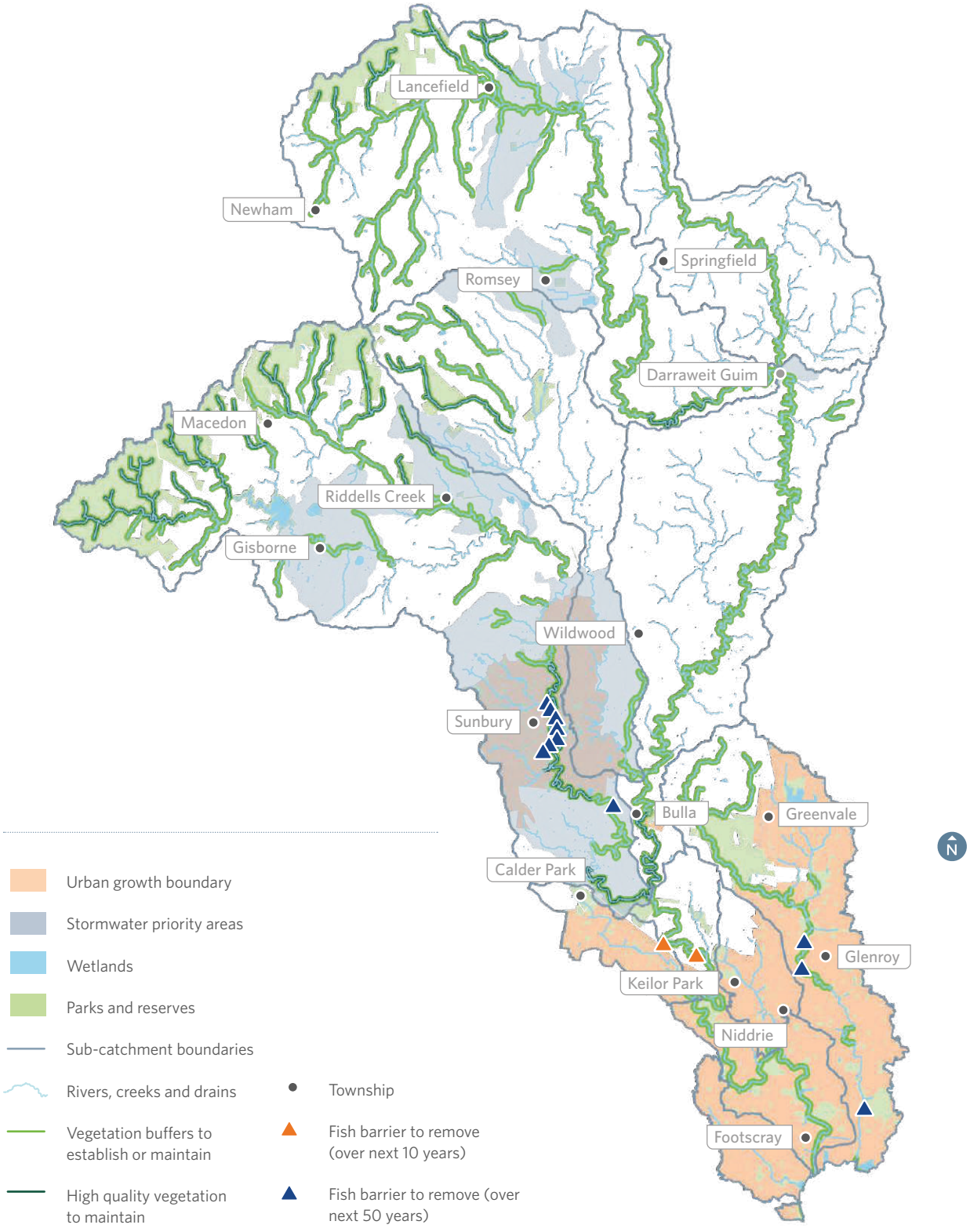


Figure 7 Summary of priorities in the Maribyrnong catchment region

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 Maribyrnong Catchment Region (including Moonee Ponds Creek)

This section provides:

- A summary of priorities in the Maribyrnong catchment region (Figure 7)
- Regional performance objectives that apply across all five major catchments in the *Healthy Waterways Strategy* including the Maribyrnong 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 Maribyrnong catchment region
- Detailed information for all ten sub-catchments, sub-set of five wetlands and three estuaries in the Maribyrnong 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.*

Maribyrnong Catchment Region (including Moonee Ponds Creek) 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 for the Maribyrnong Catchment Region (including Moonee Ponds Creek).

Overview of Performance Objectives for Rivers
Progressively implement stormwater harvesting, focusing on rural townships such as Lancefield, Romsey, Macedon and Mt Macedon and new urban areas such as Sunbury. Once this catchment has reached its anticipated long-term urban footprint (2050), this will require around 15 GL/year of stormwater harvested and 3.9 GL/year infiltrated. Ensure directly connected imperviousness (DCI) levels in these priority catchments do not increase beyond current levels and headwater streams are retained as features in the landscape for environmental and social benefits.
Investigate options to increase the environmental water reserve by 5 GL/year by 2028 to meet ecological watering objectives and cover projected shortfalls. This will benefit Jacksons Creek and the lower Maribyrnong River. Any water ecovery for the environment will be considered through the Victorian SWSs, markets and use of alternative water.
Protect refuge reaches and key flow components to support instream values including platypus.
Reduce the key threat of flow stress on waterways by addressing factors such as domestic, stock and agricultural uses, climate change, diversions or urbanisation.
Establish 407 km and maintain 297 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 74 km of high and very high quality vegetation (vegetation quality levels 4 and 5) through effective monitoring and management of threats.
Investigate and mitigate threats to physical form (eg erosion) and other high values in the Boyd Creek, Deep Creek Lower, Deep Creek Upper, Emu Creek, Jacksons Creek and Moonee Ponds Creek sub-catchments.
Increase access to and along waterways by 36 km by improving connections with existing path networks and extending paths into new urban area. Investigate opportunities to improve access for on-water activities.
Reduce nutrient and sediment runoff from rural land through improved management of 530 ha of land including works to protect and increase vegetation along headwater streams.
Provide connectivity for fish along major waterways through the removal of two more barriers by 2028. This will improve fish passage from the estuary to the mid-catchment and along Deep Creek.
Conserve all currently listed water dependent species and communities (10 fauna species, 41 flora species and 25 EVCs) through habitat protection, research and monitoring.

Maribyrnong Catchment Region (including Moonee Ponds Creek) Overview - Rivers

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

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds score for rivers is moderate overall. There are over 350 bird species recorded, of which 95 species are considered riparian specialists and two are considered threatened: Latham's snipe and the eastern great egret. Today, bird values are high in Deep Creek Upper and Boyd Creek, but low in Emu Creek and Steele Creek. Birds scores are considered likely to decline over time. The target is to maintain to moderate.
low	low	mod.		Fish score is low overall, with 13 native and nine exotic freshwater species recorded. These include the threatened freshwater species Australian grayling, Yarra pygmy perch and Australian mudfish. Fish score is considered likely to improve over time. The target is to improve from low to moderate.
mod.	low	mod.		Frogs score is moderate overall, which means not many of the expected species are to be found today. Threatened species recorded in the catchment include growling grass frog, Bibron's toadlet and southern toadlet. Frogs score is considered likely to decline with time unless the performance objectives outlined in this Strategy are achieved. The target is to maintain at moderate.
mod.	low	high		Macroinvertebrates score is moderate, with values higher in forested headwaters and decreasing towards the lower reaches, which are increasingly impacted by urban runoff. Macroinvertebrates score is considered unlikely to improve with time unless the performance objectives outlined in this Strategy are achieved. The target is to improve from moderate to high.
mod.	very low	mod.		Platypus have been observed in the lower reaches of Jacksons Creek near Sunbury, Emu Creek Lower, Deep Creek Upper and Lower, and in the Maribyrnong River near the junctions with these creeks. Platypus score is considered likely to decline from moderate to very low unless the performance objectives outlined in this Strategy are achieved. Target is to maintain current score and populations.
low	very low	mod.		Vegetation score varies, with upper forested areas very high due to extensive high quality vegetation, and other parts of the catchment low to very low due to land clearing and urban development. Overall score is low and likely to decline under the current trajectory. The target is to improve from low to moderate.
high	mod.	high		Amenity score, which is based on level of satisfaction, is currently high but likely to decline in the long term. The target is to maintain as high.
high	mod.	very high		Community connection score, which is based on level of satisfaction, is currently high but likely to decline in the long term. The target is to improve to very high.
high	mod.	very high		Recreation score, which is based on level of satisfaction, is currently high but likely to decline in the long term. 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		
mod.	mod.	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is moderate and the target is high.
mod.	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
mod.	low	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is high.
mod.	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is moderate.
low	low	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is low and the target is high.
low	low	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.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
low	low	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.
high	mod.	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	low	very high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is moderate and the target is very high.

Maribyrnong Catchment Region (including Moonee Ponds Creek) Overview - Wetlands

Overview of Performance Objectives for Wetlands
Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, and cultural and social values.
Reduce the threat of invasive plants on wetland vegetation communities.
Improve the buffer of native vegetation surrounding key wetlands.
Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance these values.

Maribyrnong Catchment Region (including Moonee Ponds Creek) Overview - Wetlands

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

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	low		Wetland bird score is currently very low across the catchment. Some improvements to wetland water regime, habitat form and vegetation condition may improve the score in some areas. However, the impacts of climate change and reduced periods of wetlands inundation, and the extensive urban growth in the catchment will continue to provide risk to birds. The overall target is to improve from very low to low.
	n/a	n/a	n/a		Fish Very little data exists for wetland fish and a metric for wetland fish in this region will be developed through the Strategy implementation.
	low	low	mod.		Frogs score for wetlands is currently low and is predicted to remain low, as decreased frequency and duration of wetlands inundation will affect the frog community. However, improvements to wetland water regime, habitat form and vegetation condition will enable the frog score to increase to moderate.
	very low	very low	low		Wetland vegetation score is currently very low overall. Decreased frequency and duration of wetland inundation will impact the vegetation condition. However, improvements to wetland water regime, habitat form and vegetation condition will somewhat mitigate the predicted impacts of climate change and urban growth and enable the vegetation score to increase to low for wetlands.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	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.
	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.

Maribyrnong Catchment Region (including Moonee Ponds Creek) Overview - Estuaries

Overview of Performance Objectives for Estuaries
Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
Enhance estuarine emergent vegetation condition that provides instream habitat.
Reduce threat of invasive plant species to significant estuarine vegetation communities.
Investigate opportunities to improve access for on-water activities, and improve connections with existing path networks.
Maintain recreational water quality within the Maribyrnong estuary so that it suitable for secondary contact (boating and fishing)
Enhance site appropriate opportunities for recreation (boating, fishing, walking/cycling).
Enhance site appropriate facilities that support passive enjoyment and recreation.

Maribyrnong Catchment Region (including Moonee Ponds Creek) 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 for estuaries is currently very low. The estuaries are fringed by highly urban environments and the predicted climate change impacts will further erode suitable wetland bird habitat.
high	high	high	Fish score for estuaries is high and is predicted to remain high in the long term. A good diversity of estuarine dependent species inhabits the estuaries and are likely to remain. There are also several estuarine species, including black bream, yellow-eye mullet and mulloway.
very low	very low	low	Estuarine vegetation score is currently very low and likely to continue to decline. Adopting some climate change adaption strategies may mitigate some of the risk to estuarine vegetation and improve the vegetation value score to low. The estuaries are fringed by highly urbanised environments allowing little potential for estuarine vegetation communities to migrate into more favourable less saline conditions.
mod.	mod.	high	Amenity score is moderate with a current trajectory of moderate. Increased tracks, pathways and other facilities, along with improvements to estuarine vegetation are predicted to improve the amenity score to high.
very high	very high	very high	Community connection score is very high and will remain very high. Community groups are active for estuaries in this catchment.
mod.	mod.	high	Recreation score is moderate with a current trajectory to maintain at moderate. The target is to increase 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.
mod.	high	high	Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is moderate and the target is high.
very low	very low	mod.	Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
very low	very low	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."

– Tony Smith, active member of Friends of Moonee Ponds Creek and Friends of Maribyrnong Valley






"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."

