Co-Designed Catchment Program for the

Yarra Catchment

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

WURUNDJERI FOREWORD FOR THE YARRA RIVER COMMUNITY VISION

Ganbu gulinj Narrm, Wurundjeri Gulinj nuringianith biik baambuth

The First People of Melbourne, the Wurundjeri People, have been caring for Country since the beginning of time

The Birrarung is a river of mists and shadows - the river and its environs are a living, breathing entity that follows Wurundjeri songlines and forms a central part of the Dreaming of the Wurundjeri. A Dreaming that links the billabongs, wetlands and swamps in the upstream forests, across the meandering plains and out to the salt water. We the Wurundjeri are connected to the Birrarung through spirit, culture and nature. The river follows the paths that our ancestors have travelled for thousands of years - providing for them as now it provides for all Victorians.

We honour the land and water of the Birrarung. Wurundjeri people have a deep cultural obligation and a birthright to look after the river - to make sure the Birrarung is healthy and continues to support the plants and animals, our community and all people, both those currently alive and the generations yet to come.

The Wurundjeri have lived with and known the Birrarung since the beginning. The Birrarung is now shared by many Victorians, who value the river and its surrounds for what they bring to the beauty of our city. In sharing in the benefits that the river provides, we must also share responsibility for preserving and restoring the wellbeing of the Birrarung.

The city of Melbourne grew out from the banks of the Birrarung – the river has allowed it to become the vibrant city it is today, but this has come at great expense to the Wurundjeri.

Our songlines have been sustained even though many of the creeks have dried up and billabongs been destroyed. Rubbish, sediment and pollutants have built up and are choking the river, stopping the Birrarung from breathing clearly. The health of the Birrarung underpins the health of Wurundjeri People, and the damage that has been done over the past two centuries is felt by all Wurundjeri people. We, along with many other Victorians, are worried that without a process of restoration and healing the pressures on the wellbeing of the river will become insurmountable.

The Wurundjeri believe that we need to change how all Victorians think about and actively respect the Birrarung. We believe we need to see not a resource to be exploited but rather to recognise the complex, living system that is sensitive to its surrounds and a uniquely Victorian treasure. By engaging with those partners with whom we now share the river we, together, are capable of turning around the damage of the past and acting to restore the river and its environment for the future use and enjoyment of all.

Wurundjeri invites all people to see the Birrarung through our eyes, to talk with us to understand our values, and to partner with us to re-energise the river as we fulfil our cultural duty in bringing the Birrarung back to environmental, cultural, ceremonial and spiritual health.

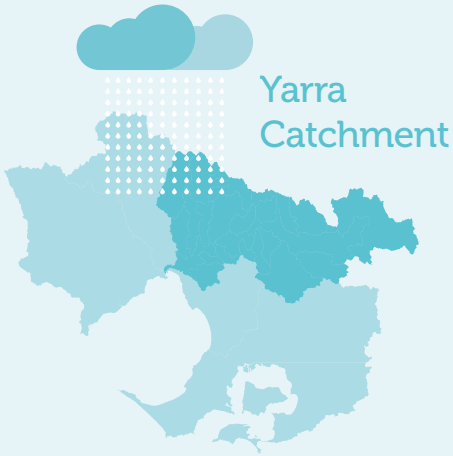
A shared Strategy

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 Yarra catchment 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 Yarra catchment:

Aquatic Systems Management

Banyule City Council

Ben Carr Enterprises

Bend of Islands Conservation Association

Birdlife Australia

Bunurong Land Council Aboriginal Corporation

Candlebark Community Nursery

Canoeing Victoria

Chum Creek Landcare

City West Water

Clearwater

Cloverly Pastoral

Creative Suburbs / Teal Collaborative

Damper Creek Bushland Reserve

Darebin City Council

Darebin Creek Management Committee

DELWP

Environment Protection Authority Victoria

Epworth Hospital

Fairfield Canoe Club

Friends of Banyule

Friends of Cockatoo Creek

Friends of Damper Creek

Friends of Helmeted Honeyeater

Friends of Leadbeater's Possum

Friends of Merri Creek

Friends of Mt Evelyn Aqueduct

Friends of Plenty River

Friends of Sassafras Creek

Friends of Water Race and Quinn Reserve

Friends of Yarra Valley Parks

Healesville Environment Watch Inc (HEWI)

Hume City Council

Indigenous Design

Kororoit Institute

La Trobe University

Latrobe Golf Club

Lilydale Community Food Gardeners

Macclesfield Landcare Group

Manningham City Council

Maroondah City Council

Melbourne City Council

Melbourne Water

Merri Creek Management Committee

Monash City Council

Monash University

Moonee Valley City Council

Moreland City Council

Mt Evelyn History Group

Mt Evelyn Township Group

Municipal Association Victoria

Native Fish Australia

Nillumbik Shire Council

Office of the Commissioner for Environmental Sustainability

Paddle Australia - canoe polo

Parks Victoria

Parliament Victoria

Port Phillip and Westerport CMA

Port Phillip City Council

Port Phillip Ecocentre

Resilience Project Services

Riverland Conservation Society

Rose Hill Lowline Stud

Stonnington City Council

Swinburne University of Technology

University of Melbourne

VicRoads

Victoria University

Victorian Environmental Water Holder

VR Fish

Warringal Conservation Society

Wattle Glen Residents' Association

Westgate Biodiversity: Bili Nursery and Landcare

Whitehormooneese City Council

Whittlesea City Council

Wurundjeri Tribe Land and Compensation Cultural Heritage Council Aboriginal Corporation

Y4L

Yarra City Council

Yarra Ranges Council

Yarra Ranges Heritage Network

Yarra Ranges Landcare Network

Yarra Riverkeeper Association

Yarra Valley Water

Yellingbo Conservation Area Co-ordinating Committee

Overview

The Yarra catchment covers an area of 4046 square kilometres. About 55 per cent of the area retains its natural vegetation, 30 per cent is used for agriculture and 15 per cent is urban.

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.

The catchment includes the Yarra (*Birrarung*) River, which is the largest river in the Port Phillip and Westernport region (Figure 1). The river rises in the Great Dividing Range to the east of Warburton and flows 245 kilometres until entering Port Phillip at Newport. The Lerderderg River and Yarra River, between Warburton and Warrandyte, have been identified as a Victorian Heritage River, meaning that it has significant recreation, nature conservation, scenic and cultural heritage attributes.

There are over 21,000 wetlands in the Yarra catchment, including approximately 16,000 constructed wetlands and nearly 5100 natural wetlands that support significant environmental and social values. More than one third of Victoria's native plant and animal species can be found in the Yarra catchment. Poor quality stormwater inputs, drainage and clearing of vegetation have already impacted many wetlands of the Yarra catchment. Additionally the construction of levees and harvesting of water means that river-fed wetlands, including billabongs, are less frequently inundated and less able to act as nursery and breeding areas.

Climate modelling shows that the catchment is becoming hotter and drier, facing more periods of extreme heat and drought, reductions in annual rainfall and increases in intense rainfall events. Population modelling shows that Melbourne will likely grow and undergo transformations rivalling the changes driven by the gold rush and post-war booms. The Yarra catchment will increase from some 1.8 million people to over 2.4 million in the next 20 years, resulting in an additional 14,000 dwellings per year. The North Growth corridor from Wallan to Broadmeadows, Mernda and Epping is the main growth area in the Yarra catchment. The Yarra catchment also encompasses part of the Fishermans Bend urban renewal area, which is planned to become home to approximately 80,000 residents and provide employment for up to 80,000 people by 2050.

A drier climate in an increasingly paved landscape poses a very real threat to the long-term values of the Yarra's 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.

Increased discharges of stormwater, toxicants and litter can threaten the use of waterways and beaches for swimming and boating activities. Inappropriate development along the waterways can limit public access, overshadow the waterways, destroy floodplain habitat and change the character of waterways for the worse for ever.

If current policy and levels of investment are maintained, without improvement, then it is likely that the Yarra catchment will experience declines in environmental and social values over the next 30 years. There is a real need to take action to avoid an otherwise inevitable decline in waterway health.

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

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

The Yarra Strategic Plan

In addition to the *Healthy Waterways Strategy*, Melbourne Water is leading the development of the *Yarra Strategic Plan*, which will give effect to the community's long-term vision for the Yarra and provide the basis for the future planning of the river corridor and each of its reaches.

Following the Ministerial Advisory Committee recommendations in 2016, the Victorian Government's Yarra River Action Plan was released in early 2017. It detailed 30 actions to ensure the long-term protection of the Yarra River, and its environs and parklands. The Action Plan nominated Melbourne Water as the lead agency for seven actions including the development of a 50 year Community Vision for the Yarra, which will become the foundation for an overarching Yarra Strategic Plan. This vision is provided below.

The *Healthy Waterways Strategy* has a 'whole of catchment' view of waterways (including wetlands, estuaries, rivers and creeks). Five catchments are considered in the *Healthy Waterways Strategy*, the Yarra catchment being one of them. The *Yarra Strategic Plan* focuses on a more specific geographical area to the *Healthy Waterways Strategy*, concentrating on the Yarra River Corridor (rather than the whole of the Yarra catchment) and will consider public open space along the river, statutory planning, and the management of public land and infrastructure.

In developing the vision for the Yarra catchment, a working group considered the Yarra River 50-year community vision to ensure alignment but considered different visions were appropriate given the different contexts and frameworks for which they are written.

Yarra River 50-year community vision

Our Yarra River, *Birrarung*, is recognised around the world as an iconic example of a nurturing relationship between a river and its community.

Flowing from source to sea, it is the resilient lifeblood of past, present and future generations of Victorians. It connects and enriches our flourishing city, suburbs, regions and beyond.

Our Yarra River, *Birrarung*, its essential role in our lives and its rich history, are respected, understood and protected. It has cared for us for thousands of years and will for thousands to come.

The vital and continued role of Traditional Owners as custodians of the River, and its role in their culture, is recognised and celebrated.

Our Yarra River, Birrarung and its diverse surrounding landscapes provide a place of refuge, recreation, learning and livelihood. It brings communities together and supports sustainable local economies.

Its clean waters and connected network of thriving green spaces nurture biodiversity, and deepen the relationship between people and nature.

Our Yarra River, Birrarung is respected as a sacred natural living entity and everyone takes responsibility for its care. Its health and integrity are paramount and uncompromised.

What is good for the Yarra is good for all.

The Healthy Waterways Strategy

VISION

Achieving the Community Vision for the Yarra River relies on a healthy catchment. This *Healthy Waterways Strategy* has interpreted the Yarra River 50-year Community Vision to mean:

Our Yarra catchment waterways are increasingly protected, respected and collaboratively cared for by Traditional Owners, government and community as living and highly valued entities. They are a linked network of thriving corridor and in-stream spaces which nurture biodiversity, deepen the relationship between people and nature, build resilience as our population grows and the climate changes, and contribute to wellbeing and liveability. Their ecological health and value to the community continuously improves through rehabilitated waterways and balanced uses.

GOALS

1. The environmental values and significant ecological processes of all of the Yarra catchment waterways are protected and improved.
2. Riparian and instream habitats provide landscape connectivity, allowing the movement of native species and promoting resilient native flora and fauna populations.
3. Cultural and heritage values are recognised, protected, maintained and enhanced.
4. Communities and individuals connect with and appreciate the values of waterways. Waterway corridors are used appropriately for places of solitude, enjoyment of nature, and active and passive recreation that support mental and physical wellbeing.
5. An engaged and knowledgeable community in the Yarra catchment acts to protect and promote sustained waterway values. Our waterways are a place of continuous learning.
6. The waterways of the Yarra catchment support natural system maintenance, potable and agricultural water supply, commerce and tourism in a balanced and environmentally sustainable manner.
7. The Yarra waterways are managed in a transparent and collaborative governance framework that allows for strategic, innovative and integrated ways to protect waterways across public and private land.
8. The cultural, historical, amenity values and landscape settings of all modified waterways are protected and improved.

"It is important to consider the Yarra River as one entity, fully connected from its source to its estuary"
– quote from participant at workshop 1

RIVERS - Plenty Gorge Park, Plenty River

Plenty Gorge Park, with its significant natural and heritage features, offers a wide range of environmental, cultural and social experiences.

WETLANDS - Bolin Bolin Billabong, Yarra River

Bolin Bolin, "place of many lagoons" is a highly significant site to the Wurundjeri and is an integral part of the much larger cultural landscape.

SUB-CATCHMENTS

1 Brushy Creek
2 Darebin Creek
3 Diamond Creek (Rural)
4 Diamond Creek (Source)
5 Gardiners Creek
6 Koonung Creek
7 Little Yarra River and Hoddles Creek
8 Merri Creek (Rural and Forested)
9 Merri Creek (Urban)
10 Mullum Mullum Creek
11 Olinda Creek
12 Plenty River (Source)
13 Plenty River Lower
14 Plenty River Upper
15 Steels and Pauls Creek (Rural)
16 Steels and Pauls Creek (Source)
17 Stringybark Creek
18 Watsons Creek
19 Watts River (Rural)
20 Watts River (Source)
21 Woori Yallock Creek
22 Yarra River Lower
23 Yarra River Middle
24 Yarra River Upper (Rural)
25 Yarra River Upper (Source)

WETLANDS

1 Donnybrook Road Lake
2 Hearnes Swamp
3 Kalkallo Creek Wetland
4 Growling Grass Frog reserve wetlands
5 Ringwood Lake
6 Lillydale Lake
7 Stormwater wetlands
8 Domain Chandon Billabongs
9 Cockatoo Swamp
10 Annulus Billabong, Yarra Flats
11 Banyule Flats Billabong
12 Bolin Bolin Billabong
13 Burke Road Billabong
14 Hays Paddock Billabong
15 Westgate Park Wetlands
16 Willsmere Billabong
17 Anderson Creek East retarding basin
18 Spadonis Billabong
19 Yarra Bridge Stream Side Reserve
20 Yering Backswamp, Yarra River

ESTUARIES

1 Yarra River Estuary

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

Collaborative design (co-design)

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

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

In developing the Strategy:

- A group of volunteers developed the vision and goals
- Four workshops were held with over 208 participants representing around 88 organisations attending at least one workshop
- The YourSay website provided details and updates on the process as well as opportunities to provide input and feedback.

Collaboration process

October 2017
Yarra Catchment Collaborations commenced

October 2017 – April 2018
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 Yarra catchment

What we heard

Comments were received via discussions at the workshops, the YourSay webpage and follow-ups with stakeholders. For the Yarra catchment, a total of 692 formal comments were received on the preliminary targets with an additional 100 formal comments received on the draft Strategy.

The underlying theme was strong support for setting targets and performance objectives at the sub-catchment scale. However, there were questions about the appetite for enforcement or policy changes to drive improvements. Another line of comment was that the performance objectives were too generic and lacked sufficient detail to inform the types of activities needed to achieve the targets.

This feedback resulted in performance objectives being improved by adding additional context – to specify where works are needed, providing quantitative outcomes and making reference to related projects (e.g. extending the Merri Creek shared trail).

Collaborators worked together to develop a list of potential actions across the Yarra catchment. A sampling of these actions is included on the sub-catchment pages of the Catchment Program and a full list is included in the *Collaborative Design Report*. Following the seventh workshop, 25% of participants strongly agreed and 55% agreed that they were committed to working together on implementation of the Strategy.

Collaborative implementation

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

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

People play a major part in ensuring that the Yarra catchment 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.

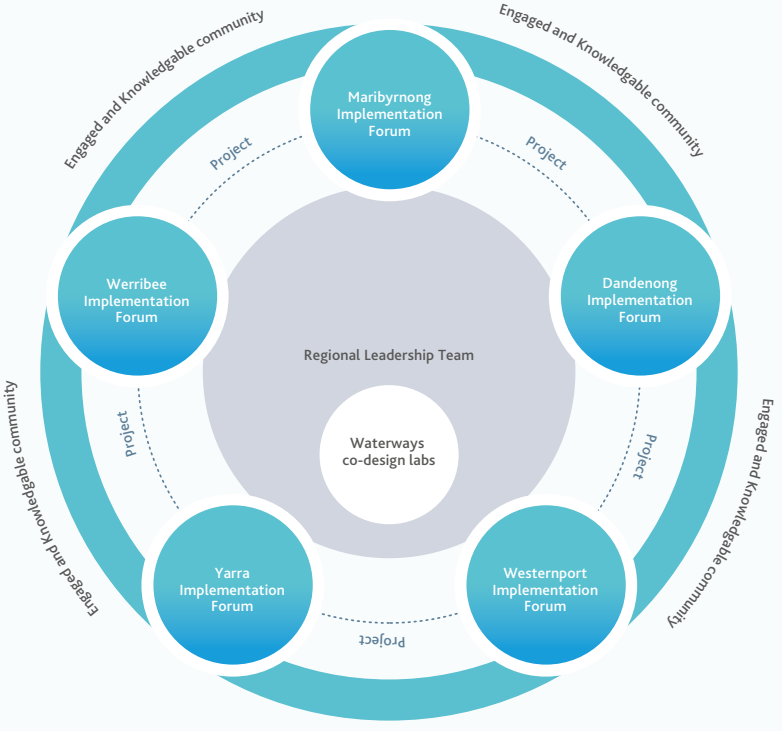


Figure 3 Collaborative Governance Model

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 prog ram 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 – 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.

Cultural and Economic Waterway Value

Cultural Values

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

The people of the *Woi wurrung* language group were the original occupants of this land, as evidenced by the thousands of cultural sites and places recorded, most of these occurring within 200 metres of a watercourse. Two significant sites include Bolin Bolin Billabong and Corranderk Aboriginal Station.

The Wurundjeri Land and Compensation Cultural Heritage Council Aboriginal Corporation released the Wurundjeri Water Policy in May 2018. This Strategy supports the Policy and supports increased Traditional Owner and Aboriginal community involvement in waterway management.

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.

Major drinking water storages for Melbourne are located in the Yarra catchment. There are numerous diversions for domestic, stock and agricultural uses. Yarra Valley and Dandenong Ranges tourism is a significant economic driver, worth $559 million to the region's economy in 2015/2016.

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.

Bird species listed as nationally-threatened in the Yarra catchment include: the swift parrot, Australasian bittern and helmeted honeyeater. There are 16 native fish species, including the nationally-listed dwarf galaxis, Macquarie perch (introduced), Australian mudfish and Australian grayling. Frog species include threatened species such as the growling grass frog and the brown toadlet. Two threatened species of frog, Bibron's toadlet (Endangered in Victoria) and southern toadlet (Vulnerable in Victoria) have seemingly disappeared from several areas in the catchment since the Millennium Drought.

Vegetation scores across the catchment are highly variable: the upper headwaters contain areas of very high value intact native vegetation protected within the Yarra Ranges National Park. Vegetation and macroinvertebrate scores decrease further from the headwaters as a result of agricultural activities and increasing areas of urbanisation.

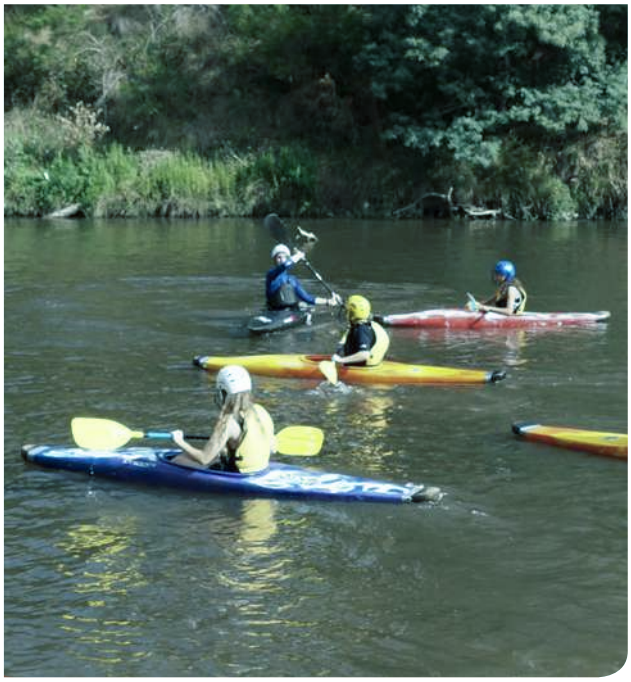
Resilient and vulnerable populations of platypus have been observed across the catchment. A locally threatened population of platypus has been observed in the Plenty River in South Morang.

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 Yarra catchment, social value scores for rivers are currently high. The social value score for the estuary is 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. The terminology 'performance objectives' is aligned with the requirements of the *Yarra River Protection (Wilip-gin Birrarung Murron) Act* 2017.

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

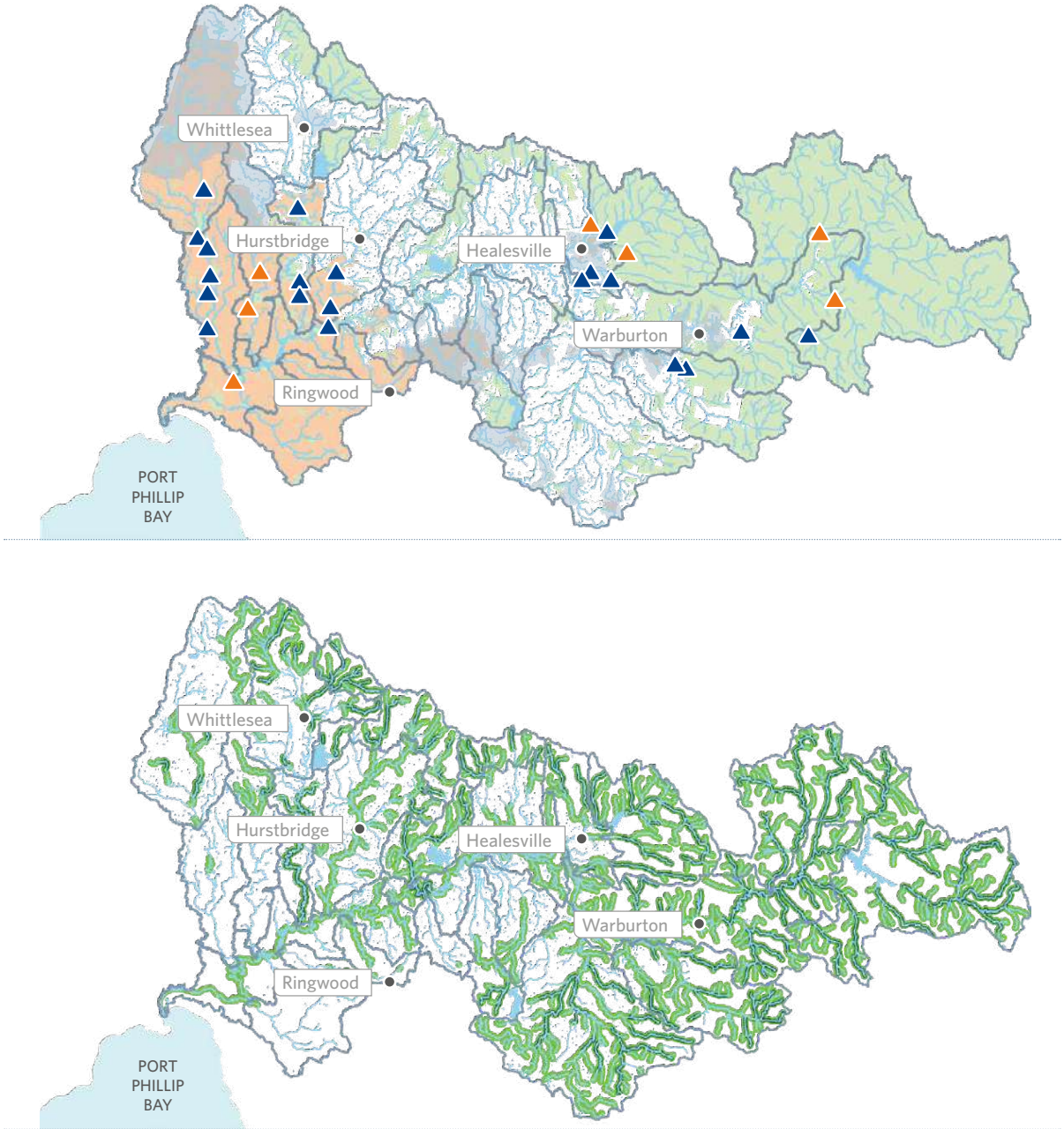


Figure 7 Summary of priorities in the Yarra catchment

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 Yarra catchment

This section provides:

- A summary of priorities in the Yarra catchment (Figure 7)
- Regional performance objectives that apply across all five major catchments in the *Healthy Waterways Strategy* including the Yarra catchment
- 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 Yarra catchment
- Detailed information for all 25 sub-catchments, sub-set of 20 wetlands and one estuary in the Yarra catchment. 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.*

Yarra Catchment Overview

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

Overview of Performance Objectives for Rivers
Progressively implement stormwater harvesting, focusing on rural townships along the Middle and Upper Yarra River, Woori Yallock, Olinda Creek catchments and new urban areas in the Merri Upper and Darebin Creek sub-catchments. Once this catchment has reached its anticipated long term urban footprint based on the urban growth boundary, this will require around 37.8 GL/year of stormwater harvested and 10.7 GL/year infiltrated. Ensure directly connected imperviousness (DCI) levels in the above priority catchments do not increase beyond current levels and headwater streams are retained as features in the landscape for environmental and social benefits.
Investigate options to increase the environmental water reserve by 10 GL/year by 2028 to meet ecological watering objectives and cover projected shortfalls from climate change. This will benefit the middle Yarra River. Any water recovery for the environment will be considered through Victorian Sustainable Water Strategies, markets and use of alternative water.
Identify opportunities to maintain or improve the flow regime in refuge reaches to support instream values, including platypus.
Reduce the key threat of flow stress by addressing the threats and other activities that impact waterways such as domestic, stock and agricultural uses, climate change, diversions or urbanisation.
Establish 376 km and maintain 1793 km of continuous vegetated buffers (using EVC benchmarks and to at least a level 3 vegetation quality) along at least 80 per cent of priority reaches. In addition, increase vegetation cover in existing and planned urban areas by 2 km to support social values.
Maintain 735 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 Darebin Creek, Diamond Creek (Rural), Merri Creek (Rural and Forested), Mullum Mullum Creek, Plenty River Lower, Plenty River Upper, Steels and Pauls Creek (Rural) and Woori Yallock Creek sub-catchments
Increase access to and along waterways by 41 km by improving connections with existing path networks and extending paths into new urban areas. Establish new boat launch facilities at key locations along the Yarra River to improve access for on-water activities.
Reduce nutrient and sediment runoff from rural land through improved management of 1800 ha of land including works to protect and increase vegetation along headwater streams.
Provide connectivity for fish along major tributaries of the Yarra River through the removal of seven barriers by 2028. This will improve fish passage in several areas, including Darebin Creek and the Upper Yarra tributaries.
Conserve all currently listed water dependent species and communities (16 fauna species, 150 flora species and 39 EVCs) through habitat protection, research and monitoring.

Yarra Catchment Overview - Rivers

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

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds score is currently moderate overall, with 252 bird species being recorded in the catchment including 153 species of riparian birds. Nationally threatened species include swift parrot, Australasian bittern and helmeted honeyeater. Without further action bird scores are considered unlikely to improve. The target is to maintain at moderate.
low	mod.	high		Fish scores are currently low overall, however the main stem of the Yarra is very important for native fish – with 14 indigenous freshwater species, including the nationally significant Australian grayling, Australian mudfish, and several estuarine species such as black bream, yellow eye mullet and mulloway. The fish score is considered likely to improve over time. The target is to improve the overall score from low to high.
low	low	mod.		Frogs score is currently low overall. Fifteen species of frog are expected to occur in the Yarra catchment. The nationally listed growling grass frog still occurs in some sub-catchments, mostly along north-western tributaries such as the Merri and Darebin Creeks. Frogs score is considered likely to decline unless the performance objectives in this strategy are achieved. The target is to improve to moderate.
high	high	very high		Macroinvertebrates score is currently high overall. Diversity is higher along the main stem and in the middle and upper catchments. The target is to improve to very high.
high	mod.	high		Platypus score is currently high overall for the catchment. Platypus are mostly found in tributaries of the middle and upper catchment and the main stem of the Yarra. Platypus are at risk, particularly in the lower and middle tributaries of the Yarra River, unless the performance objectives in this Strategy are achieved. The target is to maintain current populations at a high level.
mod.	low	mod.		Vegetation score is currently moderate. The largest and most intact areas of vegetation are the forested headwaters in the Yarra Ranges National Park which support many rare and threatened plant species such as the jungle bristle fern, tall astelia, tree geebung and old growth mountain ash. Without further action vegetation score is considered likely to decline. The target is to maintain vegetation scores as moderate.
high	high	very high		Amenity score is currently high based on community satisfaction, but is likely to decline in response to population growth and urbanisation. The target is to improve to very high.
high	mod.	high		Community connection score is currently high based on community satisfaction, but is likely to decline in response to population growth and urbanisation. The target is to maintain at high.
high	high	very high		Recreation score is currently high based on community satisfaction, but is likely to decline in response to population growth and urbanisation. 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.	low	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is moderate and the target is high.
high	mod.	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
high	mod.	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is high.
mod.	low	high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is high.
high	high	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is high and the target is high.
mod.	mod.	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is high.
mod.	mod.	high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is moderate and the target is high.
low	low	mod.		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is low and the target is moderate.
high	mod.	high		Litter Absense is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
mod.	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.

Yarra Catchment Overview - Wetlands

Overview of Performance Objectives for Wetlands
Reduce the threat of invasive plant species.
Deliver environmental water to key billabongs on the Yarra floodplain.
Investigate opportunities to re-engage natural floodplain wetlands in key locations to meet ecological watering objectives, improve ecosystem services, cultural and social values.
Reduce the threat of invasive animals such as dogs, cats and foxes to protect key wetland bird habitats.
Develop understanding of the amenity, community connection and recreation values of wetlands and develop performance objectives to enhance these values.

Yarra Catchment Overview - Wetlands

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

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
very low	low	low	Wetland bird score in the Yarra catchment is on average currently very low. However, some wetlands such as Cockatoo Swamp have high bird values. Environmental watering of key billabongs in the Yarra catchment is predicted to improve the bird value of many billabong wetlands. The target is to improve from very low to low.
low	high	high	Fish score is currently low overall. However, environmental watering of key billabongs and re-engagement of floodplain wetlands in the long term is predicted to significantly improve the fish score up to high.
high	mod.	high	Frogs score is high. Actions to reduce the threats of changed water regimes, altered wetland form, lack of wetland buffers and poor wetland vegetation condition will maintain the score at high, particularly in the Yarra billabongs. Many Yarra wetlands provide habitat for significant frog species such as growling grass frog. It is predicted that these habitats will continue to support these species.
low	low	mod.	Vegetation score is currently low. Actions to reduce the threats of changed water regimes, improve vegetation condition and wetland habitat form will improve the wetland vegetation score to a potential trajectory of moderate.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

low	high	high	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is low and the target is high.
low	low	low	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
very low	low	high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is high.
low	mod.	high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is high.
low	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is low and the target is moderate.

Yarra Catchment Overview - Estuaries

Overview of Performance Objectives for Estuaries
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 Yarra estuary so that it is suitable for secondary contact (boating and fishing).
Maintain existing high value opportunities for recreation (walking/cycling, boating, fishing etc.).
Maintain existing high value facilities that support passive enjoyment and recreation.

Yarra Catchment Overview - Estuaries

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

KEY VALUES (10-50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	very low		Estuary birds score is currently very low due to the historical loss of habitat, industrial and urban development. The target is to avoid further decline.
very high	very high	very high		Fish score is currently very high, with significant species such as the Australian Grayling using the estuary as part of its migration path between the sea and fresh waters. A good diversity of estuarine dependent fish species also inhabit the estuary. The target is to maintain at very high.
very low	very low	very low		Vegetation score is currently very low due to the historical loss of habitat, and industrial and urban development. The target is to avoid further decline.
very high	very high	very high		Amenity score is currently very high and is expected to remain very high with continued improvements to parks, facilities and vegetation.
very high	very high	very high		Community connection score is currently very high. The Yarra River estuary is an iconic location loved by visitors and locals to Melbourne.
very high	very high	very high		Recreation score is currently very high and will remain high. The estuary is a hub of activity including boating, cycling and walking.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

very low	very low	high		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is high.
very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
very low	very low	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.

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






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

The following section presents detailed information for all 12 sub-catchments including seven wetlands and 16 estuaries. Information on the wetlands and estuaries is listed immediately following the respective sub-catchment.

Brushy Creek

Darebin Creek

- Donnybrook Road Lake

Diamond Creek (Rural)

Diamond Creek (Source)

Gardiners Creek

Koonung Creek

Little Yarra River and Hoddles Creek

Merri Creek Upper

- Hearnes Swamp
- Kalkallo Commons Grassland and Kalkallo Creek Wetlands

Merri Creek Lower

- Growling Grass Frog reserve wetlands
- Stormwater wetlands (including Galada Tamboore and Dunnetts Road Swamp)

Mullum Mullum Creek

- Ringwood Lake

Olinda Creek

- Lillydale Lake

Plenty River (Source)

Plenty River Lower

Plenty River Upper

- Stormwater Wetlands (including Galada Tamboore and Dunnetts Road Swamp) - See Merri Creek (Lower)

Steels and Pauls Creek (Rural)

Steels and Pauls Creek (Source)

Stringybark Creek

- Spadonis Billabong

Watsons Creek

Watts River (Rural)

Watts River (Source)

Woori Yallock Creek

- Cockatoo Swamp

Yarra River Lower

- Annulus Billabong, Yarra Flats
- Banyule Flats Billabong
- Bolin Bolin Billabong
- Burke Road Billabong
- Hays Paddock Billabong
- Westgate Park Wetlands
- Willsmere Billabong
- Yarra River Estuary

Yarra River Middle

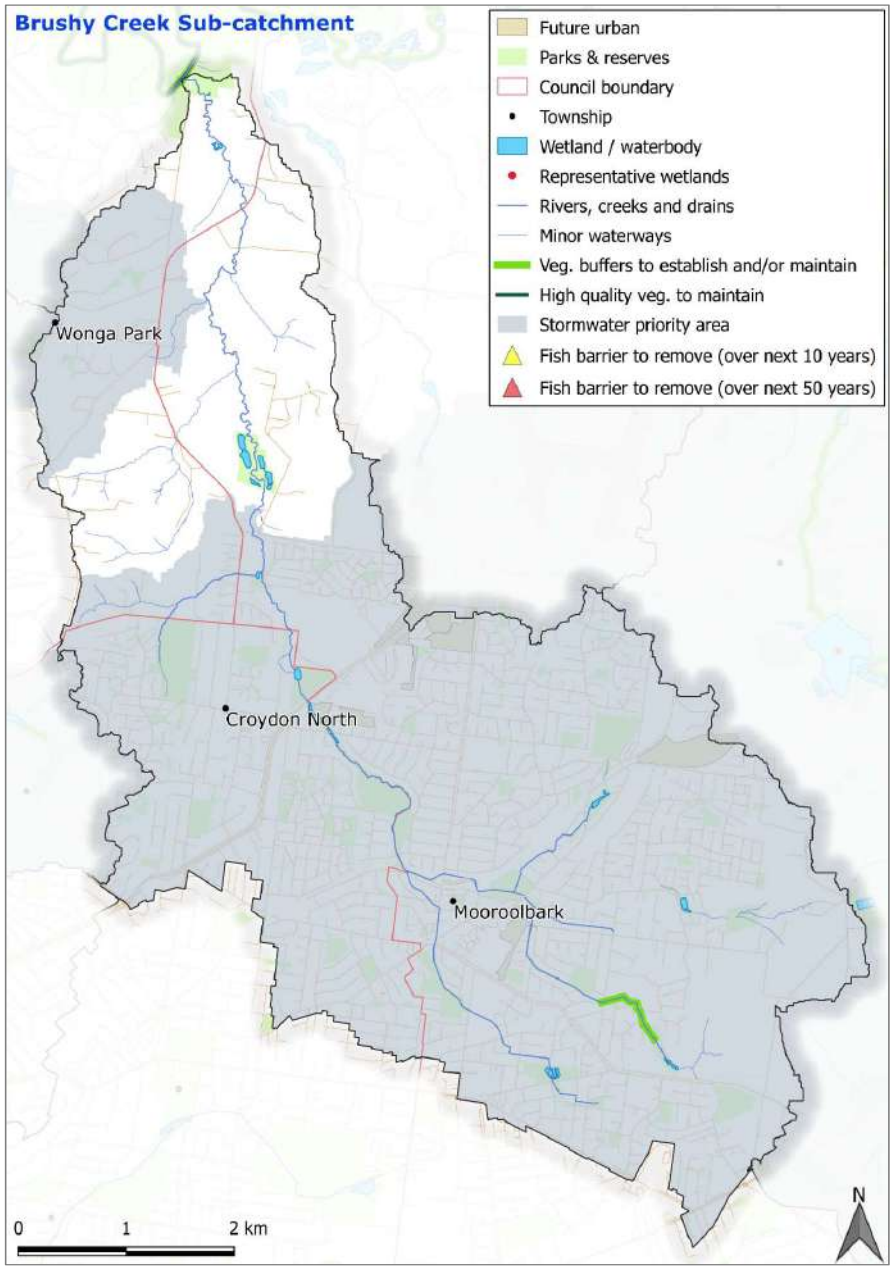
- Anderson Creek East Retarding Basin

Yarra River Upper (Rural)

- Domain Chandon Billabongs
- Yarra Bridge Stream Side Reserve
- Yering Backswamp, Yarra River

Yarra River Upper (Source)

Brushy Creek Sub-catchment



Description

Brushy Creek rises in Mooroolbark and joins the Yarra River at Wonga Park. Tributaries of Brushy Creek include Mooroolbark, Lincoln Road, Five Ways and Warrien Road Main drains.

