

An aerial photograph of a river system with a winding, highlighted catchment area in a light green color. The surrounding landscape is a mix of green and brown, indicating vegetation and land use. The river is dark blue/black, and the highlighted area follows its course and branches.

Overview of catchment values

Water Resource Risks in the Maribyrnong and
Moorabool Catchments

March 2025

alluvium



Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Melissa Barton. This piece was commissioned by Alluvium and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for Country and the waterways within.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for Southern Rural Water under the contract titled Water Resource Risks in the Maribyrnong and Moorabool Catchments.

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1 Scope

This paper provides a high level summary of the key catchments values that relate to the Maribyrnong and Moorabool Water Resources Risk project area. The overview considers flow dependent environmental values that are stipulated in the Maribyrnong and Moorabool FLOWs reviews. These values are also in line with those that are described in the Healthy Waterways strategy, which also includes a description of cultural, social and economic values. This review aims to classify what water dependent values there are in the upper catchments, and what hydrological regime they are vulnerable to. This will form the basis for a hydrological impact and risk assessment, so values that have been listed are those that may be at risk from changes in the hydrological regime within the sub-catchments.

Healthy Waterways Strategy (Melbourne Water, 2018), waterway values include environmental, cultural, social and economic. Environmental values are described as significant for underpinning all other waterway values, and include birds, fish, frogs, macroinvertebrates, platypus and vegetation. Waterways should also be managed to support other animals such as turtles, skinks, water rats, crayfish, and values should be considered as representative of all species.

Cultural values are based on physical and spiritual connections to land, waters and sky. In the upper Moorabool and Maribyrnong Aboriginal Traditional Owners from Wadawurrung and Wurundjeri language groups hold this connection, which is underpinned by the health of environmental values of land, water, vegetation and wildlife.

Economic values are supported by the quality and condition of waterways, with economic benefits such as urban water supply and storage, industry (recreation, commercial, primary production, tourism), connection to services (sewerage, water treatment, stormwater management) dependent on waterway condition. Declining waterway conditions can lead to direct economic costs where these services are threatened.

Social values include amenity, entertainment and active and recreational connection to waterways and their attributes. The environmental values of waterways provide opportunities for community connection to nature, and for entertainment and activities such as swimming, boating, and fishing. The natural greenspace surrounding waterways also contributes to amenity through urban cooling.

2 Role of values in the project

The identification of values in the catchments form part of the information source that will be used to determine risks in the catchments, with the other being the hydrologic modelling being developed.

The approach to the determination of risks is through a modified version of the standard risk approach used in risk assessments, such as those under the ISO standards on risk assessment (see Figure 1). In the risk assessment matrix in Figure 1, risk is determined through the alignment of the probability of occurrence and the consequence of the event occurring. The risk assessment of this project is through the comparison of flow dependant values, and the potential outcomes from the hydrologic modelling.

In this comparison, the modelling outcomes would form the probability of changes in flow, with the values that are being described in this paper forming the consequence of the change. The consequence would be estimated through what the potential impact changes in flow would have on the values identified.

| RISK PROBABILITY | | CONSEQUENCE OF RISK | | | | |
|------------------|---|---------------------|------|--------|-----|----------|
| | | VERY HIGH | HIGH | MEDIUM | LOW | VERY LOW |
| | | A | B | C | D | E |
| VERY LOW | 1 | 1A | 1B | 1C | 1D | 1E |
| LOW | 2 | 2A | 2B | 2C | 2D | 2E |
| MEDIUM | 3 | 3A | 3B | 3C | 3D | 3E |
| HIGH | 4 | 4A | 4B | 4C | 4D | 4E |
| VERY HIGH | 5 | 5A | 5B | 5C | 5D | 5E |

Figure 1 Example risk matrix (Silva et al, 2021)

3 Overview of values

3.1 Maribyrnong catchment

Environmental

Flow dependant environmental values in the Maribyrnong River are relatively well known, informed by the current update to the FLOWS study. The river flows are known to support the following values:

- *Biodiversity* - within the whole Maribyrnong catchment, 80 threatened flora species and 80 listed fauna species were identified through a NatureKit search. The 80 listed fauna species include seven fish species, two amphibian species, six reptile species, five invertebrate species, 11 mammal species and 49 bird species.
- *Vegetation* - there are three bioregions, within which there are;
 - Three Endangered Ecological Vegetation Communities (EVCs) and four Vulnerable EVCs in the Central Victorian Uplands bioregion
 - Four Endangered EVCs and one categorised as Vulnerable in the Gippsland Plains bioregion
 - Ten Endangered EVCs and two Vulnerable EVCs in the Victorian Volcanic Plain bioregion.
- *Fish* - There are three fish species that are found in the Maribyrnong system that are listed as vulnerable or endangered under the *Flora and Fauna Guarantee Act 1998* (FFG Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Frogs* - Three frog species recorded in the Maribyrnong catchment are listed as endangered or vulnerable, however in the Healthy Waterways Strategy mid-term review (Melbourne Water, 2024b) it was noted that several Maribyrnong sub-catchments that historically supported listed frogs no longer have positive records for Growling Grass Frogs (Deep Creek Upper and Boyd Creek), and for Brown Toadlets (Taylors Creek, Maribyrnong River, Emu Creek, Deep Creek Lower, Deep Creek Upper, Jacksons Creek, Boyd Creek).
- *Platypus* - Platypus populations are now largely restricted in lower and middle reaches of Jacksons Creek, lower Deep Creek and the upper Maribyrnong River.
- *Invertebrates and aquatic macroinvertebrates* - A survey of macroinvertebrate species in the Maribyrnong system identified 70 families across 17 sites.
- *Birds* - Of the 49 bird species listed on NatureKit, a number of them are classified as vulnerable to critically endangered under the FFG Act and the EPBC Act.

Economic

The flow dependant economic values of the Maribyrnong River are through the availability of water for extraction and use, and the economic benefits that come with supporting a tourism industry. The achievement of water dependant economic values for extraction and use is through the availability of water for use in line with the rules and regulations linked to each of the access requirements. The Moorabool River system is also an

important supply of public water, supplying water to the local areas, as well as supplying parts of Geelong and the towns to the north of the Geelong City Centre.

The economic benefits are also expected to be supported through the availability of a healthy riparian environment, and a sustained economy that can provide a community and resources for the tourism industry. As a result, tourism benefits will be assessed through the achievement of environmental and extraction-based flow metrics.

Social

Social values in the Maribyrnong River system are linked to values across the environmental, economic and cultural values. Access to a healthy, flowing river is vital for local communities. Uses will range from on river social activities, as well as general enjoyment of the surrounding riparian area. It is known to support a range of public use activities including walking, camping and fishing that depend on maintained river flows and a healthy riparian environment. Sustaining strong communities is also dependant on maintaining the economic conditions that a flowing river will protect through supporting the irrigation economy and supplying the high levels of demand for rural lifestyle living.

A review conducted in 2024 for Melbourne Water by Mosaic Insights investigated the relationship between the flow dependant values of a catchment and the human wellbeing outcomes they support. The findings included (Mosaic Insights, 2024):

For vegetation

- Trees are the most important factors of aesthetic quality
- People prefer complexity, diversity, and naturalness
- Clear sightlines of waterways are important for perceived safety but also visually appealing
- High coverage of vegetation can improve the perceptions of amenity and benefit the landscape's restorative effect compared to purely visual landscape
- Tree canopy height has varying levels of importance

Biodiversity

- Sounds of wind, leaves, bird and insect are beneficial for wellbeing
- Human wildlife interactions are important drivers of sense of place, connection to areas
- Some interactions can be negative (certain vegetation, perceptions of snakes)
- More biodiversity may not be universally preferred in urbanized areas, but more biodiversity is generally preferred, enhances wellbeing and health

Water quality/regime

- Devaluation of dry rivers or stagnant water due to aesthetic, recreational and biological reasons
- Cleanliness is tied to positive perception and strong mental restoration potential.
- Water motion /water acoustics is important depending on preferences and context

Based on the information described, the social values will be viewed through the quantitative approach of the environmental and economic values, and a qualitative impact assessment on the social values described in the Mosaic Insights reporting.

Cultural

The upper Maribyrnong catchment lies on the traditional lands of the Wurundjeri Woi Wurrung people. The Maribyrnong (Mirrangbamurn) River is culturally significant to Traditional Owners. The entire watercourse (mainstem and named tributaries) is recognised as a site of cultural heritage sensitivity (ACHRIS, 2024), as are the thousands of individual cultural heritage sites, including scar trees and artefacts, that demonstrate occupation of the river and its floodplains by hundreds of generations of Aboriginal people.

The Wurundjeri Woi Wurrung Nation Statement on Water articulates the principle that healthy water means healthy Country and healthy people, and the desire to see healthy and cleaner Country, through well managed and adequately protected hydrological systems. For the Wurundjeri, the natural world is the cultural world, with

the natural landscapes holding cultural importances that are essential to the identity and well being of the Wurundjeri people.

The risks to cultural values in the Maribyrnong will be in the form of a qualitative assessment of the impact of changes in flows on the values identified and the objectives of the Wurundjeri Woi Wurrung people. The Maribyrnong River continues to areas of the Bunurong people, however this is outside of the study area of this project.