– Helen van den Berg, spokesperson for Friends of Steele Creek and Rivers of the West

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

Deep Creek Lower

Deep Creek Upper

Emu Creek

Jacksons Creek

- Gisborne Marshlands

Boyd Creek

Maribyrnong River

- Pipemakers Park Wetlands
- Maribyrnong River Estuary

Moonee Ponds Creek

- Greenvale Reservoir Park Wetlands
- Jacana Wetlands
- Queens Park Wetlands
- Moonee Ponds Creek Estuary

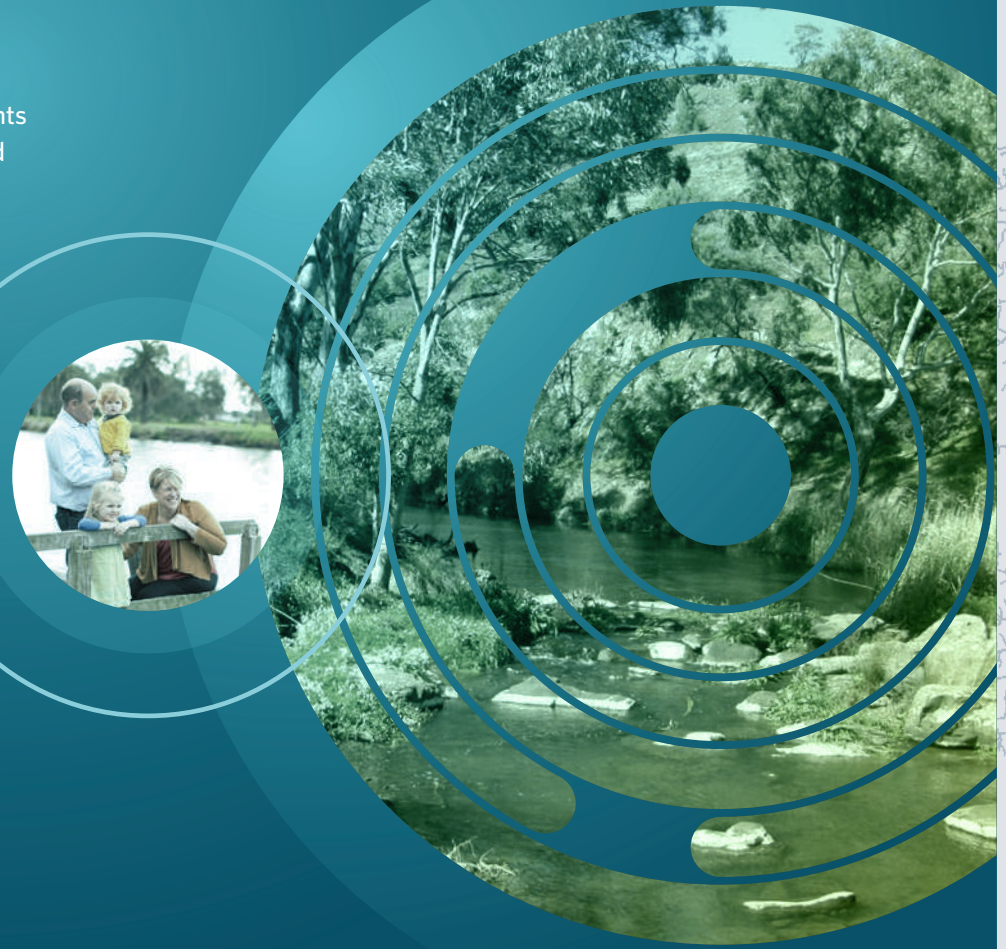
Steele Creek

Stony Creek

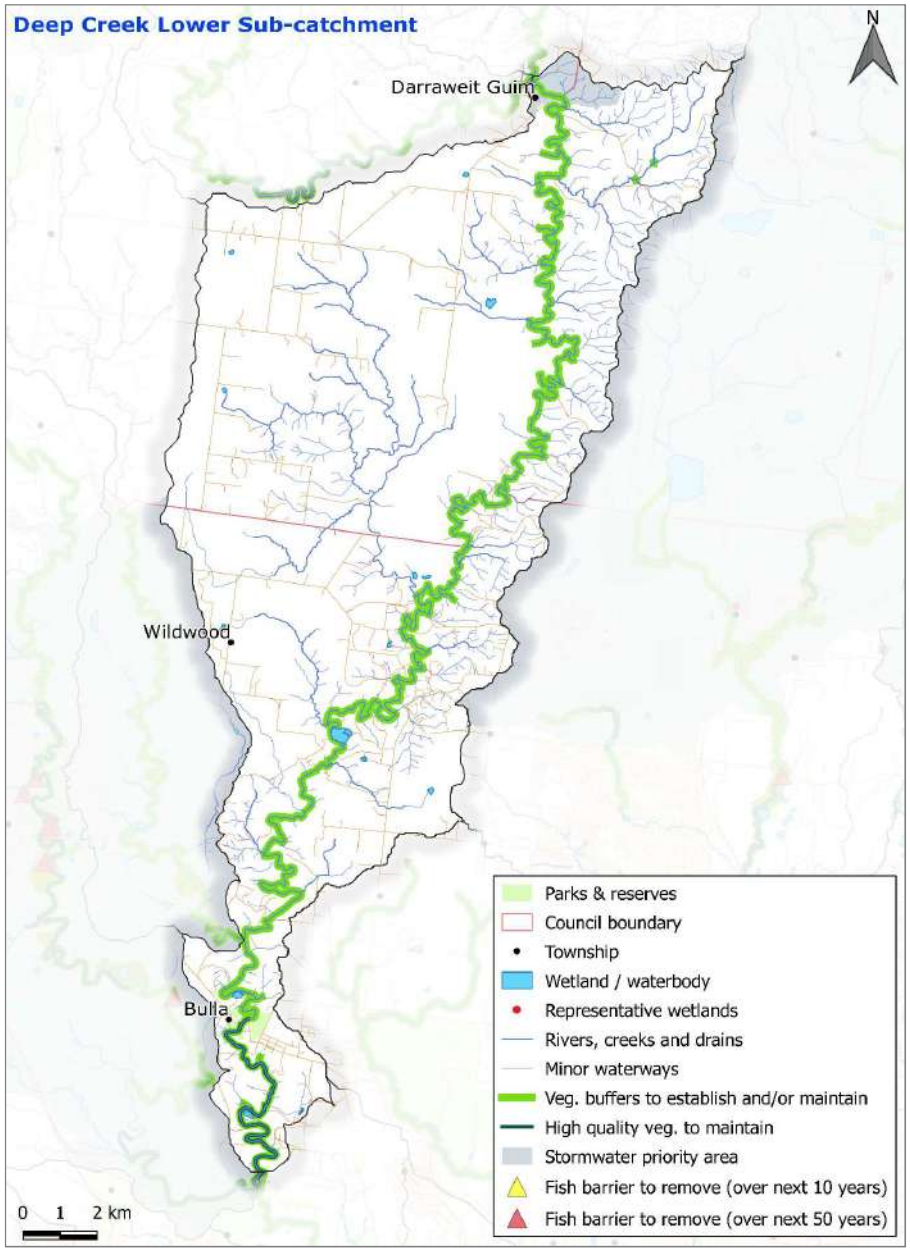
- Stony Creek (PPB) Estuary

Taylors Creek

Further information about the key value and waterway condition metrics.



Deep Creek Lower Sub-catchment



Description

Deep Creek rises near Newham in the Macedon Ranges and flows through the rural townships of Lancefield, Romsey and Darraweit Guim before joining Jacksons Creek at Bulla to become the Maribyrnong River. The lower Deep Creek catchment commences near Romsey. The two main tributaries in this area are Five Mile and Konagaderra creeks. The Deep Creek Lower sub-catchment has no areas of formal significance. It has limited areas of naturalness as a result of current and past landuse.

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.

"Landcare projects for biolinks – Romsey - Darraweit Guim - Bulla (fence and revegetation)"

"Rural land program – effluent management etc."

"Landholders guide to protecting environmental values and sustainable land use"

"Protect drought refuge habitats and improve environmental flows"

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

Deep Creek Lower Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Quality	Maintain or achieve high and very high quality vegetation (level 4 and 5 vegetation quality is currently 9 km) along Deep Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
2	Stormwater condition	Improve stormwater condition by treating existing and future urban development from Darraweit Guim so directly connected imperviousness (DCI) is below 1% prior to connection to Deep Creek. For every hectare of impervious area, this requires harvesting around 4.0 ML/y and infiltrating 0.8 ML/y.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (39 km, 154 ha) and maintain existing vegetation (39 km, 157 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus and Yarra pygmy perch populations.
5	Access	Improve access to and along waterways through extending Maribyrnong River Trail to Bulla and by additional paths and access points in townships and larger parks (about 5km of path).
6	Participation	Increase participation rates from high to very high; support community groups, connect with growth area communities and build capacity of land owners through rural programs.
7	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (particularly along tributaries).

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

Notes:

Deep Creek Lower Sub-catchment

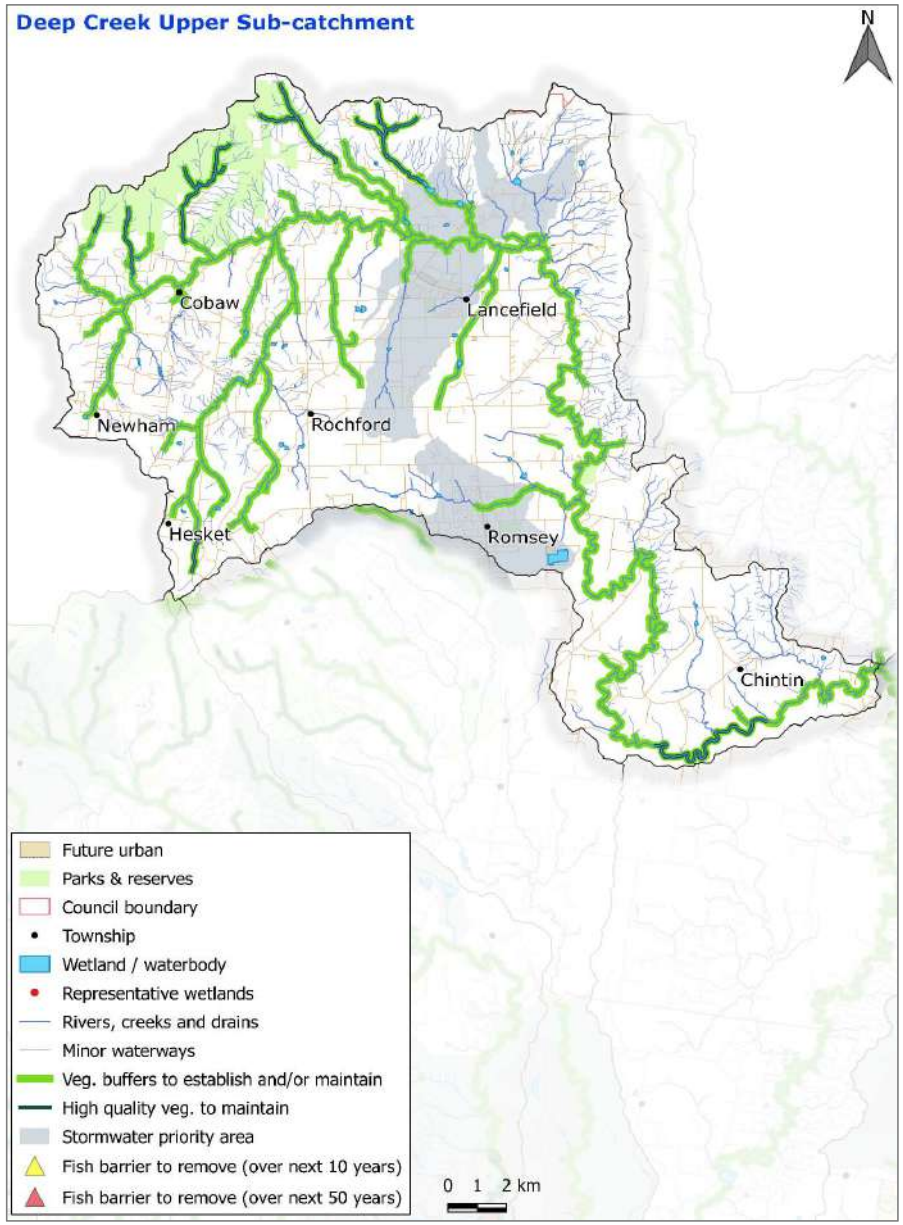
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, which means most expected species occur but some of these only infrequently. Protecting and improving riparian habitat will be balanced against adverse effects of land use intensification and climate change driven reductions in flow volumes and durations/seasonality and, potentially, water quality. Birds is likely to remain moderate overall.
low	mod.	very high		Fish are currently rated as low due to a lack of suitable habitat (instream and riparian) and barriers to migration along the Maribyrnong River. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to vegetation, flows, water quality and instream connectivity will improve habitat for a wider range of species and increase the score to very high in the long term. There are currently no known listed species in the sub-catchment.
high	low	high		Frogs score is high since many of the expected species were recorded. With targeted management score can be maintained despite impacts of land use intensification and climate change. Significant species include growling grass frog, southern toadlet and brown (Bibron's) toadlet.
mod.	low	high		Macroinvertebrates is moderate due to a lack of suitable instream and riparian habitat, flows and water quality, with a current trajectory of decline to low. Improvements to urban stormwater and rural land management will increase score to high over long term.
mod.	very low	mod.		Platypus is moderate due to a lack of flows and instream and riparian habitat, with a predicted decline to very low. Management of flows, urban stormwater and improvements to riparian vegetation is expected to maintain score as moderate in the face of climate change.
low	very low	mod.		Vegetation is low as quality and extent of riparian vegetation is largely degraded and threats such as pest plants and animals persist. With climate change score is predicted to decline to very low. Protection of the best areas and management of flows, pest plant and animal control and additional revegetation will improve some areas and increase overall score to moderate.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
low	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is low and the target is moderate.
low	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 low and the target is moderate.
mod.	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is moderate.
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.	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is moderate.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
high	mod.	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
High	mod.	Very High		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is High and the target is Very High.

Deep Creek Upper Sub-catchment



Description

Deep Creek rises near Newham in the Macedon Ranges and flows through the rural townships of Lancefield, Romsey and Darraweit Guim before joining Jacksons Creek at Bulla to become the Maribyrnong River. The upper reaches of Deep Creek lie above Romsey. Major tributaries within this area include Dry, Garden Hut, and Monument creeks.

Actions

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

"Drought refuge habitat protecting – Boyd and Deep Creeks – address salinity and suspended solids"

"Forest road management"

"Weed management"

"Use of fire for ecological protection and enhancement"

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

Deep Creek Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Maintain critical flow components in refuge reaches along Deep Creek to protect Yarra pygmy perch, platypus and other instream values.
2	Water for Environment	Reduce threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, diversions and climate change.
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (level 4 and 5 vegetation quality is currently 28 km) along Deep Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
4	Participation	Increase participation rates from high to very high; support community groups, connect with growth area communities and build capacity of land owners through rural programs.
5	Stormwater condition	Improve stormwater condition by treating existing and future urban development in Lancefield and Romsey so directly connected imperviousness (DCI) is below 1% in Five Mile Creek before Deep Creek confluence; and below 1% in Lancefield prior to Deep Creek connection. For every hectare of impervious area, harvest 5.0 ML/y and infiltrate 1.4 ML/y. For existing urban this is 0.5 GL/y and 0.2 GL/y for Lancefield, and 0.9 GL/y and 0.3 GL/y for Romsey. For new urban, further 0.3 GL/y and 0.1 GL/y is required for Lancefield and 1.0 GL/y and 0.3 GL/y for Romsey.
6	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land. This may include establishment of vegetated buffers in headwater streams.
7	Vegetation Extent	Establish a continuous riparian vegetated buffer (144 km, 575 ha) and maintain existing vegetation (54 km, 215 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
8	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (particularly along tributaries).
9	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.
10	Fish (value)	Investigate opportunities to translocate Yarra pygmy perch into suitable habitat along the creek corridor.