Actions

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

"Conduct litter management and prevention programs."

"Develop human trail links along waterways - bike and walking paths through riparian zones. This also aids habitat links."

"Reduce run off from new housing developments in Chirnside Park into Brushy Creek."

How to read the scores

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

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

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

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

For description of scores see metrics tables at end of document

Brushy Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Stormwater Condition	To prevent decline in stormwater condition in the Yarra River, treat urban development so directly connected imperviousness (DCI) of Brushy Creek remains below 13% at confluence with Yarra River. For every hectare of new impervious area, this requires harvesting around 5.5 ML/y and infiltrating 1.9 ML/y. This is about to 2.6 GL/y and 0.9 GL/y for full development to urban growth boundary.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 2 ha) and maintain existing vegetation (less than 1 km, 1 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
4	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 volumes where possible) ensuring they are released in a manner that ensures environmental values are supported in the waterway.
5	Access	Increase access to and along waterways (about 1 km of path) by filling gaps and improving connections with existing path network.
6	Participation	Increase participation rates from very low to moderate; support community groups, connect with growth area communities and build capacity of land owners through rural programs. Increase support for community/environment groups as population increases.

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

Notes:

Brushy Creek Sub-catchment

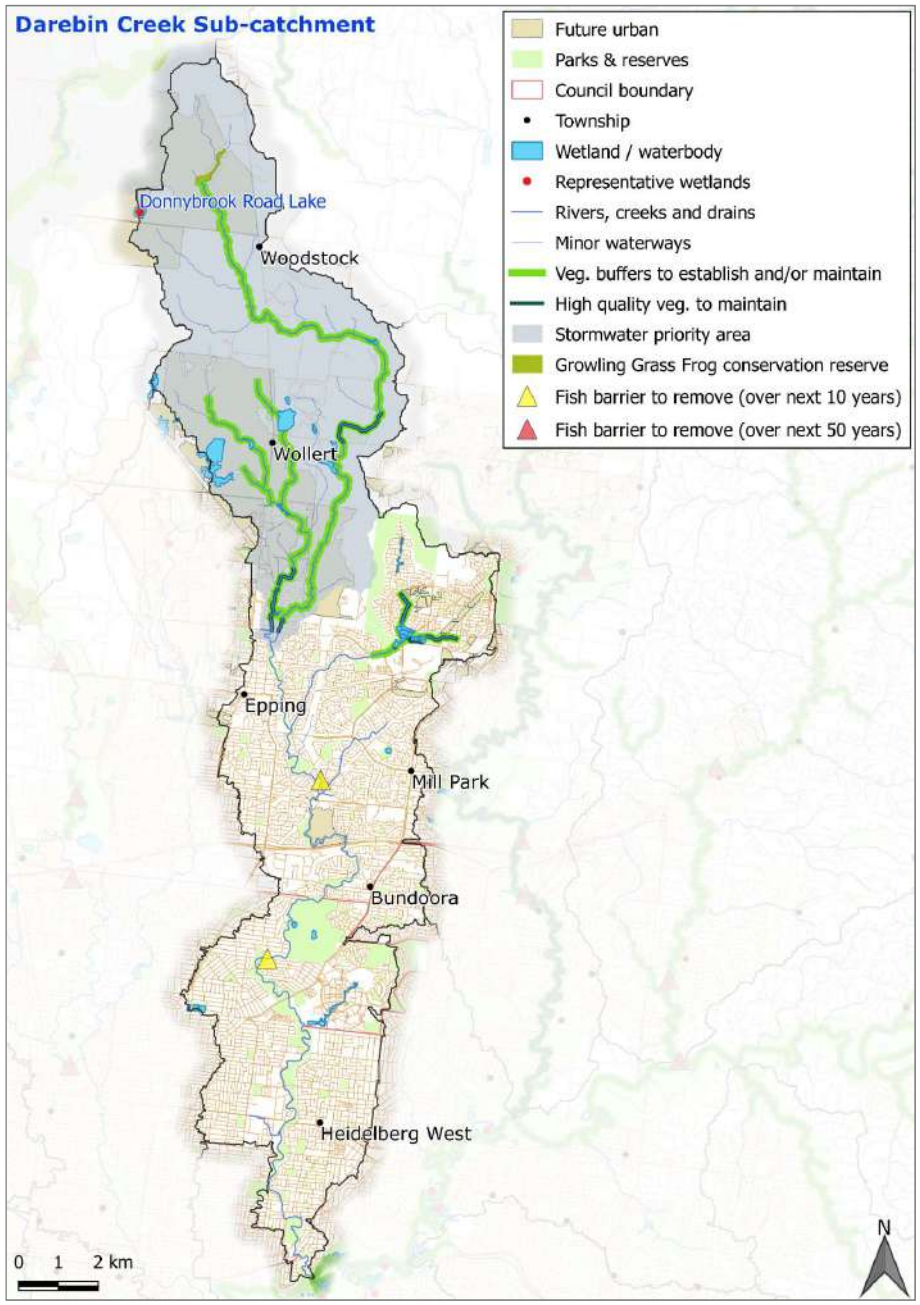
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		Insufficient bird observation to establish a birds (riparian) score for this sub-catchment. It is likely to be moderate and 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. Target is to maintain as moderate.
low	mod.	mod.		Fish are currently rated as low due to lack of suitable instream and riparian habitat, which is largely a result of a highly urbanised catchment. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to vegetation and flows (particularly urban stormwater) are expected to improve habitat for a wider range of species and ensure a moderate rating in the long term. Threatened species include macquarie perch near confluence with Yarra River.
very low	low	low		Frogs score is very low since very few of the expected species of frog were recorded. With appropriate management frog score could be improved to low.
very low	very low	low		Macroinvertebrates score is very low due to highly urbanised catchment resulting in a highly degraded stream, and is likely to remain very low unless improvements to stormwater management occur across the entire sub-catchment. With significant investment the score may improve to low in long term, but the feasibility of significantly improving all environmental conditions is low.
very low	very low	very low		Platypus score is very low due to lack of instream and riparian habitat largely resulting from significant urban development. Although platypus may use the lower reach from time to time, without substantial improvements to conditions it is expected that score will remain very low in long term.
low	very low	mod.		Vegetation score is low. The quality and extent is largely degraded and threats such as stormwater, weeds and pest animals persist. Climate change and existing threats will reduce score to very low unless mitigated. Enhancing vegetation along priority reaches will improve score to moderate in long term. There are 7 known listed water dependent flora species.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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	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 moderate and the target is low.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
mod.	mod.	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is moderate.
low	low	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is moderate.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
very low	very 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 very low and the target is high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
low	low	low		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is low and the target is low.
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.

Darebin Creek Sub-catchment



Description

Darebin Creek rises near Woodstock on Melbourne's northern outskirts. The creek flows through Epping, Reservoir and Heidelberg West before joining the Yarra River at Alphington.

Actions

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

"Map riparian revegetation requirements for the whole catchment. Refer to Nature Conservancy data or collect data."

"Educate community to consider environmental flow requirements."

"Maintain and promote the Darebin Creek bike trail. Make improvements to Banksia St area."

How to read the scores

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

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

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

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

For description of scores see metrics tables at end of document

Darebin Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Instream Connectivity	Increase instream connectivity to provide fish passage along Darebin Creek from the confluence with the Yarra River to the upper reaches (remove 2 fish barriers).
3	Stormwater Condition	To prevent decline in stormwater condition, treat urban development within Darebin Creek and Findons Creek catchments so directly connected imperviousness (DCI) remains below 2% in Darebin Creek at McDonalds Road (Epping). For every hectare of new impervious area, this requires harvesting around 4.5 ML/y and infiltrating 1.1 ML/y, which is about 4.5 GL/y and 1.1 GL/y for full development out to urban growth boundary.
4	Vegetation Extent	Establish a continuous riparian vegetated buffer (31 km, 122 ha) and maintain existing vegetation (3 km, 13 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
5	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 6 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
6	Physical form	Investigate and mitigate threats to physical form and other high values (including impacts of urbanisation).
7	Access	Increase access to and along waterways from 50% to 57% (about 5 km of path) by filling gaps and improving connections with existing path network.
8	Participation	Increase participation rates from very low to high; support community groups, citizen science programs and rural programs in upper catchment. Increase participation through Darebin Creek Management Committee.

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

Notes:

Darebin Creek Sub-catchment

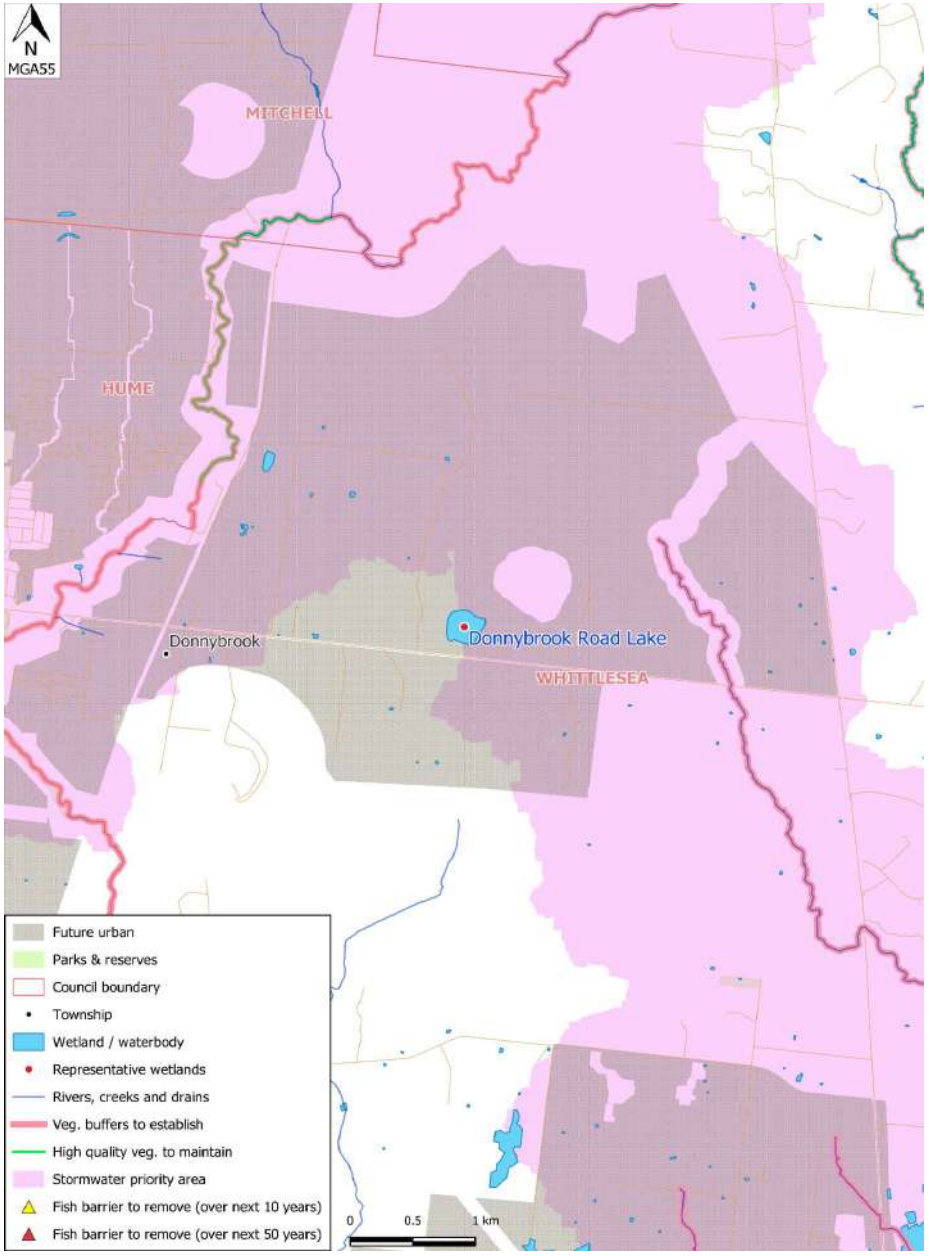
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very 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. 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 and barriers to migration. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Improvements to vegetation, flows (particularly urban stormwater) and removal of fish barriers are expected to improve habitat for a wider range of species and increase score to moderate in the long term. There are no listed threatened species in this sub-catchment.
very low	very low	very low		Frogs score is very low. Combined effects of reduced rainfall and flows, and urban land use intensification mean score is likely to remain in a very low condition. Significant species include growling grass frog.
low	very low	low		Macroinvertebrates score is low due largely due to impacts of urbanisation and will decline further with increased urbanisation and climate change. Managing the impacts of urban stormwater and improving habitat through revegetation is expected to maintain existing score.
very low	very low	very low		Platypus score is very low due to a lack of suitable instream and riparian habitat and impacts from urban stormwater. The Yarra River population may occasionally use the lower reaches near the confluence. It is unlikely to be feasible to increase score in long term without substantial improvements to their habitat.
low	very low	low		Vegetation score is low resulting from large scale urbanisation and persistent threats such as weeds and pest animals. Without intervention this score is predicted to reduce to very low. There are 16 known listed water dependent species. Long term outcome is to maintain current score by managing 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	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is low and the target is low.
high	low	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
high	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 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.
very low	very low	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is moderate.
low	low	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is low and the target is very high.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
mod.	mod.	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is very high.
mod.	low	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
low	low	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is low and the target is high.
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.

Donnybrook Road Lake



Description

Donnybrook Road Lake, in Donnybrook, is a large shallow ephemeral wetland on the basalt plains. It was listed as a Biosite by DELWP in 2000 because of its vegetation values. It is a seasonal herbaceous wetland of the coastal temperate plains vegetation, which is protected under the EPBC Act.

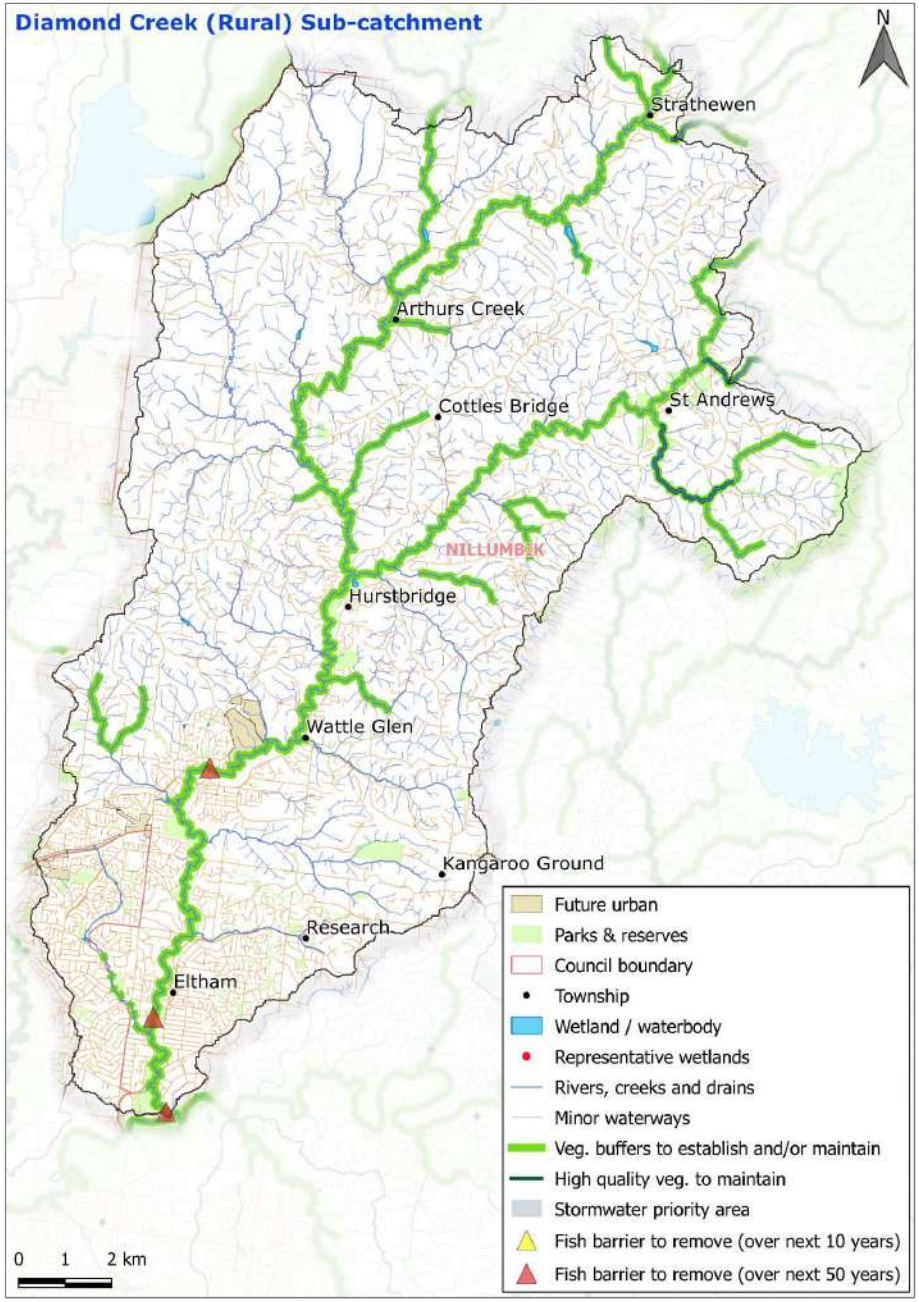
Performance Objectives

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

Donnybrook Road Lake

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is currently very low. It is not formally recognised as significant bird habitat and its vegetation condition is low. Score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very high	very high		Frog score is currently very high with significant species present. Maintenance of the wetland water regime is expected to maintain score at very high. Site specific survey will further inform long-term targets.
	low	very low	low		Wetland vegetation score is low with a predicted decline to very low due to predicted drying associated with climate change. Maintaining the wetland water regime is predicted to maintain score at low.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is very high.
	low	low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
	very low	very low	low		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is low.
	low	low	low		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is low.
	mod.	very low	low		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is low.

Diamond Creek (Rural) Sub-catchment



Description

Diamond Creek rises in the Kinglake National Park near St Andrews and flows though Hurstbridge and Diamond Creek townships before joining the Yarra River at Eltham. Arthurs Creek rises in the Kinglake National Park near Kinglake and flows through Strathewen and Arthurs Creek before joining Diamond Creek in Hurstbridge. Other tributaries include Kangaroo Creek, Running Creek, Stewart Gully, Deep Creek and Smiths Gully.

Actions

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

"Explore opportunities for environmental flows in face of climate change drying up waterways."

"Revegetate and protect waterways through rural / agricultural areas at Arthurs Creek, Strathewen and Kangaroo Ground."

"Educate residents to plant indigenous vegetation that complements bushland / riparian 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

Diamond Creek (Rural) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve flow regime in refuge reaches to support in stream values and platypus populations. Reduce key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions and urbanisation.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (25 km, 101 ha) and maintain existing vegetation (81 km, 322 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 4 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
4	Physical form	Investigate and mitigate threats to physical form and other high values (particularly along tributaries and from urbanisation).
5	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
6	Participation	Increase participation rates from moderate to very high; support community groups, connect with growth area communities and build capacity of land owners through rural programs. Increase support for community/environment groups and promotion of high value areas (e.g. Kinglake National Park) as population increases.

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

Notes:

Diamond Creek (Rural) Sub-catchment

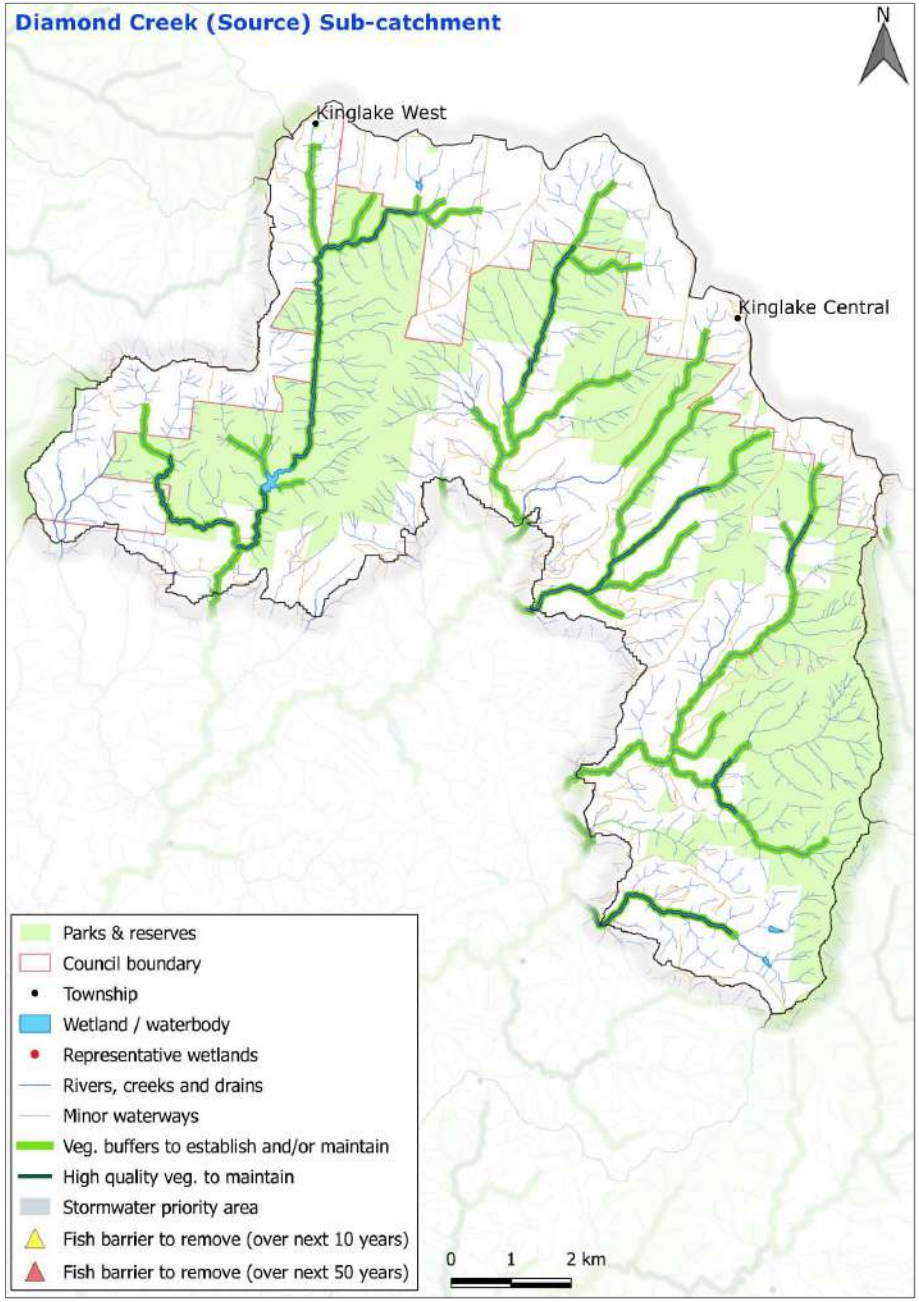
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
low	low	mod.		Birds (riparian) is low, meaning few of the expected riparian bird species were recorded. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species include the powerful owl, eastern great egret and intermediate egret.
mod.	high	high		Fish are currently rated as moderate due to lack of suitable habitat (instream and riparian) and barriers to migration. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Improvements to fish passage and habitat and management of urban stormwater, will benefit a number of less widespread species and increase score to high in long term. Threatened species include macquarie perch in lower reach near the confluence with the Yarra River.
very low	low	low		Frogs score is very low since very few of the expected species of frog were recorded. With appropriate management score could be improved to low.
mod.	mod.	high		Macroinvertebrates score is moderate as a result of a lack of instream and riparian habitat, and stream flows. Improvements to riparian vegetation and flows will increase macroinvertebrate score to high in long term.
very low	very low	low		Platypus score is very low due to lack of suitable instream and riparian habitat and low flows. Improvements to habitat and maintenance of stream flows will increase score to low in long term.
low	very low	mod.		Vegetation score is low. Catchment scale impacts and persistent threats such as stock access, pest plants and animals have degraded riparian vegetation. Climate change and unmitigated threats will reduce score to very low. There are 28 known water dependent listed species. Long term outcome is to increase score to moderate through protecting the best and enhancing priority reaches.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Diamond Creek (Source) Sub-catchment



Description

Diamond Creek rises in the Kinglake National Park near St Andrews and flows though Hurstbridge and Diamond Creek townships before joining the Yarra River at Eltham. Arthurs Creek rises in the Kinglake National Park near Kinglake and flows through Strathewen and Arthurs Creek before joining Diamond Creek in Hurstbridge. Other tributaries include Kangaroo Creek, Running Creek, Stewart Gully, Deep Creek and Smiths Gully.

Actions

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

"Manage and plan for increasing conflict between recreational activity and environmental protection of sensitive areas."

"Weed and pest control in Kinglake - private land and waterways connecting to National Park. Pest animals include pig, goat and deer."

"Protect headwater forests and woodlands to safeguard downstream flows and water quality."

How to read the scores

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

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

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

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

For description of scores see metrics tables at end of document

Diamond Creek (Source) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 22 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
2	Vegetation 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.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (4 km, 17 ha) and maintain existing vegetation (59 km, 237 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Participation	Increase participation rates from high to very high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science through promotion of high value areas (e.g. Kinglake National Park).
5	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
6	Water Quality - Environmental	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.

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

Notes:

Diamond Creek (Source) Sub-catchment

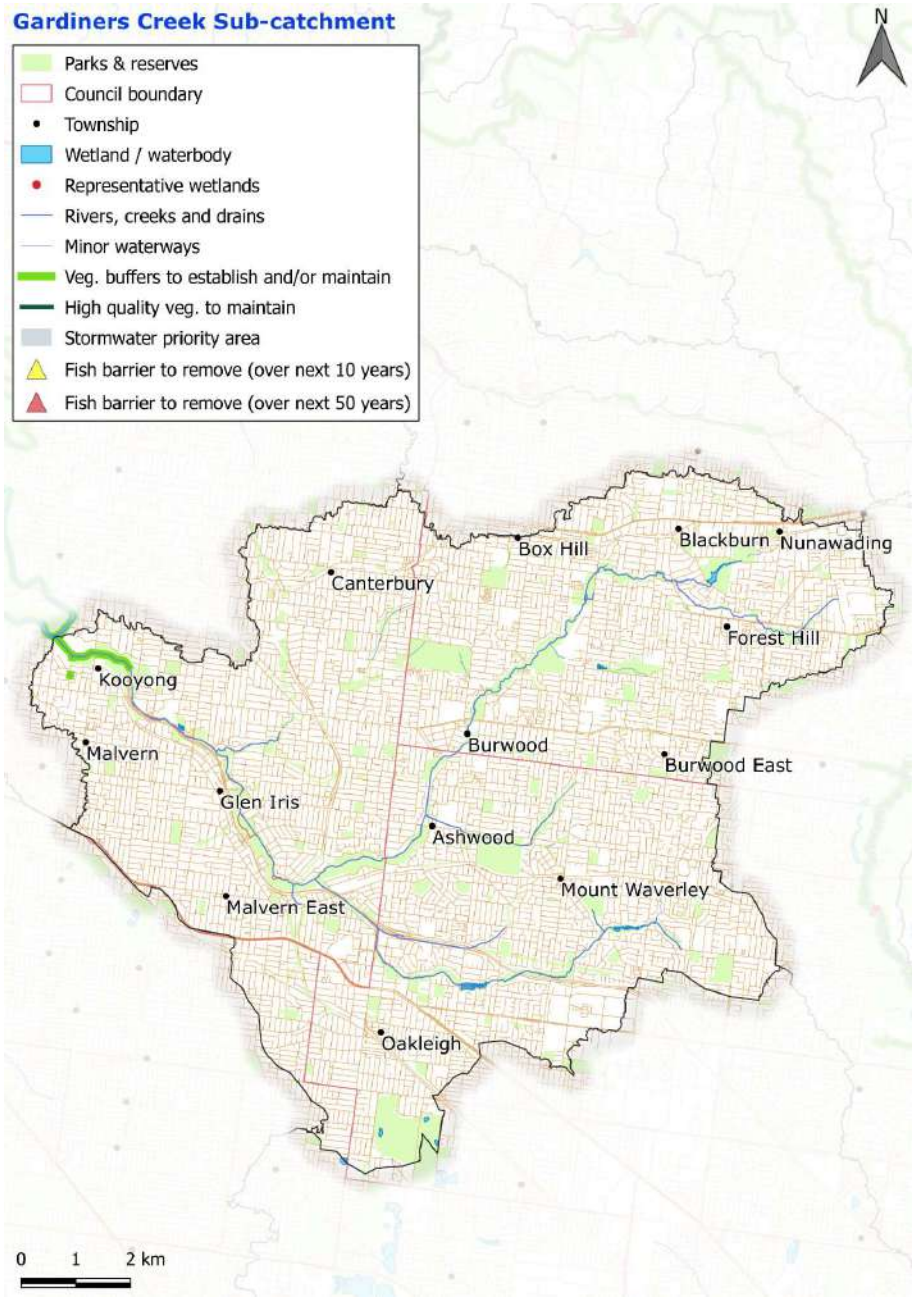
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		Insufficient data to estimate a riparian bird score. Despite the effects of climate change adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species include the powerful owl.
low	mod.	high		Fish are currently rated as low. This is partly expected as it is a headwater stream with naturally low flows, however barriers to fish migration are also limiting the richness of species. The higher current trajectory rating is due to climate change improving habitat suitability for common and widespread species. Improvements to fish passage, riparian vegetation and urban stormwater is expected to increase habitat suitability for a wider range of species, leading to a high rating in the long term.
mod.	low	mod.		Frogs score is moderate since not as many of the expected species of frog were recorded. With appropriate management score should be maintained as moderate. Significant species include southern toadlet.
very high	very high	very high		Macroinvertebrates score is very high as sub-catchment is largely within Kinglake National Park. Monitoring and maintenance of existing high quality habitats including ensuring vegetation condition does not decline will ensure macroinvertebrates remain very high in long term.
low	very low	low		Platypus score is low largely due to lack of suitable habitat and disconnection with Yarra River population. Low flows are likely to be limiting and will cause greater stress under climate change. Maintaining flows and improving instream and riparian habitat will be essential for maintaining the population in long term.
mod.	low	high		Vegetation score is moderate due to very high quality vegetation in forested headwaters and poorer quality in lower reaches. Score is predicted to decline with persistent and emerging threats such as pest plant and animals and climate change. There are 22 known water dependent listed species. Protecting high quality reaches and enhancing lower reaches will increase score to high in long term.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very high	high	very high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very high and the target is very high.
very high	high	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is high.
high	mod.	high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is high and the target is high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
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.
high	mod.	high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is high and the target is high.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
very high	high	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 very 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.
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.

Gardiners Creek Sub-catchment



Description

Gardiners Creek originates near Blackburn and flows through Burwood and Malvern East before following the Monash Freeway corridor to the Yarra River. Major tributaries include Scotchmans and Damper creeks.

Actions

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

"Identify litter hot spots and build targeted education programs and interception infrastructure. Work with councils and volunteer groups e.g. Blackburn Lake Advisory Committee."

"Develop new land owner waterway information pack with support from council and agencies - make consistent across catchment."

"Support large landowners (including golf clubs) to develop revegetation programs. Provide seed funding, guidelines and case study examples."

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

Gardiners Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to reduce the key threat of flow stress on waterways by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 5 ha) and maintain existing vegetation (less than 1 km, 1 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality). In addition to improve social values increase vegetation cover in existing and planned urban areas by 1 km.
3	Access	Increase access to and along waterways from 73% to 75% (about 1 km of path) by filling gaps and improving connections with existing path network.
4	Participation	Increase participation rates from low to high; support community groups and build capacity through citizen science and cultural engagement.

