Frankston City Council Integrated Water Action Plan

2016 – 2026

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Development of this document was assisted by a grant from Melbourne Water, as part of the Living Rivers program.

Seaford » Frankston » Langwarrin » Karingal » Skye » Frankston South » Frankston North » Carrum Downs » Langwarrin South » Sandhurst

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1 EXECUTIVE SUMMARY

Frankston City Council's *Integrated Water Action Plan* (IWAP) is a ten year plan to facilitate a strategic and practical approach to integrated and sustainable water management. The IWAP will deliver economic, environmental and social benefits to Frankston City and the wider region.

The IWAP builds on work previously undertaken by Council during the development and implementation of its *Stormwater Management Plan* (2001), *Sustainable Water Use Plan* (2006), as well as the completion of Frankston City's *Integrated Water and Pollutant Balance Study* (2014). During this time, Council has made significant headway in reducing its mains water use and undertaking initiatives to reduce stormwater pollution to the City's waterways and Port Phillip Bay.

The IWAP sets Council's vision for integrated water management, including targets and actions that reflect local conditions and opportunities. It identifies how water is currently managed within the Frankston municipality and the challenges that need to be addressed to transition to a water sensitive city. In particular, the IWAP focuses on actions that Council can achieve and has control of to improve integrated water management outcomes for the municipality.

Water is integral to all life. We use water in our homes and businesses. Away from home we swim and recreate in our local beaches and waterways. We appreciate good quality water and value our dependence on it, as well as the recreational and amenity values it provides through our landscape and environment. Clean water is also important for our biodiversity and keeping natural environments healthy. However, climate change, increasing population and urbanisation have all impacted on the water environment. This pressure has led to higher expectations from government agencies and the wider community regarding how cities manage their water environment.

Integrated water management looks at the urban water cycle in a holistic way, bringing together all parts of the water cycle - water supply, sewage management, water treatment and stormwater management. This new approach enables more efficient use of resources and achieving greater economic, environmental and social benefits.

The **potential benefits** of making the transition to a water sensitive city include:

- reduced demand for mains drinking water, leading to improvements to water security
- cleaner and less polluted waterways and bays
- flood mitigation and a reduction in nuisance flooding
- protection and enhancements to biodiversity, and a
- city that is more liveable with improvements to local amenity.

The IWAP outlines projects and activities that Council can undertake to achieve these multiple integrated water management outcomes, with a prioritised 10 year investment plan to ensure best value and to maximise the economic, environmental and social benefits to the Frankston City community and beyond. The IWAP includes:

- 12 stormwater infrastructure projects to reduce Council's mains water use, stormwater run-off and associated pollutants entering local waterways

- Two projects to use recycled water to reduce Council's mains water use and increase water security for Council's assets and services
- Six actions for advocating to Melbourne Water to invest in stormwater infrastructure projects to reduce stormwater run-off and pollutants entering local waterways
- 37 actions for improving Council's processes to enable efficient and effective integrated water management
- 10 actions for improving the capacity of Council staff and community members to deliver effective integrated water management.

Implementing all of the recommended actions is estimated to cost $10.6M and result in 283 megalitres per year of alternative water use, as well as significant reductions in the load of pollutants being discharged into the City's waterways and Port Phillip Bay. However, additional cost savings are also possible by:

- scheduling new stormwater infrastructure projects to integrate with Council's existing capital works program, for example, by coinciding projects during oval renewal and refurbishment works
- seeking external funding opportunities wherever possible, for example, through Melbourne Water's *Living Rivers* program.

Over the life of the proposed stormwater infrastructure projects (25 year lifecycle), the estimated value of avoided water costs to Council is $18M. The financial value of these projects therefore exceeds the cost to Council of implementing all actions in the 10 year Implementation Plan.

Valuing water means valuing our future.