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

Deep Creek Upper Sub-catchment

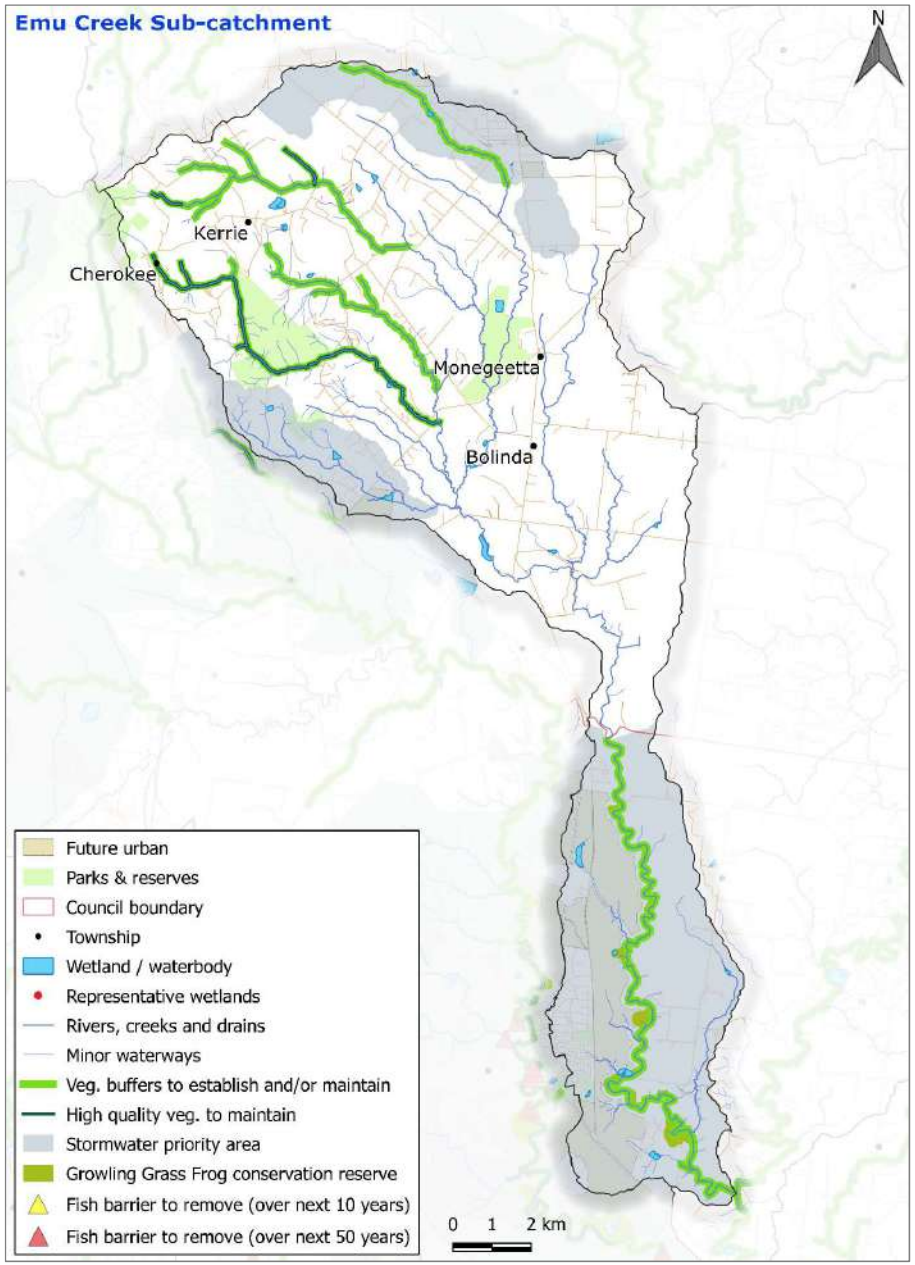
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, which means most expected species occur but some of these only infrequently. Protecting and improving riparian habitat will be balanced against adverse effects of land use intensification and climate change driven reductions in flow volumes and durations/seasonality and, potentially, water quality. Significant species is the powerful owl.
low	low	mod.		Fish are currently rated as low due to a lack of suitable instream and riparian habitat, together with barriers to migration along the Maribyrnong River. Significant species present include Yarra pygmy perch. Improvements to vegetation, flows (including urban stormwater) and removal of fish barriers will increase score to moderate and protect Yarra pygmy perch populations over long term.
low	low	low		Frogs score is low since few of the expected species were recorded. With targeted management can maintain frogs score but is unlikely to improve more due to land use intensification and climate change effects on the volume and timing of flows. Significant species include growling grass frog and brown (Bibron's) toadlet.
mod.	mod.	very high		Macroinvertebrates is moderate due to a lack of suitable instream and riparian habitat, flows and water quality. Improvements to flows, extensive revegetation and prevention of water quality decline is expected to increase score to very high over long term.
mod.	low	mod.		Platypus is moderate due to a lack in flows and instream and riparian habitat, with a predicted decline to low with impacts of a drier climate. Management of flows and improvements to riparian vegetation is expected to maintain current score in the face of climate change.
low	very low	mod.		Vegetation is low as much of the riparian vegetation is degraded with only few high quality reaches remaining in the headwaters. With existing threats such as pest plants and animals and climate change score is predicted to decline to very low. Protection of the high quality reaches and management of key threats will improve score to moderate.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
low	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is low and the target is moderate.
low	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 low and the target is moderate.
mod.	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is moderate.
low	low	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is low and the target is high.
low	low	low		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is low.
mod.	low	mod.		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is moderate.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	mod.	Very High		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is Moderate and the target is Very High.

Emu Creek Sub-catchment



Description

Emu Creek originates near Romsey and flows through basalt plains to join Deep Creek upstream of Bulla. Major tributaries include Main, Charlies, Bolinda, Dry and Duckhole creeks, all of which originate between the townships of Romsey and Riddells Creek. The Emu Creek sub-catchment includes the Mount Charlie Flora Reserve and other smaller flora reserves.

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.

"Living Rivers and stormwater programs"

"Protection and enhancement of Growling Grass Frog wetlands"

"Public access reserve"

"Water diversion management and compliance (including farm dams)"

"Cultural heritage protection"

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

Emu Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Stormwater condition	Prevent decline in stormwater condition by treating urban development in Emu Creek catchment (e.g. from new developments in Sunbury), so directly connected imperviousness (DCI) remains below 0.4% at the confluence with Deep Creek. For every hectare of new impervious area, this requires harvesting around 4.4 ML/y and infiltrating 1.1 ML/y, which is about 3.4 GL/y and 0.8 GL/y for full development to the urban growth boundary.
2	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land. This may include establishment of vegetated buffers in headwater streams.
3	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing sedimentation from run-off associated with construction for urban development. Identify and mitigate sources of sedimentation from development construction activities. This can be through education programs or enforcement actions.
4	Vegetation Quality	Maintain or achieve high and very high quality vegetation (level 4 and 5 vegetation quality is currently 14 km) along Emu Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
5	Water for Environment	Reduce threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, climate change, diversions or urbanisation.
6	Vegetation Extent	Establish a continuous riparian vegetated buffer (40 km, 159 ha) and maintain existing vegetation (33 km, 130 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
7	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (including impacts of urbanisation).
8	Access	Improve access to and along waterways through regional projects and by additional paths and access points in new urban areas, townships and larger parks (about 8 km of path).
9	Participation	Increase participation rates from moderate to very high; support community groups, connect with growth area communities and build capacity of land owners through rural programs.
10	Water Quality - Environmental	Protect water quality of Port Phillip Bay and waterways from industrial activity by reducing industrial pollutant levels detected in waterways. Identify and mitigate sources of industrial pollution. This can be through education programs, enforcement actions or disconnections from the stormwater system.

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

Emu Creek Sub-catchment

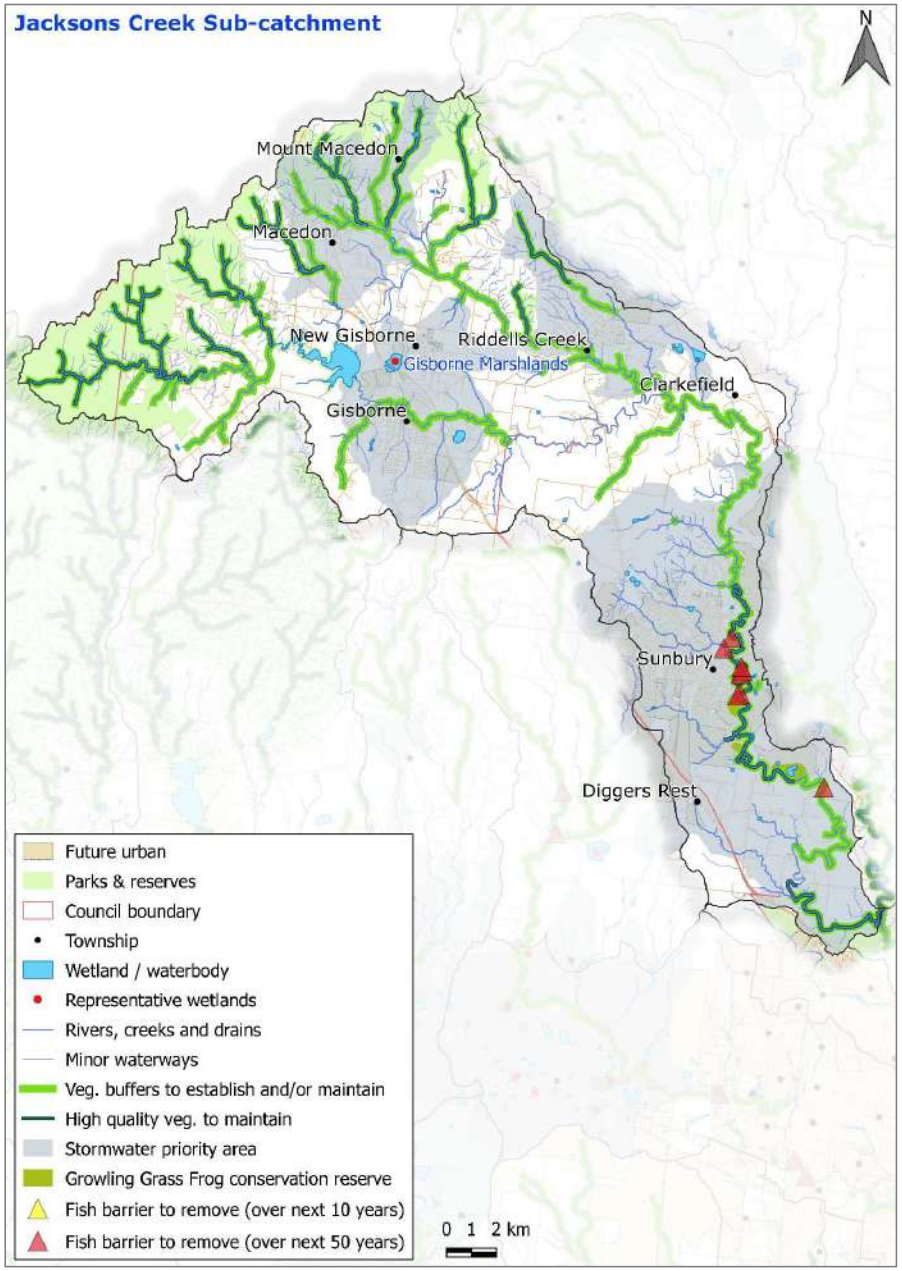
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		There is currently insufficient data to assess the birds (riparian) score in Emu Creek. The current trajectory score is moderate, which means most expected species occur but some of these only infrequently. Protecting and improving riparian habitat will be balanced against adverse effects of land use intensification and climate change driven reductions in flow volumes and durations/seasonality and, potentially, water quality.
low	low	mod.		Fish are currently rated as low due to lack of suitable instream and riparian habitat and barriers to migration along the Maribyrnong River. Improvements to fish passage, habitat and mitigation of urban impacts will improve habitat for a wider range of species and increase score to moderate over long term.
high	low	high		Frogs score is high since many of the expected species of frog were recorded. With targeted management score can be maintained despite impacts of land use intensification and climate change. Significant species include growling grass frog and brown (Bibron's) toadlet.
mod.	low	high		Macroinvertebrates is moderate as a result of lack of flows and instream and riparian habitat and is predicted to decline to low in the face of un-mitigated urbanisation and climate change. Management of urban stormwater, rural flows and water quality and improvements to riparian vegetation will increase score to high in long term.
mod.	low	mod.		Platypus is moderate due to a lack of flows and instream and riparian habitat. They are most likely to be found in the lower reaches near the confluence of Deep Creek. The score is expected to decline to low as a result of urbanisation and climate change. Management of stormwater and rural flows, as well as improvements to riparian vegetation is expected to maintain score as moderate.
low	very low	mod.		Vegetation is low as much of the riparian vegetation is degraded with only few high quality reaches remaining in upper reaches. Score is predicted to decline to very low due to persistent and emerging threats such as pest plant and animals and climate change. Long term outcome is to protect areas of remaining high quality and improve score to moderate.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Jacksons Creek Sub-catchment



Description

Jacksons Creek rises in Bullengarook, near Gisborne and flows through Sunbury before joining Deep Creek in Sydenham Park at Bulla near Melbourne Airport. Tributaries to Jacksons Creek include Riddells, Sandy, Turitable, Willimagongong, Gisborne, Longview and Barringo creeks. Rosslynne Reservoir is located on the upper Jacksons Creek and provides drinking water for Gisborne and Sunbury as well as for agricultural purposes.

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.