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

Notes:

Gardiners Creek Sub-catchment

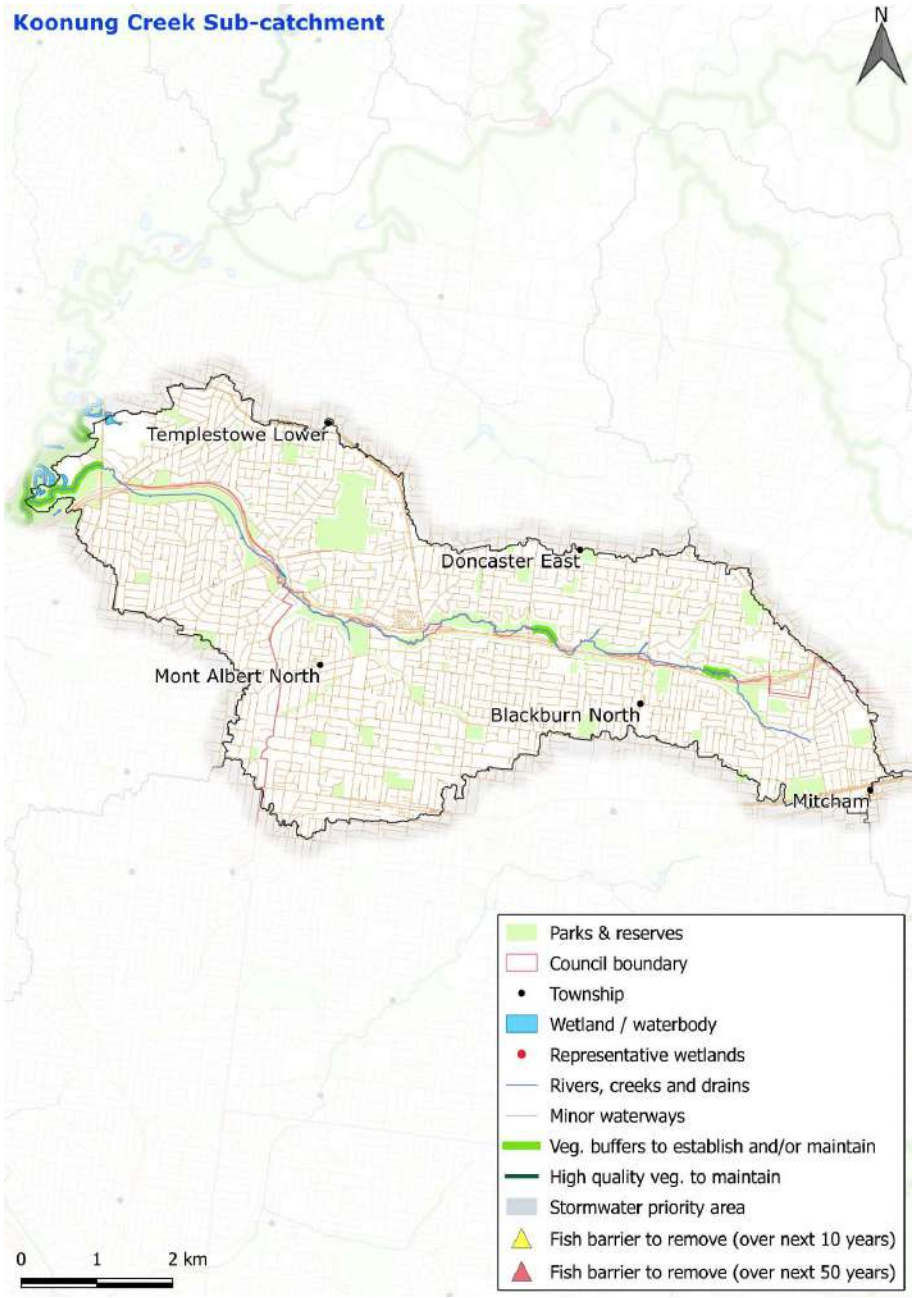
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very low	mod.		Birds (riparian) is moderate, meaning most of expected species occurred but some of these were only infrequently recorded. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl, little egret and eastern great egret.
low	mod.	mod.		Fish are currently rated as low due to lack of suitable instream and riparian habitat, largely due to a highly urbanised catchment and modified channel. The higher current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Improvements to stormwater and instream and riparian habitat are predicted benefit wider range of native fish species, particularly in sections with more natural channel. This will ensure a moderate rating in the long term.
mod.	very low	mod.		Frogs score is moderate since not as many species of frog were recorded. With appropriate management score should be maintained as moderate. Significant species include growling grass frog.
very low	very low	very low		Macroinvertebrates score is very low mainly due to impacts of urban stormwater and lack of instream and riparian habitat. Without substantial improvements to stormwater and restoration of habitats score is expected to remain very low.
very low	very low	very low		Platypus score is very low due to a lack of instream and riparian habitat resulting largely from urban stormwater impacts and substantial channel modification. The Yarra River population may occasionally use lower reaches. Without substantial improvements to habitat and stormwater impacts it is unlikely score will increase in long term.
low	very low	low		Vegetation score is low. The vegetation is highly modified and fragmented as a result of large scale urban impacts. Score will decline to very low due to persistent and emerging threats such as pest plant and animals and climate change. There are 8 known listed water dependent species. Long term outcome is to ensure future threats are mitigated and current score is maintained.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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.
mod.	mod.	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is moderate.
very low	very low	low		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is low.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
high	high	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is high and the target is very high.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
very low	very low	low		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 low.
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.

Koonung Creek Sub-catchment



Description

Koonung Creek rises near Nunawading and follows the Eastern Freeway corridor for much of its length before entering the Yarra River at Bulleen.

Actions

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

"Engage with schools and community stakeholders to increase uptake of Frog Census App to fill data gaps in inner sub-catchments."

"Increase recreation opportunities for Koonung Creek through bike and trail paths, habitat creation and weed removal. Widening of Eastern Freeway has taken away recreation areas."

"Create trail finding app with waterway information including history and heritage at points of interest."

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

Koonung Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 3 ha) and maintain existing vegetation (1 km, 5 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Participation	Increase participation rates from low to high; support community groups and build capacity through citizen science and cultural engagement.

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

Notes:

Koonung Creek Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very low	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred but some of these only infrequently. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl, eastern great egret and intermediate egret.
low	mod.	mod.		Fish are currently rated as low due to lack of suitable habitat (instream and riparian), which is a consequence of a highly urbanised catchment and modified channel. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species.
low	very low	low		Frogs score is low since only some of the expected species of frog were recorded. Combined impacts of urbanisation and climate change on surface flows and water quality are likely to see the score decrease without proper management. Target is to maintain at low.
very low	very low	very low		Macroinvertebrates score is very low mainly due to impacts of urban stormwater and lack of instream and riparian habitat. Without substantial improvements to stormwater and restoration of habitats score is expected to remain very low.
very low	very low	very low		Platypus score is very low due to a lack of instream and riparian habitat resulting largely from urban stormwater impacts and channel modification. The Yarra River population may occasionally use lower reaches. Without substantial improvements to habitat it is unlikely score will increase in long term.
low	very low	low		Vegetation score is low. The vegetation is highly modified and fragmented as a result of land use impacts. Score will decline to very low due to persistent and emerging threats such as pest plant and animals and climate change. There is 1 known listed water dependent species. Long term outcome is to ensure future threats are mitigated and current score is maintained.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Little Yarra River and Hoddles Creek Sub-catchment

Description

The headwaters of the Little Yarra River and Hoddles Creek rise in the forested slopes of the Yarra State Forest. The Little Yarra River joins the Yarra near Yarra Junction to the northeast of Melbourne. Hoddles Creek meets the Yarra near Launching Place. Tributaries of Little Yarra River include Sally, Britannia, Edwardstown, Ely and Tugwell creeks.

Actions

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

"Increase width of revegetation buffer zone to greater than 10 meters in areas such as Don Valley and Hoddles Creek."

"Ensure strategy has an aligned education / school program."

"Restore floodplain billabongs on public and private land."

How to read the scores

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

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

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

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

For description of scores see metrics tables at end of document

Little Yarra River and Hoddles Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve flow regime in refuge reaches to support in-stream values and platypus populations. Reduce key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions and urbanisation.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (11 km, 44 ha) and maintain existing vegetation (130 km, 519 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 47 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
4	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.
5	Stormwater Condition	To prevent decline in stormwater condition, treat urban development in the region of Yarra Junction and Powelltown, so directly connected impervious (DCI) of Little Yarra River remains below 0.3% at the juncture with the Yarra River, and along the stem of Little Yarra River. For every hectare of new impervious area, this requires harvesting around 6.8 ML/y and infiltrating 3.7 ML/y. This is about 250 ML/y and 140 ML/y for full development to the urban growth boundary.
6	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science through promotion of high value areas (e.g. Yarra State Forest).
7	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity impacts from rural land, urban growth and unsealed roads as well as nutrient and pesticide inputs from rural land. This may include establishment of vegetated buffers in headwater streams. And mitigating where required potential impacts from septic tanks.

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

Notes:

Little Yarra River and Hoddles Creek Sub-catchment

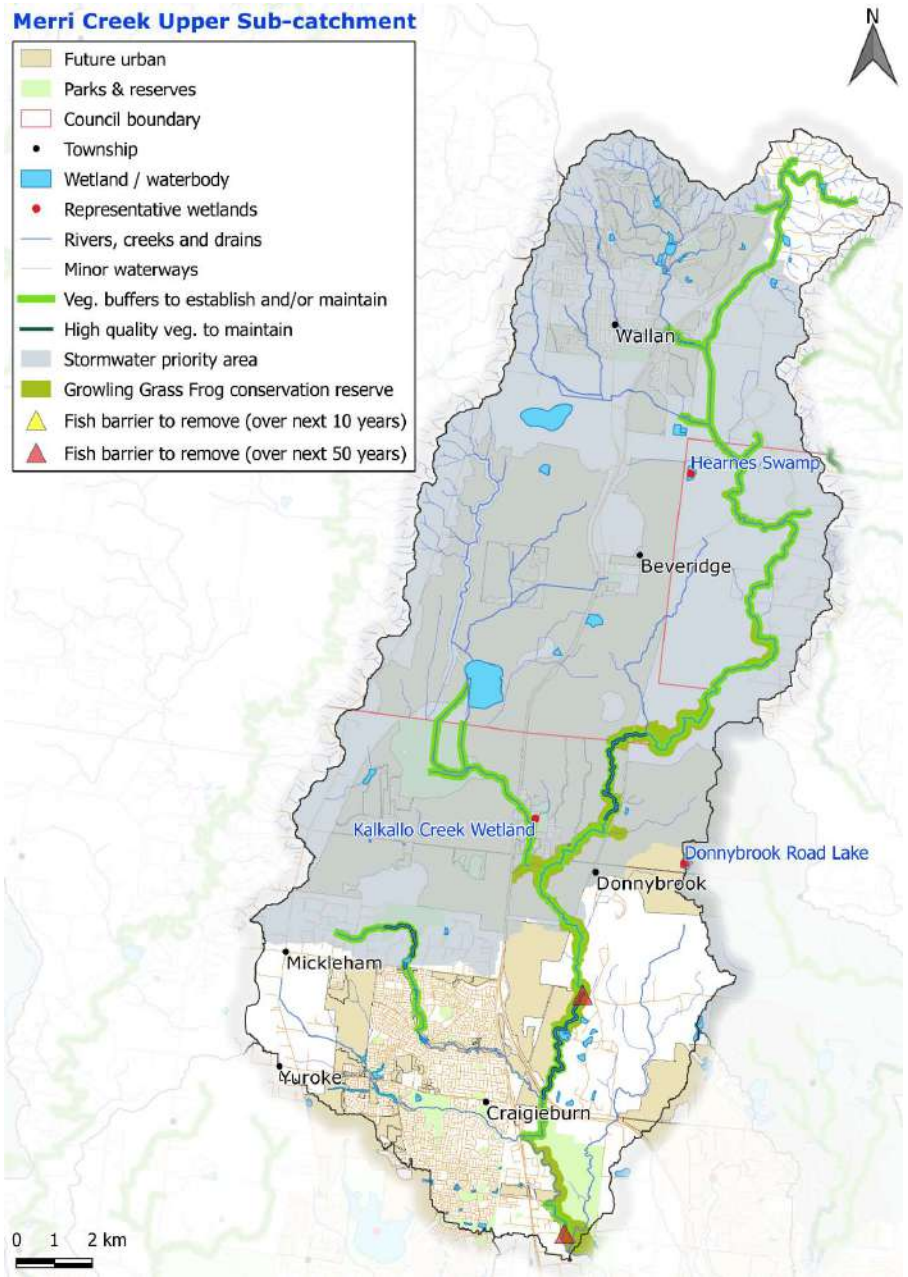
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	high	high		Insufficient bird observation to establish a birds (riparian) score. Despite the effects of climate change adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of high. Significant species include the powerful owl.
mod.	high	high		Fish are currently rated as moderate. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species; however other species, notably river blackfish, will be threatened by reduced flows under climate change. Managing flow and improving vegetation is required to protect more sensitive species and ensure a rating of high in the long term. Threatened species include macquarie perch in the lower reach near the confluence with Yarra River.
high	mod.	high		Frogs score is high since most of the expected species of frog were recorded. With dedicated management score can be maintained at high.
very high	very high	very high		Macroinvertebrates score is very high as a result of good instream and riparian habitat. Threats include urban development. Monitoring and maintenance of existing high quality habitats and managing future water quality and flow impacts will ensure macroinvertebrates remain very high in long term.
high	mod.	high		Platypus score is high based on good instream and riparian habitat, water quality and flows, however is predicted to decline under climate change. Improving vegetation will enhance their habitat however managing flows will be critical to maintaining high score in long term.
mod.	low	high		Vegetation score is moderate, with high quality reaches in the headwaters. With persistent and emerging threats such as stock access, pest plant and animals and climate change score will decline to low in long term. There are 17 known water dependent listed species. Protecting high quality reaches and enhancing the lower reaches will increase score to high in long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to maintain at high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
high	mod.	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
high	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 high and the target is high.
high	mod.	high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is high and the target is high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
mod.	mod.	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is moderate.
high	mod.	high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is high and the target is high.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	high	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.	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.

Merri Creek Upper Sub-catchment



Description

Merri Creek Upper sub-catchment includes the catchment upstream of Craigieburn Road. Major tributaries of Merri Creek in this section are Kalkallo, Malcolm and Aitken creeks.

Actions

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

"Reduce stormwater and gross pollutant run-off from construction sites."

"Support online citizen science. Develop website and survey social users. Look at Zooinverse site to inform."

"Document the importance of the catchment for biodiversity health and protection of threatened species (growling grass frog and other environmental protection and biodiversity conservation threatened species) requirements of ecological communities / biodiversity."

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

Merri Creek Upper Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support instream values.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (53 km, 213 ha) and maintain existing vegetation (12 km, 46 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 10 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
4	Stormwater Condition	To prevent decline in stormwater condition, treat urban development so directly connected imperviousness (DCI) remains below 2% on the Merri Creek at Summerhill Road (Wollert). For every hectare of new impervious area, this requires harvesting around 4.5 ML/y and infiltrating 1.1 ML/y, which is about 21.4 GL/y and 5.2 GL/y for full development to the urban growth boundary.
5	Stormwater Condition	To prevent decline in stormwater condition, treat urban development upstream of Mount Ridley Road so directly connected imperviousness (DCI) remains below 1% throughout the upper Malcolm Creek catchment. For every hectare of new impervious area, this requires harvesting around 4.2 ML/y and infiltrating 0.9 ML/y, which is about 110 ML/y and 25 ML/y for full development to the urban growth boundary.
6	Water Quality - Environmental	Protect water quality for Port Phillip Bay and waterways by maintaining current quality of discharges from sewage treatment plants (and reducing volumes where possible), and ensuring they are released in a manner that ensures environmental values are supported in the waterway.
7	Physical form	Investigate and mitigate threats to physical form and other high values (including impacts of urbanisation).
8	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new areas (contributes to Merri Creek shared trail).
9	Participation	Increase participation rates from low to high; support community groups, connect with growth area communities and build capacity of land owners through rural programs. Increase support for community/environment groups that undertake waterway improvement projects (e.g. Merri Creek Management Committee).
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.
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.

Merri Creek Upper Sub-catchment

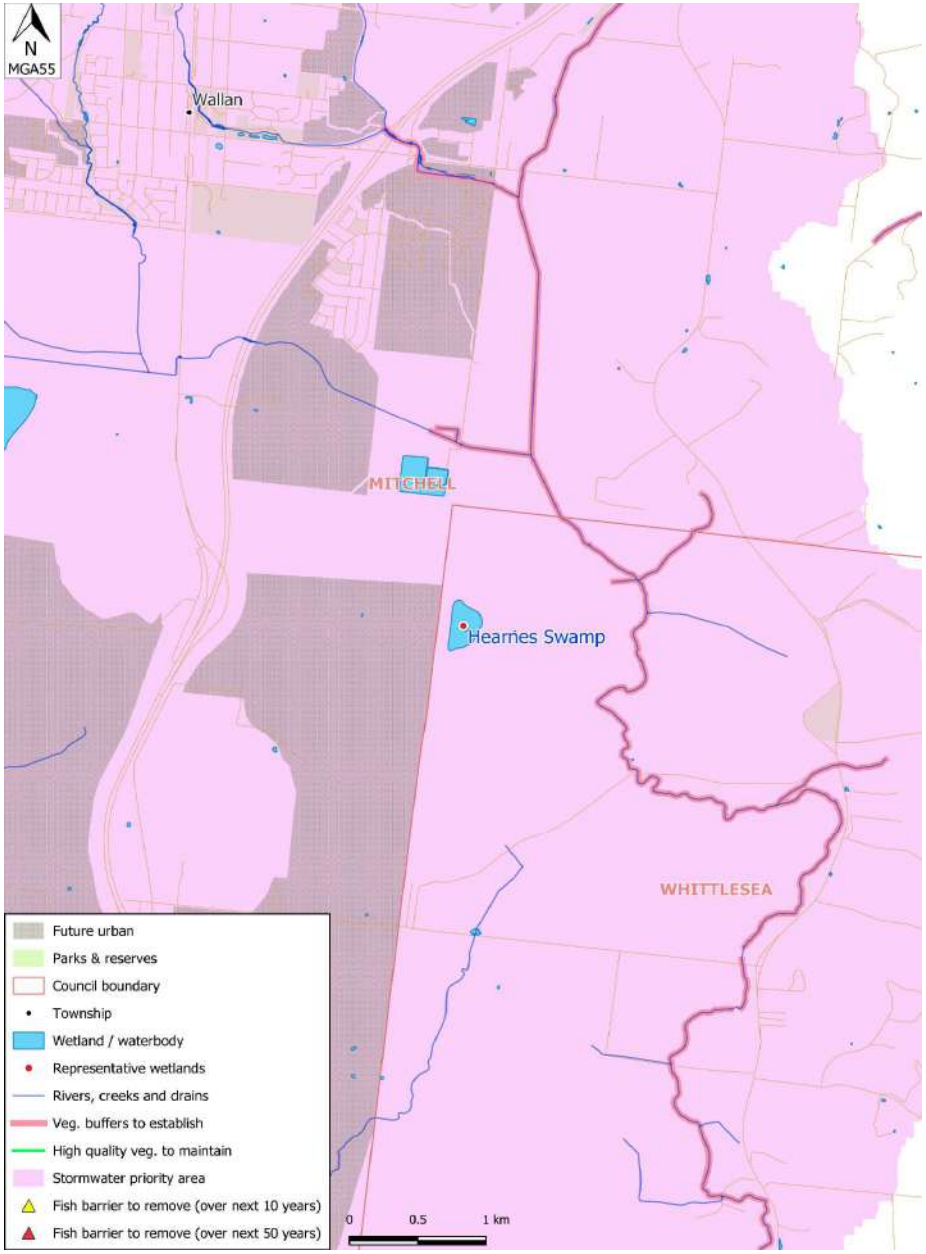
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very low	mod.		Birds (riparian) is moderate, meaning most of expected species occurred but some of these were only infrequently. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate.
very low	mod.	high		Fish are currently rated as very low due to a lack of suitable habitat (instream and riparian), barriers to migration, and the impact of urban and rural land use on water quality and flows. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Significant improvements to riparian vegetation, stormwater management, and fish passage, is predicted to increase the score to high in the long term and support a wider range of species.
mod.	very low	mod.		Frogs score is moderate since not as many expected species of frog were recorded. With appropriate management score can be maintained as moderate. Significant species include growling grass frog and brown (Bibron's) toadlet.
low	very low	mod.		Macroinvertebrates score is low due to poor riparian and instream habitat, and flows. Improvements to vegetation and protection of flows and water quality through stormwater management is predicted to increase score to moderate in long term.
very low	very low	low		Platypus have not been found in this sub-catchment for many years. Naturally low flows and disconnection with the Yarra River population are likely to limit their range. An improvement to riparian vegetation and management of urban stormwater is predicted to improve habitat suitability to low in long term.
low	very low	mod.		Vegetation score is low. Land use impacts have highly modified and fragmented the vegetation. Score will decline to very low due to persistent and emerging threats such as stormwater, pest plant and animals and climate change. There are 27 known listed water dependent species. Improving the quality and extent of vegetation and managing key threats will increase score to moderate in long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
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.
mod.	very low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
very high	low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is low.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
very low	very low	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very low and the target is moderate.
very low	very low	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.	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.
very low	very low	mod.		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is moderate.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	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.

Hearnes Swamp



Description

Hearnes Swamp near Wallan is a freshwater meadow and is also a nationally listed Seasonally Herbaceous Wetland. Before being drained the swamp would have been an extensive shallow freshwater marsh.

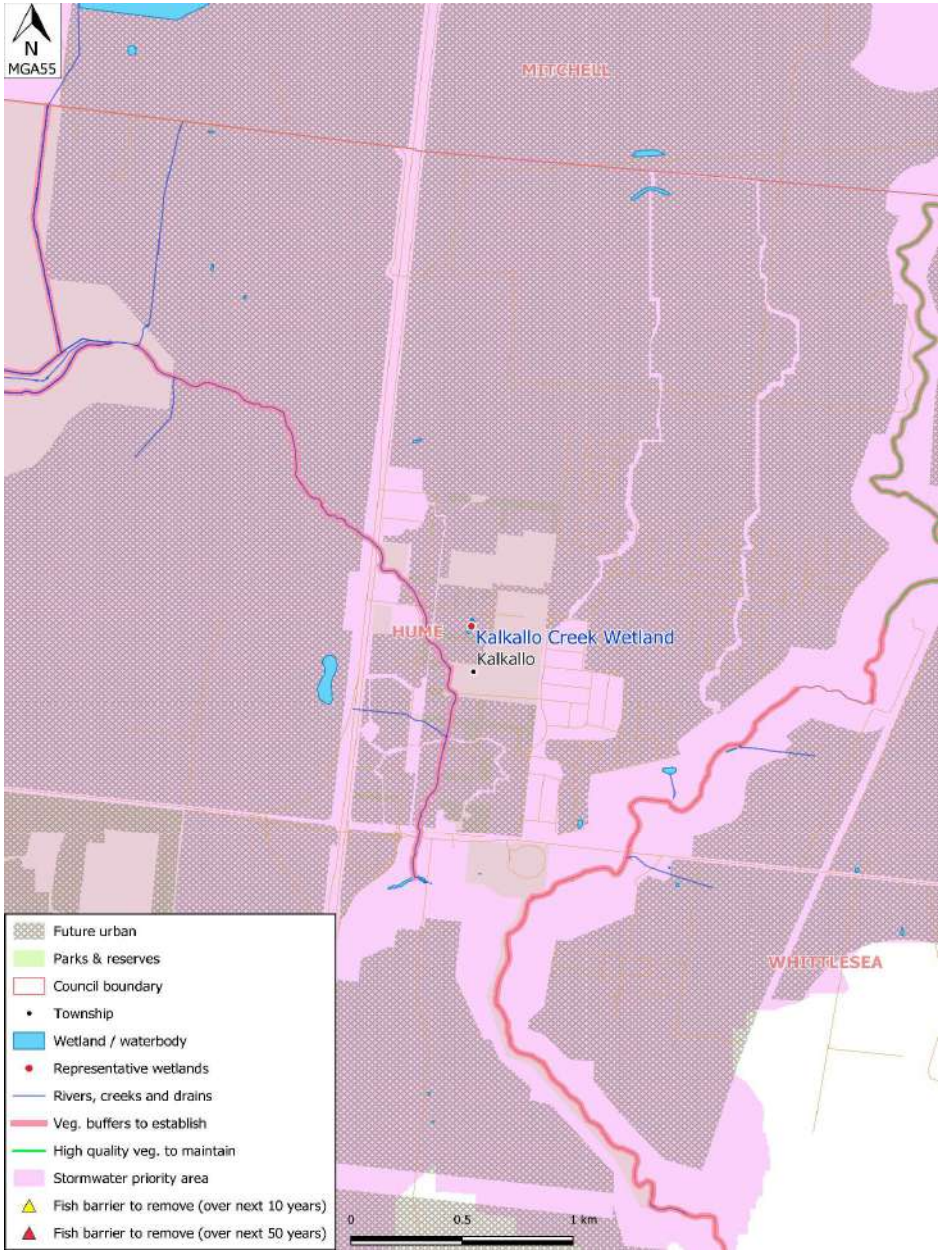
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Investigate opportunities to further re-engage the natural wetlands in this area and to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland habitat form	Identify opportunities to improve the wetland habitat.
3	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.

Hearnes Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is currently very low. It is not formally recognised as significant bird habitat and its vegetation condition is very low. Score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.		The moderate Merri Creek Upper frog value score has been applied to Hearnes Swamp. The current trajectory is expected to decline to very low. However, reducing threats at this site is expected to maintain score at moderate. Site specific survey will further inform long-term targets.
	very low	very low	mod.		Wetland vegetation score is very low due to the very low wetland vegetation condition. Reducing risks of poor wetland vegetation, wetland buffer, wetland habitat form and water regime is predicted to protect the EPBC listed Seasonal Herbaceous wetland vegetation community and improve 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.
	mod.	mod.	high		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is moderate and the target is high.
	very low	very low	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.
	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.

Kalkallo Commons Grassland and Kalkallo Creek Wetlands



Description

The Kalkallo Common Grassland contains an intact area of Gilgai plain and stands of Plains Grassland and Seasonal Herbaceous Wetland.

The site is important habitat for the EPBC listed growling grass frog and is identified as a Conservation area of Strategic Importance in the Melbourne Strategic Assessment prepared by DELWP.

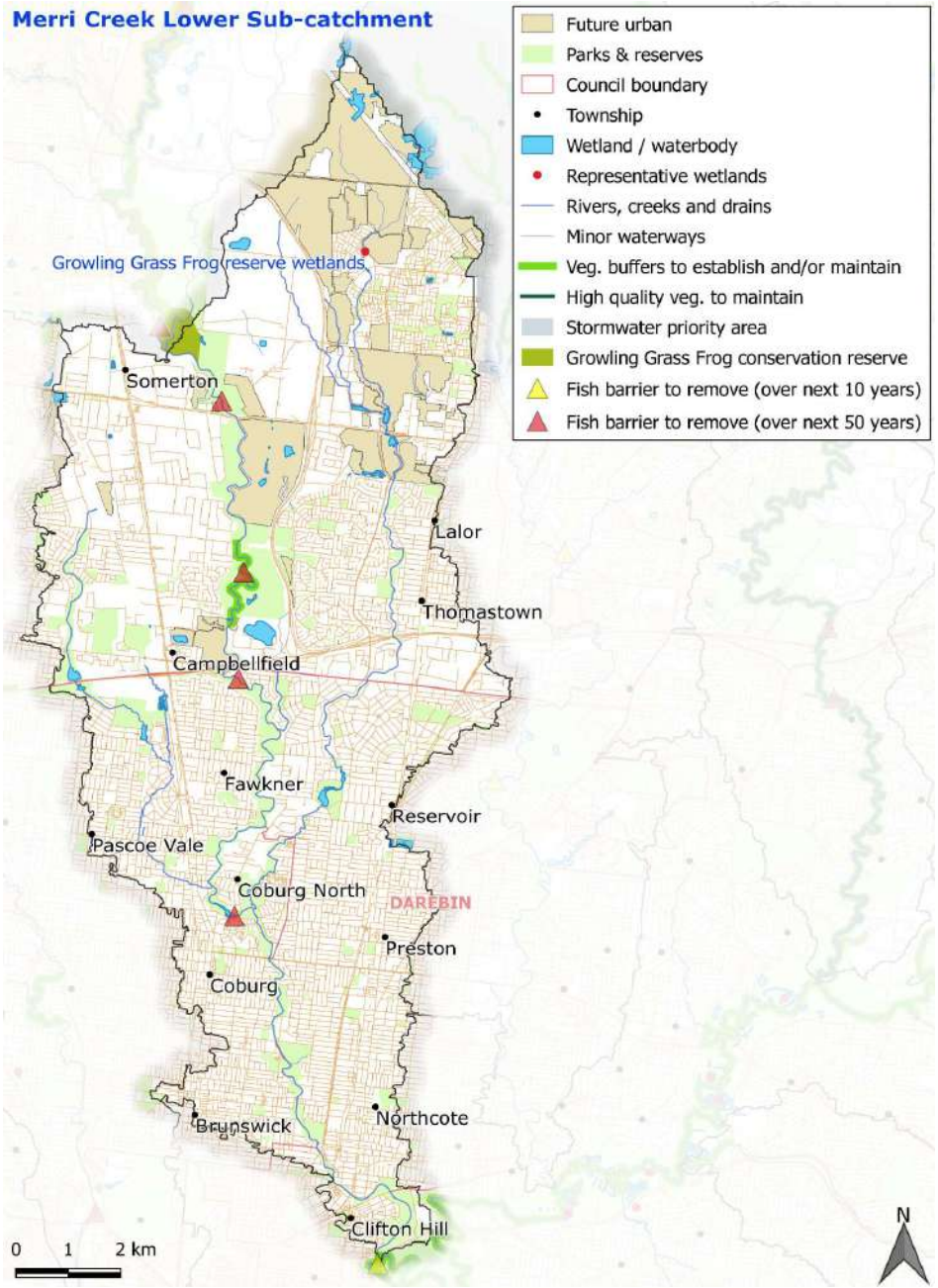
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Investigate opportunities to further re-engage the natural wetlands in this area and to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.

Kalkallo Commons Grassland and Kalkallo Creek Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is currently very low. It is not formally recognised as significant bird habitat and its vegetation condition is very low. Score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		Frog score is currently very high with growling grass frog present. The current trajectory is expected to decline to very low. However, reducing threats at this site is expected to maintain score at very high.
	high	very low	mod.		Wetland vegetation score is currently high. Reducing risks of poor wetland vegetation condition, wetland buffer, wetland habitat form and water regime is predicted to protect the EPBC listed Seasonal Herbaceous wetland vegetation community and somewhat mitigate the predicted impacts of climate change and urbanisation to ensure a long term score of moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	mod.	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is moderate.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	very low	mod.		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is moderate.
	high	very low	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is high and the target is moderate.
	mod.	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Merri Creek Lower Sub-catchment



Description

Merri Creek Lower sub-catchment lies downstream of Craigieburn Road. Tributaries in this section include Edgars, Central and Merlynston creeks.

The sub-catchment includes Galada Tamboore which has been combined with Dunnetts Road wetlands (within the Plenty River Upper sub-catchment) on the Stormwater Wetlands page.

Actions

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

"Reduce heavy metal and toxicant load from industrial and stormwater run-off."

"Map remnant vegetation using mapping technologies shared across key agencies."

"Advocate for container deposit legislation programs. Support communities who recycle."

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

Merri Creek Lower Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support in-stream values and platypus populations.
2	Vegetation Extent	Establish a continuous riparian vegetated buffer (2 km, 10 ha) and maintain existing vegetation (less than 1 km, 2 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
3	Water Quality - Environmental	Protect water quality for Port Phillip Bay and waterways by maintaining current quality of discharges from sewage treatment plants (and reduce where possible), and ensuring they are released in a manner that supports environmental values. Additionally identify and mitigate other sources (eg sewer leaks) of faecal contamination.
4	Access	Increase access to and along waterways from 47% to 61% (about 10 km of path) by improving connections with existing path network and extending paths into new areas (contributes to Merri Creek shared trail).
5	Participation	Increase participation rates from low to high; support community groups and build capacity through citizen science and cultural engagement. Increase support for community/environment groups that undertake waterway improvement projects (e.g. Merri Creek Management Committee).
6	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.

Notes:

Merri Creek Lower Sub-catchment

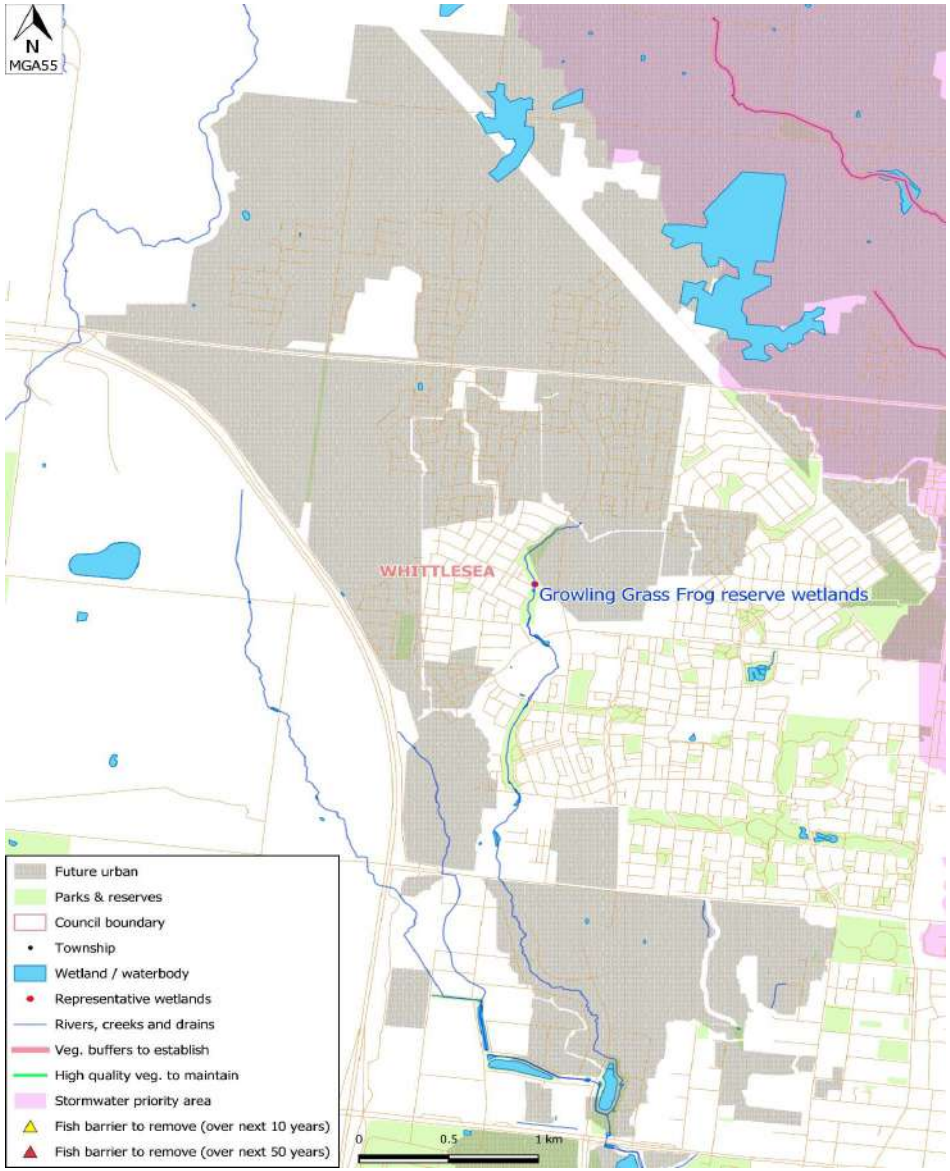
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very low	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred but some of these were only infrequently. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include three egrets, the eastern great, little and intermediate.
low	mod.	high		Fish are currently rated as low due to a lack of suitable instream and riparian habitat (resulting from urbanisation) and barriers to migration. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation, stormwater management and fish passage are predicted to increase the rating to high in the long term and support a wider range of species. Threatened species include macquarie perch in lower reaches near confluence with Yarra River.
mod.	very low	mod.		Frogs score is moderate since not as many expected species of frog were recorded. With appropriate management score can be maintained as moderate. Significant species include growling grass frog.
very low	very low	very low		Macroinvertebrates score is very low mainly due to impacts of urban stormwater and lack of instream and riparian habitat. Without substantial improvements to stormwater and restoration of habitats score is expected to remain very low.
very low	very low	very low		Platypus score is very low due to a lack of instream and riparian habitat resulting largely from urban stormwater impacts. The Yarra River population may occasionally use lower reaches. Substantial management of urban stormwater and improvement to riparian and instream habitat would be necessary to improve the score in the long term.
low	very low	low		Vegetation score is low. Land use impacts have highly modified and fragmented the vegetation. Stormwater, pest plants and animals and climate change will reduce score to very low unless mitigated. There are 26 known listed water dependent species.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very low	very low	low		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very low and the target is low.
high	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.
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.
very low	very low	mod.		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is very low and the target is moderate.
very low	very low	low		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very low and the target is low.
mod.	mod.	very high		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is moderate and the target is very high.
mod.	low	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	high	high		Water Quality (Recreational) is critical to minimise human health risks. Exposure to pathogens (disease causing microorganisms) via primary (e.g. swimming) and/or secondary (e.g boating) can lead to illness. Water quality guidelines set water standards for primary and secondary contact. The current state is high and the target is high.
low	very low	high		Participation in waterway management creates and enhances a sense of community. Similarly, citizen science strengthens social capital by increasing knowledge of environmental / ecosystem services, skills and capacities, allowing people to meet and enhance social networks. The current state is low and the target is high.