2 INTRODUCTION

Water is integral to the liveability and long term sustainability of our communities. Frankston City Council (herein referred to as Council), recognises that activities occurring within the municipality impact both the health of communities and environmental systems not only in our backyard, but beyond our municipal boundaries, including the nearby Western Port and Port Phillip Bays.

This Integrated Water Action Plan (IWAP) will facilitate a strategic and practical approach to integrated and sustainable water management to deliver economic, environmental and social benefits to Frankston City and the wider region. The Plan will also assist Council in better managing its approach to integrated water management.

Council has previously demonstrated its commitment to water management through the development and implementation of its *Stormwater Management Plan* (2001), *Sustainable Water Use Plan* (2006) and completion of the Frankston City *Integrated Water and Pollutant Balance Study* (2014). These existing documents provide a strong foundation for the IWAP.

The IWAP sets Council's vision for integrated water management, including targets and prioritised actions that reflect local conditions, challenges and opportunities, over the next 10 years.

Overview of the Frankston municipality

Frankston City is situated on the eastern shores of Port Phillip Bay approximately 40 kilometers south of Melbourne (refer Figure 1). The municipality is approximately 130 square kilometers (km) and includes around 10 km of coastal foreshore. Frankston City comprises of the suburbs of Frankston, Frankston South, Frankston North, Seaford, Carrum Downs, Langwarrin, Langwarrin South, Karingal, Sandhurst and Skye.

The majority (85%) of the municipality drains to Port Phillip Bay with the remainder draining towards Watsons Inlet within Western Port. Stormwater runoff from the municipality discharges to three major receiving environments:

- Port Phillip Bay, via Sweetwater Creek, Kananook Creek and Boggy Creek
- Western Port, via Watsons Creek and various minor tributaries contained in the City of Casey and Mornington Peninsula Shire
- Patterson River Catchment in Greater Dandenong, via the Eastern Contour Drain.

The majority of stormwater flowing through Frankston City is generated within the municipality, with negligible inflows from areas outside the municipality.

Frankston City includes sites with significant ecological habitat, as well as recreational and aesthetic amenity. Some of these areas include the Frankston and Seaford foreshores, Kananook Creek, Ramsar Convention[1] listed Seaford Wetlands (part of Edithvale-Seaford Wetlands), Sweetwater

[1] The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

Creek, as well as the Frankston Nature Conservation Reserve (formerly the Frankston Reservoir), Pines Flora and Fauna Reserve and the Langwarrin Flora and Fauna Reserve.

The Frankston municipality includes part of the Eastern Treatment Plant (ETP) which treats about 40% of Melbourne's sewage. The pipe conveying treated water to the Boags Rock outfall on the Mornington Peninsula passes through Frankston City.

Figure 1 Location of the Frankston municipality

Catchments

The Frankston municipality is broken up into eight catchments based on topography of the landscape and drain alignments. The catchments are shown in Figure 2 and are listed below:

- Balcombe Creek
- Boggy Creek
- Eastern Contour Drain
- Eel Race Drain
- Kackeraboite Creek
- Kananook Creek
- Sweetwater Creek
- Watson Inlet

Figure 2 Catchment boundaries[2]

Population

The municipal population in 2011 was around 126,000 (from 2011 Census) and is forecast to grow by 22% by 2031. The larger population will generate a higher water demand and a greater wastewater discharge volume within Frankston City.

[2] Source: Frankston City's Integrated Water and Pollutant Balance Study, Frankston City Council, 2014.

It is anticipated that the majority of new residents in Frankston City will be accommodated via increased density of residential dwellings, rather than an expansion of the residential development area. This increased density will contribute to an increase in the proportion of impervious surfaces, resulting in both an increase in the volume of stormwater runoff, as well as associated pollutants potentially entering the City's waterways and bay.

2.1 WHAT IS INTEGRATED WATER MANAGEMENT?

Integrated water management looks at the urban water cycle in a holistic way, bringing together all parts of the water cycle - water supply, sewage management, water treatment and stormwater management. This new approach enables more efficient use of resources and achieving greater economic, environmental and social benefits. Integrated water management aims to provide best value to the community without compromising the health of aquatic ecosystems (refer Figure 3 Integrated water management schematic).