"Public access and buffer zones in rural townships"

"Erosion, sediment and pesticide management – forestry, recreational vehicles, rural land management"

"Stormwater management, reuse and targets to reduce and mitigate impervious surfaces"

"Protection of wetland (Gisborne Race Course)"

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

Jacksons Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Stormwater condition	Prevent decline in stormwater condition by treating urban development in the Jacksons Creek catchment (e.g. from new developments in Sunbury and Gisborne), so directly connected imperviousness (DCI) is maintained or improved along the main stem of Jacksons Creek. For every hectare of new impervious area, this requires harvesting around 4.5 ML/y and infiltrating 1.1 ML/y, which is about 8.4 GL/y and 2.0 GL/y for full development to the urban growth boundary.
2	Stormwater condition	Improve stormwater condition by treating existing and future urban development from Macedon and Mount Macedon so directly connected imperviousness (DCI) remains below 0.5% in Riddells Creek immediately downstream of Macedon. For every hectare of impervious area, this requires harvesting around 5.3 ML/y and infiltrating 1.7 ML/y, which equates to approximately 0.5 GL and 0.2 GL for the two townships combined.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (97 km, 389 ha) and maintain existing vegetation (129 km, 516 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.
4	Water for Environment	Investigate options to increase environmental water reserve by 5 GL/year by 2028 to meet ecological watering objectives and cover projected shortfalls. This will benefit Jacksons Creek and the lower Maribyrnong River. Any water recovery will be considered through the sustainable water strategies, markets and use of alternative water.
5	Water for Environment	Identify and implement opportunities to maintain or improve flow regime in refuge reaches to support platypus populations and other instream values. Reduce threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, climate change, diversions or urbanisation.
6	Water Quality - Environmental	Protect water quality for Port Phillip Bay and waterways by maintaining the current quality of discharges from sewage treatment plants (and reducing where possible) ensuring they are released in a manner that ensures environmental values are supported in the waterway. Reduce turbidity and nutrient run-off from rural land. This may include establishment of vegetated buffers in headwater streams.
7	Vegetation Quality	Maintain or achieve high and very high quality vegetation (level 4 and 5 vegetation quality is currently 103 km) along Jacksons Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping and understanding of the extent, composition and condition of high and very high quality vegetation.
8	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (including impacts of urbanisation).
9	Access	Improve access to and along waterways through regional projects such as the Maribyrnong River Trail to Sunbury and by additional paths and access points in new urban areas, townships and larger parks (about 25 km of path).
10	Participation	Increase participation rates from moderate to very high; support community groups and citizen science, connect with growth area communities and build capacity of land owners through rural programs.
11	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing sedimentation from run-off associated with construction for urban development. Identify and mitigate sources of sedimentation from development construction activities. This can be through education programs or enforcement actions.

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

Jacksons Creek Sub-catchment

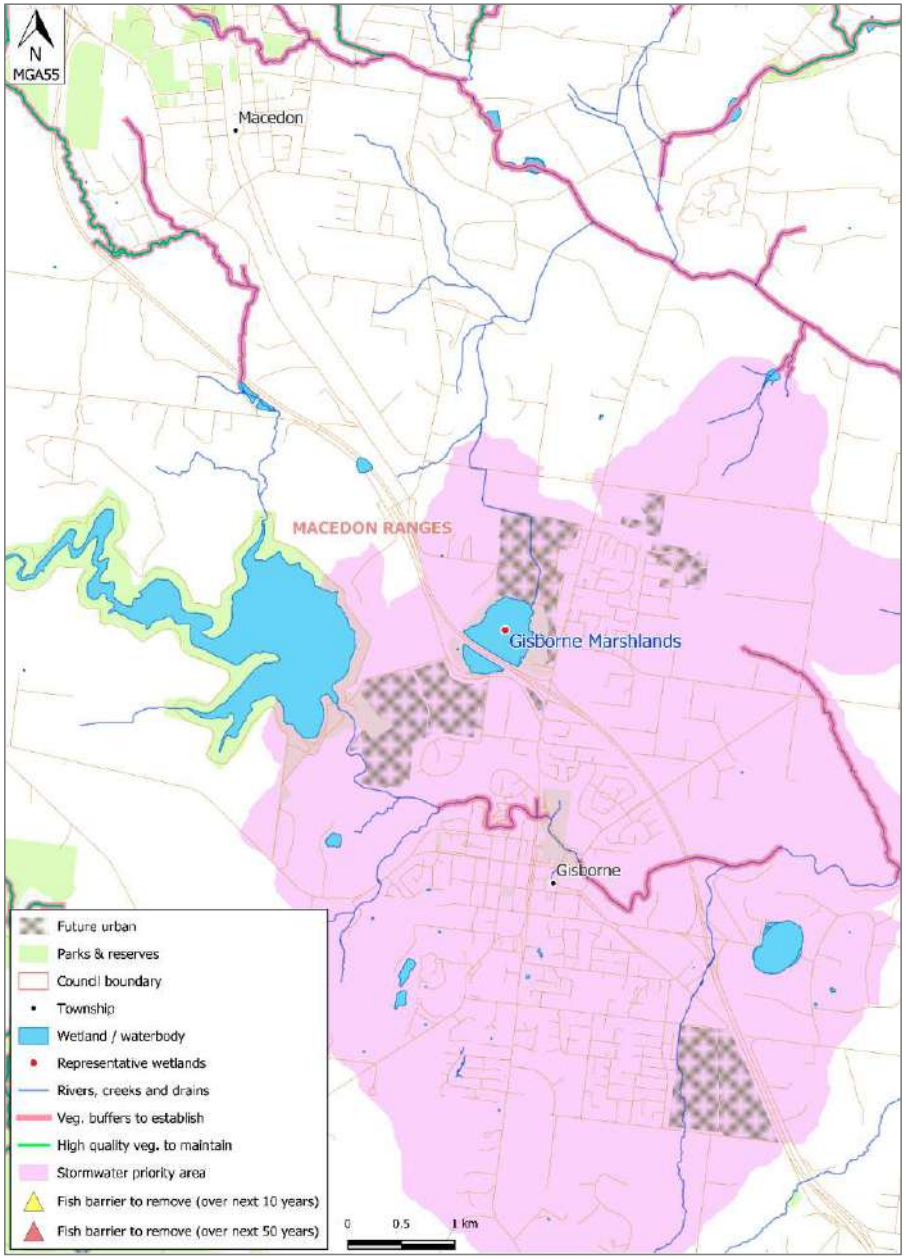
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, which means most expected species occur but some of these only infrequently. Protecting and improving riparian habitat will be balanced against adverse effects of land use intensification and climate change driven reductions in flow volumes and durations/seasonality and, potentially, water quality. Significant species is powerful owl. Target is to maintain as moderate.
very low	low	mod.		Fish are currently rated as very low due to lack of suitable instream and riparian habitat, together with barriers to fish migration along the Maribyrnong River and Jacksons Creek. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to fish passage, revegetation and mitigation of urban and rural land use impacts will improve habitat for a wider range of species and increase score to moderate over long term.
very low	low	low		Frogs score is very low since very few of the expected species of frog were recorded. With targeted management frogs score might improve to low but is unlikely to improve more due to land use intensification and climate change effects on the volume and timing of flows. Significant species include growling grass frog and brown (Bibron's) toadlet.
mod.	mod.	high		Macroinvertebrates is moderate as a result of a lack of flows as well as instream and riparian habitat, and urban stormwater. Management of key water quality and flow threats from urban and rural land use and revegetation will improve score to high in long term.
mod.	very low	mod.		Platypus is moderate due to a lack of instream and riparian habitat and urban stormwater, and is predicted to decline to very low. Management of land use impacts and flows, as well as improvements to riparian vegetation is expected to maintain score as moderate in the face of future urban growth and climate change.
low	very low	mod.		Vegetation is low as much of the riparian vegetation is degraded with only a few high quality reaches remaining in upper reaches. Score is predicted to decline to very low due to persistent and emerging threats such as pest plant and animals and climate change. The long term outcome is to increase score to moderate with a focus on areas of remaining high quality.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Gisborne Marshlands



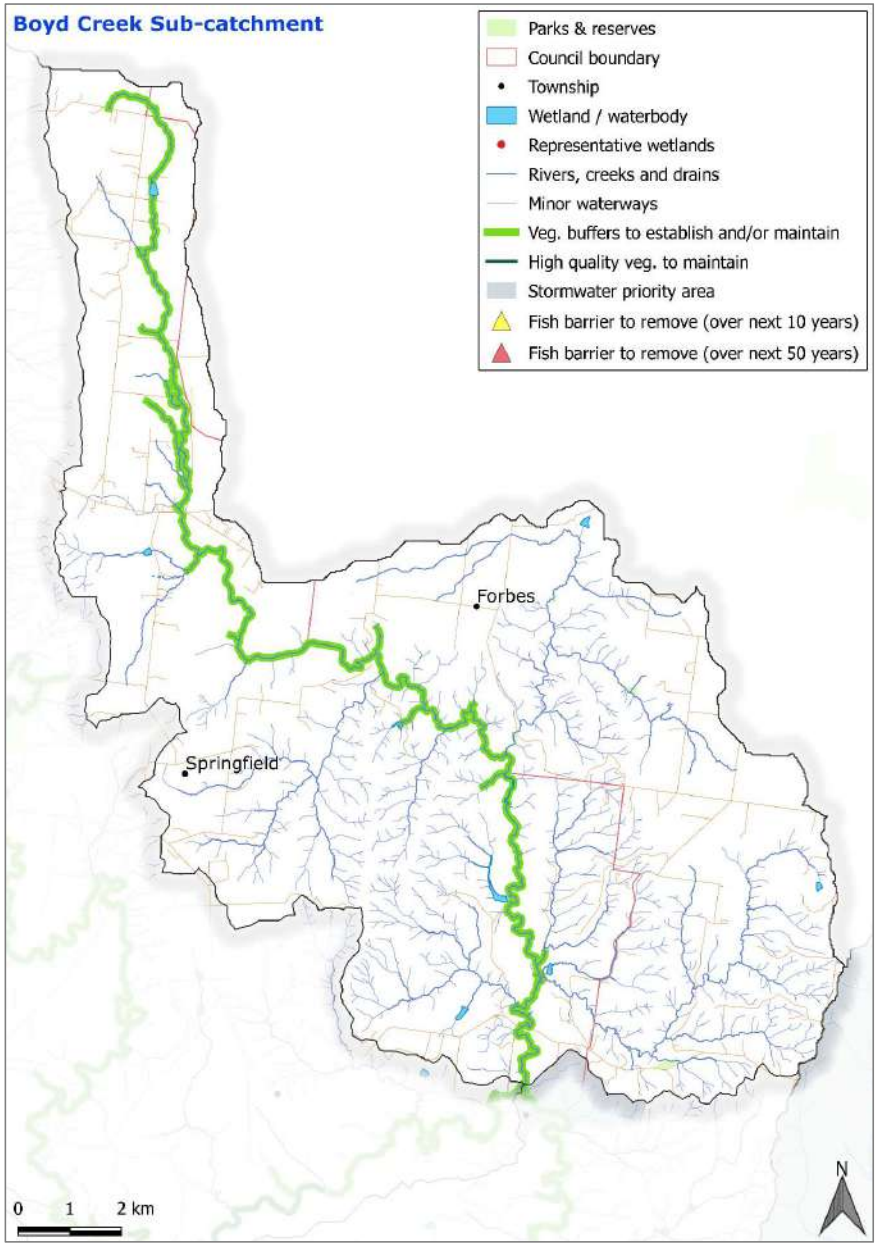
Description
Gisborne Marsh is located within the Gisborne Nature Conservation Reserve and is classified as a temporary freshwater marsh or meadow. It status as a Seasonally Herbaceous Wetland, which is EPBC listed is to be confirmed.

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 in line with Gisborne Marshlands Environmental Management Plan.
2	Vegetation condition	Reduce invasive flora threat to low.

Gisborne Marshlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	mod.		Wetland bird score is very low. With improvements to wetland water regime and vegetation, the score is predicted to improve to moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish will be developed through the Strategy implementation.
	low	low	high		Frog score is currently low, and without intervention, is predicted to remain low. Reduction in threats of changed wetland water regime and improvements to wetland vegetation condition can improve the frog score to high in the long term.
	mod.	very low	high		Vegetation is currently moderate, with a current trajectory of decline to very low. Improvements to wetland water regime will drive an improvement in wetland vegetation condition and value. Target is to improve to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is moderate.
	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	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	high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is high.
	mod.	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Boyd Creek Sub-catchment



Description

Boyd Creek rises near Mount William and flows through the rural lands west of Kilmore, before joining Deep Creek upstream of Darraweit Guim. The two main tributaries in this area are Number Three and Slab Hut creeks. The Boyd Creek sub-catchment has no areas of formal significance, and limited areas of naturalness as a result of current and past landuse.

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.

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

Boyd Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation Quality	Determine extent of and maintain high quality vegetation along Boyd Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
2	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural land. This may include establishment of vegetated buffers in headwater streams.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (31 km, 126 ha) and maintain existing vegetation (9 km, 36 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Water for Environment	Reduce threat of summer low flow stress by addressing causal factors such as water for domestic and stock use, diversions and climate change.
5	Participation	Support participation in Landcare and other rural programs that improve waterways and promote citizen science. Increase participation through support of community/environment groups as rural population increases.
6	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (particularly along tributaries).
7	Fish (value)	Investigate opportunities to translocate Yarra pygmy perch into suitable habitat along the creek corridor.

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

Notes:

Boyd Creek Sub-catchment

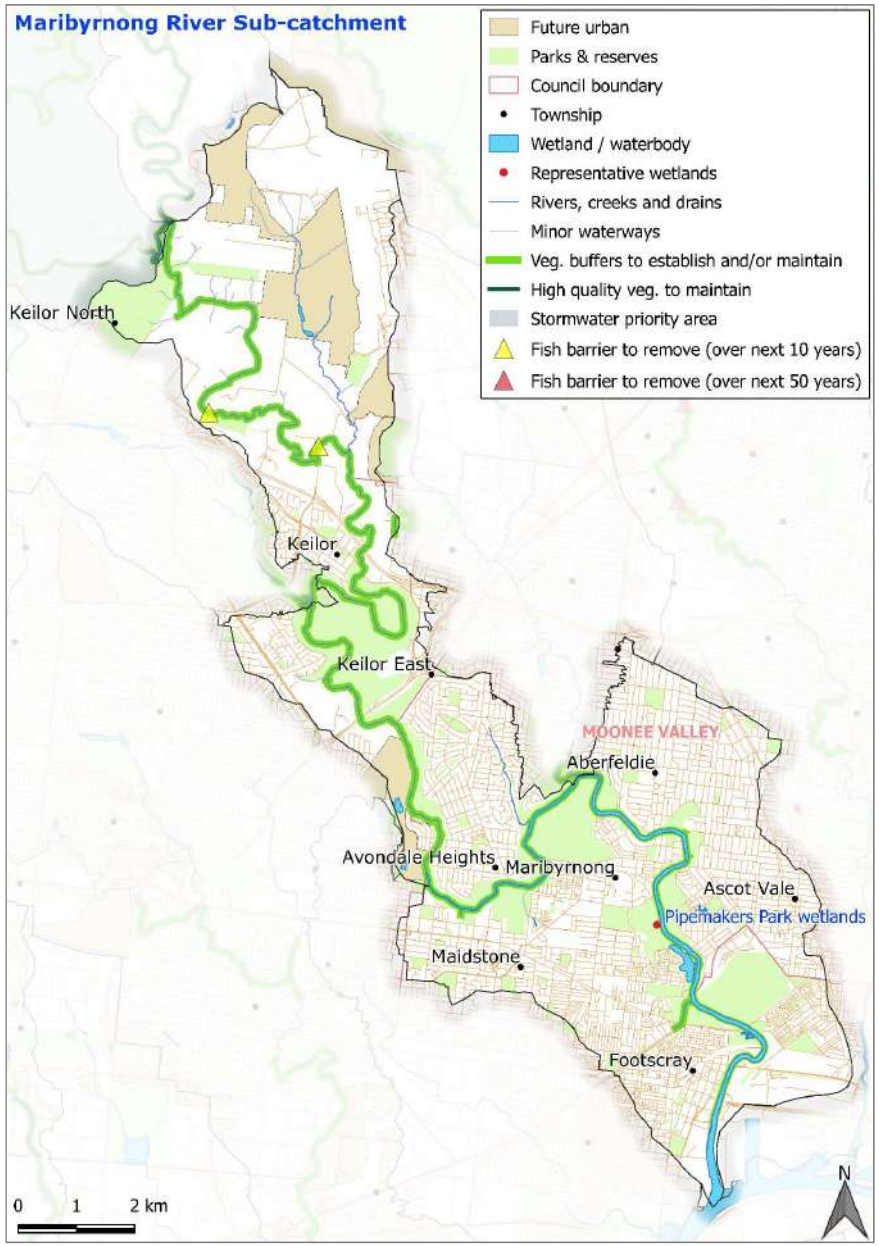
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		There is currently insufficient data to assess the birds (riparian) score in Boyd Creek. The current trajectory score is moderate, which means most expected species occur but some of these only infrequently. Protecting and improving riparian habitat will be balanced against adverse effects of land use intensification and climate change driven reductions in flow volumes and durations/seasonality and, potentially, water quality.
low	low	mod.		Fish are currently rated as low due to a lack of suitable habitat (instream and riparian), and barriers to fish migration along the Maribyrnong River. Improvements to riparian vegetation, flows and removal of fish barriers are expected to increase the target trajectory rating to moderate in the long term. There are no known threatened species found in the sub-catchment.
n/a	n/a	n/a		Insufficient data to assess frogs score in Boyd Creek. Targeted management can reduce impacts to frogs from land use intensification and climate change effects. Significant species include southern toadlet and brown (Bibron's) toadlet.
mod.	mod.	very high		Macroinvertebrates is moderate as a result of a lack of instream and riparian habitat and flow stress. With improvements to riparian vegetation and flows the score is expected to increase to very high in long term.
low	very low	low		Platypus is low due to a lack of instream and riparian habitats and flows. They are expected to occur in the lower reaches near the confluence with Deep Creek. Improving riparian vegetation and restoring flows to the stream will prevent any further decline in the face of climate change.
low	very low	low		Vegetation is low due to large scale land use change and is predicted to decline to very low with persistent threats and climate change. Target is prevent further decline.
high	mod.	high		Amenity, which is based on level of satisfaction, is currently high but likely to decline in the long-term; target is to maintain at high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	mod.	high		Recreation, which is based on level of satisfaction, is currently high but likely to decline in the long-term if supply doesn't keep up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Maribyrnong River Sub-catchment



Description

The Maribyrnong River begins where Deep and Jacksons creeks meet in Sydenham Park near Keilor North and flows through steep sided country, Brimbank Park and the urbanised inner western suburbs of Melbourne before joining the Yarra River estuary at Yarraville. Melbourne Airport lies just to the east of the confluence of Jacksons and Deep creeks.

Actions

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

"Biolink between Brimbank Park and Organ Pipes (revegetation, weed management, pathway etc"

"Expand Maribyrnong value connection project to whole valley"

"Yarra planning controls to be investigated for application to Maribyrnong"

"Enhance billabongs and stormwater wetlands in lower Maribyrnong"

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

Maribyrnong River Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Instream Connectivity	Increase instream connectivity by providing fish passage between the mouth of the Maribyrnong River to the confluence with Deep Creek and Jacksons Creek (by removing, or providing effective fish passage over, Arundel Road Weir and McNabs Weir).
2	Vegetation Quality	Determine extent of and maintain high quality vegetation along Maribyrnong River and tributaries 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 (21 km, 83 ha) and maintain existing vegetation (21 km, 83 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Water for Environment	Investigate options to increase environmental water reserve for the catchment is increased by 5 GL/year by 2028 to meet ecological watering objectives and cover projected shortfalls. This will benefit Jacksons Creek and the lower Maribyrnong River. Any water recovery will be considered through the sustainable water strategy, markets and the use of alternative water.
5	Access	Increase access to and along waterways from 50% to 69% (about 10 km) by filling gaps in existing path networks, improving connections and extending the Maribyrnong River Trail. For on-water activities increase boat launching/recovery facilities for canoe/kayaking (non-motor) in the middle reaches.
6	Water Quality – Recreational	Protect recreational water quality in Maribyrnong River to support existing recreational activities (swimming above Brimbank Park and boating downstream).
7	Participation	Increase participation rates from low to high; support community groups and citizen science and build capacity of land owners in upper catchment through rural programs. Increase participation through promotion of high value species in the region (e.g. platypus and growling grass frog).
8	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations and other instream values.

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

Notes:

Maribyrnong River Sub-catchment

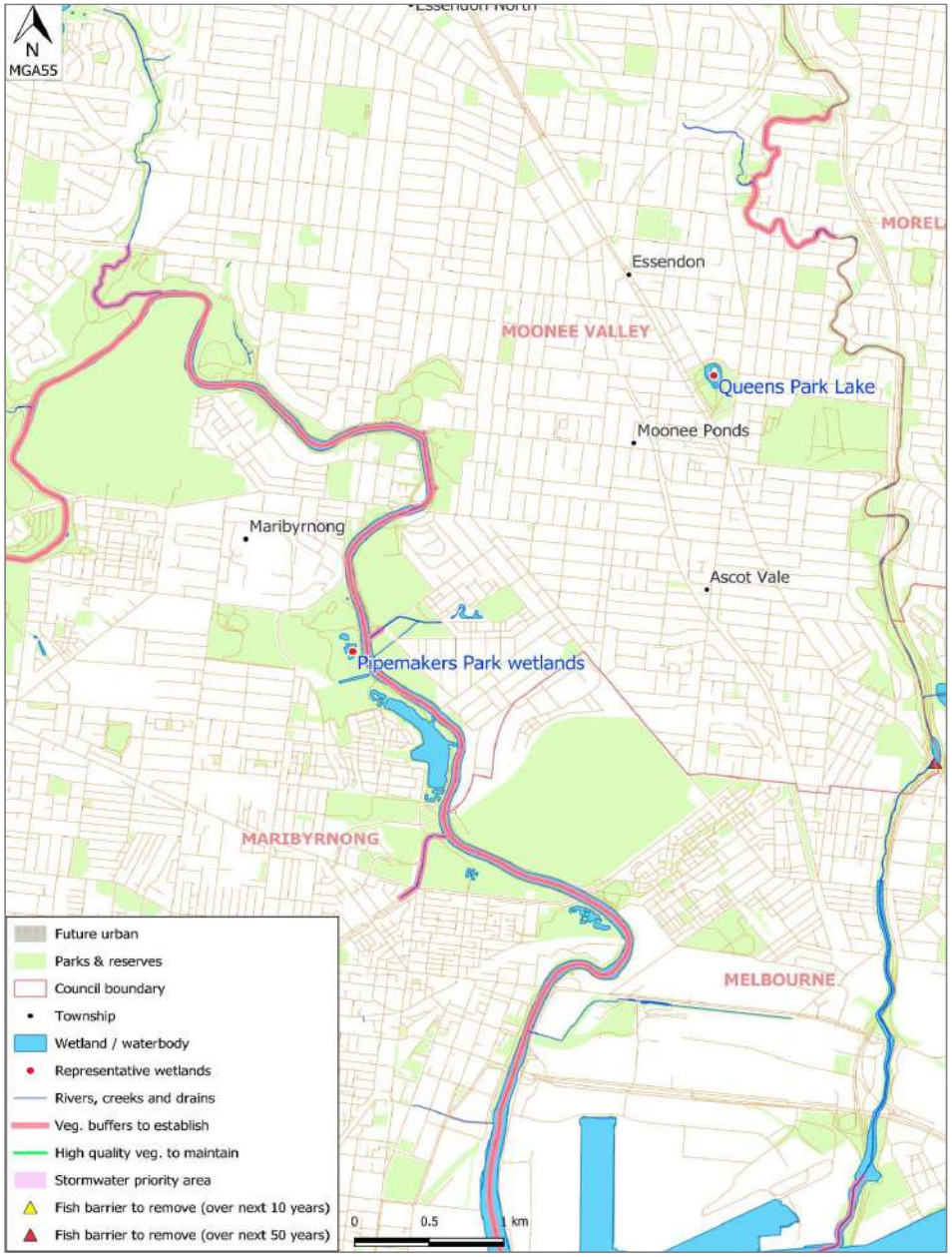
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds (riparian) is moderate, which means most expected species occur but some of these only infrequently. Score is likely to decline with fewer expected species because of habitat degradation due to increased disturbance and introduced predators as well as effects of climate change. Significant species include eastern great egret and intermediate egret.
mod.	mod.	very high		Fish are currently rated as moderate due to lack of suitable instream and riparian habitat, urban stormwater and barriers to fish migration. Significant species present include the Australian Grayling and Australian mudfish. Improvements to vegetation, stormwater and removal of fish barriers will increase score to very high in the long term.
very low	very low	very low		Frogs score is very low since very few of the expected species of frog were recorded. The combined effects of reduced rainfall and flows, and urban land use intensification mean the frog score is predicted to remain very low. growling grass frog is a threatened species that should occur.
low	low	low		Macroinvertebrates is low as a result of a lack of instream and riparian habitat, and urban stormwater. Habitat improvements as well as progressive management of urban stormwater will be required to maintain score as low in the face of future urban growth and climate change.
very low	very low	low		Platypus is very low due to a lack of instream and riparian habitat and urban stormwater. They are most likely to occur near the confluence with Jackson and Deep Creeks. Management of urban stormwater and flows, as well as improvements to riparian vegetation is expected to increase score to low in the face of future urban growth and climate change.
low	very low	mod.		Vegetation is rated as low, primarily as a result of urbanisation and persistent threats such as pest plants and animals. Progressive revegetation and management of threats will improve score to moderate.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Pipemakers Park Wetlands



Description

Pipemakers Park is an eight hectare reserve located on Van Ness Avenue on the Maribyrnong River in Maribyrnong. Burton Crescent Reserve is located further north along the River, while Frogs Hollow Wetlands are located to the south. Thompson Reserve is a four hectares reserve located to the west on Gordon Street. The area is located in the Maribyrnong River Valley and includes flood plain and a steep escarpment along the Van Ness Avenue boundary.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Social values	Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance the values.

Pipemakers Park Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is very low. Continuing threats associated with urbanisation including changed wetland water regime, poor vegetation quality and poor wetland water quality will maintain score as very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish will be developed through the strategy implementation.
	very low	very low	very low		Frog score is very low and is predicted to remain very low in the long-term. Threats including poor water quality, changed wetland water regime and very poor wetland vegetation quality will limit the frog community.
	very low	very low	very low		Vegetation is currently very low. This is predicted to remain very low due the very low or low trajectory 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.
	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.
	very low	very low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is low.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Maribyrnong River Estuary

Description

The Maribyrnong River estuary confluence with the Yarra River is about 3.5 km upstream of the Yarra River entrance to Port Phillip Bay near Yarraville. The tidal influence in the Maribyrnong River extends 12.8 km upstream to the Canning Street Ford. Riparian vegetation is sparse so banks have been stabilised by concrete lining and rock walls.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine vegetation	Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
2	Flow regime	Maintain critical flow components in refuge reaches to protect instream environmental values.
3	Access & Recreation	Maintain and support existing high value opportunities for access and recreation, including walking, cycling, boating and fishing.
4	Estuarine vegetation	Enhance estuarine emergent vegetation to provide instream habitat for fish.
5	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Maribyrnong River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Estuarine bird score is very low. The estuary is fringed by a highly industrial environment and the predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		Fish score is high and 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	low		Vegetation is very low. Reducing the threat of invasive weeds to the little remaining areas of salt marsh will improve vegetation to low. Adopting some climate change adaption strategies may mitigate some risk to vegetation, however, the estuary is fringed by highly industrialised and urbanised environments allowing little potential for 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 is 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 is 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. Target is to maintain at very high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	mod.		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is moderate.
	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	mod.		Water Quality incorporates compliance with the EPA Victoria's water quality guidelines for estuaries. The current state is very low and the target is moderate.
	very low	very low	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.

Moonee Ponds Creek Sub-catchment

Description

Moonee Ponds Creek originates north of Greenvale and flows through Woodlands Historic Parklands and along the Citylink route before joining the Yarra River at Docklands. Yuroke Creek is a tributary and joins Moonee Ponds Creek upstream of the Jacana wetlands.

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.

"Enhance Upper Moonee Ponds Creek (headwaters) including Yuroke Creek"

"Address pollution hot spots (commercial, airport (part) and other)"

"Investigate opportunities for naturalisation of Moonee Ponds Creek channel"

"Planning controls for stormwater management"

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

Moonee Ponds Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation Quality	Determine extent of and maintain high quality vegetation along Moonee Ponds Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (33 km, 131 ha) and maintain existing vegetation (11 km, 43 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Access	Increase access to and along waterways from 48% to 25% (about 3 km of path) by filling gaps in existing path networks and improving connections, including to nearby open space, with a focus on urban and urban growth areas.
4	Participation	Increase participation rates from very low to high; support community groups and citizen science and build capacity of land owners in upper catchment through rural programs. Increase participation through Moonee Ponds Creek Collaboration and increase awareness of the waterway through interpretative signage and art.
5	Physical form	Investigate and mitigate threats to physical form (e.g. erosion) and other high values (including impacts of urbanisation).

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

Notes:

Moonee Ponds Creek Sub-catchment

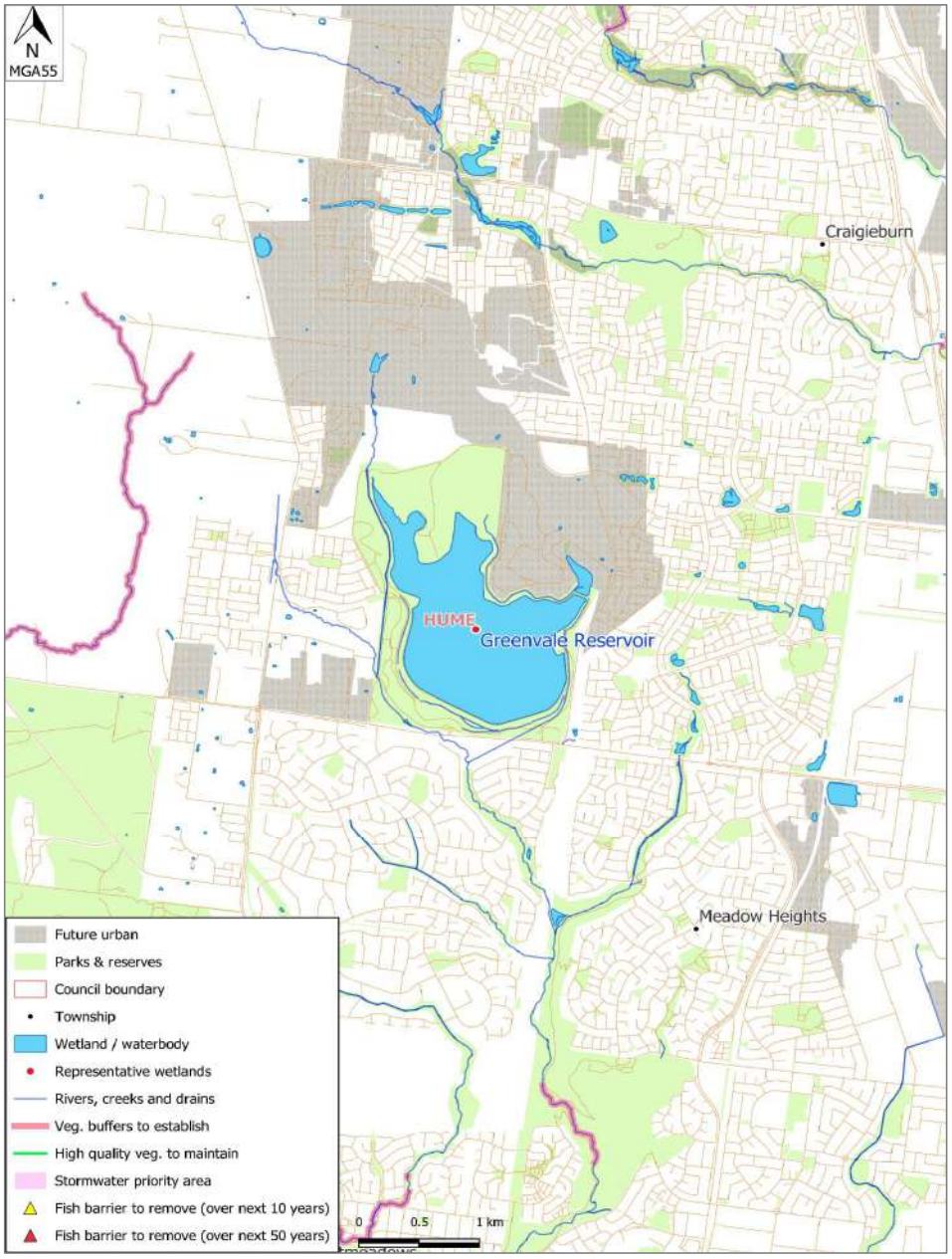
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	low	mod.		Birds (riparian) is moderate, which means most expected species occur but some of these only infrequently. Protecting and improving riparian habitat will be balanced against adverse effects of land use intensification and climate change driven reductions in flow volumes and durations/seasonality and, potentially, water quality. Significant species include eastern great egret and powerful owl.
low	low	mod.		Fish are currently rated as low due to lack of suitable instream and riparian habitat, urban stormwater impacts and barriers to migration (particularly highly modified channels in the middle and lower parts). Improvements to fish passage, instream and riparian habitat, water quality and flows will increase score to moderate in the long term (particularly in middle to upper reaches).
low	very low	low		Frogs score is low since only some of the expected species of frog were recorded. With targeted management frogs score can be maintained at low but is unlikely to improve more due to land use intensification and climate change effects on the volume and timing of flows. Significant species include growling grass frog and brown (Bibron's) toadlet.
low	very low	low		Macroinvertebrates is low as a result of a lack of instream and riparian habitat, and urban stormwater, particularly in the middle to lower reaches. With increasing urbanisation and climate change score is expected to decline to very low without intervention. Management of stormwater and flows and improvements to riparian vegetation will ensure no further decline.
very low	very low	very low		Platypus are no longer expected to be found in Moonee Ponds Creek as a result of large-scale urbanisation, lack of suitable habitat and isolation from Yarra and Maribyrnong River populations.
low	very low	mod.		Vegetation is low overall and predicted to decline further as a result of large scale existing and proposed urbanisation. Long term outcome is to increase quality of priority reaches and improve overall score to moderate.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
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.
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.
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.
very low	very low	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is high.
low	low	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is very high.
low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is low and the target is low.
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.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	mod.	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
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.

Greenvale Reservoir Park Wetlands



Description

Greenvale Reservoir Park is adjacent to Melbourne Water's Greenvale Reservoir, which is an off-river storage (26,839 ML) built in 1971 to provide drinking water supplies to the north-western and western suburbs of Melbourne. The park includes a chain of ponds built along Brodies Creek.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Social values	Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance the values.

Greenvale Reservoir Park Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is very low. The site is primarily managed for social and water supply values.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish will be developed through the strategy implementation.
	very low	very low	very low		Frog Score is very low and is predicted to remain very low in the long-term. The site is primarily managed for social and water supply values.
	very low	very low	very low		Vegetation is very low with a long-term trajectory of very low. Management of the site as a water supply storage limits the ability to support diverse wetland vegetation.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	low		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is low.
	very low	very low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is low.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Jacana Wetlands

Description

The Jacana Wetlands are artificial wetlands constructed by Melbourne Water to manage nitrogen levels in local stormwater run-off. However, along with this significant role in improving water quality, the wetlands also contain some significant environmental values including growling grass frog.

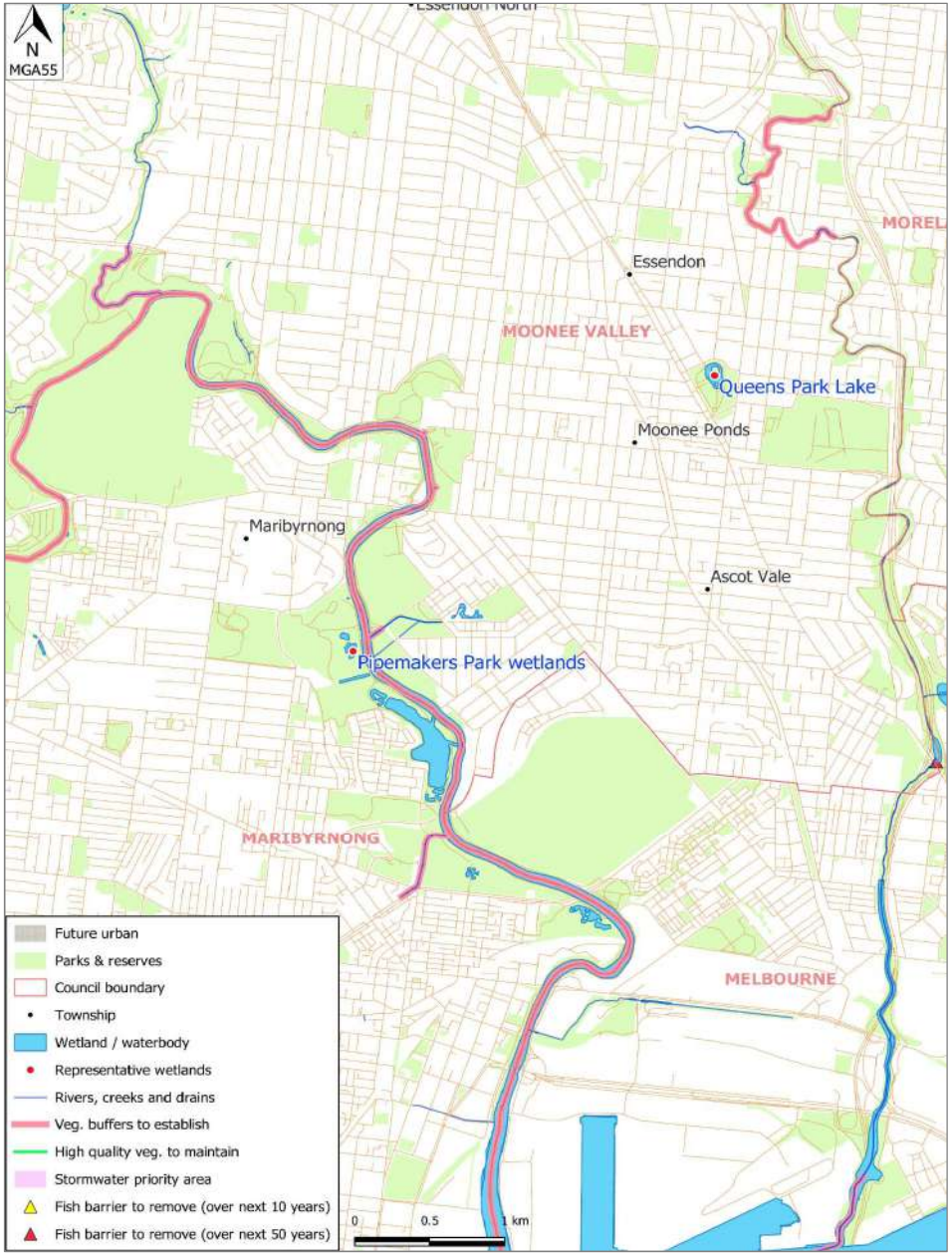
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Maintain stormwater treatment design intent of Jacana wetland, with consideration of growling grass frog community.
2	Bird (value)	Reduce invasive fauna threat to low.
3	Wetland buffer condition	Improve wetland buffer width and fill gaps in wetland buffer length.

Jacana Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	mod.		Jacana wetland is primarily managed as a stormwater treatment wetland. The wetland bird score is currently very low. With improvements in wetland buffer condition and vegetation condition, the predicted long-term trajectory is moderate.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish will be developed through the strategy implementation.
	very high	mod.	very high		Jacana wetlands support a population of growling grass frog, leading to a frog score of very high. The current trajectory is a decline to moderate, however, reducing risk associated with threats of poor water quality and vegetation condition are predicted to maintain score at very high.
	very low	very low	mod.		Vegetation is very low. Long-term improvements to wetland water regime and water quality along with improvements to wetland buffer condition and vegetation condition are predicted to improve the wetland vegetation score to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is moderate.
	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	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	very low	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	very low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Queens Park Wetlands



Description

Queens Park located in Moonee Ponds includes an ornamental lake surrounded by parkland. From the late 1800s the park was used as a water reserve for travelling stock and as a stop-over point for travellers to the gold fields. Today the lake and surrounding gardens are a small retreat from the busy streets near by.

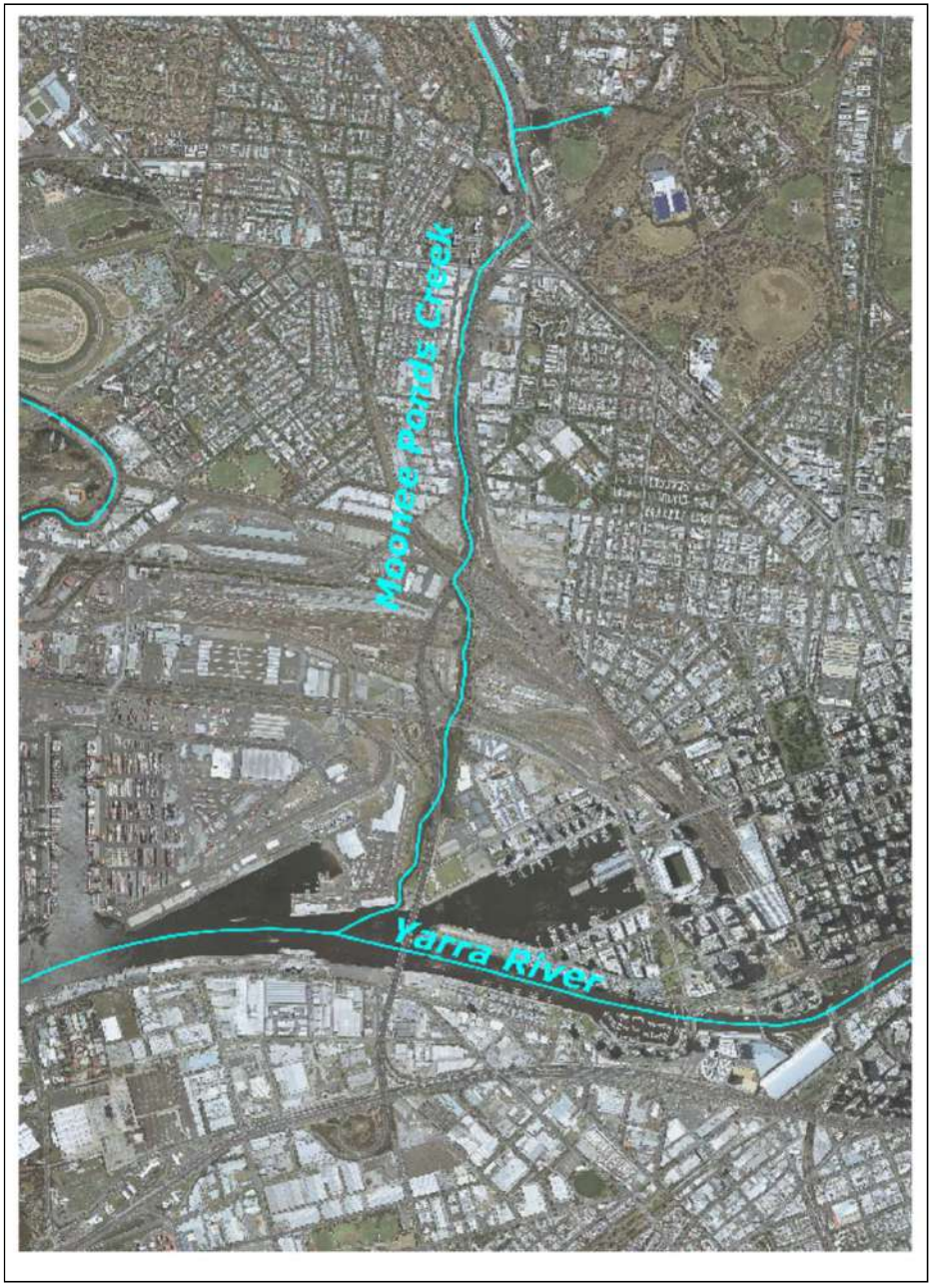
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Social values	Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance the values.

Queens Park Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is very low. It is not formally recognised as significant bird habitat and currently has very poor wetland vegetation condition. The long-term bird score will 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	very low	low		Frogs score for the Moonee Ponds sub-catchment has been applied for Queens Park Wetlands. The frog value is currently low and is predicted to decline due to high threats continuing from poor water quality, vegetation condition, vegetation buffer and water regime. Target is to maintain the score at low.
	very low	very low	very low		Vegetation is currently very low. Very low or low vegetation condition will maintain the vegetation value at very low.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	low		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is low.
	very low	very low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is low.
	very low	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is low.

Moonee Ponds Creek Estuary



Description

Moonee Ponds Creek starts near Greenvale and flows through the inner suburbs of Melbourne, including Broadmeadows, Essendon and Flemington, before joining the Yarra River at Docklands. The estuarine section is highly modified and concrete lined to reduce flooding and erosion. A likely tidal flow barrier is 2.7 km upstream immediately after Macaulay Road Bridge. There is minimal lateral connectivity with flood plain due to modification and much of the bank vegetation has been removed due to proximity of road and rail infrastructure.

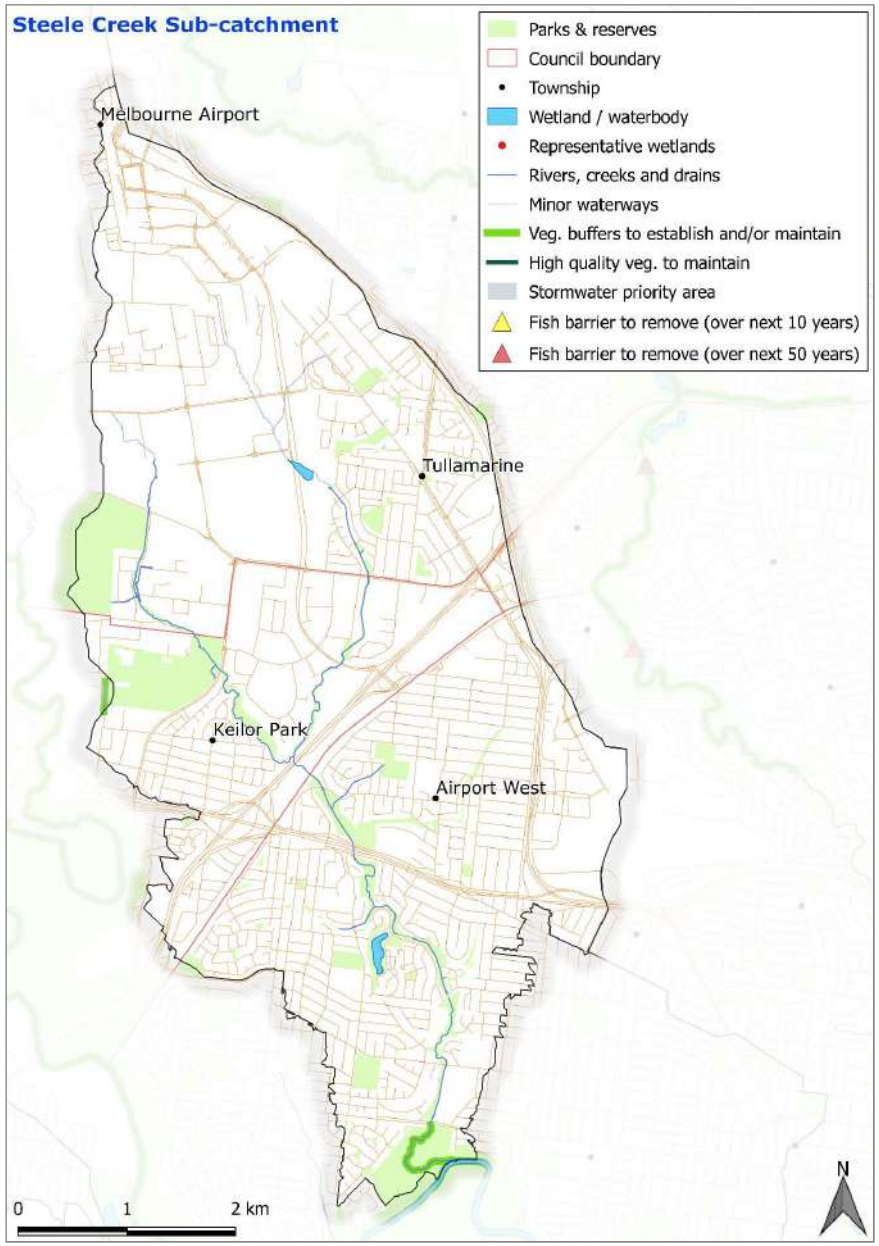
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine vegetation	Protect remnant estuarine vegetation communities, particularly coastal saltmarsh and mangrove, through targeting key invasive plant species.
2	Flow regime	Maintain critical flow components in refuge reaches to protect instream environmental values.
3	Access & Recreation	Enhance appropriate opportunities for recreation and appropriate access including improving connections with existing path networks.
4	Estuarine vegetation	Identify opportunities to enhance habitat connectivity, access and vegetation links to other green spaces (e.g. Maribyrnong River estuary).
5	Amenity	Enhance appropriate opportunities for access and facilities that support passive enjoyment.

Moonee Ponds Creek Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Estuarine bird score is very low. The estuary is fringed by a highly industrial environment and the predicted climate change impacts will further erode suitable bird habitat.
	high	high	high		Fish score 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	low		Vegetation is very low with a current trajectory of very low. Reducing threat of invasive weeds to the little remaining areas of salt marsh will improve the score to low. Adopting some climate change adaption strategies may mitigate some risk to vegetation, however, the estuary is fringed by highly industrialised and urbanised environments allowing little potential for 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.
	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.

Steele Creek Sub-catchment



Description

Steele Creek originates at Keilor Park near Melbourne Airport, flows through Keilor East under the Western Ring Road and Calder Freeway then joins the Maribyrnong estuary at Avondale Heights. The Steele Creek sub-catchment has limited areas of naturalness as a result of current and past landuse, and extensive urbanisation. Areas with some naturalness can be found on the northern side of the Western Ring Road.

Actions

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

"Investigate naturalising stream between Fullarton Road and Roberts Road"

"Target interventions around airport (pesticides/ herbicides)"

"Stormwater management – commercial areas"

"Protect Australian Mudfish habitat near confluence with Maribyrnong"

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

Steele Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Access	Increase access to and along waterways from 44% to 59% (about 2 km of path) by filling gaps and improving connections with existing path network and building new crossings (formal and informal).
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 3 ha) and maintain existing vegetation (less than zero km, 1 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Participation	Increase participation rates from low to high; support community groups and build capacity of land owners in upper catchment through rural programs. Increase business/industry participation in waterway health education and capacity building programs.

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

Notes:

Steele Creek Sub-catchment

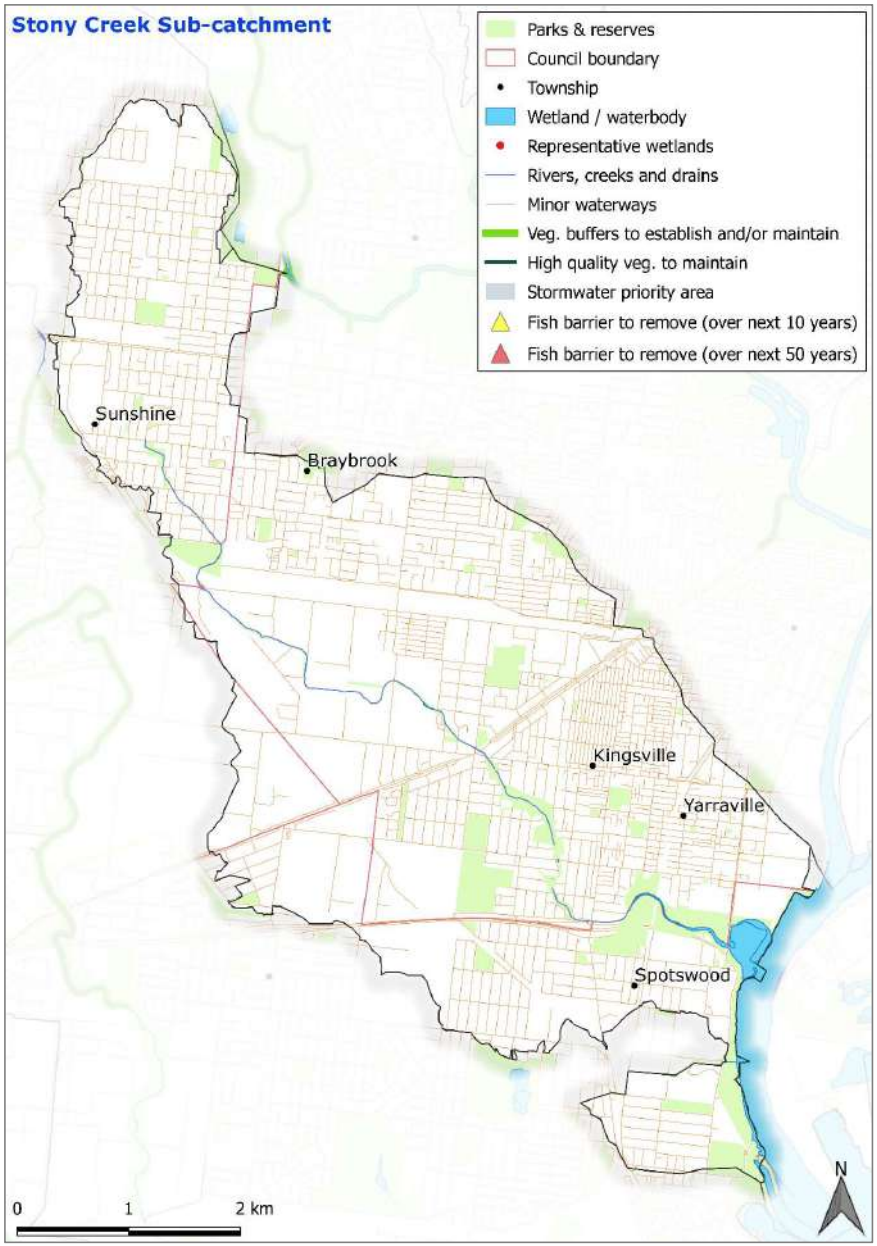
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	mod.		There is currently insufficient data to assess the birds (riparian) score in Steele Creek. Current trajectory is likely to be low with fewer than expected species recorded, because of habitat degradation due to increased disturbance of habitat and introduced predators as well as the effects of climate change. Target is moderate.
low	mod.	mod.		Fish are currently rated as low due to a lack of suitable instream and riparian habitat, urban stormwater impacts and barriers to fish migration. These effects are most prominent in the highly modified middle to upper reaches. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation and progressive improvements to stormwater will ensure a rating of moderate in the long term. Significant species present include Australian mudfish.
very low	very low	very low		Frogs score is very low since very few of the expected species of frog were recorded. The combined effects of reduced rainfall and flows, and urban land use intensification mean the frog community is predicted to remain in a very low condition.
very low	very low	very low		Macroinvertebrates is very low primarily from extensive urbanisation and many reaches where the channel is highly modified. Without substantial management of urban stormwater and improvements to instream habitat and water quality, score is likely to remain very low in the face of future urban growth and climate change.
very low	very low	very low		Platypus are no longer expected to be found in Steele Creek as a result of large-scale urbanisation, lack of suitable habitat and isolation from the Maribyrnong River population.
low	very low	low		Vegetation is low, primarily as a result of urbanisation and persistent threats such as pest plants and animals. Without management this score will become very low. The long term outcome is to prevent decline through management of key threats.
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	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	low		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is low.
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.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
Low	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.