Growling Grass Frog Reserve wetlands



Description

The Growling Grass Frog Reserve wetlands are conservation ponds, specifically built to offset growling grass frog habitat loss and contribute to the conservation of the species.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Implement urban stormwater treatment measures in the catchment to reduce the threat of poor water quality in the Growling Grass Frog Reserve wetlands.
2	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.

Growling Grass Frog Reserve 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 its vegetation condition is very low. Score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very high	very high		These ponds have been specifically built to support the EPBC listed growling grass frog, therefore score is very high and will be maintained at very high. Maintenance of the wetland water regime will be critical for supporting frog habitat.
	very low	very low	mod.		Wetland vegetation is very low. As the ponds have been built to support growling grass frogs, vegetation condition will be improved, raising score to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very high	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very high and the target is very high.
	very low	very low	very low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	very low	very low	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	mod.	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is moderate.
	mod.	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Stormwater wetlands

Description

The Galada Tamboore (Merri Creek Lower) and Dunnetts Road (Plenty River Upper) wetlands and other stormwater treatment wetlands in the Yarra catchment are designed to capture nutrients and sediment from urban stormwater before it enters the waterways. There is also a semi-natural shallow freshwater marsh at Dunnetts Road.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland water quality	Maintain the design intent of stormwater wetlands in the Yarra catchment, to ensure that nutrients and sediment are captured, whilst considering significant biodiversity values at the site.

Stormwater wetlands

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low	Wetland bird score is currently very low for the stormwater wetlands. It is not formally recognised as significant bird habitat and its vegetation condition is low. Score is expected to remain very low.
	n/a	n/a	n/a	Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	very low	mod.	Frogs score is moderate, however scores will vary between stormwater treatment wetlands. Overall prediction is for decline due to urbanisation and climate change. With appropriate management stormwater wetlands will remain moderate due to reductions in threats of poor water quality, wetland buffers and vegetation condition.
	low	very low	mod.	Wetland vegetation value is currently low and it is expected to decline to very low. With improvements to water quality as a result of improving stormwater and maintenance of wetland habitat form at moderate the wetland vegetation value may improve to moderate (noting stormwater wetlands are managed primarily for their water quality treatment function).
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	low	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is low.
	mod.	mod.	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is moderate and the target is moderate.
	very low	very low	low	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is low.
	low	low	low	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is low and the target is low.
	very low	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Mullum Mullum Creek Sub-catchment

Description

Mullum Mullum Creek flows from Croydon through Ringwood and Warrandyte and enters the Yarra River in the Yarra Valley Parklands at Templestowe.

Actions

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

"Increase connectivity trail along Mullum Mullum Creek and improve signage to support way finding. Fill gaps between Nunawading and Box Hill."

"Continue sewage backlog program for Mullum Mullum Creek through partnership with Yarra Valley Water and Manningham. Ensure compliance in isolated areas."

"Repair erosion impact at the top of Mullum Mullum Creek."

How to read the scores

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

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

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

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

For description of scores see metrics tables at end of document

Mullum Mullum Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Vegetation Extent	Establish a continuous riparian vegetated buffer (2 km, 7 ha) and maintain existing vegetation (12 km, 46 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
2	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
3	Water Quality - Environmental	Investigate and mitigate where required potential impacts from septic tanks.
4	Physical form	Ensure existing erosion control assets are maintained and high values are protected.
5	Access	Increase access to and along waterways (about 1 km of path) by improving connections with existing path network and in conjunction with urban development.
6	Participation	Increase participation rates from low to high; support community groups and build capacity through citizen science and cultural engagement. Increase participation through support of inter-agency waterway improvement projects.

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

Notes:

Mullum Mullum Creek Sub-catchment

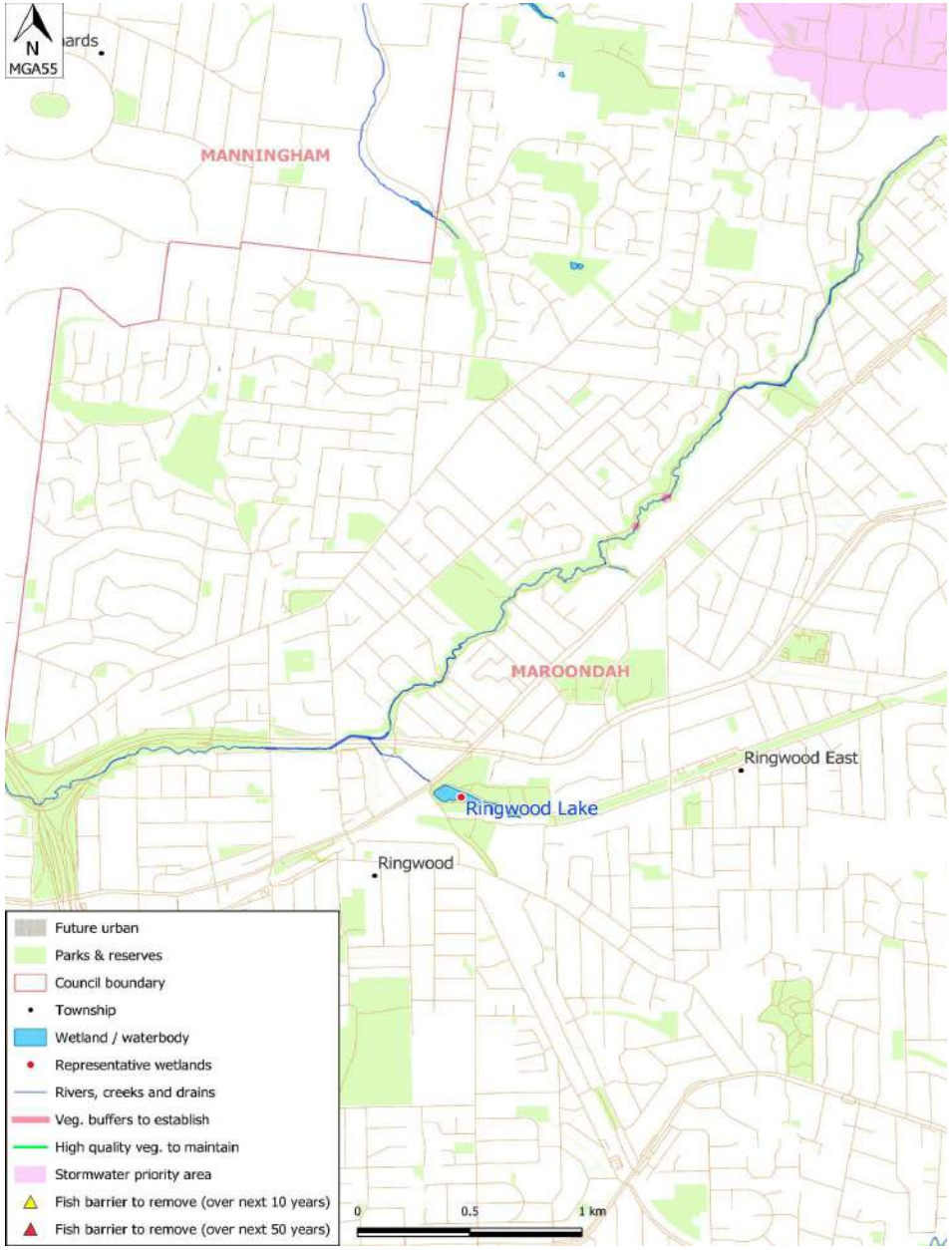
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred but some of these were only infrequently. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the riparian bird score is maintained at moderate. Significant species include the powerful owl.
low	mod.	mod.		Fish are currently rated as low due to a lack of suitable instream and riparian habitat, urban stormwater impacts and modifications to stream channel. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. Managing urban stormwater and improving instream and riparian habitat will support a wider range of species and ensure a moderate rating in the long term. Threatened species include macquarie perch in the lower reaches.
mod.	low	mod.		Frogs score is moderate since not as many expected species of frog were recorded. With appropriate management score can be maintained as moderate.
very low	very low	very low		Macroinvertebrates score is very low mainly due to impacts of urban stormwater and a lack of instream and riparian habitat. Without substantial improvements to stormwater and restoration of physical habitats score is expected to remain very low.
very low	very low	very low		Platypus score is very low due to a lack of instream and riparian habitat resulting largely from urban stormwater impacts and channel modification, although platypus from the Yarra River use the lower reaches. Without significant management of stormwater impacts and improvements to riparian and instream habitat, score is predicted to remain very low.
mod.	low	mod.		Vegetation score is moderate as it largely fragmented with generally only mid and upper story species present. Higher quality sections are found in lower reaches. Pest plants and animals, stormwater impacts and climate change will reduce score to low unless threats mitigated. There are 18 known listed water dependent species.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Ringwood Lake



Description

Ringwood Lake in Ringwood was created in 1926 by damming the Sandy Creek, which flowed north-westerly to Mullum Mullum Creek. It was an area of mud, fallen logs and grasses that now provides alternative habitat for wildlife as well as passive recreational opportunities. The 8.5 hectare park surrounding the lake is enjoyed by many locals and visitors. The paths around the lake are sealed making the park popular for running and walking, and there are picnic facilities, accessible toilets and shade.

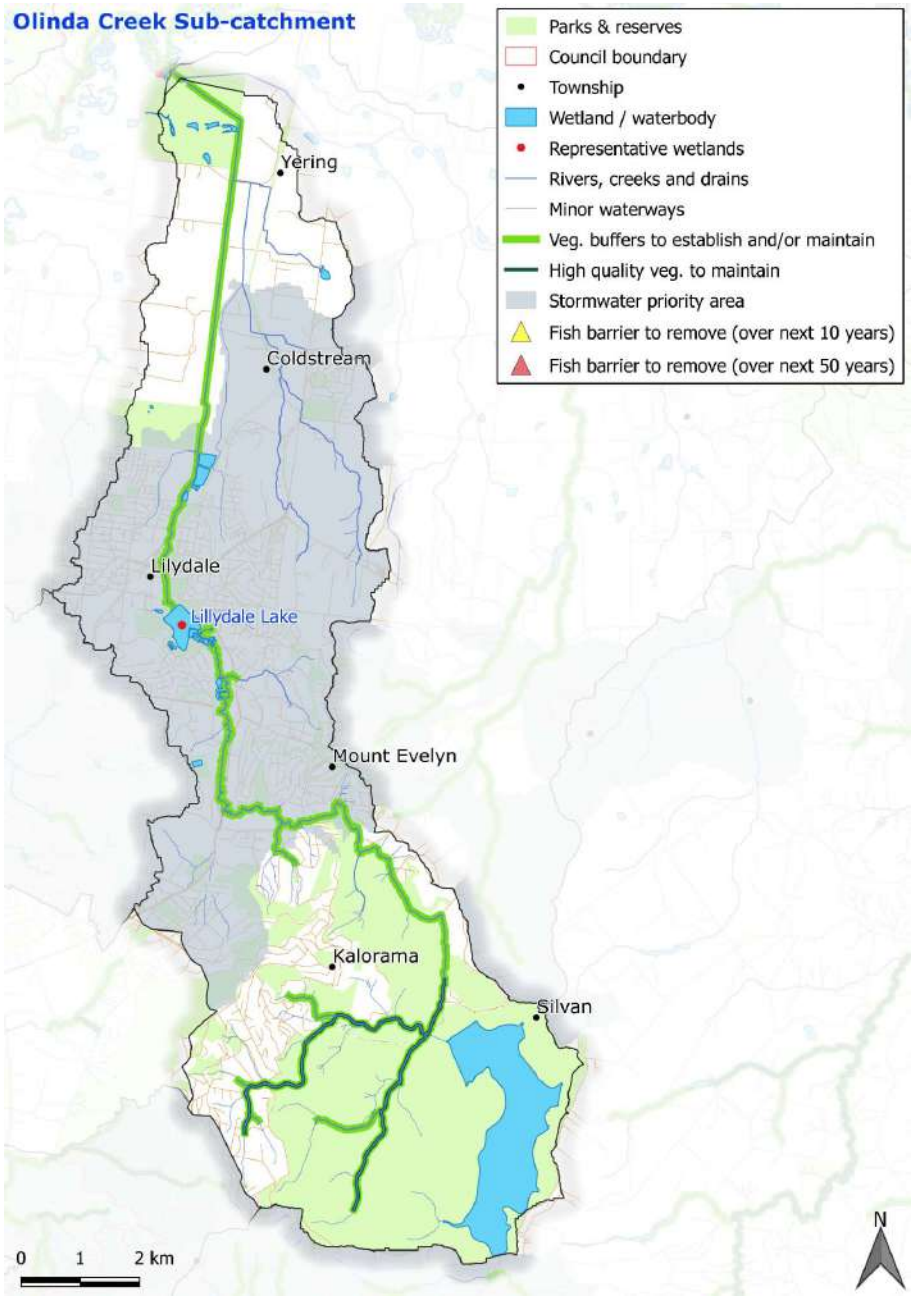
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Investigate opportunities to improve water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland water quality	Implement urban stormwater treatment measures in the catchment to reduce the threat of poor water quality in Ringwood Lake.

Ringwood Lake

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is currently very low. It is not formally recognised as significant bird habitat and its vegetation condition is very low. Score is expected to remain very low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	low	low		The moderate Mullum Mullum Creek frog score has been applied to Ringwood Lake. Score is expected to decline to low.
	very low	very low	low		Wetland vegetation value is currently very low, due to the vegetation condition. Target is to improve to 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.

Olinda Creek Sub-catchment



Description

Olinda Creek rises in the Dandenong Ranges near the Olinda township and flows through the Dandenong Ranges National Park, Kalorama, Mt Evelyn and Lilydale before joining the Yarra River at Yering. The main tributaries of Olinda Creek are Lyrebird Gully Creek and Lilydale East Drain.

Actions

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

"Continue to improve riparian vegetation along upper tributaries of Olinda Creek downstream of Olinda township."

"Explore potential for environmental flow releases from Olinda Reservoir (increase from current release)."

"Remove fish and platypus barriers (i.e. Lilydale Lake dam wall)."

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

Olinda Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
2	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
3	Stormwater Condition	To prevent decline in stormwater condition, and to protect the threatened Dandenong Amphipod, treat urban development in the Olinda Creek catchment, so directly connected imperviousness (DCI) remains below 3.5% prior to confluence with the Yarra River. For every hectare of new impervious area, this requires harvesting around 5.9 ML/y and infiltrating 2.3 ML/y, which is about 1.2 GL/y and 0.5 GL/y for full development to the urban growth boundary.
4	Water Quality - Environmental	Improve water quality for water supply and Port Phillip Bay by investigating the quality of water discharged from Lilydale sewage treatment plant and other pollution sources above the Yering Gorge offtake, and opportunities for improvements which may include offsets. Ensure discharges are of sufficient quality and are delivered in a way that supports waterways and Port Phillip Bay.
5	Water Quality - Environmental	Protect waterways and drinking water supply by reducing pesticide impact from Olinda Creek catchment.
6	Vegetation Extent	Establish a continuous riparian vegetated buffer (9 km, 34 ha) and maintain existing vegetation (27 km, 109 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
7	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 10 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
8	Access	Increase access to and along waterways (about 1 km of path) by improving connections with existing path network and in conjunction with urban development.
9	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of farmers and land owners through rural programs. Increase participation in citizen science though promotion of high value areas (e.g. Dandenong Ranges National Park).

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

Notes:

Olinda Creek Sub-catchment

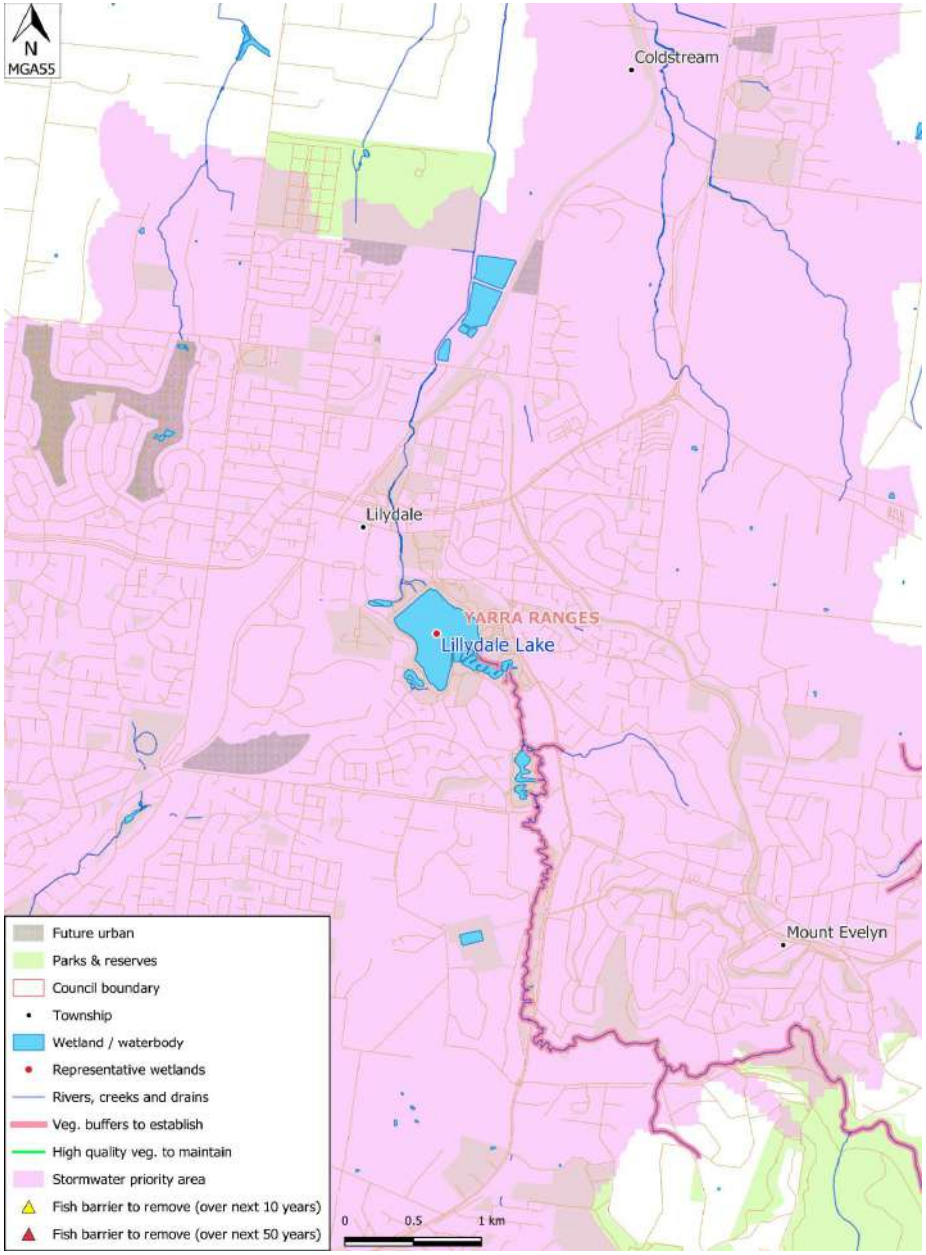
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
low	low	mod.	Birds (riparian) is low, meaning few of the expected riparian bird species were recorded. Despite the effects of climate change adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species of riparian bird occurring in this sub-catchment include the powerful owl and eastern great egret.
low	mod.	high	Fish are currently rated as low due to lack of suitable instream and riparian habitat, fish barriers and impacts of urbanisation. The increased current trajectory is due to climate change increasing habitat suitability for common and widespread species. More sensitive species such as river blackfish and ornate galaxias will be threatened by reduced flows under climate change. Managing flows, including stormwater impacts and improving vegetation is predicted to provide suitable habitat for wider range of species and increase the rating to high in the long term.
very low	low	low	Frogs score is very low since very few of the expected species of frog were recorded. With appropriate management score can be improved to low.
mod.	mod.	high	Macroinvertebrates score is moderate as a result of a lack of instream and riparian habitat. The listed Dandenong Amphipod has been found in headwaters of Olinda Creek. Managing future stormwater impacts and improving riparian vegetation will increase score to high in long term.
mod.	low	mod.	Platypus score is moderate, with a lack of instream and riparian habitat and isolation from the Yarra River population. Improving habitat and maintaining flows will be critical to maintaining current score in long term.
mod.	low	mod.	Vegetation score is moderate as it largely fragmented with generally only mid and upper story species present. Higher quality reaches occur in the Dandenong Ranges. Stock access, pest plants and animals, stormwater impacts and climate change will reduce score to low unless threats mitigated. Protecting the best and enhancing other areas will maintain moderate score in long term. There are 17 known listed water dependent species.
very high	high	very high	Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high	Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	mod.	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is high.
high	mod.	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is high and the target is high.
mod.	low	mod.		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is moderate.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
high	high	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is high and the target is 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.	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.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	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.	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.

Lillydale Lake



Description

Lillydale Lake is an artificial lake and wetlands area created in Lilydale. Following floods in September 1984, construction of the lake was proposed to prevent future flooding and provide recreational facilities.

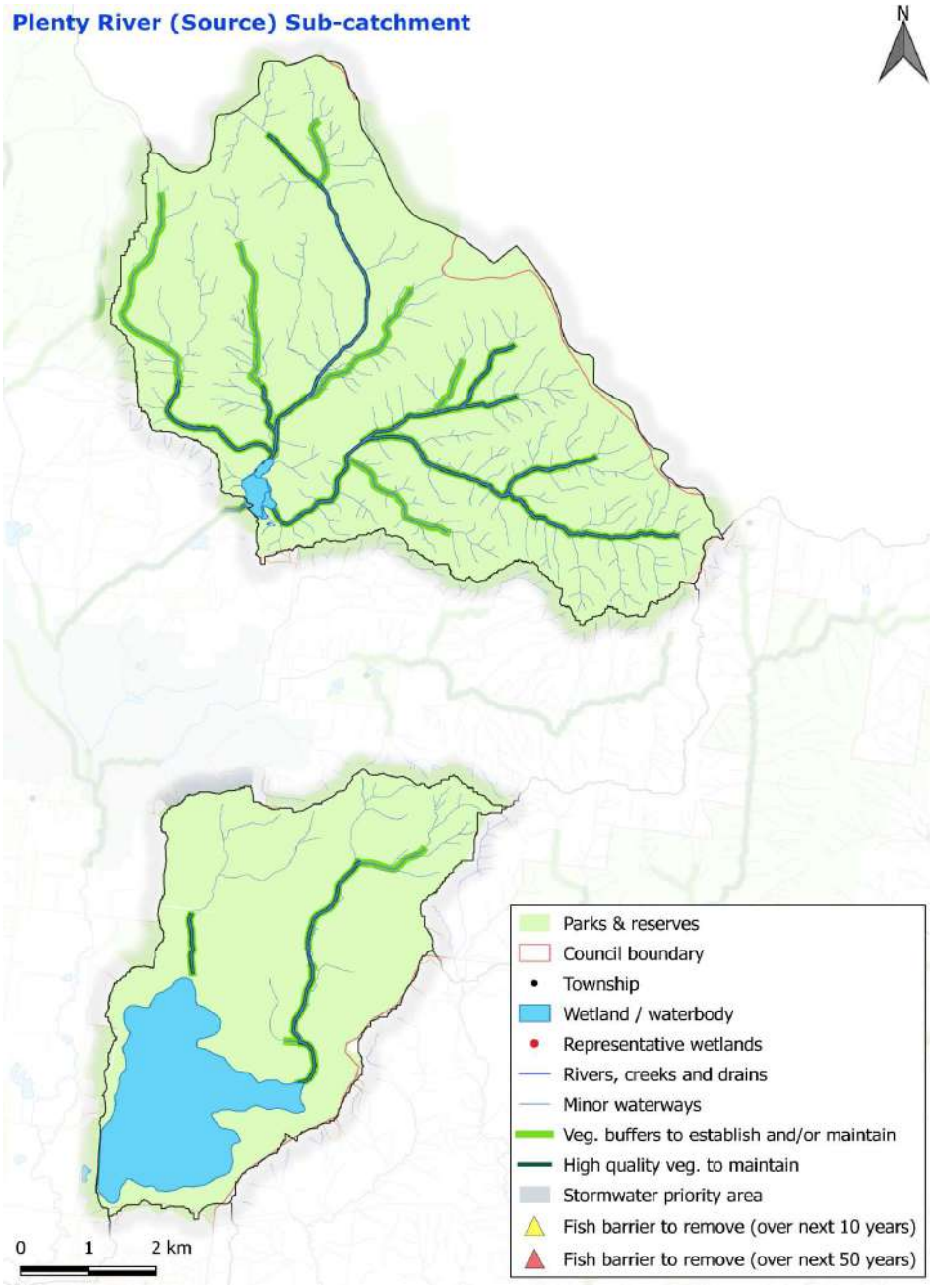
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Ensure flood mitigation design intent of lake is retained, whilst considering site biodiversity values including significant vegetation communities identified in site management plan.
2	Wetland water quality	Implement urban stormwater treatment measures in the catchment to reduce the threat of poor water quality in Lillydale Lake.

Lillydale Lake

	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 its vegetation condition is very low. Score is expected to remain very low.
	n/a	n/a	n/a	Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very low	low	low	The very low frog value in the Olinda Creek sub catchment has been applied to Lilydale Lake. Score is expected to improve to low in long-term.
	very low	very low	low	Wetland vegetation value is currently very low, due to the vegetation condition. Target is to improve to 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.

Plenty River (Source) Sub-catchment



Description

Plenty River rises in the Mt Disappointment State Park and flows through Whittlesea, Plenty Gorge and Greensborough before joining the Yarra River at Viewbank. Both the Yan Yean and Toorourrong water storages lie within the catchment. Water is diverted from the King Parrot Creek catchment on the northern side of the Great Dividing Range into the Toorourrong Reservoir. The river has a number of tributaries, including Falls, Jacks, Bruces, Scrubby and Barbers creeks.

Actions

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

"Investigate establishment of Plenty river Management Committee like Merri and Darebin Creek Management committee to coordinate management of values and issues."

"Pest weed/ animal control and revegetation in Kinglake National Park. Management plan to interface between public and private land."

"Educate community that environmental values underpin all social, heritage and community connections."

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

Plenty River (Source) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 27 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	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.
4	Vegetation Extent	Maintain existing vegetation (38 km, 150 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).

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

Notes:

Plenty River (Source) Sub-catchment

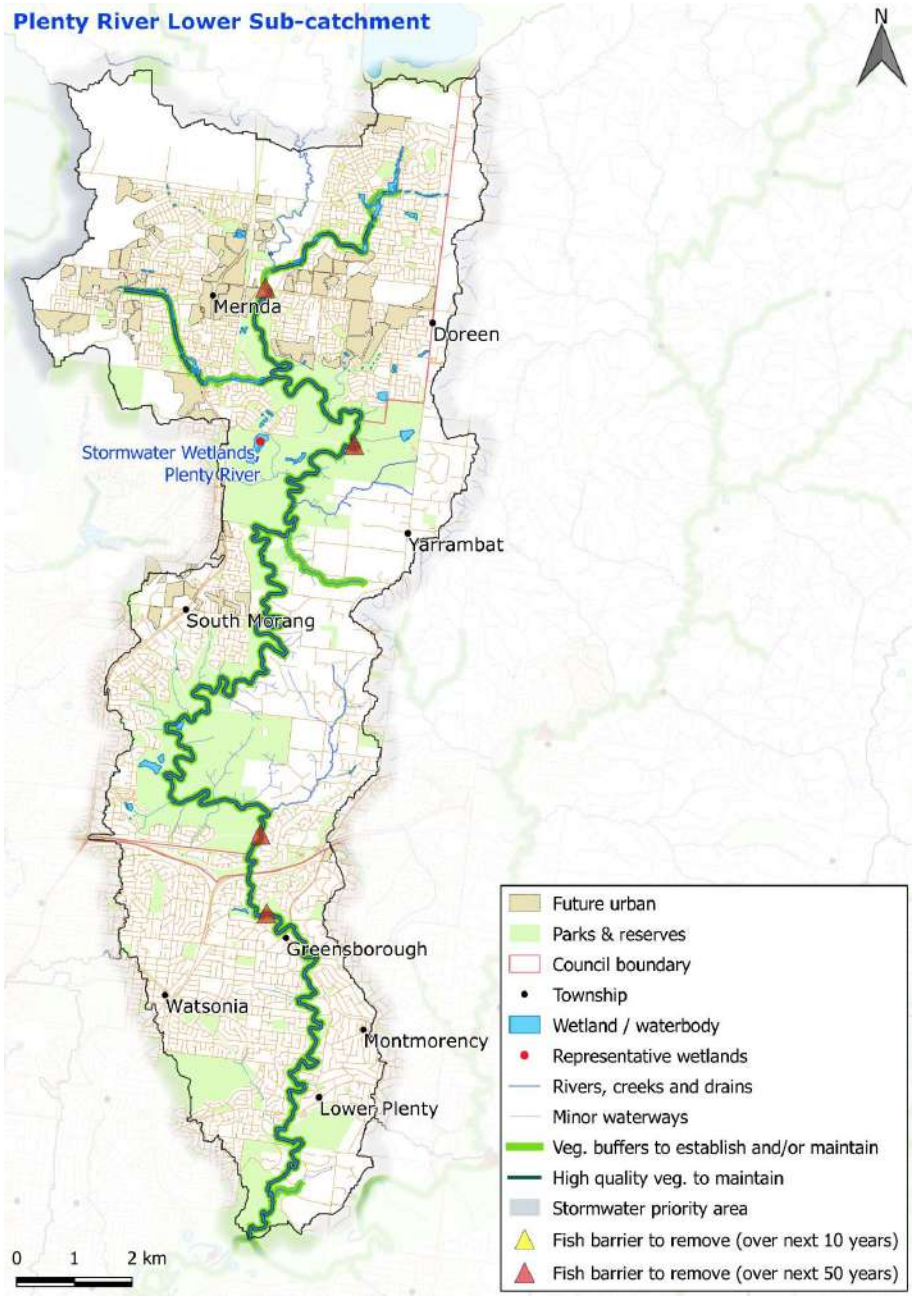
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	n/a	mod.		Insufficient data to estimate a riparian bird score. Despite effects of climate change adequate investment in targeted management such as riparian revegetation should ensure riparian bird score of moderate. Significant species include the powerful owl, eastern great egret and little egret.
low	mod.	mod.		Fish are currently rated as low. This is partly expected for headwater streams with naturally low flows, however barriers, particularly Toorourrong Reservoir, are also limiting the richness of species. The higher current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. More sensitive species, such as river blackfish, will be threatened by reduced flows under climate change. The long term target is a moderate rating.
very high	low	very high		Frogs score is very high since all, or almost all, expected species of frog were recorded. With appropriate management score can be maintained as very high. Significant species include growling grass frog.
very high	very high	very high		Macroinvertebrates score is very high as the sub-catchment is within Kinglake National Park. Monitoring and maintenance of vegetation and protecting flows will ensure score remains very high in long term.
mod.	low	mod.		Platypus score is moderate. Recent drought and bushfires have been implicated in severe decline or complete loss of this population. Reduced flows from climate change are a significant threat and will reduce score to low unless they can be maintained.
high	mod.	high		Vegetation score is high as the waterway is within Kinglake National Park. Pest plants and animals, recreational access and climate change (including an altered fire regime) will reduce score to moderate unless mitigated. Monitoring and maintenance is critical to maintaining high score.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very high	high	very high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very high and the target is very high.
mod.	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 moderate and the target is low.
very high	high	very high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very high and the target is very high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
mod.	mod.	very high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is very high.
high	mod.	high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is high and the target is high.
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.
n/a	n/a	n/a		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. No data exists for this sub-catchment.

Plenty River Lower Sub-catchment



Description

Plenty River rises in the Mt Disappointment State Park and flows through Whittlesea, Plenty Gorge and Greensborough before joining the Yarra River at Viewbank. Both the Yan Yean and Toorourrong water storages lie within the catchment. Water is diverted from the King Parrot Creek catchment on the northern side of the Great Dividing Range into the Toorourrong Reservoir. The river has a number of tributaries, including Falls, Jacks, Bruces, Scrubby and Barbers creeks.

Actions

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

"Support to maintain existing and establish new friends of community groups and other environmental groups."

"Engage with new residents to educate on waterway values."

"Plan for strategic revegetation / weed control and protection of Plenty river habitat corridor."

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

Plenty River Lower Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support instream values and platypus populations.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (14 km, 57 ha) and maintain existing vegetation (32 km, 128 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 44 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
5	Vegetation Quality	Improve understanding of the extent, composition and condition of high and very high quality vegetation, and effectively monitor and manage both values and threats.
6	Physical form	Investigate and mitigate threats to physical form and other high values (particularly along tributaries and including impacts of urbanisation).
7	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
8	Participation	Increase participation rates from low to high; support community groups and build capacity through citizen science and cultural engagement. Increase participation through promotion of high value areas (e.g. Plenty Gorge Park).