The term "water sensitive city" has recently been adopted to describe the ultimate goal of integrated water management. The Cooperative Research Centre for Water Sensitive Cities[3] describes such a city as one that is liveable, resilient, sustainable and productive.

[3] Source: Cooperative Research Centre for Water Sensitive Cities, watersensitivecities.org.au

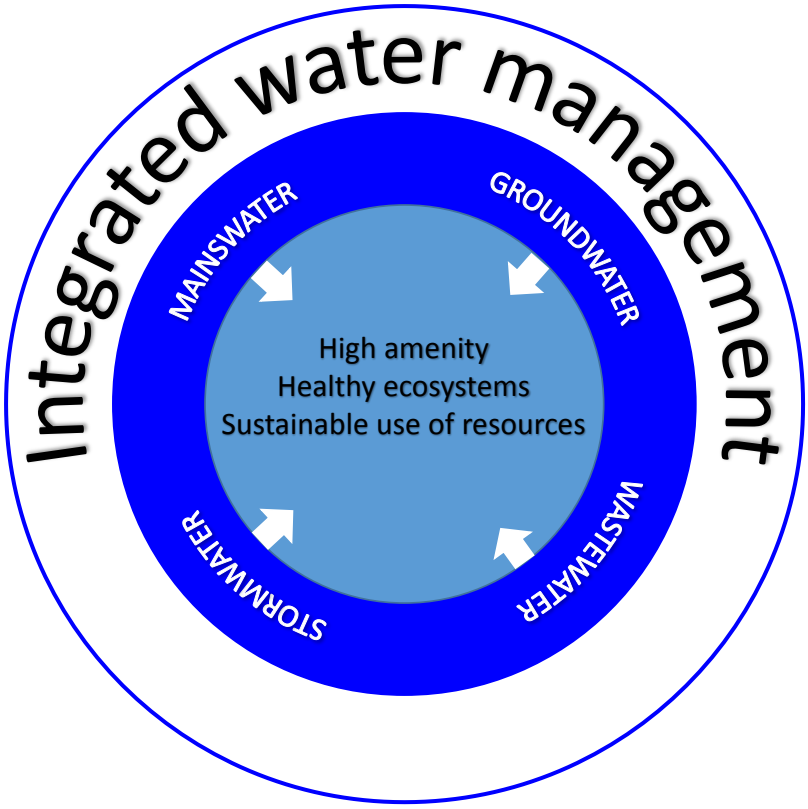

Figure 3 Integrated water management schematic

2.2 THE ROLE OF COUNCIL AND OTHER STAKEHOLDERS IN INTEGRATED WATER MANAGEMENT

Council collaborates with other agencies, developers, businesses, community groups and individuals to manage parts of the Frankston municipality's urban water cycle. Council is directly responsible for:

- Managing local roads, streets, footpaths and public open space including extensive irrigated areas
- Stormwater management
  - Development approval
  - Maintaining local stormwater drainage network
  - Contributing to waterway protection in liaison with Melbourne Water
  - Managing flooding risks
- On-site wastewater regulation and management
- Implementing local alternative water use schemes for Council assets, such as rainwater tanks, recycled water and stormwater harvesting systems

- Strategic planning and implementation of relevant planning and building controls, for example, through land use planning and the development of Council plans, local laws and regulations.

The role of other key stakeholders, with respect to integrated water management, is shown in Table 1.

Table 1 Other stakeholders and key roles - integrated water management

Stakeholder	Key role(s) relevant to integrated water management
Residents, industry and community groups	- Careful use of mains (drinking quality) water through efficiency and using alternative sources where available and appropriate - Manage private land so that minimal pollutant loads enter the stormwater system - Development of private land that can influence water cycle planning on Council and public lands
Melbourne Water	- