

## W4 Monitoring Water Quality: Review and refining our long-term water quality monitoring network to support waterway management under a changing climate.

### Objective(s)

This project will review the suitability of the water quality network to meet Melbourne Water's current and expected future needs, and optimise future data collection through site selection and integration of a range of sampling methods and measurement frequency.

### Why this research is important

The waterways long-term ambient water quality monitoring network (the network) has been operating since the 1970s to detect long-term trends across the Greater Melbourne region. The network currently monitors physicochemical parameters at 134 sites and draws on a long historical dataset.

Since establishment, the design and uses of the network have changed in many ways, as have many contextual factors (such as urbanization growth, agricultural practices and climate). Reviews of the network have confirmed the value of network for management of the waterways in the region, but also identified opportunities to significantly increase the benefits to Melbourne Water and stakeholders. These recommendations include undertaking a review of the network's ability to deliver on key goals and develop proposed improvements to redesign the network, which is the purpose of this research project.

#### *Contribution to Melbourne Water research priorities*

- A3P\_MWRPP\_4 (H4) Understanding the threat of climate change to water quality in waterways to inform mitigation opportunities.

### Approach

This research will be delivered through a PhD project (Vaughn Grey). It will require a review of international best practices, detailed interrogation of the existing datasets, the collection and analysis of additional waterways WQ samples and/or further modelling where required. Within the overarching intent to design an efficient and effective monitoring program, the network review will describe the advantages and disadvantages of any options that may emerge to alter the cost of delivering the program in the future. More specifically, the project will:

- Interrogate a range of existing datasets (e.g. Model outputs from the Port Phillip and Western Port Source Catchments model).

- Undertake additional sampling as required to support the interrogation and analysis of the existing datasets (e.g. additional high intensity grab sampling).
- Analysis using mathematical techniques and modelling.

### Key Outputs

- Assessment of how water temperature has changed across the region over the past 30 years (period 1992 -2021),
- Methods to accurately detect trends and site means of stream water temperature using the Melbourne Water long-term WQ monitoring network
- A method to identify reaches or waterways of expected homogenous WQ, and generalization of expected ambient WQ from monitoring sites.
- A method to optimize the sampling network to meet multiple needs, including spatial coverage.

### Expected benefits

- Identification of management actions to address historical and anticipated future warming of stream temperatures
- Robust methods for interpretation of the data collected from the long-term WQ monitoring network, allowing certainty in interpretation and provision of reliable "WQ products" to key stakeholders
- Development of a method that allow for prediction of "expected WQ" at sites where sampling does not occur.
- Identification of reaches where alteration to the existing monitoring program is required to extend coverage to, and thus support the optimization of the network.
- Development of a robust method to create a strategy for optimization of the sampling regime of the long-term monitoring network.

### Project teams

University Of Melbourne: Vaughn Grey, Tim Fletcher, Kate Smith-Miles, Darren Bos. Melbourne Water: Vaughn Grey, Belinda Hatt, Rhys Coleman, David Flower, Anna Lucas, Trish Grant, Sophie Bourgues, Alison Kemp, Slobadanka Stojkovic.