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

Notes:

Plenty River Lower Sub-catchment

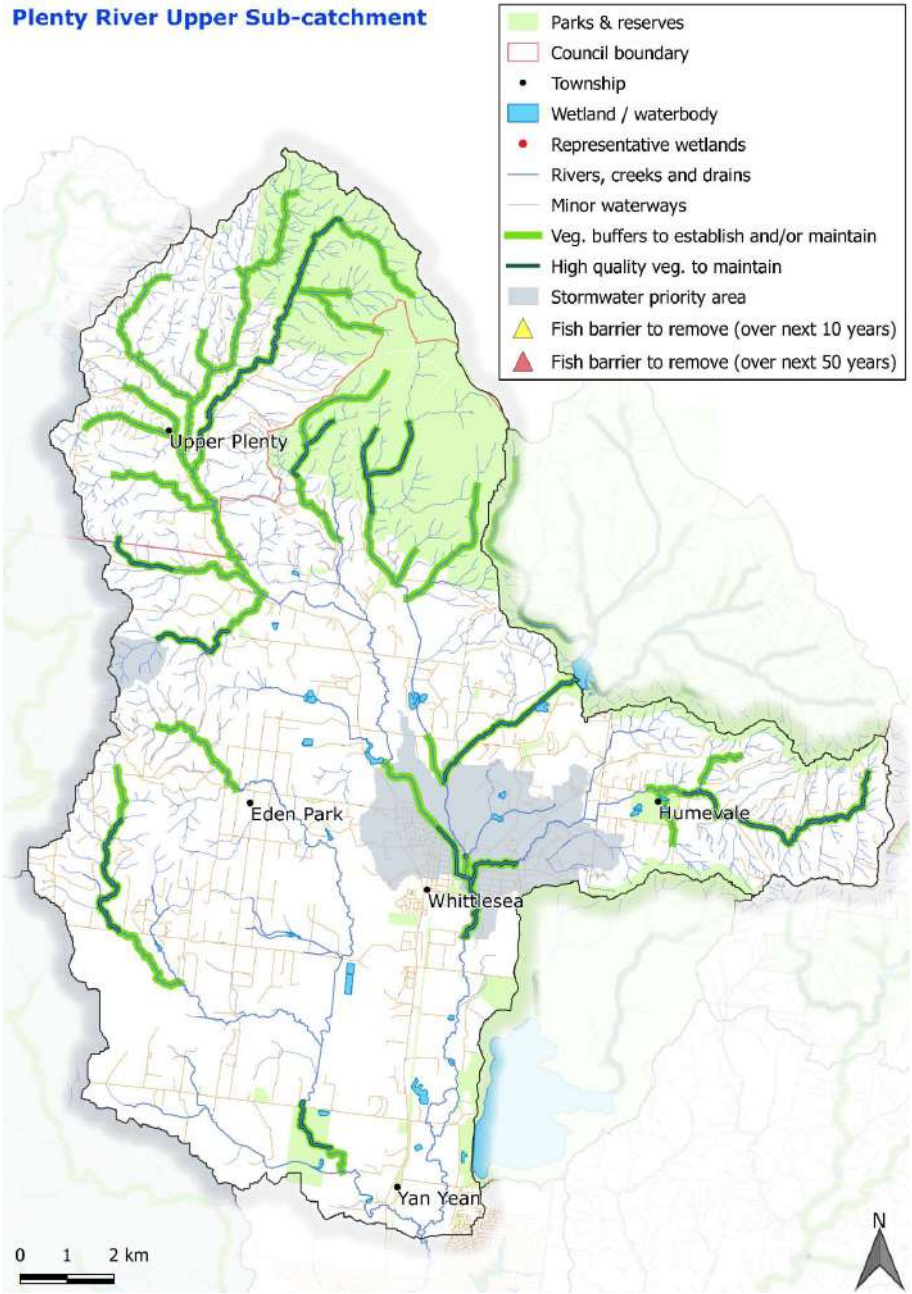
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very low	mod.		Birds (riparian) is moderate, which means most expected species occur but some of these only infrequently. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure score is maintained at moderate. Significant species include the powerful owl, eastern great egret and little egret.
mod.	high	high		Fish are currently rated as moderate due to a lack of suitable instream and riparian habitat, fish barriers and impacts of urbanisation. The higher current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Managing barriers, improving vegetation, and managing flows (including stormwater) will increase score to high and support a wider range of species. Listed species that occur in this sub-catchment include macquarie perch and murray cod.
very low	very low	very low		Frogs score is very low since very few of the expected species of frog were recorded. Combined effects of reduced rainfall and flows, and urban land use intensification mean the score is likely to remain very low. Significant species is growling grass frog.
low	low	low		Macroinvertebrates score is low due to poor riparian and instream habitat resulting from large scale land use changes including significant urbanisation. Improvements to vegetation and protection of flows and water quality through stormwater management is predicted to increase score in some areas but will remain low overall.
very low	very low	low		Platypus score is very low due to a lack of instream and riparian habitat and stormwater impacts. The Yarra River population may occasionally use the lower reaches. Improvements to vegetation and stormwater is predicted to increase score to low in long term.
mod.	low	high		Vegetation score is moderate as it largely fragmented with generally only mid and upper story species present. Reaches through the Plenty Gorge Parklands contain high quality vegetation. Pest plants and animals, stormwater impacts and climate change will reduce score to low unless threats mitigated. Protecting the best and enhancing other areas will increase score to high in long term.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Plenty River Upper Sub-catchment



Description

Plenty River rises in the Mt Disappointment State Park and flows through Whittlesea, Plenty Gorge and Greensborough before joining the Yarra River at Viewbank. Both the Yan Yean and Toorourrong water storages lie within the catchment. Water is diverted from the King Parrot Creek catchment on the northern side of the Great Dividing Range into the Toorourrong Reservoir. The river has a number of tributaries, including Falls, Jacks, Bruces, Scrubby and Barbers creeks.

The sub-catchment includes Dunnetts Road wetlands which has been combined with Galada Tamboore (within the Merri Creek Lower sub-catchment) as the Stormwater 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 Co-Designed Summary Report.

"Manage emerging weed movement from Whittlesea to Nillumbik (target weeds including Needle grasses, Artichoke thistle and South African Weed Orchid)."

"Prepare strategy to manage conflict between recreation use and environmental protection. Need to manage mountain bike and horse-riding."

"Create Plenty River Heritage trail that celebrates the values of river - Willis, Mills, YanYean, gold mines, water channels and cascades. Indigenous and European cultural heritage."

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

Plenty River Upper Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support instream values and platypus populations through releases from Tourooong reservoir.
3	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run off from rural land upstream of Whittlesea. Investigate and seek to mitigate source of high nutrients, turbidity and metals in Bruce's Creek. Establish vegetated buffers in headwater streams.
4	Stormwater Condition	To prevent decline in stormwater condition, treat urban development upstream of and within Whittlesea, so directly connected imperviousness (DCI) remains below 0.5% downstream of Whittlesea (and throughout the Upper Plenty River catchment). For every hectare of new impervious area, this requires harvesting around 5.5 ML/y and infiltrating 1.9 ML/y, which is about 350 ML/y and 120 ML/y for full development to the urban growth boundary.
5	Physical form	Investigate and mitigate threats to physical form and other high values (particularly along tributaries).
6	Vegetation Extent	Establish a continuous riparian vegetated buffer (36 km, 145 ha) and maintain existing vegetation (60 km, 241 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality). In addition, to improve social values increase vegetation cover in existing and planned urban areas by 1 km.
7	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 35 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
8	Access	Increase access to and along waterways (about 5 km of path) by improving connections with existing path network and extending paths into new urban areas.
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 (e.g. Stream Frontage management Program). Increase support for community/environment groups and promotion of high value areas (e.g. Plenty Gorge Park) as population increases.

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

Notes:

Plenty River Upper Sub-catchment

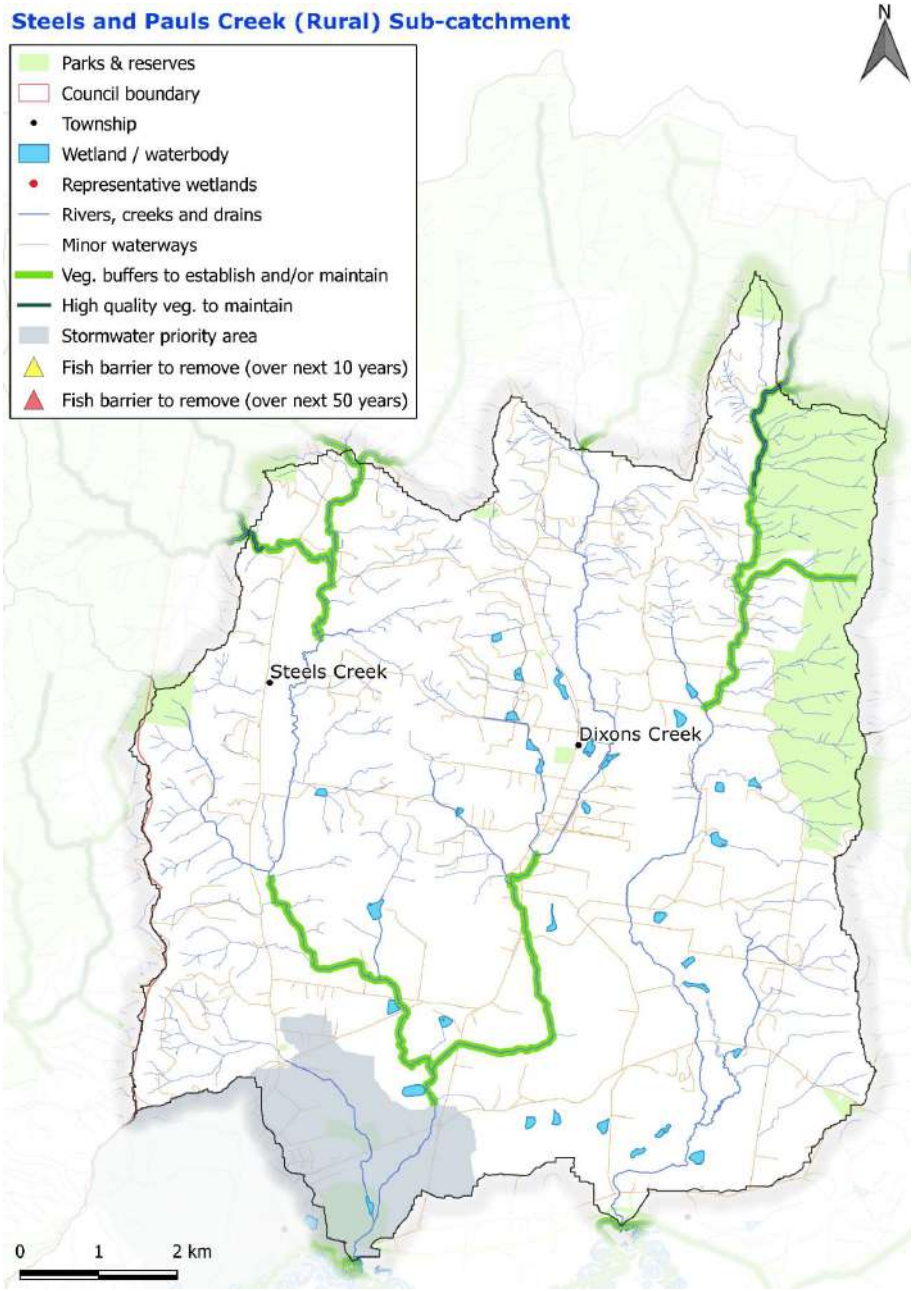
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
low	very low	low	Birds (riparian) is low meaning few of the expected riparian bird species were recorded. The urbanised sub-catchment means poor water quality and non-natural flow regimes, which lead to a current trajectory of very low. Target is to maintain at low. Significant species include the eastern great egret.
low	mod.	high	Fish are currently rated as low due to lack of suitable instream and riparian habitat, flow stress, fish barriers and impacts of urbanisation. The increased current trajectory rating is due to climate change increasing distribution of common and widespread species. Managing barriers, improving vegetation, and managing flows (including stormwater) will increase score to high and support a wider range of species.
low	very low	low	Frogs score is low. Combined impacts of urbanisation and climate change to surface flows and water quality are likely to decrease the score to very low without proper management. Target is to maintain at low. Significant species is growling grass frog.
high	high	high	Macroinvertebrates score is high as a result of good instream and riparian habitat. Improving riparian vegetation and water quality from rural land is expected to ensure score remains high in long term.
low	very low	low	Platypus score is low due to a lack of instream and riparian habitat. Substantial improvement to habitat including downstream reaches to reconnect the Yarra River population will be required to maintain habitat suitability in long term.
mod.	low	mod.	Vegetation score is moderate as it largely fragmented with generally only mid and upper story species present. Stock access, pest plants and animals and climate change will reduce score to low unless threats mitigated. There are 9 known listed water dependent species. Protecting the best and enhancing other areas will ensure current score is maintained in long term.
high	high	very high	Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high	Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
mod.	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
high	mod.	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.
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.	mod.		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is moderate.
very low	very low	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	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.

Steels and Pauls Creek (Rural) Sub-catchment



Description

The headwaters of Steels Creek rise in the Kinglake National Park and flow through the Steels Creek township before joining the Yarra River near Yarra Glen. Dixons Creek is the main tributary of Steels Creek, flowing into it just upstream of the Yarra. Other tributaries include Jehosophat, Pinchgut, Dry, Full and Plenty creeks. Pauls Creek rises in the Toolangi State Forest near Toolangi and joins the Yarra upstream of Steels Creek, near Tarrawarra.

Actions

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

"Control willows and woody weeds in lower reaches of Steels and Dixons Creek."

"Manage and treat nutrient and chemical runoff from vineyards, golf courses and farms."

"Engage community (stakeholder groups and schools) in citizen science and waterway values advocacy south of Pinnacle Lane."

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

Steels and Pauls Creek (Rural) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 2 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	Physical form	Investigate and mitigate threats to physical form and other high values.
4	Vegetation Extent	Establish a continuous riparian vegetated buffer (7 km, 28 ha) and maintain existing vegetation (17 km, 67 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
5	Participation	Increase participation rates from high to very high; support community groups, build capacity of land owners through rural programs and promote citizen science (e.g. BioBlitz program).

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

Notes:

Steels and Pauls Creek (Rural) Sub-catchment

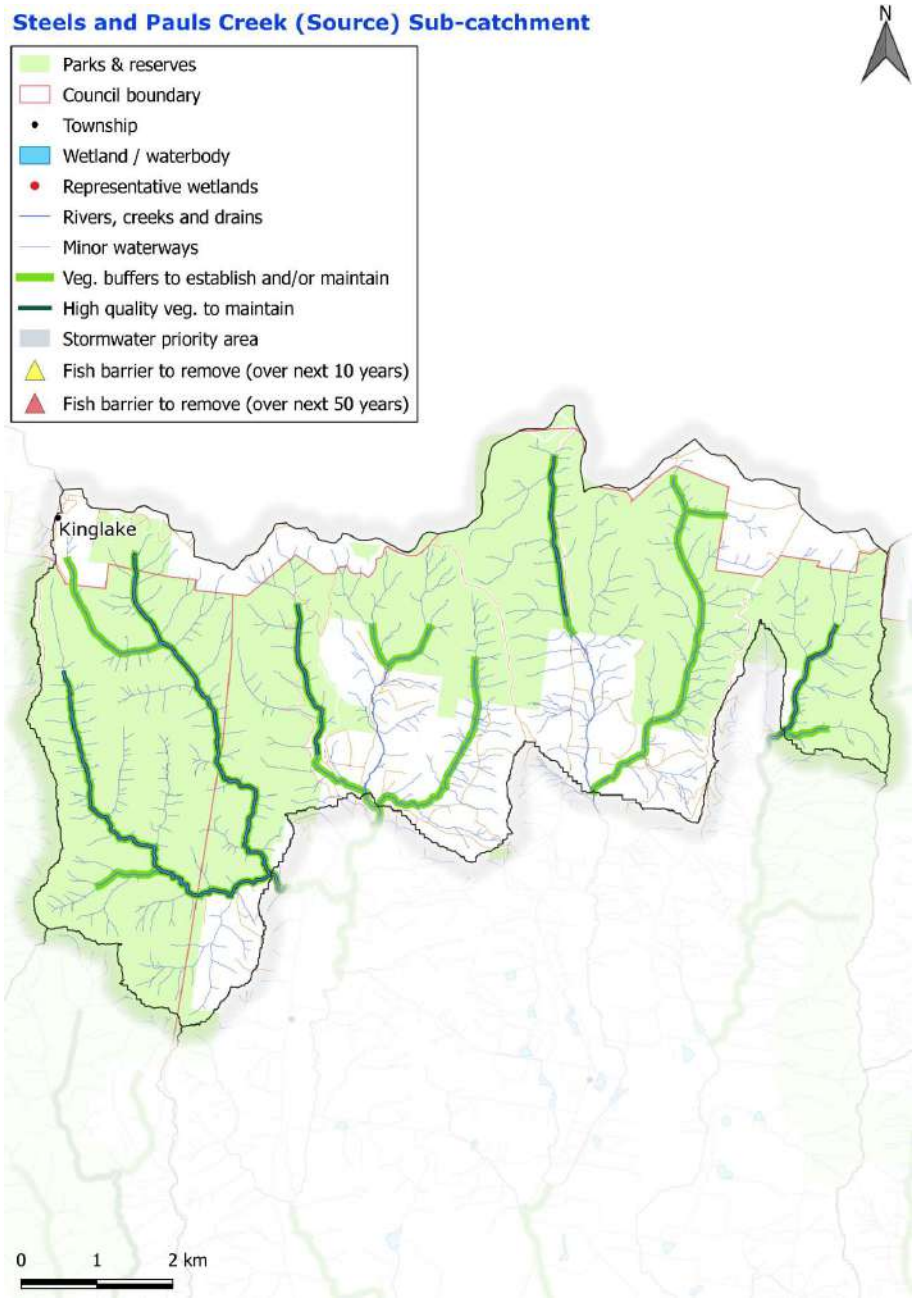
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		There are insufficient bird observations to establish a current score. Investment in targeted management actions (e.g. riparian vegetation) should result in a long-term moderate score.
mod.	high	high		Fish are currently rated as moderate due to a lack of suitable instream and riparian habitat, naturally low flows and barriers to movement. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Improvements to flows, instream and riparian habitat and removal of barriers downstream is predicted to support a wider range of species and ensure a high rating in the long term.
n/a	low	low		Frog score cannot be calculated because of a lack of data. Even with targeted management the future score is likely to be low because of the residual effects of urbanisation and land use intensification and emerging impacts of climate change.
mod.	low	very high		Macroinvertebrates score is moderate as a result of a lack of instream and riparian habitat and flows. Climate change will reduce flows and score to low unless this impact can be mitigated. Improving riparian vegetation and maintaining flows will increase score to very high in long term.
very low	very low	low		Platypus score is very low due to a lack of instream and riparian habitat and naturally low flows, although the Yarra River population may occasionally use lower reaches. Improvement to their habitat may improve score to low in long term.
low	very low	mod.		Vegetation score is low overall, however there are better quality reaches in upper parts resulting from past improvement works. Stock access, pest plants and animals and climate change will reduce score to very low unless mitigated. There are 8 known listed water dependent species. Enhancing vegetation and managing threats will increase score to moderate in long term.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	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 low	very low	low		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very low and the target is low.
low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is low and the target is moderate.
mod.	mod.	high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is moderate and the target is high.
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	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.
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.

Steels and Pauls Creek (Source) Sub-catchment



Description

The headwaters of Steels Creek rise in the Kinglake National Park and flow through the Steels Creek township before joining the Yarra River near Yarra Glen. Dixons Creek is the main tributary of Steels Creek, flowing into it just upstream of the Yarra. Other tributaries include Jehosophat, Pinchgut, Dry, Full and Plenty creeks. Pauls Creek rises in the Toolangi State Forest near Toolangi and joins the Yarra upstream of Steels Creek, near Tarrawarra.

Actions

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

"Protect and maintain vegetation quality (especially listed species) in forested upper reaches of all creeks."

"Increase collaboration with Dixons and Steels Creek landowners to deliver improved waterway values."

"Support research into cultural heritage values of 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

Steels and Pauls Creek (Source) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural and forest land. This may include establishment of vegetated buffers in headwater streams.
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 17 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	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.
4	Participation	Increase participation rates from high to very high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science through promotion of high value areas (e.g. Kinglake National Park).
5	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 3 ha) and maintain existing vegetation (30 km, 121 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).

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

Notes:

Steels and Pauls Creek (Source) Sub-catchment

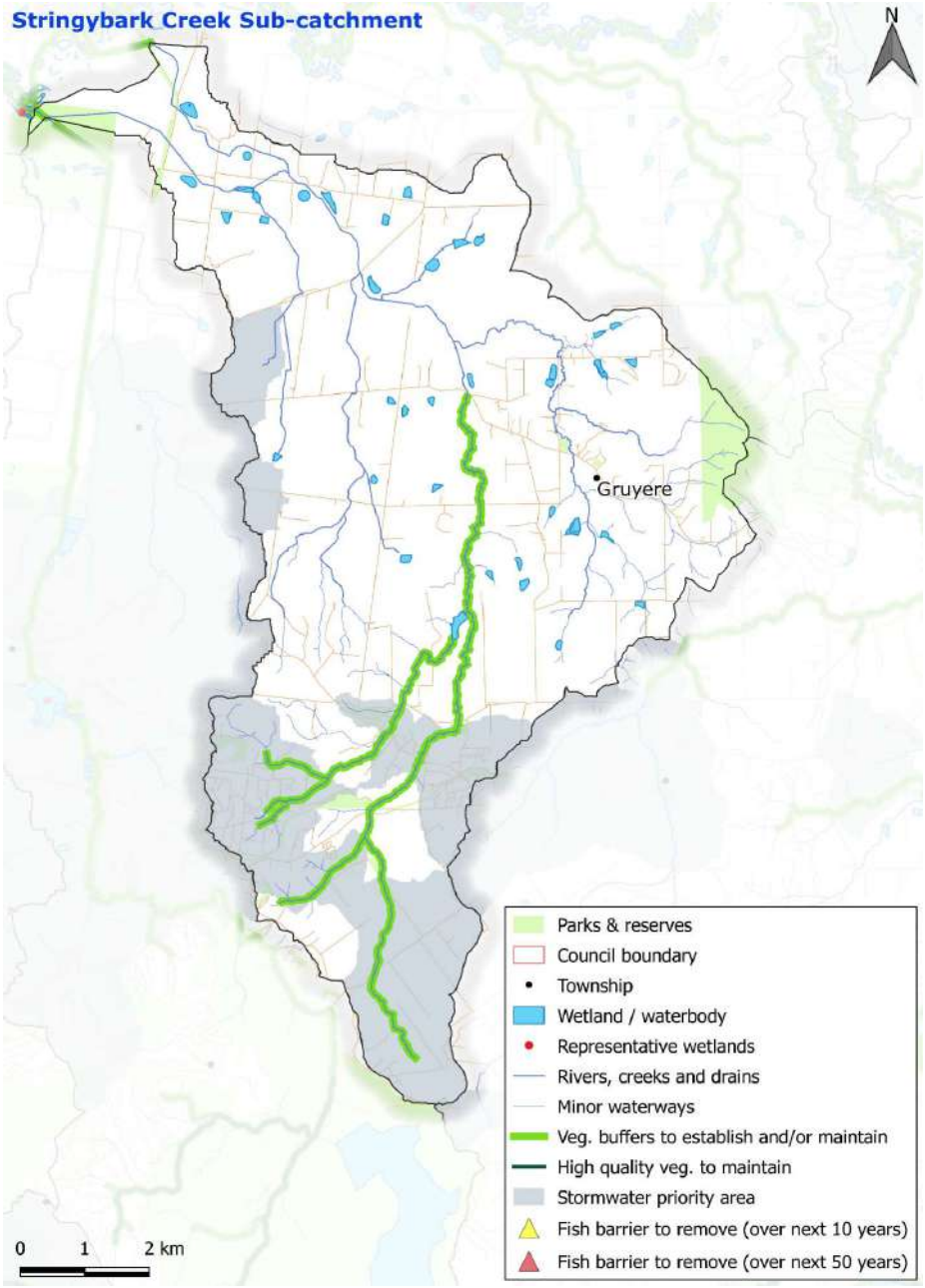
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory	
n/a	mod.	mod.	Insufficient bird observation to establish a birds (riparian) score. Despite the effects of climate change adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species include the powerful owl.
low	high	high	Fish are currently rated as low. This is partly expected as it is a headwater stream with naturally low flows, however habitat suitability is also impacted barriers to fish movement downstream. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. The long term target is a high rating.
very high	low	very high	Frogs score is very high since all, or almost all, species of frog were recorded. With appropriate management score should be maintained as very high.
very high	very high	very high	Macroinvertebrates score is very high as much of the sub-catchment is forested. Monitoring and maintenance of vegetation are expected to ensure score remains very high in long term.
very low	very low	very low	Platypus score is very low. It is unlikely these reaches would have supported a large platypus population due to low flows. Poor downstream habitat has also disconnected these reaches from the Yarra River population.
high	mod.	high	Vegetation is high as these upper reaches are largely forested. Threats including pest plants and animals and climate change are predicted to reduce the rating to moderate if not adequately addressed. There are 6 known listed water dependent flora species.
very high	high	very high	Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high	Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high	Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very high	high	very high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very high and the target is very high.
high	mod.	mod.		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is high and the target is moderate.
high	mod.	high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is high and the target is high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
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 high	high	very high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very high and the target is very high.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
very high	very high	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 very 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.
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.

Stringybark Creek Sub-catchment



Description

Stringybark Creek originates near Silvan and flows through Coldstream before joining Olinda Creek just upstream of the Yarra River. Tributaries of Stringybark Creek include Little Stringybark and Log creeks.

Actions

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

"Restrict housing development on creek sides especially in floodplains and promote streamside revegetation. Where developments exist clean up, revegetate and reinstate values."

"Treat stormwater closer to the homes and roads it runs off from through use of treatment ponds and raingardens."

"Revegetate 20 meters either side of Olinda, Brushy, Stringybark, and Little Stringybark banks."

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

Stringybark Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Stormwater Condition	Prevent decline in stormwater condition, treat urban development in the Stringybark Creek catchment, so directly connected imperviousness (DCI) remains below 0.5% at the confluence with the Yarra River, and throughout the catchment. For every hectare of new impervious area, this requires harvesting around 5.8 ML/y and infiltrating 2.2 ML/y, which is about 470 ML/y and 70 ML/y for full development to the urban growth boundary.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (7 km, 29 ha) and maintain existing vegetation (16 km, 64 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of farmers and land owners through rural programs. Increase support for community/environment groups as population increases.

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

Notes:

Stringybark Creek Sub-catchment

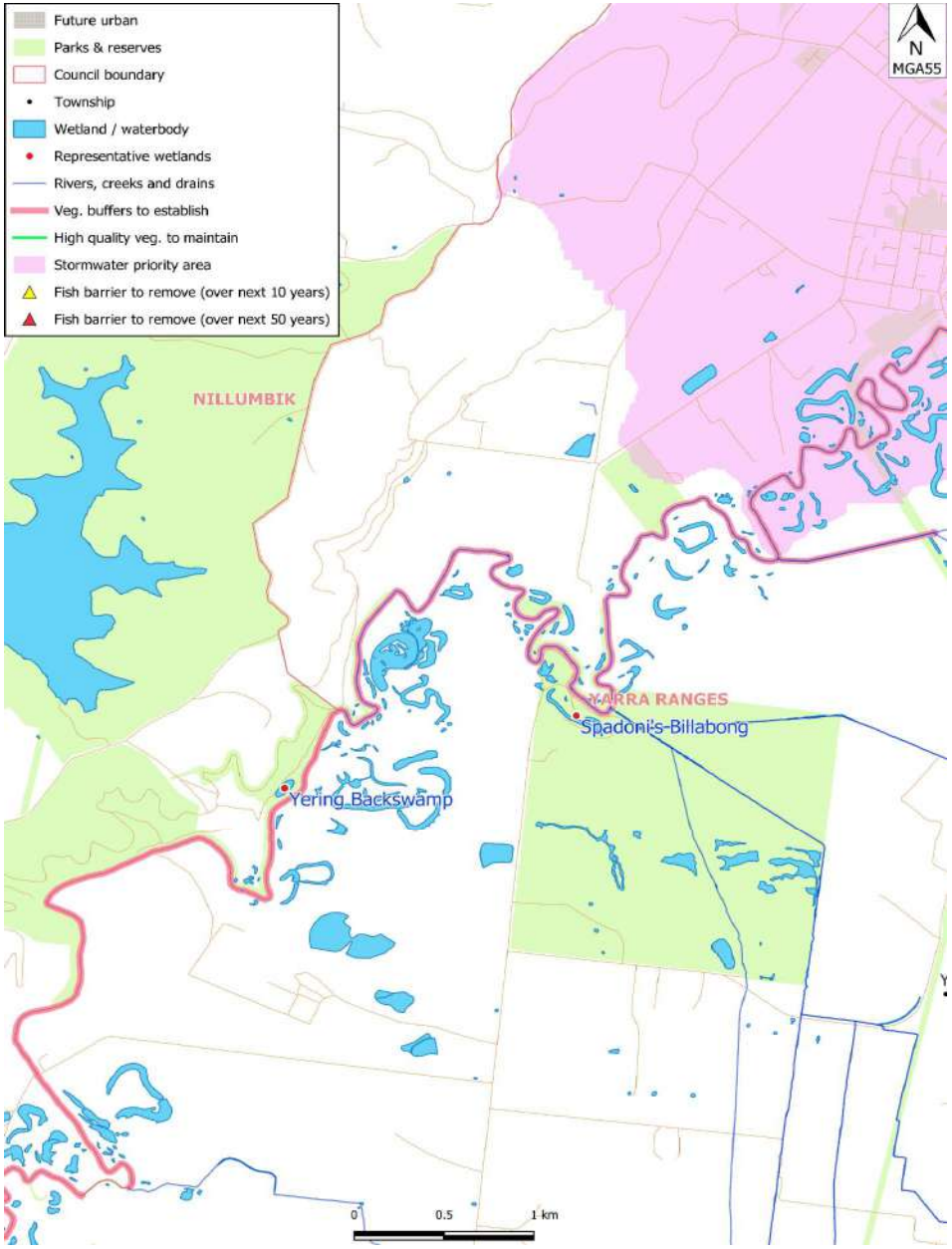
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		Insufficient bird observation to establish a birds (riparian) score. Despite the effects of climate change adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species include the powerful owl.
low	high	high		Fish are currently rated as low due to a lack of suitable habitat (instream and riparian) and barriers to fish migration. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Improvements to habitat (instream and riparian) and stormwater management will support a wider range of species and increase score to high in the long term. There are no threatened species known to occur in the sub-catchment.
n/a	low	low		Frog score cannot be calculated because of a lack of data. Even with targeted management future score is likely to be low because of residual effects of urbanisation and land use intensification and emerging impacts of climate change. Significant species include growling grass frog.
low	low	high		Macroinvertebrates score is low due to poor riparian and instream habitat resulting from large scale land use changes and channel modification. Extensive improvements in riparian habitat and management of flows is predicted to increase score to high in long term.
low	low	low		Platypus score is low due to a lack of instream and riparian habitat. The Yarra River population may occasionally use the lower reaches. Without substantial improvement to their habitat it is unlikely the rating will increase in the long term.
low	very low	mod.		Vegetation score is low from land use impacts that has modified the channel and fragmented the vegetation. Stock access, pest plants and animals and climate change will reduce score to very low unless mitigated. Enhancing vegetation and managing threats will increase score to moderate in long term.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
high	high	high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is high and the target is high.
mod.	low	mod.		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is moderate.
mod.	low	mod.		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is moderate.
very low	very low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very low and the target is moderate.
low	low	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.	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is high.
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.	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.

Spadonis Billabong



Description

Spandonis Billabong is a billabong located on the Yarra River floodplain at Yering, with the Spandonis Natura Conservation Reserve.

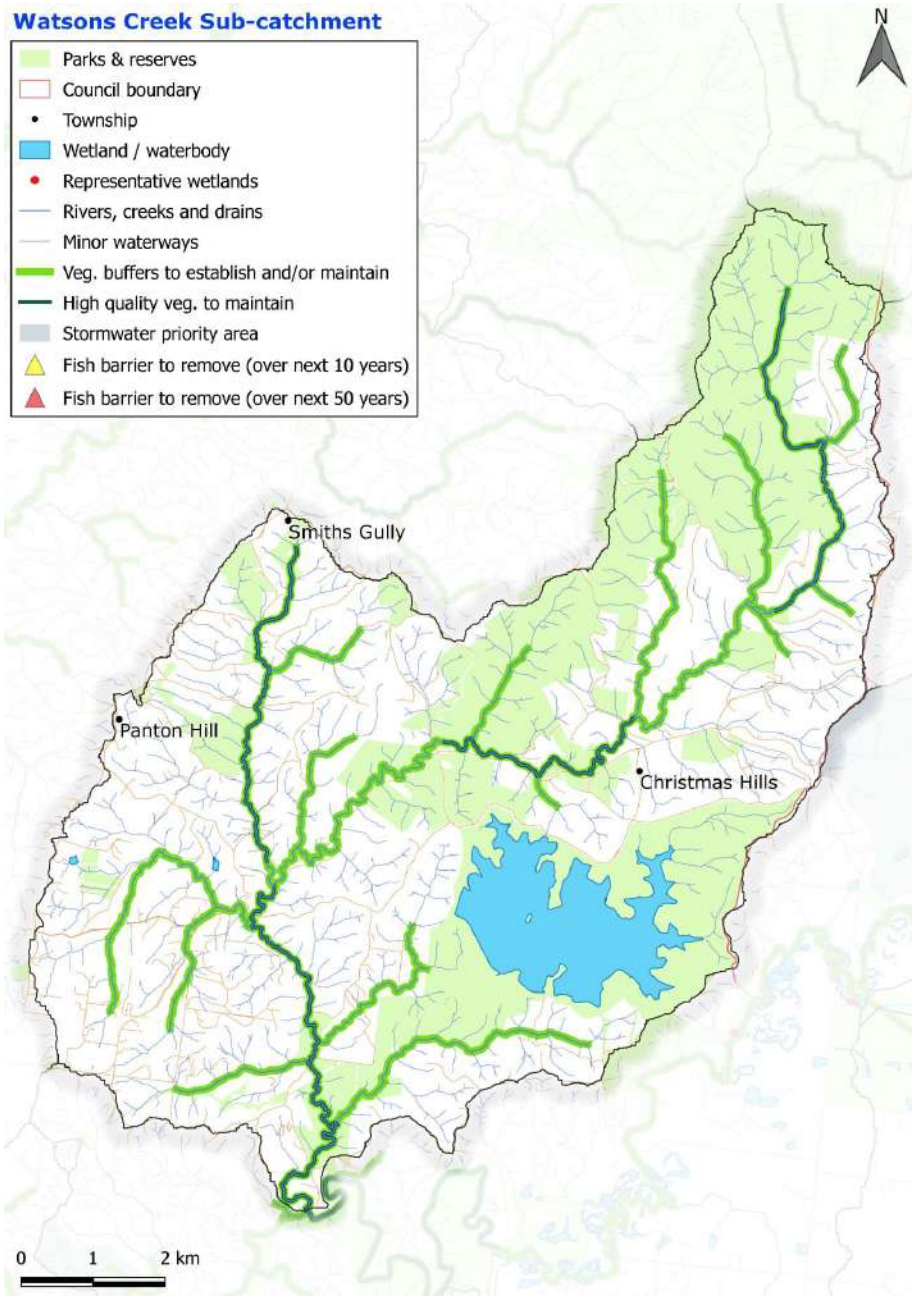
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland water quality	Implement urban stormwater and rural land management improvements upstream to reduce water quality threat to wetland.
3	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
4	Vegetation condition	Reduce weed threat to low.

Spadonis Billabong

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	mod.	mod.	Spandonis Billabong is listed in the Directory of Important Wetlands and is a known drought refuge. The current score is low due to moderate vegetation condition. The current and potential trajectory is an improvement to moderate as a result of the delivery of environmental water, improving vegetation condition, wetland habitat form and maintaining water quality in the long-term.
	very high	very high	very high	Fish score is very high with significant native fish species having been previously found in the wetland. In the long-term the fish value is expected to be maintained.
	low	high	high	Low frog score from the Yarra River Upper (Rural) sub catchment has been applied. It is predicted to improve to high as the threats of changed water regime, moderate vegetation condition and habitat form are reduced and these conditions improved.
	mod.	high	high	Vegetation value at Spadonis is currently moderate with a current and potential trajectory of high. Environmental watering objectives focussing on vegetation needs with drive an improvement in vegetation condition and other aspects of the wetland habitat values.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	low	low	mod.	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is moderate.
	very low	mod.	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 high	very high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	mod.	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Watsons Creek Sub-catchment



Description

Watsons Creek originates in the forested Kinglake National Park, flowing through cleared land at Christmas Hill and Kangaroo Ground before entering the Yarra River near Wonga Park. Tributaries of Watsons Creek include Long Gully, Five Mile, Sugarloaf and Stevenson creeks. Sugarloaf Reservoir is within this catchment.

Actions

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

"Establish drought refuges on minor tributaries. Could utilise run-off water to create mini wetlands. Good for key species such as platypus."

"Educate landowners in riparian zones to protect and expand native vegetation and better management. This will prevent damage due to ignorance."

"Support increased citizen science including waterwatch, frog watch , biodiversity monitoring and observations from people using trails."

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

Watsons Creek Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support river blackFish and platypus populations.
2	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 26 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (8 km, 31 ha) and maintain existing vegetation (58 km, 232 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
4	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity and nutrient run-off from rural and forest land. This may include establishment of vegetated buffers in headwater streams.
5	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science through promotion of high value areas (e.g. Kinglake National Park).

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

Notes:

Watsons Creek Sub-catchment

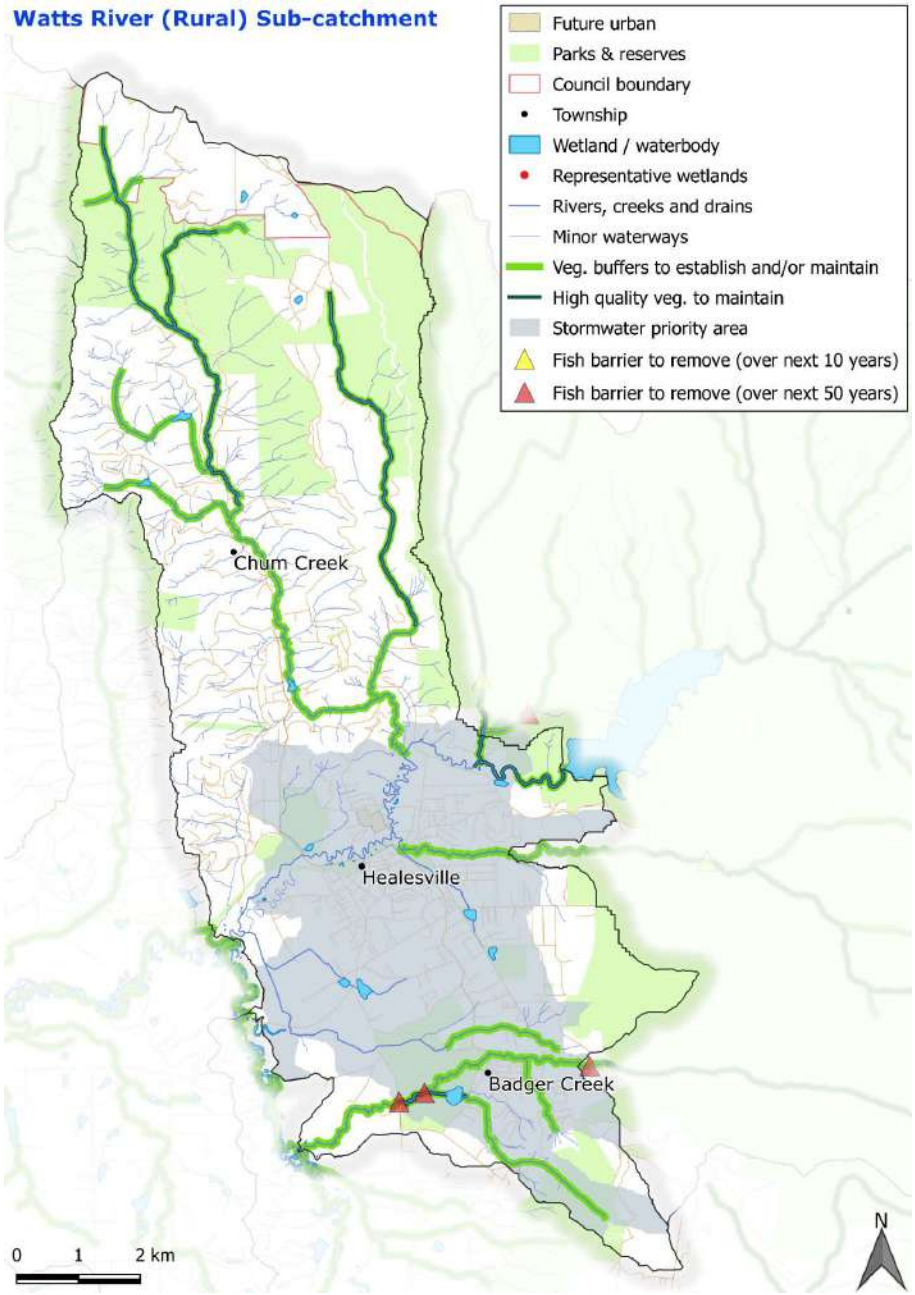
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	mod.	very high		Birds (riparian) is very high, meaning almost all expected species were frequently recorded. With targeted management the score could be maintained as very high. Significant species include the powerful owl.
mod.	high	high		Fish are currently rated as moderate. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Maintaining flows (regardless of climate change), and improving habitat, will protect a wider range of species, including river blackfish. This will ensure a rating of high in the long term.
very high	low	very high		Frogs score is very high since all, or almost all, expected species of frog were recorded. With appropriate management score should be maintained as very high. Significant species include southern toadlet.
very high	very high	very high		Macroinvertebrates score is very high as much of the waterway has good riparian and instream habitat. Monitoring and maintenance of vegetation and flows is expected to maintain the very high score in long term.
very low	very low	very low		Platypus score is very low due to a lack of instream and riparian habitat. The Yarra River population may occasionally use the lower reaches. Without substantial improvement to their habitat it is unlikely score will increase in long term.
mod.	low	mod.		Vegetation score is moderate with some very high quality reaches along forested tributaries. Pest plants and animals (particularly deer) and climate change will reduce score to low unless mitigated. There are 16 known listed water dependent species. Protecting the best and enhancing other areas will ensure current score is maintained in long term.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Watts River (Rural) Sub-catchment



Description

Watts River rises in the Yarra Ranges National Park near Mount Donna Buang. The rural reaches of the Watts River extend downstream from the Maroondah Reservoir and through Healesville before joining the Yarra River below the Maroondah Highway. Major tributaries include Meyers, Chum and Grace Burn creeks. Piccaninny and Coranderrk creeks also lie nearby.

Actions

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

"Investigate sediment sources in Upper Chum Creek. Turbidity is high even in low rainfall."

"Improve engagement of private land holders in Watts Creek (Healesville) and Lower Chum Creek to improve riparian management practices."

"Management of deer at Watts Source rural as they are a serious threat to vegetation."

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

Watts River (Rural) Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
2	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing turbidity impacts from rural land, urban growth and unsealed roads as well as nutrient inputs from rural land and septic tanks. This may include establishment of vegetated buffers in headwater streams.
3	Stormwater Condition	To prevent decline in stormwater condition, treat urban development in the region of Healesville and Badger Creek, so directly connected imperviousness (DCI) remains below 0.6% at the confluence with the Yarra River, and throughout the catchment. For every hectare of new impervious area, this requires harvesting around 6.2 ML/y and infiltrating 2.8 ML/y, which is about 410 ML/y and 180 ML/y for full development to the urban growth boundary.
4	Vegetation Extent	Establish a continuous riparian vegetated buffer (7 km, 28 ha) and maintain existing vegetation (44 km, 175 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
5	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 19 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
6	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. increase participation in citizen science through promotion of high value areas (e.g. Yarra Ranges National Park).

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

Notes:

Watts River (Rural) Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	mod.	mod.		Insufficient bird observation to establish a birds (riparian) score. Despite the effects of climate change we believe adequate investment in targeted management such as riparian revegetation should ensure a riparian bird score of moderate. Significant species include the powerful owl and eastern great egret.
mod.	high	high		Fish are currently rated as moderate due to a lack of suitable instream and riparian habitat and flow stress. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Improvements to riparian vegetation and stormwater management, and reduction of flow stress, will support a wider range of species, including river blackfish and ornate galaxias. This will ensure a rating of high in the long term.
mod.	low	mod.		Frogs score is moderate since not as many expected species of frog were recorded. With appropriate management frog score should be maintained as moderate.
very high	very high	very high		Macroinvertebrates score is very high as much of the waterway has good riparian and instream habitat. Monitoring and maintenance of vegetation and flows (including managing stormwater) is needed to maintain very high score in long term.
mod.	mod.	mod.		Platypus are currently rated as moderate, largely due to a lack of riparian and instream habitat , flow stress and disconnection from the upper reaches. Improving vegetation will enhance their habitat however managing flows will be critical to maintaining the current rating in the long term.
mod.	low	mod.		Vegetation score is moderate with some high quality reaches in headwaters. Pest plants and animals and climate change impacts will reduce score to low unless mitigated. Protecting the best and enhancing other areas will ensure current score is maintained in long term.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Watts River (Source) Sub-catchment

Description

Watts River rises in the Yarra Ranges National Park near Mount Donna Buang. The Watts River source reaches and tributaries feed the Maroondah Reservoir upstream of Healesville. Major tributaries include Meyers, Chum and Grace Burn creeks. Piccaninny and Coranderrk creeks also lie nearby. Most of this sub-catchment is a source of drinking water and access is prohibited.

Actions

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

"Build community engagement with waterways with creation of walking trails - Badger Creek, Fernshaw Creek, Donnelly's Creek and Healesville."

"Review environmental flow arrangements to improve base flow. Large releases not giving true flows."

"Improve / increase fauna data capture through field naturalists and frog census."

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

Watts River (Source) Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Yarra River Lower), which reflects targets for whole catchment.
2	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
3	Instream Connectivity	Increase instream connectivity to provide fish passage along Donnellys Creek from the confluence with the Watts River (remove barrier at Donnellys Weir).
4	Instream Connectivity	Increase instream connectivity to provide fish passage along Graceburn Creek from the confluence with the Watts River (remove barrier at Graceburn Weir).
5	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 58 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
6	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 1 ha) and maintain existing vegetation (137 km, 547 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).

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

Notes:

Watts River (Source) Sub-catchment

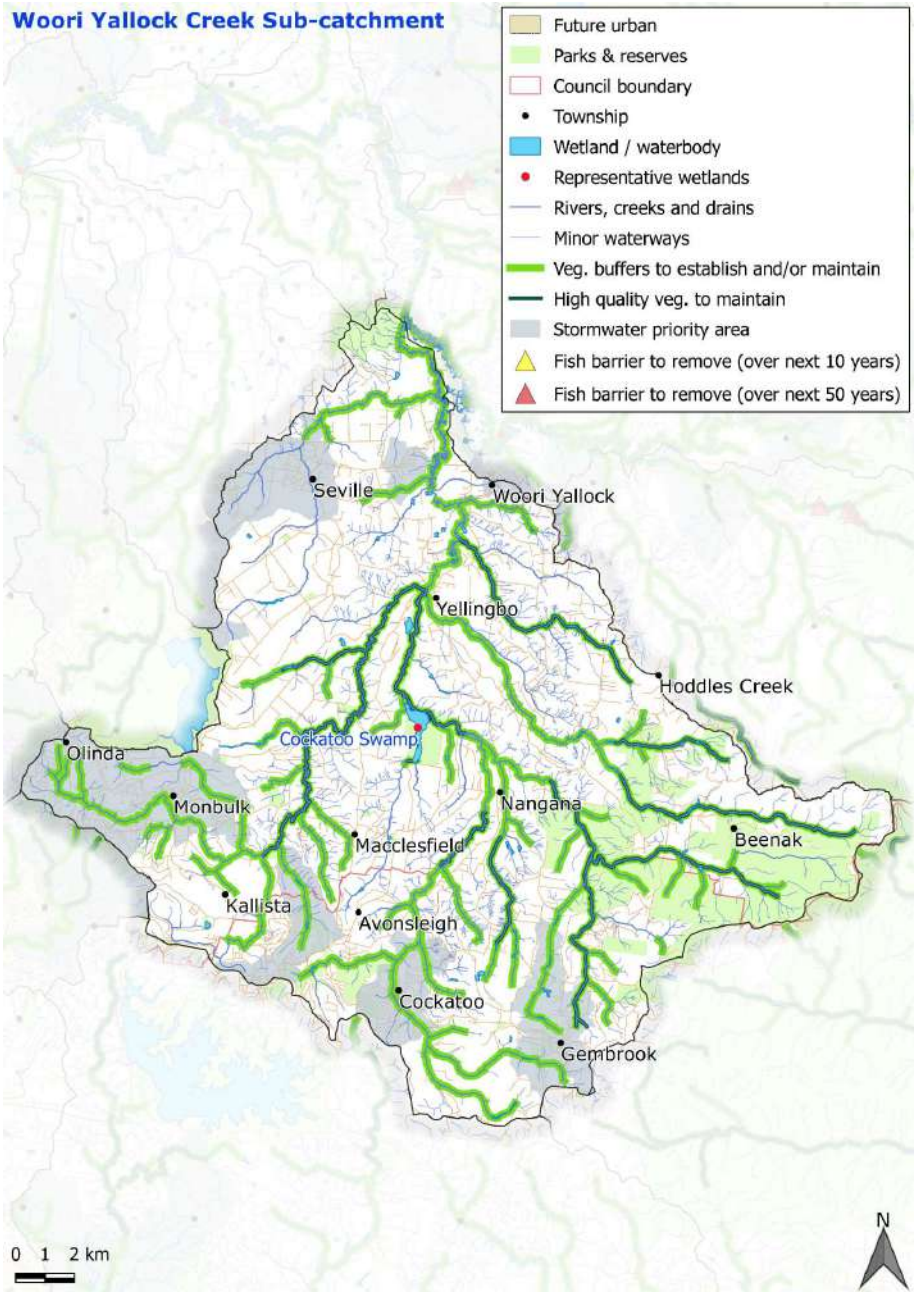
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	high	high		Insufficient bird observation to establish a birds (riparian) score. Despite the effects of climate change adequate investment in targeted management, such as protecting riparian vegetation, should ensure a riparian bird score of high. Significant species of riparian bird occurring in this sub-catchment include the powerful owl.
low	mod.	mod.		Fish are currently rated as low. This is partly expected for headwater streams with naturally low flows, however it is also due to barriers to fish movement, particularly water supply dams and weirs. The increased current trajectory rating is due to climate change increasing habitat suitability for common and widespread species. Maintaining flows and providing fish passage along Graceburn and Badger Creeks will improve habitat suitability for wider range of species and ensure a rating of moderate in the long term.
n/a	mod.	high		Insufficient data to assess frogs score. With appropriate management score is expected to be high in long term.
very high	very high	very high		Macroinvertebrates score is very high as the waterway is a protected water supply catchment. The Mount Donna Buang stonefly has been recorded. Monitoring and maintenance of habitats in particular vegetation is expected to ensure score remains very high in long term.
very high	very high	very high		Platypus score is very high as they utilise Maroondah Reservoir for habitat. Monitoring and maintenance of habitats, particularly flows under climate change will be required to maintain the very high rating.
high	mod.	high		Vegetation score is high as these upper reaches are largely forested. Threats including pest plants and animals and climate change are predicted to reduce score to moderate unless mitigated. There are 6 known listed water dependent species.
n/a	n/a	n/a		As this is a closed catchment for water supply, there has been no assessment or setting of targets for social values.
n/a	n/a	n/a		As this is a closed catchment for water supply, there has been no assessment or setting of targets for social values.
n/a	n/a	n/a		As this is a closed catchment for water supply, there has been no assessment or setting of targets for social values.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very high	high	very high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very high and the target is very high.
very high	high	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is high.
very high	high	very high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very high and the target is very high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
mod.	mod.	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is high.
very high	high	very high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very high and the target is very high.
n/a	n/a	n/a		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. No data exists for this sub-catchment.
n/a	n/a	n/a		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. No data exists for this sub-catchment.
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.
n/a	n/a	n/a		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.No data exists for this sub-catchment.

Woori Yallock Creek Sub-catchment



Description

Woori Yallock Creek rises near Macclesfield in the Yarra Ranges and joins the Yarra River near Healesville. The Wandin Yallock Creek rises near the Silvan Reservoir and joins Woori Yallock Creek just upstream of the Yarra. Other tributaries of Woori Yallock Creek include Cockatoo, Shepherd and McCrae creeks.

Actions

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

"Reduce number of dams in sub-catchment to support stream flow and fish movement."

"Revegetate along Cockatoo, Macclesfield and Woori Yallock Creeks."

"Intercept nutrient, chemical and sediment runoff from agricultural and household discharges."

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

Woori Yallock Creek Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
2	Water for Environment	Identify and implement opportunities to reduce the key threat of summer low flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
3	Stormwater Condition	To prevent decline in stormwater condition, treat urban development (e.g. from new developments in Cockatoo, Emerald and Seville), so directly connected imperviousness (DCI) remains below 0.3% at the confluence with the Yarra River, and at current levels along the stem of Woori Yallock Creek and Cockatoo Creek and tributaries. For every hectare of new impervious area, this requires harvesting around 6.3 ML/y and infiltrating 2.8 ML/y, which is about 0.7 GL/y and 0.3 GL/y for full development to the urban growth boundary.
4	Vegetation Extent	Establish a continuous riparian vegetated buffer (49 km, 196 ha) and maintain existing vegetation (204 km, 817 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
5	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 84 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
6	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing sediment run-off from rural land, urban growth and unsealed roads as well as nutrient inputs from rural land and septic tanks. This may include establishment of vegetated buffers in headwater streams.
7	Water Quality - Environmental	Improve water quality for environmental values by reducing pesticide impacts from rural and urban land.
8	Water Quality - Environmental	Protect water quality for Port Phillip Bay and waterways by maintaining the current quality of discharges from Monbulk sewage treatment plant (or reducing volumes where possible), whilst ensuring they are released in a manner that ensures environmental values are supported in the waterway.
9	Physical form	Investigate and mitigate threats to physical form and other high values.
10	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation in citizen science through promotion of high value areas (e.g. Yellingbo Nature Conservation Reserve).

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

Woori Yallock Creek Sub-catchment

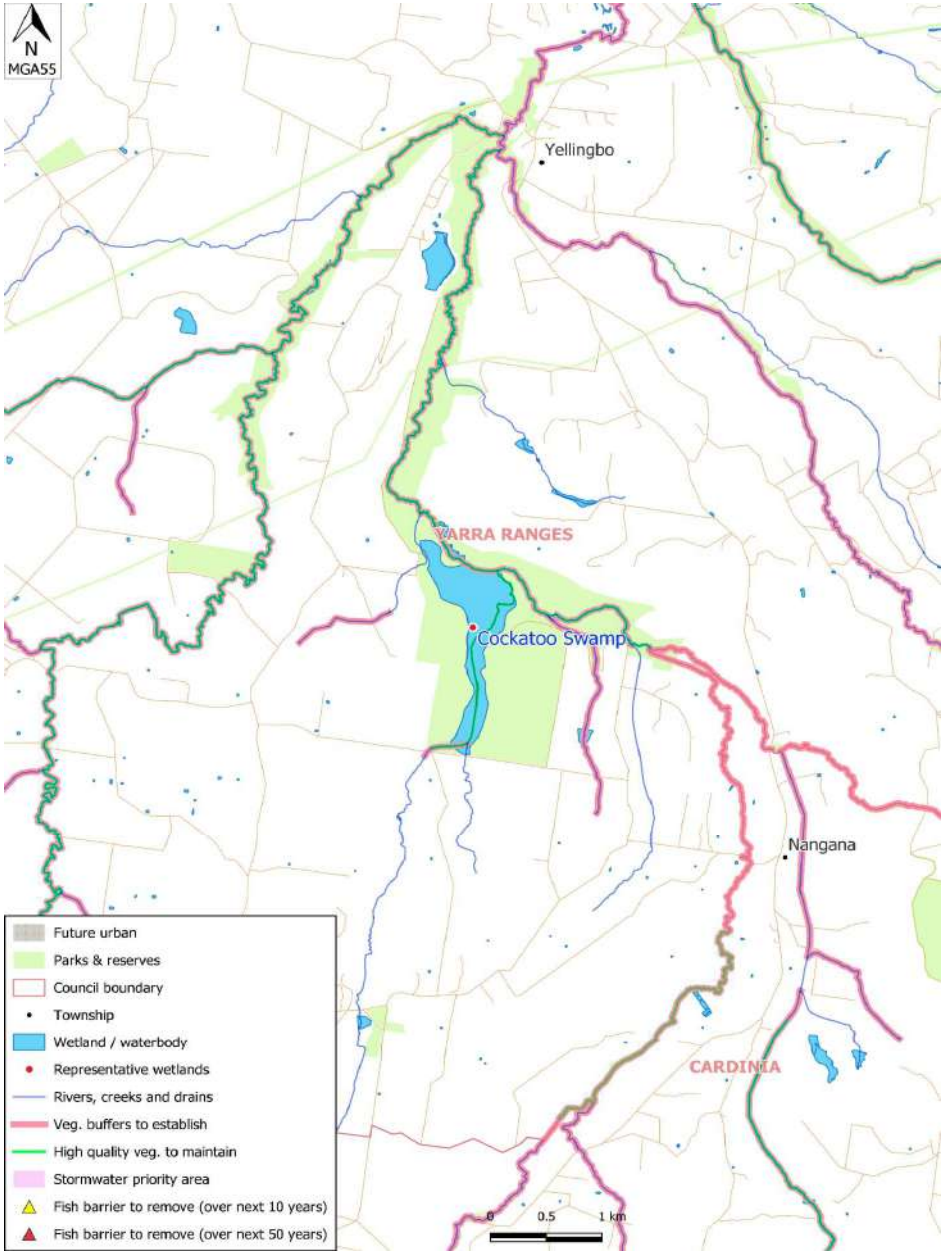
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred but some of these infrequently. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure the score is maintained at moderate. Significant species include the helmeted honeyeater, powerful owl and eastern great egret.
mod.	high	very high		Fish are currently rated as moderate due to a lack of suitable instream and riparian habitat and flow stress. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improving riparian vegetation and water quality, together with reducing flow stress, is predicted to increase habitat suitability for a wider range of species, including river blackfish and ornate galaxias, and increase score to very high in the long term. The tubercle burrowing crayfish is a listed species that occurs in this sub-catchment.
mod.	low	mod.		Frogs score is moderate since not as many species of frog were recorded. With appropriate management score should be maintained as moderate. Significant species include the growling grass frog and southern toadlet.
very high	high	very high		Macroinvertebrates score is very high as much of the waterway has good riparian and instream habitat. Future flow impacts from stormwater and climate change will reduce score if not mitigated. Improving riparian vegetation and protecting flows is predicted to maintain very high score in long term.
high	mod.	high		Platypus score is high based on instream and riparian habitat, however, are predicted to decline with lower flows under climate change. Improving riparian habitat and managing flows will be critical to maintaining high score in the long term.
mod.	low	mod.		Vegetation score is moderate. Threats including pest plants and animals (particularly deer) and climate change are predicted to reduce score to low unless mitigated.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	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	high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is moderate and the target is high.
mod.	low	mod.		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is moderate and the target is moderate.
mod.	low	mod.		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is moderate.
high	high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is high and the target is very high.
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.
mod.	mod.	high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is moderate and the target is high.
high	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.

Cockatoo Swamp



Description

Cockatoo Swamp is located adjacent to Cockatoo Creek in the Yellingbo Conservation Area. This area provides habitat for the nationally-listed mountain swamp gum, growling grass frog, helmeted honeyeater, grey-headed flying-fox and Leadbeater's possum (also state-listed); and state-listed white-bellied sea-eagle, swamp skink and square-tailed kite.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime & Wetland buffer condition	Water regime implemented (incorporating understanding of groundwater contributions) to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Vegetation condition	Reduce threat of deer and other invasive fauna to moderate, and reduce weed threat to low.
3	Wetland water quality	Reduce nutrient threat through improved rural land management.

Cockatoo Swamp

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	high	high	high		Cockatoo Swamp has a bird value score of high. High current vegetation condition, along with the presence of significant bird species and acknowledgement of wetland as part of a drought refuge support the score. The score will remain high through improvements to water regime, habitat form, protection of the wetland buffer vegetation and vegetation condition.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very high	very high		Cockatoo Swamp currently supports the growling grass frog along with many other significant fauna and flora species. The frogs score is currently very high and is predicted to remain very high.
	high	high	very high		Vegetation score is high and predicted to improve to very high in long-term. Cockatoo Swamp supports significant vegetation communities and species including Nationally listed Mountain Swamp Gum. Improvements to wetland water regime, wetland habitat form, wetland buffer and vegetation condition will improve already high vegetation score.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	high	high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is high.
	high	high	very high		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is high and the target is very high.
	high	very high	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is high and the target is very high.
	high	very high	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is high and the target is very high.
	very low	mod.	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Yarra River Lower Sub-catchment

Description

The middle and lower sections of the Yarra River lie downstream of Warrandyte. The middle section of the Yarra flows through the Warrandyte State Park and Yarra Valley Parklands. Tributaries in this area include Cherry Hill and Chirnside Park drains, and Jumping, Andersons, Harris Gully, Ruffeys and Salt creeks. Tributaries in the lower section include Merri and Gardiners creeks and the Plenty River.

Actions

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

"Promote waterway recreation such as Inflatable Regatta and Swimming. Waterways can be promoted as a heat refuge during extreme heat events."

"Advocate for stormwater planning controls/ requirements to reduce run-off, protect waterway corridor views, align with Catchment / River Health objectives, and urban heat strategies. State Government, Councils, Yarra Valley Water and Melbourne Water to collaborate."

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

Yarra River Lower Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to increase environmental water reserve by 10 GL by 2028 to meet ecological watering objectives and cover projected shortfalls. Environmental water recovery targets captured at lowest downstream sub-catchment reflect targets for whole catchment.
2	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
3	Instream Connectivity	Increase instream connectivity to provide fish passage along the lower Yarra River (rectify Dights Falls fishway).
4	Vegetation Extent	Establish a continuous riparian vegetated buffer (15 km, 60 ha) and maintain existing vegetation (76 km, 305 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.
5	Stormwater Condition	To prevent decline in stormwater condition, treat upstream urban development so directly connected imperviousness (DCI) remains at current levels at Warrandyte, and at current levels along the main stem of the Yarra River. For every hectare of new impervious area, this requires harvesting around 5.1 ML/y and infiltrating 1.5 ML/y, which is about 0.7 GL/y and 0.2 GL/y for full development out to urban growth boundary.
6	Access	Increase access to and along waterways from 47% to 52% (about 4 km of path) by filling gaps and improving connections with existing path network.
7	Participation	Increase participation rates from low to high; support community groups and build capacity through citizen science and cultural engagement.

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

Notes:

Yarra River Lower Sub-catchment

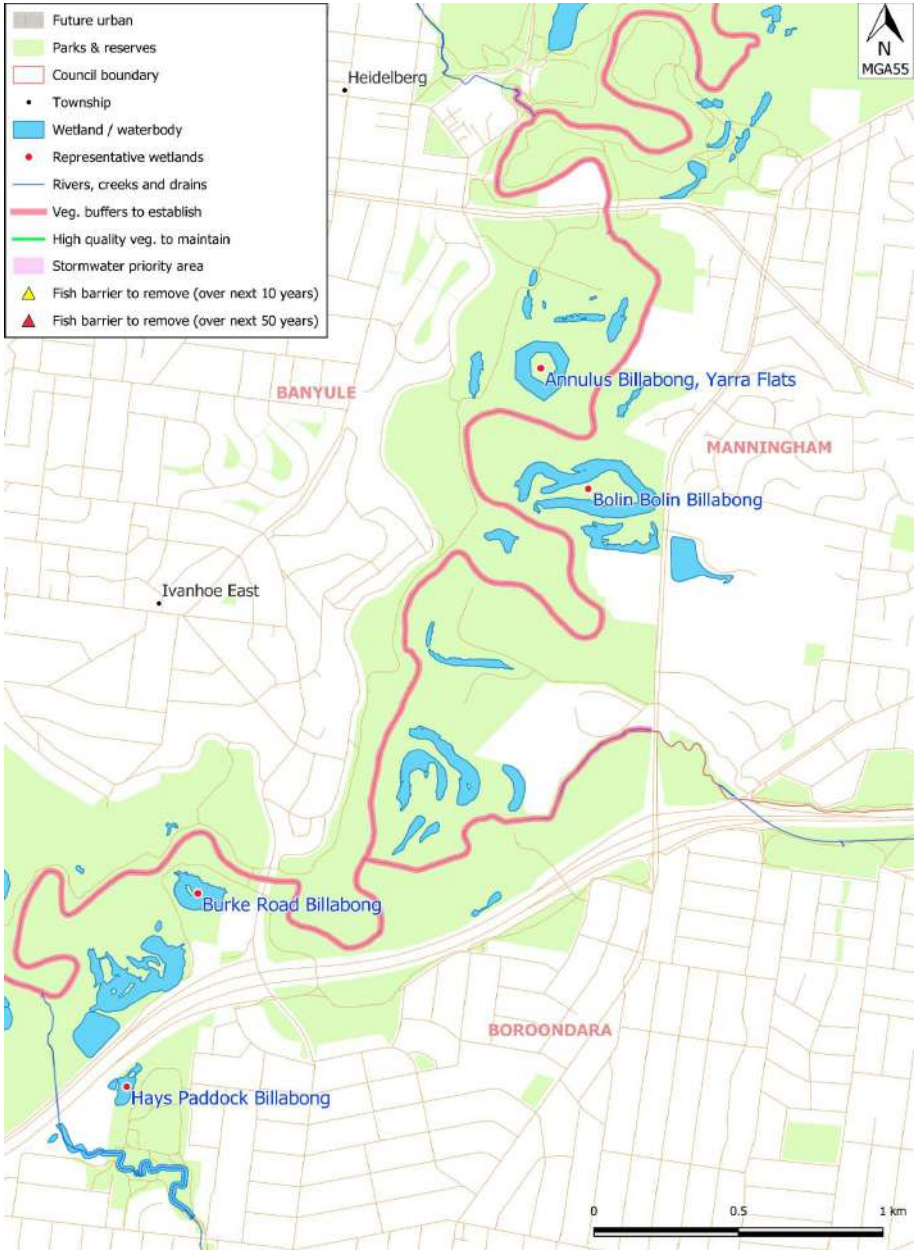
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	very low	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred. Despite the effects of climate change adequate investment in targeted management, such as riparian revegetation, should ensure score is maintained at moderate. Significant species include powerful owl and the little, intermediate and eastern great egrets.
mod.	mod.	high		Fish are currently rated as moderate due to a lack of suitable habitat (instream and riparian) and barriers to migration. Improvements to environmental conditions, including ensuring Dights Falls fishway is effective, will enable a high score in the long term. Threatened species that occur in this sub-catchment include murray cod, Australian grayling, macquarie perch and Australian mudfish.
mod.	very low	mod.		Frogs are currently rated as moderate since not as many species of frog were recorded. With appropriate management score should be maintained as moderate. A significant species is the brown toadlet.
low	low	mod.		Macroinvertebrates score is low due to poor riparian and instream habitat resulting from large scale land use changes in upstream catchment. Improving riparian vegetation and managing flows (including stormwater) can increase score to moderate in long term.
mod.	low	high		Platypus score is moderate based on lack of suitable instream and riparian habitat, and urban stormwater impacts. Future stormwater and climate change impacts are predicted to reduce the rating to low, although improving habitat, particularly riparian vegetation and flows is predicted to increase the score to high in the long term.
low	very low	mod.		Vegetation score is low resulting from large scale land use impacts. Urban infill along the waterway, pest plants and animals and climate change will reduce score to very low unless mitigated. Enhancing vegetation and managing threats will increase score to moderate in long term. There are 22 known listed water dependent species.
high	high	very high		Amenity, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term; target is to improve to very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Annulus Billabong, Yarra Flats



Description

Annulus Billabong is located within the Annulus Wildlife Sanctuary within the Yarra Flat Park.

Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime & Wetland buffer condition	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Vegetation condition	Reduce weed threat to low.

Annulus Billabong, Yarra Flats

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	mod.	mod.		Wetland bird score is very low with potential trajectory of improvement to moderate as a result of planned environmental watering. The wetland is not formally recognised as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	high	high		Yarra River Lower sub catchment frog score of moderate was used for Annulus Billabong. The score is expected to increase to high in response to reduction in threats, most significantly changed wetland water regime.
	mod.	low	mod.		Wetland vegetation score is currently moderate with a current trajectory of decline to low. Improving the wetland water regime, wetland buffer condition and maintaining the wetland vegetation condition will maintain score at moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	low	low	low		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is low and the target is low.
	mod.	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is moderate and the target is very high.
	mod.	mod.	mod.		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is moderate.
	very low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Banyule Flats Billabong

Description

Banyule Flats Billabong is located at Viewbank with the Banyule Flats Reserve. A total of 153 bird species have been sighted within the reserve, with some species rare or threatened in Victoria, while others are significant migrants. Significant community lead conservation work has been undertaken over many years.

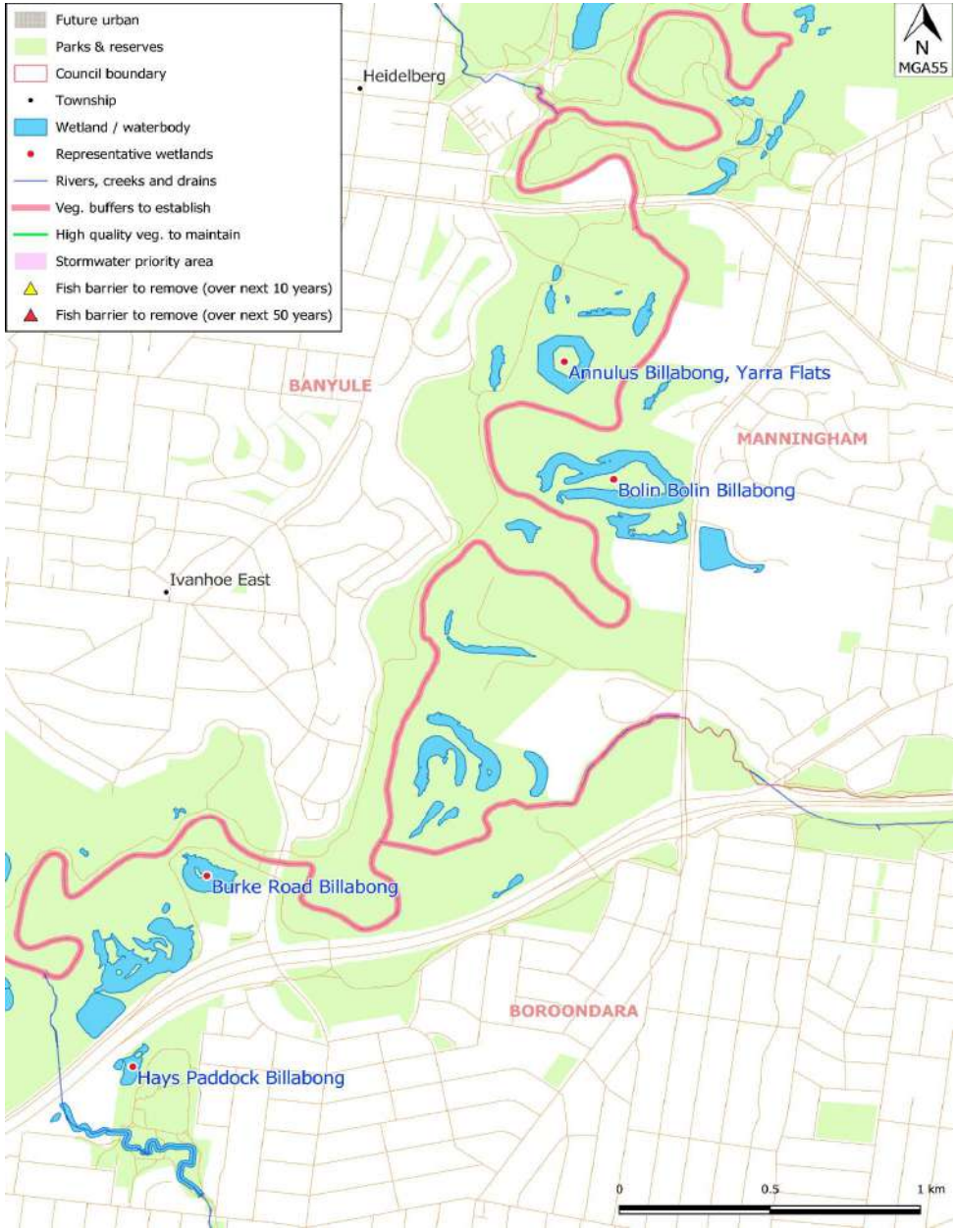
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Fish (value)	Maintain threat from carp at low following watering events.
3	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
4	Vegetation condition	Reduce weed threat to low.

Banyule Flats Billabong

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	low	low		Banyule Flats Billabong has a low bird score which is predicted to remain low. The wetland is not formally recognised as bird habitat.
	very low	mod.	mod.		Fish score is very low with a current and potential trajectory of moderate. Planned improvements to water regime, along with long-term improvements to the wetland habitat form, wetland buffer condition and vegetation condition will support opportunistic use of floodplain billabongs by native fish.
	very high	very high	very high		Frog score is very high with significant species present. Maintenance of the wetland water regime is expected to maintain score at very high.
	mod.	high	high		Wetland vegetation score is moderate. Reduction to the threats of changed water regime, poor wetland buffer and degraded wetland vegetation condition is predicted to improve score to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very high	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	very low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Bolin Bolin Billabong



Description

Bolin Bolin Billabong is located next to the Yarra River in Bulleen, the billabong is one of the few remaining in urban Melbourne and has high ecological and cultural significance.

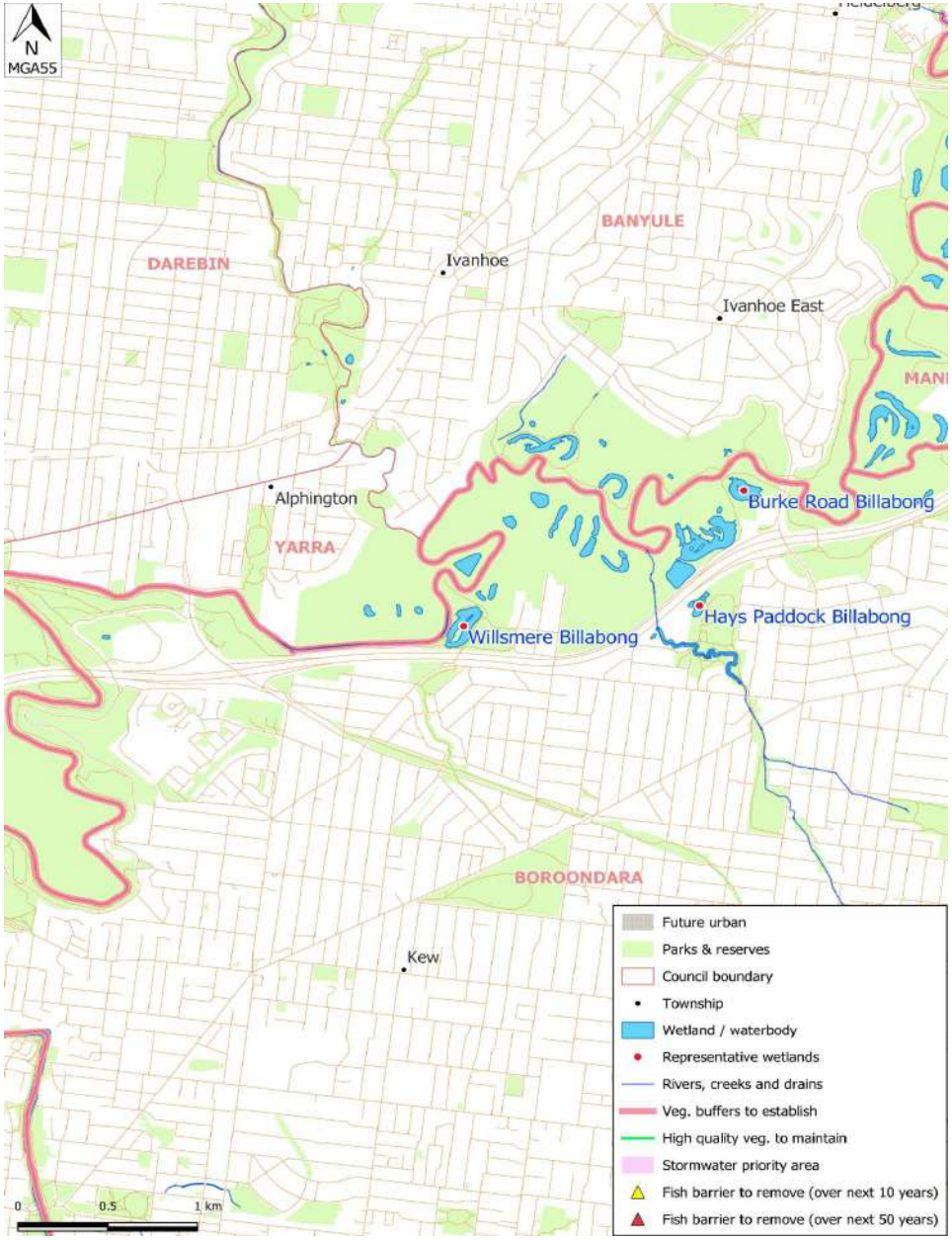
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Fish (value)	Maintain threat from carp at low following watering events.
2	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
3	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value.

Bolin Bolin Billabong

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	mod.	mod.		Wetland bird score is currently low with potential trajectory of improvement to moderate as a result of planned environmental watering. The wetland is not formally recognised as bird habitat and bird habitat is limited by current vegetation condition.
	very low	mod.	mod.		Fish score is very low with potential trajectory of moderate. Planned improvements to water regime, along with improvements to wetland habitat form, wetland buffer condition and vegetation condition will support opportunistic use of floodplain billabongs by native fish.
	very high	very high	very high		Frog score is very high with significant species present. Maintenance of the wetland water regime is expected to maintain score at very high.
	mod.	high	high		Wetland vegetation score is moderate. Reduction to the threats of changed water regime, poor wetland buffer and degraded wetland vegetation condition is predicted to improve score to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very high	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	mod.	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Burke Road Billabong



Description

Burke Road Billabong is located in Kew next to the Yarra River. It has been the subject of significant conservation works lead by local community members.

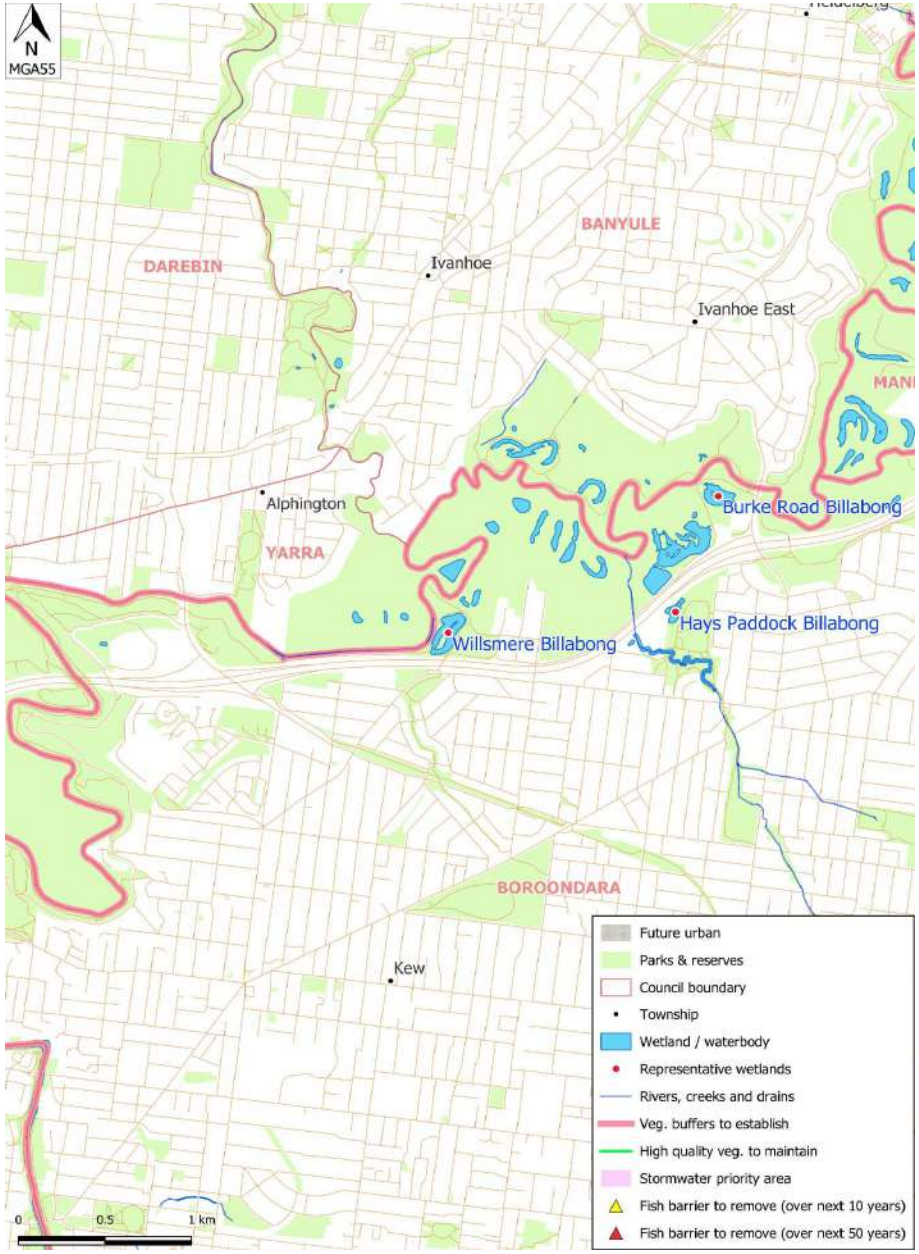
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Fish (value)	Maintain threat from carp at low following watering events.
3	Vegetation condition & Wetland buffer condition	Reduce weed threat to low.
4	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.

Burke Road Billabong

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	mod.	mod.		Wetland bird score is very low with potential trajectory of improvement to moderate as a result of planned environmental watering. The wetland is not formally recognised as bird habitat.
	very low	mod.	mod.		Fish score is very low with potential trajectory of moderate. Planned improvements to water regime, along with long-term improvements to the wetland habitat form, wetland buffer condition and vegetation condition will support opportunistic use of floodplain billabongs by native fish.
	mod.	high	high		Yarra River Lower sub catchment frog score of moderate was used for Burke Road Billabong. It is expected to increase to high in response to reduction in threats, most significantly changed wetland water regime.
	mod.	high	high		Burke Road Billabong vegetation score is moderate. Reduction to the threats of changed water regime, poor wetland buffer and degraded wetland vegetation condition is predicted to improve score to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	low	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is very high.
	mod.	very high	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	very low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Hays Paddock Billabong



Description
Hays Paddock Billabong is located within the Willsmere- Chandler Park on the Yarra River floodplain at Kew.

Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water regime	Investigate opportunities to improve wetland water regime to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Fish (value)	Maintain threat from carp at low following watering events.
3	Vegetation condition	Reduce weed threat to low.

Hays Paddock Billabong

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	mod.	mod.		Wetland bird score is very low with a currently and potential trajectory of improvement to moderate as a result of planned environmental watering. The wetland is not formally recognised as bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	high	high		Frog score at Hays Paddock Billabong is currently moderate. Improvements to the wetland water regime and vegetation condition are predicted to improve score to high.
	very low	very low	mod.		Hays Paddock has a vegetation value score of very low, with current vegetation condition very low. Score is predicted to improve to moderate with significant vegetation communities protected by improving vegetation condition and water regime.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	very low	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	very low	very high	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is very low and the target is very high.
	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.

Westgate Park Wetlands

Description

Two wetlands are located within Westgate Park. Quarrying for sand resulted in the two wetlands in the park – the larger fresh water lake having a large and diverse bird population but the smaller lake is highly saline, polluted with heavy metals and organics and often coloured pink by algae. Significant environmental projects have increased the environmental and social values of the wetlands.

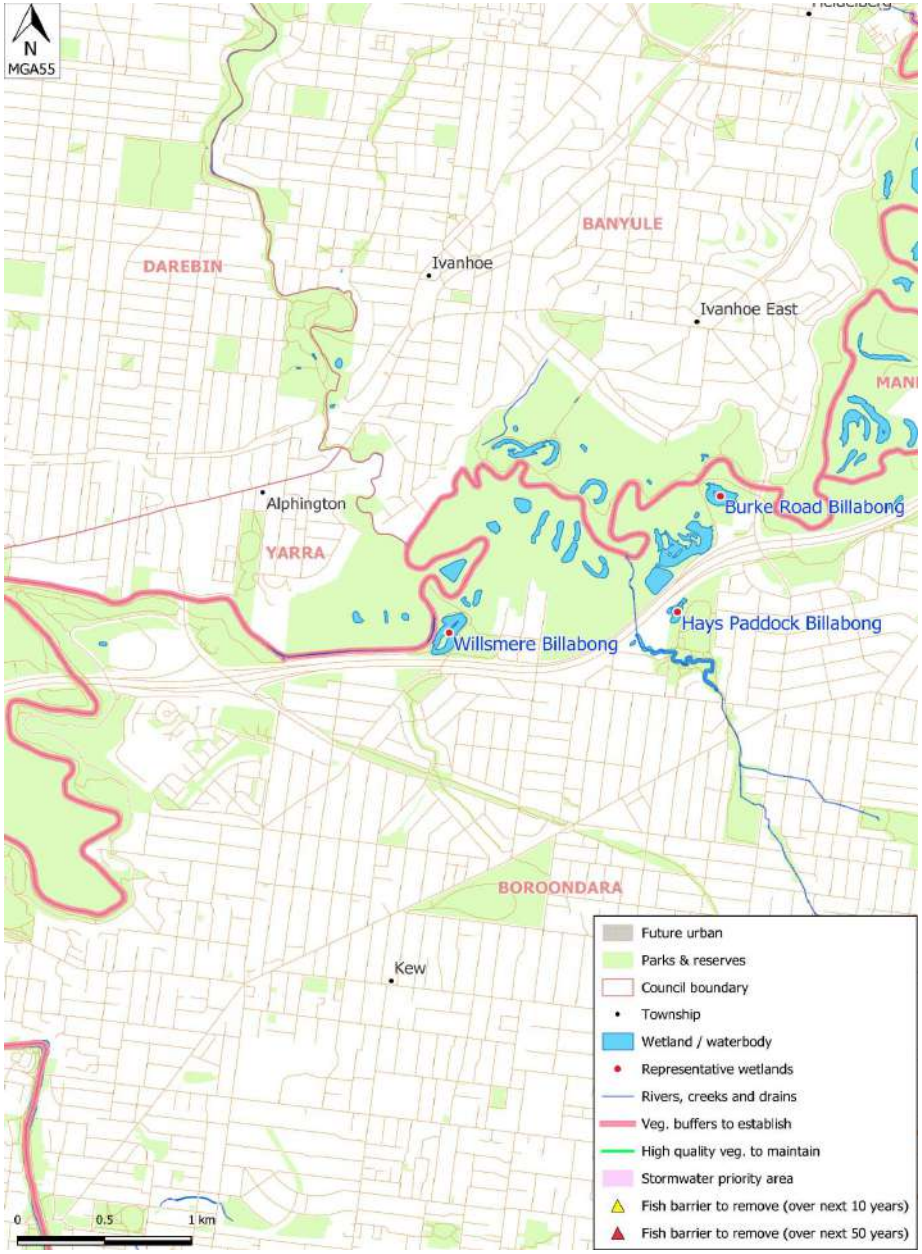
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
2	Wetland water quality	Implement urban stormwater improvements upstream to reduce water quality threat to wetland.
3	Vegetation condition	Reduce weed threat to low.

Westgate Park Wetlands

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	low	low		The bird value at Westgate Park wetlands is currently low and is predicted to remain low. The site is not formally recognised as bird habitat. In the long-term low vegetation condition will continue to provide bird habitat.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very low	very high		The frog score is currently very high with significant species present. Maintenance of the wetland water regime is expected to maintain the frog value at very high.
	very low	very low	mod.		Wetland vegetation value is currently very low, although significant vegetation communities are present. Very low wetland vegetation condition will be improved through reduction of weed threats and improvement of wetland buffer vegetation improving the value to moderate.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	mod.	mod.		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is moderate.
	very low	very low	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.

Willsmere Billabong



Description

Willsmere Billabong is located within the Willsmere- Chandler Park on the Yarra River floodplain at Kew.

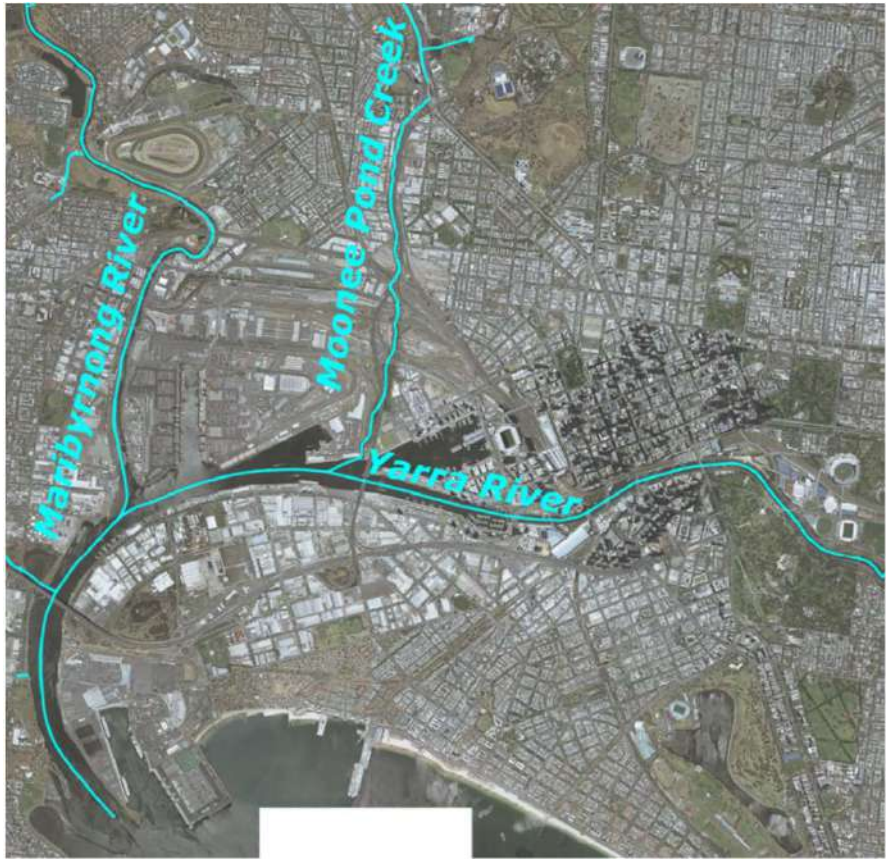
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland water quality	Implement urban stormwater improvements upstream to reduce water quality threat to wetland.
3	Fish (value)	Maintain threat from carp at low following watering events.
4	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
5	Vegetation condition	Reduce weed threat to low.

Willsmere Billabong

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	mod.	mod.	Wetland bird score is currently very low with a potential trajectory of improvement to moderate as a result of planned environmental watering. The wetland is not formally recognised as bird habitat.
	high	mod.	mod.	Fish score is high with potential trajectory of moderate. Planned improvements to the water regime, along with long-term improvements to the wetland habitat form, wetland buffer condition and vegetation condition will support opportunistic use of floodplain billabongs by native fish.
	mod.	high	high	Yarra River Lower sub catchment frog score of moderate was used for Willsmere Billabong. It is expected to increase to high in response to reduction in threats, most significantly changed wetland water regime.
	mod.	high	high	Vegetation score is moderate. Reduction to the threats of changed water regime, poor wetland buffer and wetland vegetation condition is predicted to improve score to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	very low	very low	low	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is low.
	very low	mod.	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very high	very high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	very low	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Yarra River Estuary



Description

Yarra River estuary extends abut 22 km from Dights Falls to Newport, north of Hobsons Bay. It has high ecological, social, aesthetic and recreational values as it flows through the city and eastern suburbs of Melbourne to Port Phillip Bay. It is a 'salt-wedge' estuary, where the mixing of salt and freshwater is influenced by freshwater inflows over Dights Falls. The Fisherman's Bend urban renewal area is planned to become home to approximately 80,000 residents and provide employment for up to 80,000 people by 2050.

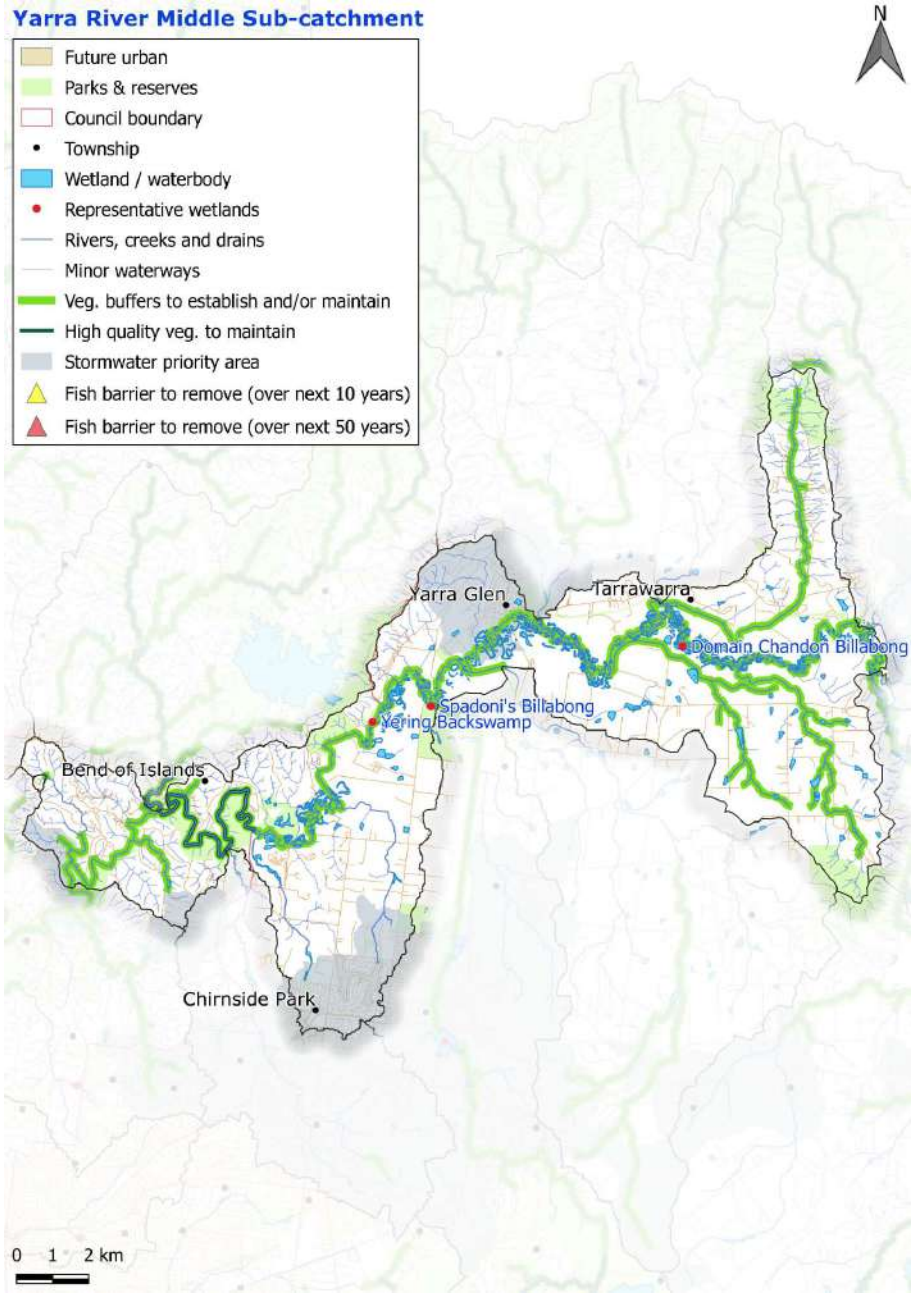
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Estuarine Vegetation	Enhance estuarine vegetation condition and reduce threat of invasive plant species.
2	Estuarine Vegetation	Enhance estuarine emergent vegetation to provide instream habitat for fish.
3	Access & Recreation	Maintain and support existing high value opportunities for access and recreation including walking, cycling, boating and fishing.
4	Amenity	Maintain existing high value access and facilities that support passive enjoyment.

Yarra River Estuary

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Yarra estuary bird score is currently rated very low with a predicted long-term score of very low. Very low to low condition ratings for estuarine vegetation and estuarine wetland connectivity limit the value of the estuary as bird habitat.
	very high	very high	very high		Estuarine fish score is very high. A good diversity of estuarine dependent species inhabit the estuary and the listed Australian grayling has been recorded. The score is predicted to be maintained at very high.
	very low	very low	very low		Estuarine vegetation score is very low and is predicted to remain very low. The estuary is surrounded by intensive urban and industrial infrastructure limiting the vegetation value into the future.
	very high	very high	very high		Amenity, which is based on the presence of facilities and activities that support passive enjoyment of the estuary, is currently very high and is expected to remain very high in the long-term; target is to maintain at very high.
	very high	very high	very high		Community connection, which is based on the presence of community groups active in the estuary area, is currently very high and expected to remain very high in the long-term if opportunities keep up with population growth; target is to maintain at very high.
	very high	very high	very high		Recreation, which is based on the presence of facilities and activities that support active recreation in the estuary, is currently very high and is expected to remain very high in the long-term if supply keeps up with population growth; target is to maintain at very high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	high		Flow regime relates to the degree of change from 'natural conditions'. The current state is very low and the target is high.
	very high	very high	very high		Tidal exchange is associated the ability of sea water and freshwater to mix in the estuarine environment. The current state is very high and the target is very high.
	very high	very high	very high		Longitudinal extent is assoicated with barriers that interfere with the movement of water. The current state is very high and the target is very high.
	very low	very low	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.

Yarra River Middle Sub-catchment



Description

The middle and lower sections of the Yarra River lie downstream of Warrandyte. The middle section of the Yarra flows through the Warrandyte State Park and Yarra Valley Parklands. Tributaries in this area include Cherry Hill and Chirnside Park drains, and Jumping, Andersons, Harris Gully, Ruffeys and Salt creeks. Tributaries in the lower section include Merri and Gardiners creeks and the Plenty River.

Actions

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

"Identify suitable areas for dog recreation."

"Continue to revegetate the main stem of Yarra River to increase connectivity and improve amenity."

"Manage stormwater runoff from new residential subdivision in Yarra Glen."

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

Yarra River Middle Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Yarra River Lower), which reflects targets for whole catchment.
2	Stormwater Condition	To prevent decline in stormwater condition, treat upstream urban development so directly connected imperviousness (DCI) remains below 0.5% at the downstream reach of this sub-catchment, and at current levels along the main stem of the Yarra River. For every hectare of new impervious area, this requires harvesting around 5.1 ML/y and infiltrating 1.6 ML/y, which is about 3.5 GL/y and 1.2 GL/y for full development out to urban growth boundary. (Note, this is inclusive of similar performance objectives in upstream sub-catchments.)
3	Vegetation Extent	Establish a continuous riparian vegetated buffer (48 km, 191 ha) and maintain existing vegetation (57 km, 227 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	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 8 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
5	Water Quality - Environmental	Improve vegetation and capacity to retain nutrients and sediments in the floodplain from Millgrove to Yehring to protect and enhance biodiversity and protect Port Phillip Bay.
6	Water Quality – Recreational	Protect recreational water quality in the Yarra River to support existing recreational activities.
7	Water Quality – Recreational	Protect water quality for key recreation areas on the Yarra - characterise, communicate and mitigate sources of microbial risk.
8	Access	Increase access to and along waterways by improving connections with existing path network. And increase access to waterways for on-water activities by developing facilities identified in collaborative strategic plans (e.g. canoe launch at Homestead Road Reserve and Westerfolds Park).
9	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation though citizen science and promotion of high value areas (e.g. Warrandyte State Park).

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

Notes:

Yarra River Middle Sub-catchment

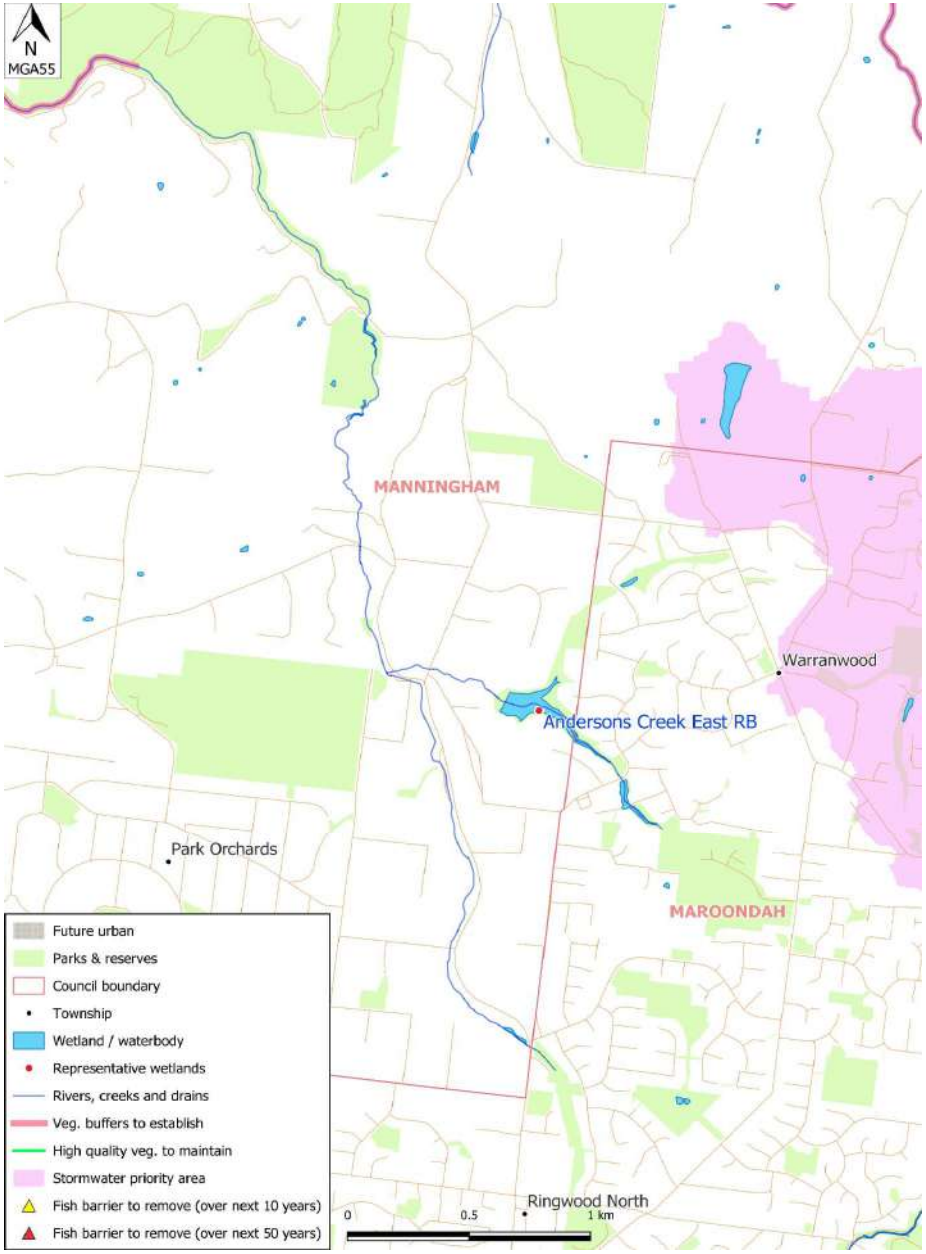
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred but some of these were only infrequently. Despite the effects of climate change adequate investment in targeted management, such as improving riparian vegetation, should ensure score is maintained at moderate. Significant species include the powerful owl and eastern great egret.
mod.	very high	very high		Fish are currently rated as moderate due to a lack of suitable habitat (instream and riparian) and barriers to migration. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to environmental conditions, particularly riparian vegetation, water quality, environmental flows, stormwater management and ensuring Dights Falls fishway is effective, will ensure a score of very high in the long term. Listed species that occur in this sub-catchment include murray cod, Australian grayling and macquarie perch.
mod.	low	mod.		Frogs score is moderate since not as many species of frog were recorded. With appropriate management score should be maintained as moderate. Significant species include brown (Bibron's) toadlet and southern toadlet.
mod.	low	very high		Macroinvertebrates score is moderate due to poor instream and riparian habitat. Future flow impacts from stormwater and climate change will reduce score if not mitigated. Improving riparian vegetation and managing flows (including stormwater) can increase score to very high in long term.
high	high	high		Platypus score is high. Improving flows particularly under climate change will be important to maintain the current population.
mod.	low	mod.		Vegetation is moderate as it fragmented with generally only mid and upper story species present. Stock access, pest plants and animals and climate change will reduce the rating to low unless adequately managed. Protecting the best and enhancing other areas will maintain moderate in the long term. There are 47 known listed water dependent species.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don’t keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

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

Anderson Creek East Retarding Basin



Description

Andersons Creek East Retarding Basin and the Cardigan Road Retarding Basins are designed to hold back stormwater to reduce flood risk to local homes and businesses. They also contain some biodiversity and social values.

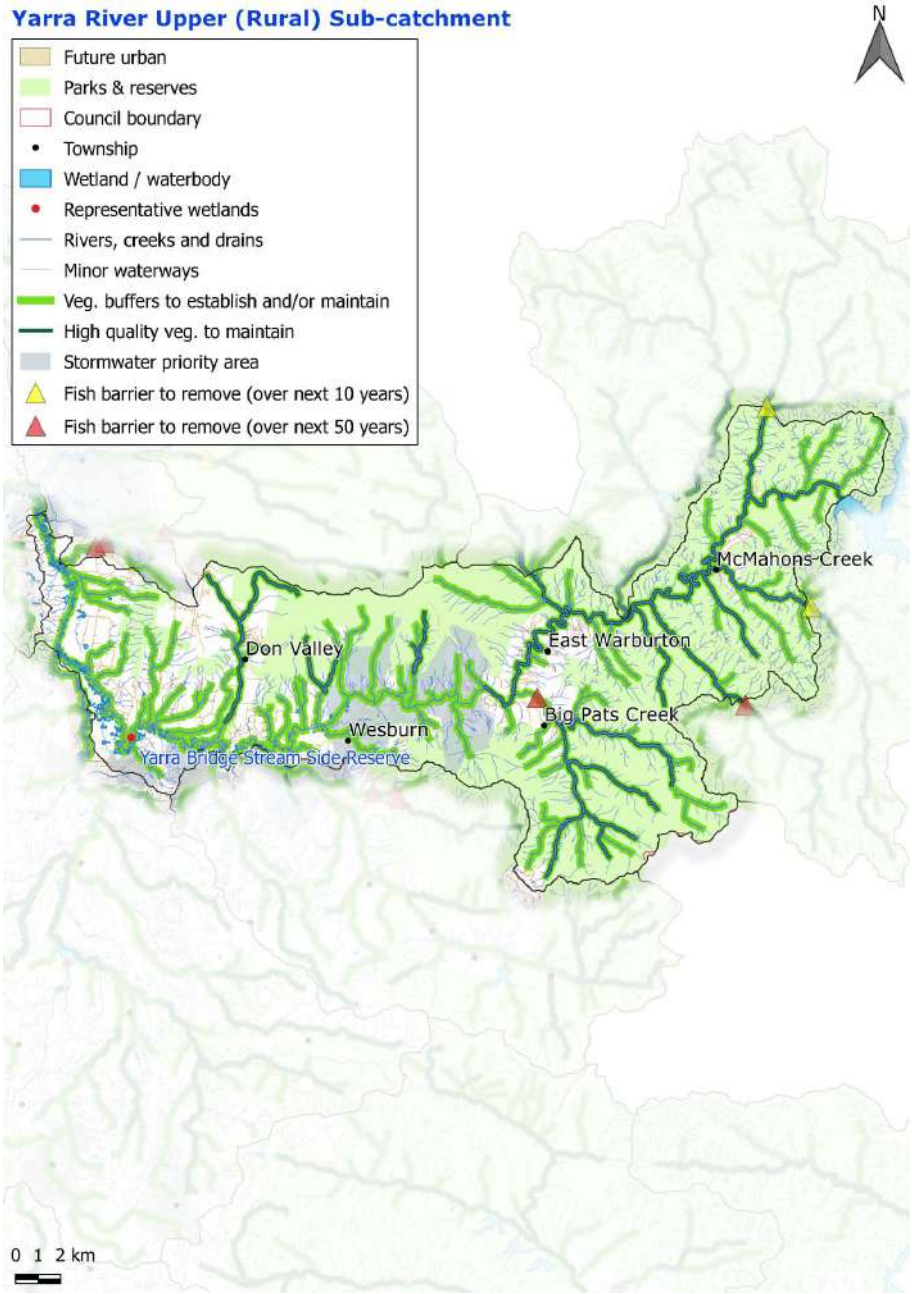
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Wetland habitat form	Ensure that the flood mitigation design intent of wetland flood retarding basin sites is retained, whilst considering site biodiversity values identified in the site management plans.

Anderson Creek East Retarding Basin

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	very low		Wetland bird score is very low for the retarding basins with biodiversity values. Score is expected to remain very low, as the basins are primarily managed for flood protection. However, retarding basins listed by Melbourne Water as Sites of Biodiversity Significance have management regimes in place to protect values.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	mod.	low	mod.		Moderate frog score for Yarra River Middle sub catchment has been applied to the retarding basins with biodiversity values. Some retarding basins in the Yarra catchment will have a higher frog score. With appropriate management score should be maintained at moderate.
	very low	very low	low		Wetland vegetation value is very low. Implementation of actions to protect significant biodiversity values will improve score to 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.

Yarra River Upper (Rural) Sub-catchment



Description

The rural sections of the upper Yarra River extend from the Upper Yarra Reservoir downstream to Yering Gorge. This area also includes the Don River, which rises in the Yarra Ranges National Park and joins the Yarra downstream of Yarra Junction. Between Woori Yallock and Yering Gorge, the floodplain of the Yarra includes numerous billabongs which are culturally and ecologically significant.

Actions

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

"Identify areas where recreation is encouraged and discouraged."

"Increase stormwater harvesting to reduce dependency on Upper Yarra for water supply and allow more environmental flows in the Yarra."

"Move from septic to sewer to improve water quality in Waterways for environment and recreation values (target areas Warburton, Yarra Junction and other towns along Yarra)."

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

Yarra River Upper (Rural) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Identify and implement opportunities to reduce the key threat of summer high flow stress by addressing causal factors such as water for domestic and stock uses, climate change, diversions or urbanisation.
2	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Yarra River Lower), which reflects targets for whole catchment.
3	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
4	Stormwater Condition	To prevent decline in stormwater condition, treat upstream urban development (including Healesville and Warburton), so directly connected imperviousness (DCI) remains at current levels along the main stem of the Yarra River. For every hectare of new impervious area, this requires harvesting around 6.6 ML/y and infiltrating 3.4 ML/y, which is about to 0.6 GL/y and 0.3 GL/y for full development out to urban growth boundary.
5	Vegetation Extent	Establish a continuous riparian vegetated buffer (42 km, 169 ha) and maintain existing vegetation (274 km, 1097 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).
6	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 108 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
7	Water Quality - Environmental	Improve water quality for environmental values and Port Phillip Bay by reducing sediment run-off from rural land, urban growth and unsealed roads as well as nutrient inputs from rural land and septic tanks. This may include establishment of vegetated buffers in headwater streams.
8	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 volumes where possible), whilst ensuring they are released in a manner that ensures environmental values are supported in the waterway.
9	Water Quality – Recreational	Protect water quality for key recreation areas on the Yarra, characterise, communicate and mitigate sources of microbial risk.
10	Participation	Increase participation rates from moderate to very high; support community groups and build capacity of land owners through rural programs. Increase participation though citizen science programs and promotion of high value areas (e.g. Yarra Ranges National Park).

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

Yarra River Upper (Rural) Sub-catchment

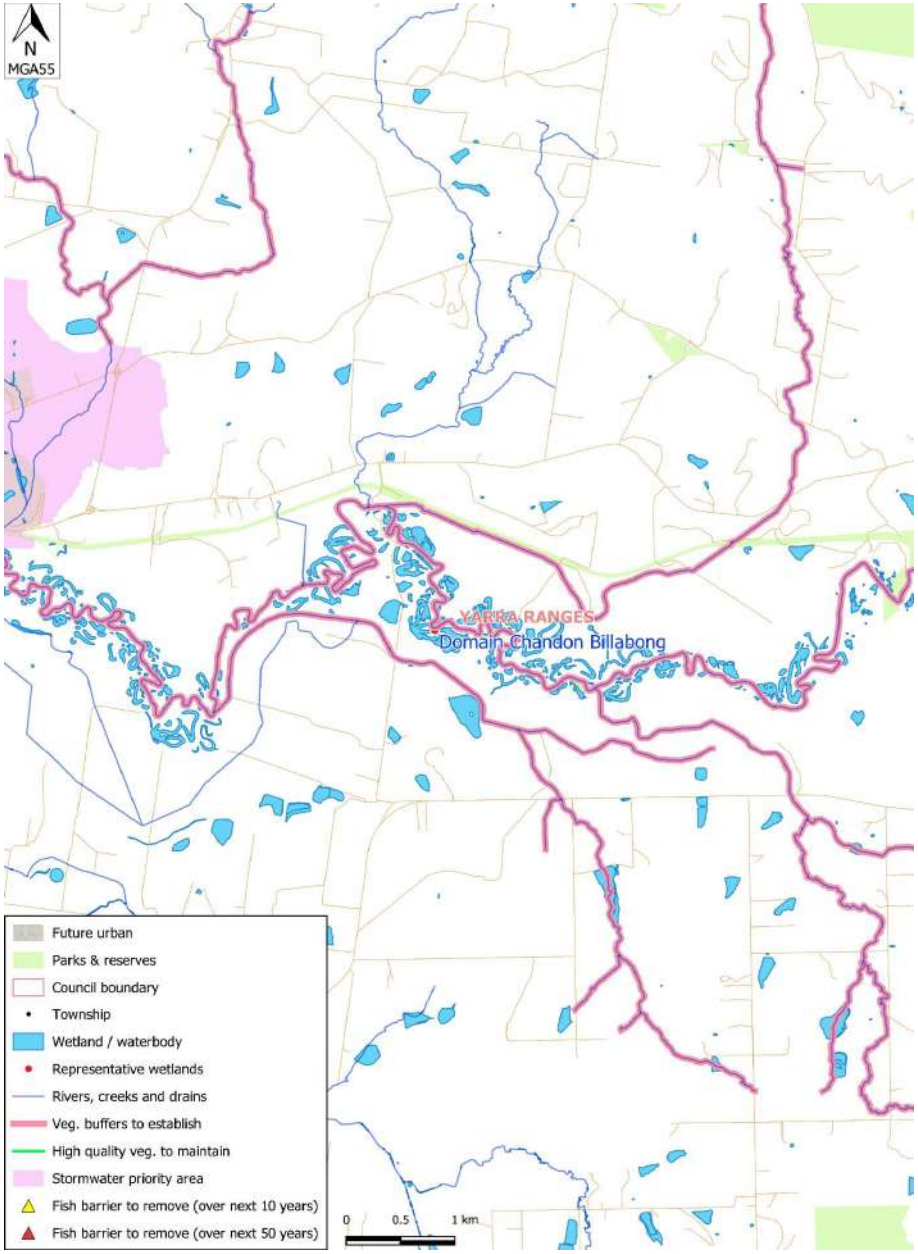
KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
mod.	mod.	mod.		Birds (riparian) is moderate, meaning most of the expected species occurred but some of these infrequently. Despite the effects of climate change adequate investment in targeted management, such as improving riparian vegetation, should ensure score is maintained at moderate. Significant species include the powerful owl and eastern great egret.
mod.	high	high		Fish are currently rated as moderate due to a lack of suitable habitat (instream and riparian) and flow stress. The increased current trajectory score is due to climate change increasing habitat suitability for common and widespread species. Improvements to environmental conditions, particularly riparian vegetation, water quality, environmental flows, stormwater management, and ensuring Dights Falls fishway is effective, will ensure a score of high in the long term. Listed species that occur in this sub-catchment include Australian grayling and macquarie perch.
very low	low	low		Frogs score is very low since very few of the expected species of frog were recorded. With appropriate management score could be improved to low. Significant species include growling grass frog.
very high	very high	very high		Macroinvertebrates score is very high as much of the waterway has good riparian and instream habitat. Maintaining high quality vegetation, improving other reaches and protecting flows will ensure score remains very high in long term.
high	high	high		Platypus score is high based on good instream and riparian habitat. Improving vegetation will enhance their habitat and managing flows will be critical to mitigating the impacts of climate change.
mod.	low	high		Vegetation is moderate with some high quality reaches along the forested tributaries. Stock access, pest plants and animals (particularly deer) and climate change will reduce the rating to low unless threats mitigated. Protecting the best and enhancing other areas will improve score to high in long term. There are 26 known listed water dependent species.
very high	high	very high		Amenity, which is based on level of satisfaction, is currently very high but likely to decline in the long-term; target is to maintain at very high.
high	mod.	high		Community connection, which is based on level of satisfaction, is currently high but likely to decline in the long-term if opportunities don't keep up with population growth; target is to maintain at high.
high	high	very high		Recreation, which is based on level of satisfaction, is currently high and is expected to remain high in the long-term if supply keeps up with population growth; target is to improve to very high.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
high	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	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 moderate and the target is very high.
mod.	low	high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is moderate and the target is high.
high	high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is high and the target is very high.
mod.	mod.	high		Instream Connectivity is measured by the proportion of waterway length within the sub-catchment that is free from barriers to fish movement. The current state is moderate and the target is high.
high	high	high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is high and the target is high.
very low	very low	low		Access to the waterway and riparian corridor supports a range of on water, in water and beside water experiences and is an enabling condition for all three social values. The current state is very low and the target is low.
high	mod.	very high		Litter absence is a strong indicator of stream health – clean waterways are healthy waterways and aesthetically pleasing. Litter detracts from the sense of naturalness and creates a perception that a place is uncared for. It also detracts from the enjoyment of active and passive recreation. The current state is high and the target is very high.
high	high	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.
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.

Domain Chandon Billabongs



Description

The Domain Chandon Billabongs are located on the Yarra floodplain at Coldstream.

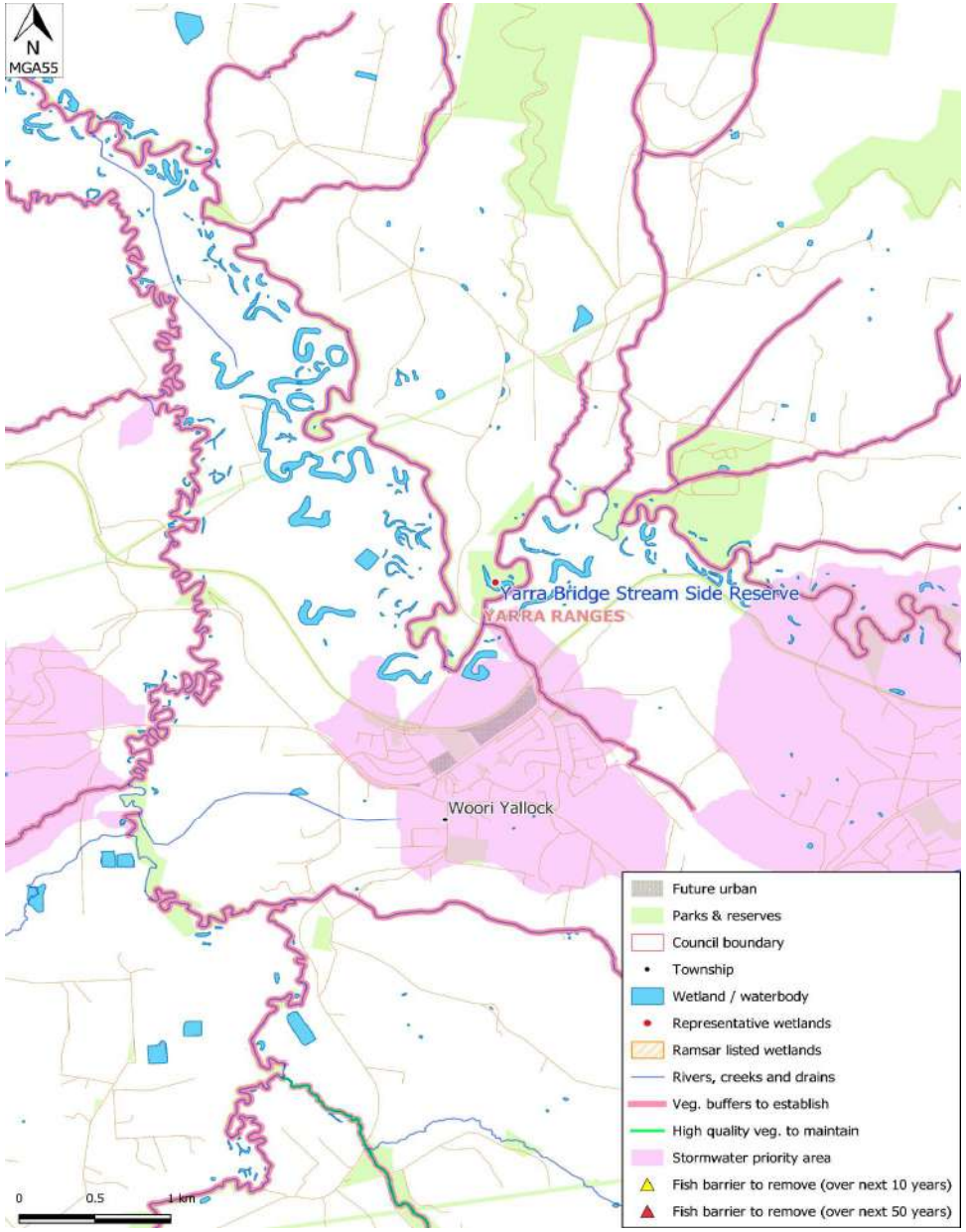
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value. And investigate opportunities to further re-engage the natural wetlands in this area.
2	Wetland habitat form	Identify opportunities to improve the wetland habitat.
3	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
4	Vegetation condition	Reduce weed threat to low.
5	Fish (value)	Maintain threat from carp at low following watering events.
6	Wetland water quality & Wetland buffer condition	Implement urban stormwater improvements upstream to reduce water quality threat to wetland.

Domain Chandon Billabongs

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	low	mod.	mod.	Domain Chandon Billabongs have a wetland bird score of low, with a currently and potential trajectory of improvement to moderate as a result of planned environmental watering. The wetlands are not formally recognised as bird habitat.
	very low	high	high	Fish score is very low with a current and potential trajectory of high. Planned improvements to water regime, along with improvements to wetland habitat form, wetland buffer condition and vegetation condition will support opportunistic use of floodplain billabongs by native fish.
	very low	high	high	Frog score is very low with a current and potential trajectory of high. Planned improvements to the water regime, along with long-term improvements to the wetland habitat form, wetland buffer condition and vegetation condition will improve score.
	mod.	low	high	Domain Chandon Billabongs score is moderate with a current trajectory of decline to low. Reductions in key threats to vegetation are predicted to improve score to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very high	very high	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	mod.	mod.	high	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is moderate and the target is high.
	very low	mod.	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is very low and the target is very high.
	mod.	very high	very high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	mod.	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Yarra Bridge Stream Side Reserve



Description

Yarra Bridge Stream Side Reserve Billabong is located on the Yarra River floodplain at Launching Place.

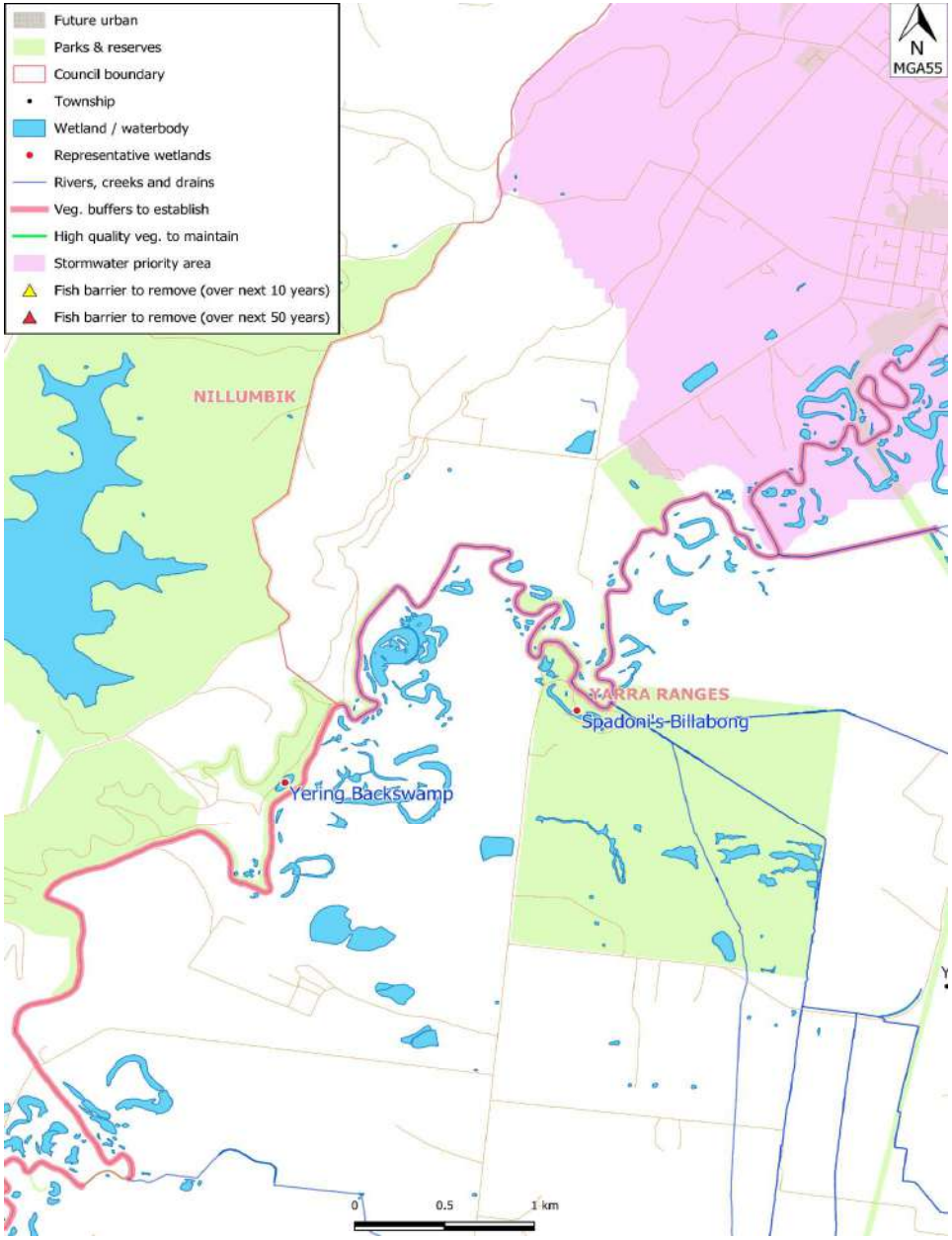
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime implemented to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland water quality	Implement urban stormwater and rural land management improvements upstream to reduce water quality threat to wetland.
3	Fish (value)	Maintain threat from carp at low following watering events.
4	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
5	Vegetation condition	Reduce weed threat to low.

Yarra Bridge Stream Side Reserve

	Current state	Current trajectory	Target trajectory	
KEY VALUES (10-50 YEAR TARGETS)	very low	very low	low	Bird score at Yarra Bridge Streamside Reserve wetland is very low. Improvements to wetland water regime and vegetation condition is likely to improve to low. Yarra Bridge Streamside Reserve is listed in the Directory of Important Wetlands.
	mod.	high	high	Fish score is moderate with a predicted trajectory of high. Improved wetland vegetation condition, water regime and maintenance of water quality is predicted to improve the score.
	low	high	high	Yarra Bridge Stream Side Reserve frog value is predicted to be low from the Yarra River Upper (Rural) sub catchment score. It is predicted to improve to high with reduction of threats of changed water regime, moderate vegetation condition and habitat form.
	low	low	high	Wetland vegetation is low. Improvements to wetland vegetation condition and water regime will improve the score to high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	very low	very low	very high	Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is very low and the target is very high.
	very low	very low	very low	Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is very low.
	low	mod.	very high	Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is very high.
	mod.	very high	very high	Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	mod.	very low	mod.	Wetland water quality considers the changed water properties within the wetland. The current state is moderate and the target is moderate.

Yering Backswamp, Yarra River



Description

Yering Backswamp is a site of biological significance located 5km southwest of Yarra Glen. This 4.8Ha site contains a rare collection of threatened vegetation, including the swamp water-starwort, slender bittercress and Australian basket-grass. It is also a habitat for the threatened peron's tree frog and river blackfish.

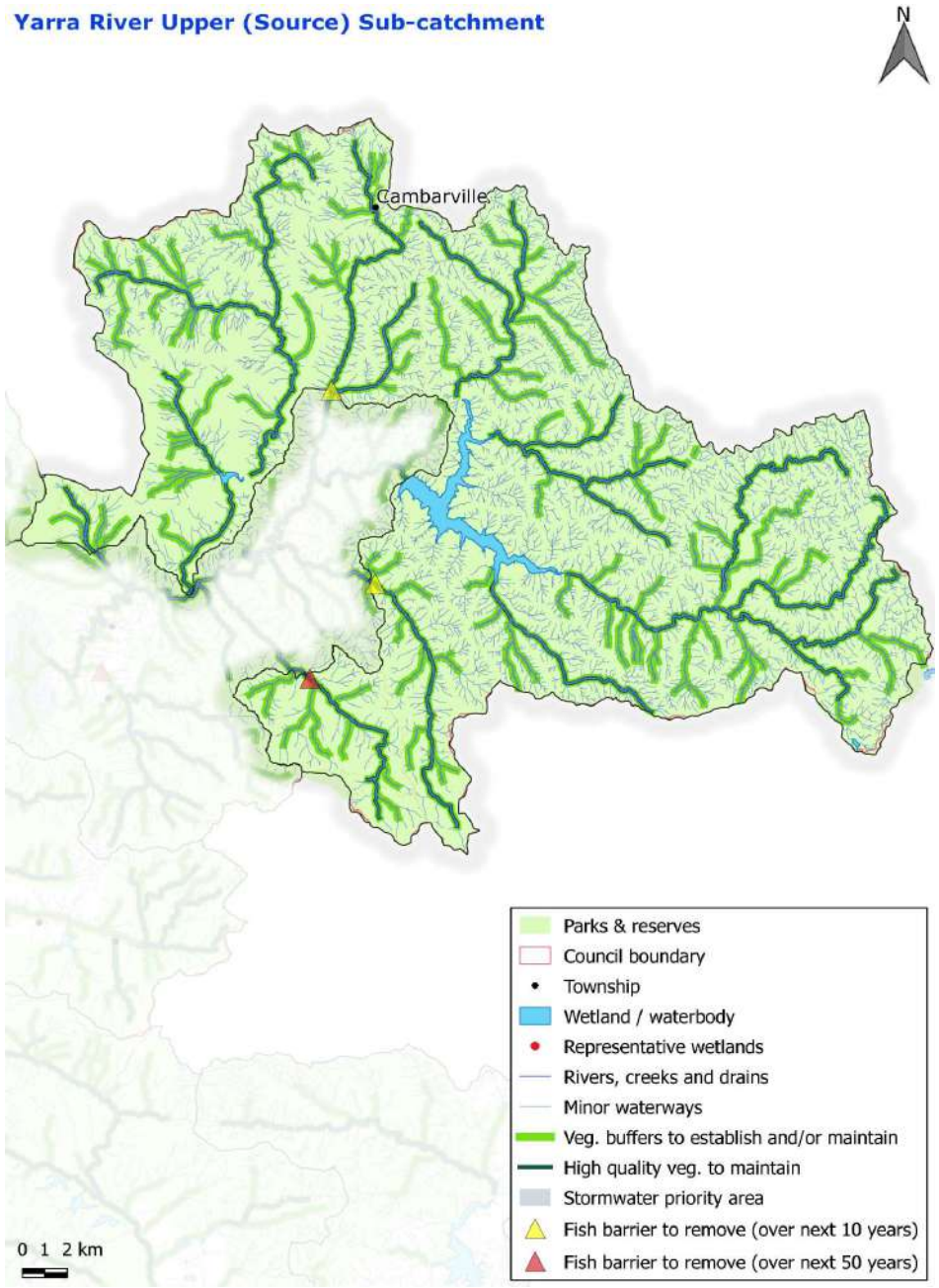
Performance Objectives

ID	Condition Supported	Performance Objectives
1	Water regime	Water regime managed to meet ecological watering objectives, improve ecosystem services, cultural and social value.
2	Wetland buffer condition	Improve wetland buffer to 50 per cent of the wetland perimeter.
3	Vegetation condition	Reduce weed threat to low.

Yering Backswamp, Yarra River

	Current state	Current trajectory	Target trajectory		
KEY VALUES (10-50 YEAR TARGETS)	low	low	low		Yerring Backswamp currently has a low bird score. Improvements to wetland vegetation condition will maintain score at low.
	n/a	n/a	n/a		Very little data exists for wetland fish and a metric for wetland fish in this catchment will be developed through the strategy implementation.
	very high	very high	very high		Frog score is currently very high with significant species present. Maintenance of the wetland water regime is expected to maintain score at very high.
	high	high	high		Wetland vegetation score is high. Improvements to wetland vegetation condition and water regime will maintain score as high.
WATERWAY CONDITIONS (10+ YEAR TARGETS)	mod.	very high	very high		Water regime is associated with changes to the flow regime such as interference with natural connectivity. The current state is moderate and the target is very high.
	very low	very low	mod.		Wetland habitat form considers the extent that the wetland area has been reduced through levee, diversions etc. The current state is very low and the target is moderate.
	low	mod.	very high		Wetland buffer condition is the native vegetation above the maximum inundation extent. The current state is low and the target is very high.
	mod.	very high	very high		Vegetation condition refers to the extent of 'natural' wetland vegetation is intact. The current state is moderate and the target is very high.
	very low	very low	mod.		Wetland water quality considers the changed water properties within the wetland. The current state is very low and the target is moderate.

Yarra River Upper (Source) Sub-catchment



Description

The Yarra River rises in the forested slopes of the Yarra Ranges National Park and Yarra State Forest. The upper sections of the Yarra River and its tributaries flow through forested, mountainous areas that have been reserved for water supply purposes for over 100 years. This sub-catchment is a source of drinking water and access is prohibited.

Actions

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

"Conduct land management sessions for land owners on native and invasive flora and fauna. Session 1 to introduce pragmatic and realistic approaches. Session 2 could introduce art, environmental psychology and community approaches."

"Monitor and manage impacts of deer on catchment and review effectiveness of controls. Take courageous actions for deer control."

"Remove or modify three diversion weirs (1, 2, 3 marked on map) to improve environmental flows down to Big Pat's confluence to support instream fauna values."

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

Yarra River Upper (Source) Performance Objectives		
ID	**Condition Supported**	**Performance Objectives**
1	Water for Environment	Environmental water recovery targets are captured at lowest downstream sub-catchment (Yarra River Lower), which reflects targets for whole catchment.
2	Water for Environment	Identify and implement opportunities to maintain or improve the flow regime in refuge reaches to support platypus populations.
3	Instream Connectivity	Increase instream connectivity to provide fish passage along Armstrong Creek from the confluence with the Yarra River (remove barrier at Armstrong Weir).
4	Instream Connectivity	Increase instream connectivity to provide fish passage along McMahons Creek from the confluence with the Yarra River (remove barrier at McMahons Weir).
5	Vegetation Quality	Maintain or achieve high and very high quality vegetation (Vegetation Quality data level 4 and 5 - currently 206 km) through effective monitoring and management of threats including protection of endangered EVCs in these reaches. Fill data gaps and ensure additional high quality reaches are also protected.
6	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.
7	Water Quality – Recreational	Protect water quality for key recreation areas on the Yarra, characterise, communicate and mitigate sources of microbial risk.
8	Vegetation Extent	Establish a continuous riparian vegetated buffer (1 km, 4 ha) and maintain existing vegetation (425 km, 1699 ha) along priority reaches (using EVC benchmarks to at least a level 3 vegetation quality).

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

Notes:

Yarra River Upper (Source) Sub-catchment

KEY VALUES (10 - 50 YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
n/a	high	high		Insufficient bird observation to establish a birds (riparian) score. Despite the effects of climate change adequate investment in targeted management, such as protecting riparian vegetation, should ensure a riparian bird score of high. Significant species of riparian bird occurring in this sub-catchment include the powerful owl.
low	low	low		Fish are currently rated as low. This is partly expected for headwater streams as they have lower flows, but it is also driven by barriers to fish movement, particularly water supply dams and weirs. Improvements to fish passage, such as along MacMahons and Armstrong Creek, is predicted to increase habitat suitability for species such as river blackfish.
n/a	mod.	high		Frog score cannot be calculated because of a lack of data. Undertaking all targeted management activities should ensure the frog score is high
very high	very high	very high		Macroinvertebrates score is very high as the waterway is a forested protected water supply catchment. The Mount Donna Buang Stonefly has been recorded. Monitoring and maintenance of habitats in particular vegetation is expected to maintain the very high score in long term.
very high	high	very high		Platypus score is very high based on good instream and riparian habitat. Improving vegetation and habitat and managing flows will be critical to mitigating impacts of climate change.
high	mod.	high		Vegetation is high as the waterway is in a protected forested catchment. Threats including pest plants and animals (particularly deer) and climate change are predicted to reduce the rating to moderate if not adequately addressed. There are 18 known listed water dependent species.
n/a	n/a	n/a		As this is a closed catchment for water supply, there has been no assessment or setting of targets for social values.
n/a	n/a	n/a		As this is a closed catchment for water supply, there has been no assessment or setting of targets for social values.
n/a	n/a	n/a		As this is a closed catchment for water supply, there has been no assessment or setting of targets for social values.

WATERWAY CONDITIONS (10+ YEAR TARGETS)

Current state	Current trajectory	Target trajectory		
very high	very high	very high		Stormwater Condition is measured by directly connected imperviousness (DCI), which is the proportion of the impervious surface in the catchment that is directly connected to a stream through a conventional drainage connection. The current state is very high and the target is very high.
very high	high	very high		Physical form is the degree of geomorphic naturalness combined with likelihood of erosion occurring along bed or banks of waterways. The current state is very high and the target is very high.
very high	high	high		Water for environment indicates compliance with flow requirements of freshwater river systems. These are identified through FLOWS method, or (where there is no flow study) Flow Stress Ranking (FSR), which indicates the level of threat to river health based on the level of water extractions by rural, urban and industry users. The current state is very high and the target is high.
very high	high	very high		Vegetation Quality is a description of quality of vegetation relative to Ecological Vegetation Classes (EVCs) and accounting for grassland or sparsely treed woodland communities which do not exhibit 100 per cent canopy cover. The current state is very high and the target is very high.
very high	very high	very high		Vegetation Extent denotes the percentage of reach that has continuous indigenous vegetation cover within 20 metres either side of the stream. The current state is very high and the target is very high.
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 high	high	very high		Water Quality (Environmental) indicates compliance with the State Environment Protection Policy (SEPP) Waters of Victoria environmental water quality objectives (EPA Water Quality Index) using the Yarra and Bay Report Card Scoring Method. The current state is very high and the target is very high.
n/a	n/a	n/a		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. No data exists for this sub-catchment.
n/a	n/a	n/a		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. No data exists for this sub-catchment.
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.
n/a	n/a	n/a		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. No data exists for this sub-catchment.

Metrics

Key values metrics for rivers

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

Key values metrics for rivers continued

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

Key values metrics for rivers continued

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

Waterway condition metrics for rivers

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

Waterway condition metrics for rivers continued

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

Waterway condition metrics for rivers continued

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

Waterway condition metrics for rivers continued

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

Key value metrics for wetlands

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

Key value metrics for wetlands continued

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

Waterway condition metrics for wetlands

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

Waterway condition metrics for wetlands continued

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

Key value metrics for estuaries

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

Key value metrics for estuaries continued

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

Waterway condition metrics for estuaries

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

Waterway condition metrics for estuaries continued

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

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

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

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

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

ISBN 978-1-925541-26-7 (print)
ISBN 978-1-925541-19-9 (online)

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

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

Page 12 Cross Cultural Awareness training day presented by Uncle Bill Nicholson Jnr at Dights Falls - Melbourne Water

Page 12 Watering of Bolin Bolin Wetland with Wurundjeri, October 2017 - James Thomas

Page 13 Canoeing Victoria - Canoeing Victoria