Stony Creek Sub-catchment



Description

Stony Creek originates in Sunshine and flows through Tottenham, West Footscray and Yarraville before entering the Yarra River at Spotswood underneath the West Gate Bridge. The Stony Creek sub-catchment has limited areas of naturalness as a result of current and past landuse, and extensive urbanisation. There are still patches of mangrove and saltmarsh in the lower reaches of the estuary.

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.

"Increased public access (lower port area)"

"Address pollution (microplastics etc) from hot spots"

"Mitigate/ minimise increases in stormwater impact from infill development"

"Revegetation in key public open space areas"

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

Stony Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Access	Increase access to and along waterways from 33% to 51% (about 2 km) by filling gaps and improving connections to existing path network - align with priorities in the Stony Creek Directions Plan.
2	Participation	Increase participation rates from very low to high; support community groups and citizen science and build capacity of business/industry through waterway health education.

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

Notes:

Stony Creek Sub-catchment

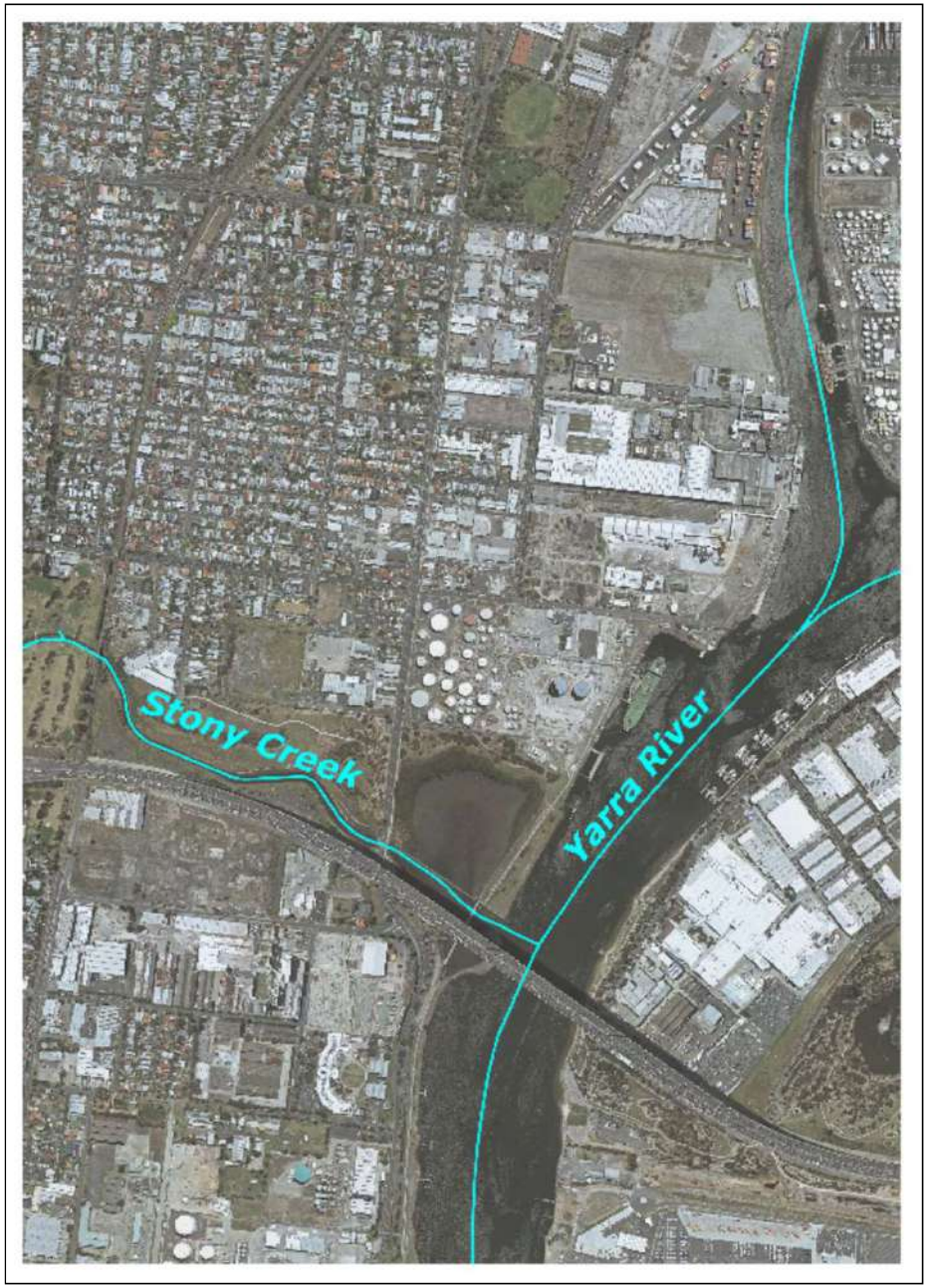
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	mod.		There is currently insufficient data to assess the birds (riparian) score in Stony Creek. Current trajectory is likely to be low with fewer than expected species recorded, because of habitat degradation due to increased disturbance and introduced predators as well as effects of climate change. Significant species include eastern great egret and intermediate egret and (rarely) common sandpiper. Target is moderate.
low	mod.	mod.		Fish are currently rated as low due to a lack of suitable instream and riparian habitat, urban stormwater (particularly poor water quality from industrial sites) and barriers to fish migration, particularly many reaches where the channel is highly modified. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to fish passage and instream habitat will ensure a rating of moderate in the long term.
very low	very low	very low		Frogs score is very low since very few of the expected species of frog were recorded. The combined effects of reduced rainfall and flows, and urban land use intensification mean the frog community is predicted to remain in a very low condition.
very low	very low	very low		Macroinvertebrates is very low primarily from extensive urbanisation and many reaches where the channel is highly modified. Without substantial management of urban stormwater and improvements to instream habitat and water quality, score is likely to remain very low in the face of future urban growth and climate change.
very low	very low	very low		Platypus are no longer expected to be found in Stony Creek as a result of large-scale urbanisation, lack of suitable habitat and isolation from Yarra and Maribyrnong River populations.
very low	very low	low		Vegetation is very low overall as a result of large scale land use change. Revegetation and improvements to existing vegetation will in long term improve score to 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	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 low and the target is low.
mod.	mod.	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is moderate.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
low	low	high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is low and the target is high.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
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.

Stony Creek (Port Phillip Bay) Estuary



Description

The Stony Creek estuary confluence with the Yarra River is about 2.5 km upstream of the Yarra River entrance to Port Phillip Bay near Newport. The system is highly modified with bank stabilisation to prevent flooding and erosion. The substrate is primarily silt and sand. Stony Creek Backwash, which was a former bluestone quarry, supports patches of mangrove and saltmarsh.

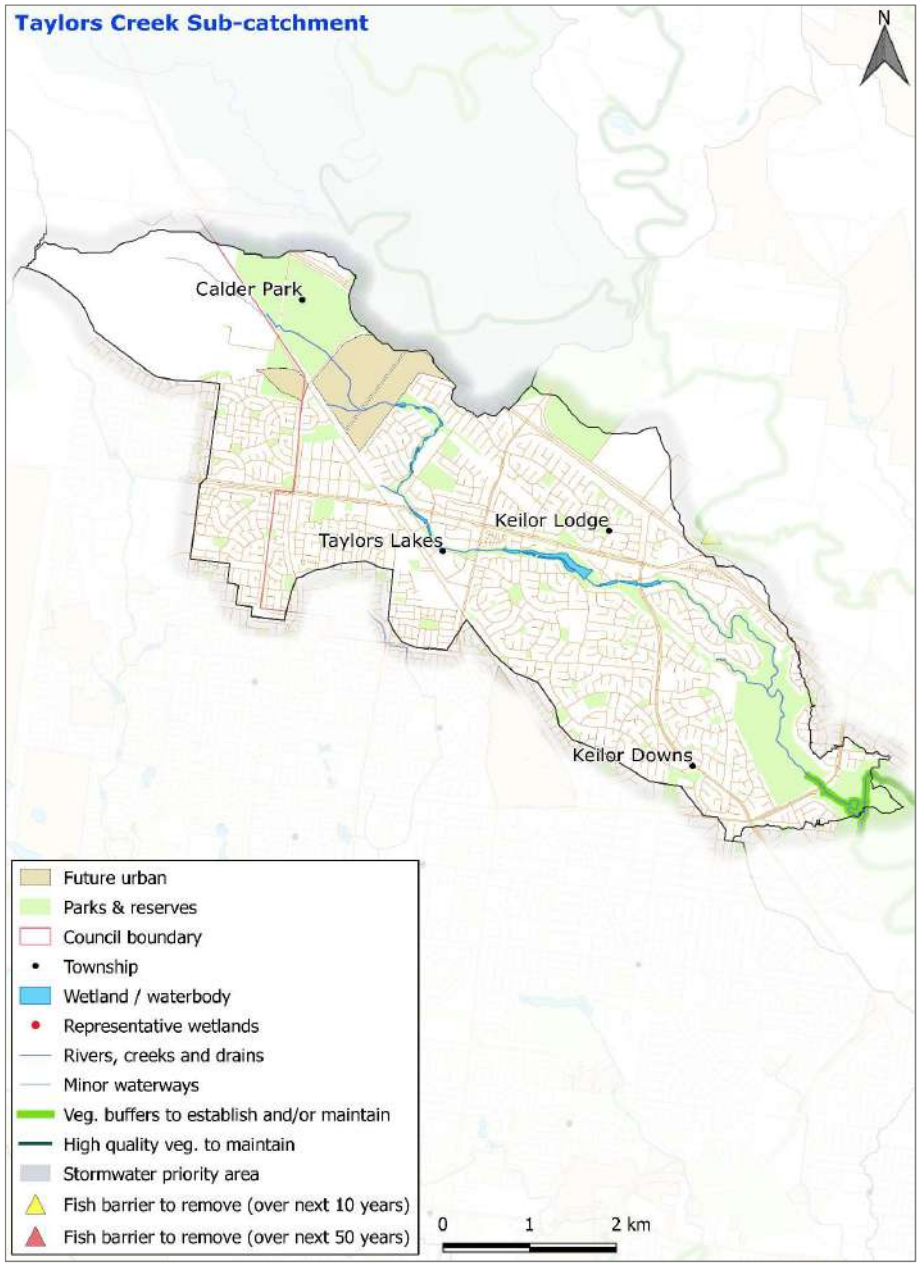
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine vegetation	Protect remnant estuarine vegetation communities, particularly coastal saltmarsh, through targeting key invasive plant species.
2	Flow regime	Maintain critical flow components in refuge reaches to protect instream environmental values.
3	Access	Maintain and support existing access opportunities.

Stony Creek (Port Phillip Bay) Estuary

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

Taylors Creek Sub-catchment



Description

Taylors Creek originates near Sydenham and flows through Taylors Lakes before entering the Maribyrnong River at Brimbank Park, Keilor. The Taylors Creek sub-catchment has limited areas of naturalness as a result of current and past landuse, and extensive urbanisation. Areas with some naturalness can be found along Taylors Creek within Green Gully Reserve and Brimbank 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.

"Address litter hotspots"

"Use planning mechanisms to mitigate development impacts"

"Headwater stream protection"

"Fish barrier investigation"

"Protection remaining natural values between Sunshine & Green Gully Road"

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

Taylors Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Vegetation Quality	Determine extent of and maintain high quality vegetation along Taylors Creek and tributaries through effective monitoring and management of threats including protection of endangered EVCs. Fill data gaps in mapping of high quality vegetation.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 2 ha) and maintain existing vegetation (1 km, 4 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Access	Increase access to and along waterways from 43% to 57% (about 2 km of path) by filling gaps and improving connections with existing path network, and extending network into new urban areas.
4	Participation	Increase participation rates from very low to high; support community groups and citizen science and connect with growth area communities. Increase participation through promotion of high value species in the region (e.g. growling grass frog).

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

Notes:

Taylors Creek Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	low	mod.		There is currently insufficient data to assess the birds (riparian) score in Taylors Creek. Current trajectory is likely to be low with fewer than expected species because of habitat degradation due to increased disturbance of habitat and introduced predators as well as effects of climate change. Target is moderate.
low	mod.	mod.		Fish are currently rated as low due to a lack of suitable instream and riparian habitat, urban stormwater impacts and barriers to fish migration. These effects are most prominent in the highly modified middle to upper reaches. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to fish passage, habitat (instream and riparian), and improved management of stormwater, will ensure a rating of moderate in the long term, particularly in the lower reaches.
mod.	very low	mod.		Frogs score is moderate since not as many of the expected species of frog were recorded. Despite the combined effects of reduced rainfall and flows and urban land use intensification, frogs score will be maintained as moderate. The growling grass frog is a threatened species that should occur in this sub-catchment.
very low	very low	low		Macroinvertebrates is very low primarily from urbanisation and many reaches where the channel is highly modified, particularly in middle to upper part. With improvements to riparian and instream habitat, as well as progressive management of urban stormwater, score will increase to low.
very low	very low	very low		Platypus are no longer expected to be found in Taylors Creek, as a result of large-scale urbanisation and lack of suitable habitat, except for potential use of the lower reaches near the confluence with Maribyrnong River.
low	very low	mod.		Vegetation is low, primarily as a result of large scale urbanisation and persistent threats such as pest plants and animals. Without intervention it is predicted to reduce to very low. Progressive revegetation and management of threats will improve score to moderate.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	high	very high		Community connection, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if opportunities keep up with population growth; target is to improve to very high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very 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.
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	low		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is low.
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.
high	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
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.

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