3.2 Moorabool Catchment

Environmental

The Environmental values of the Moorabool catchment are also reasonably well documented, and informed by the FLOWS study completed in 2015. The environmental values expected within the system include:

- *Fish* - The Moorabool River system supports a number of native freshwater fish species, including Shortfinned Eel, River Blackfish, Common Galaxias, Mountain Galaxias, Spotted Galaxias, Southern Pygmy Perch, Yarra Pygmy Perch, Short Headed Lamprey, Flat-headed Gudgeon, Australian Grayling, Australian Smelt and Tupong.
- *Macroinvertebrates* - Macroinvertebrates have been recorded in the Moorabool and are a general indicator for determining stream condition, due to their sensitivity to changes in catchment use, water quality and habitat availability.
- *Platypus and water rats* - Platypus were recorded in the Moorabool River catchment in 2004 and 2006 in the lower reaches, and anecdotal evidence from nearby landholders suggests relatively regular sightings of platypus from 1950s to 2006. Water rats have been recorded throughout the catchment, and it is estimated that the Moorabool River supported a reasonably sizeable population in the mid-2000s, particularly in the lower reaches (between Sharps Road, She Oaks and the confluence of the Barwon River).
- *Vegetation* – The Moorabool River supports various landscapes and bioregions, including volcanic uplands and plains, within which there is diversity in the vegetation profile in different zones. Remnant native vegetation falls under Stream Bank Shrubland, Riparian Woodland and Grassy Woodland EVCs. This includes instream, channel bank and floodplain vegetation, which have different supporting flow requirements depending on position relative to water level and inundation requirements.
- *Habitat processes and floodplains* – habitat values within the Moorabool River system are formed and maintained by physical geomorphic processes that form and shape the channel and floodplains. In the upper parts, the west and east branch are variable, alternating between sections that are narrow gorges and more open with broader floodplains. Downstream of the confluence of the west and east branch, the river valley opens more and there is greater development of alluvial benches and floodplain.
- *Water quality* – Water quality values include pH, turbidity, salinity and volume of dissolved nutrients that are important for the maintenance of stream health for dependent species, human health and to avoid the proliferation of algae.

Economic

As with the Maribyrnong River, the flow dependant economic values of the Moorabool River are through the availability of water for extraction and use, and the economic benefits that come with supporting a tourism industry. The achievement of water dependant economic values for extraction and use is through the availability of water for use in line with the rules and regulations linked to each of the access requirements.

The Moorabool catchment has important agricultural value, with 65% of the catchment listed as agricultural land cover (CCMA, 2024), with additional areas in the catchment supporting grazing activity (VFA, 2025) resulting in 75% of the catchment being used for agriculture (SKM, 2003).

The economic benefits are also expected to be supported through the availability of a healthy riparian environment, and a sustained economy that can provide a community and resources for the tourism industry. As a result, tourism benefits will be assessed through the achievement of environmental and extraction-based flow metrics.

Social

As was described in the section on the Maribyrnong Catchment, social values are generally associated with the elements that support the local economies, and by providing amenity outcomes for the communities. The catchment is known to support a range of community benefits including (CCMA, 2024):

- camping
- fishing
- kayaking
- swimming
- rowing
- birdwatching
- bushwalking
- camping
- picnicking

As with the Maribyrnong catchment, the social values will be viewed through the quantitative approach of the environmental and economic values, and a qualitative impact assessment on the social values described in the Mosaic Insights reporting.

Cultural

It is recognised that the Moorabool River catchment is on the traditional lands of the Wadawurrung people. The Wadawurrung people hold a deep connection to the lands and waters of the Moorabool, caring for Country, land, sky, and waters, and continual cultural practices are core to the identity of the Wadawurrung people as the Traditional Owners of Wadawurrung Country (WTOAC 2019). The catchment includes Lal Lal Falls, believed to be the earthly home of Bunjil, the Creator to most Victorian Aboriginal tribes.

The cultural values for Traditional Owners identified in the Moorabool System have been drawn from the existing goals identified by the Wadawurrung Traditional Owners Aboriginal Corporation, as detailed below.

Paleert Tjaara Dja (Wadawurrung Country Plan) goals:

- By 2030, the water in the waterways of the Barree Warree Yulluk is clean enough to drink.
- By 2025, the waterways of the Barree Warree Yulluk will have sufficient cultural flows and connectivity to support culturally important species.

Objectives from the Wadawurrung Nation Statement on Water:

- Wadawurrung [Yulluks] and waterway ecosystems flowing freely and are healthy.

The risks to cultural values in the Moorabool Catchment will be in the form of a qualitative assessment of the impact of changes in flows on the values identified and the objectives of the Wadawurrung people.

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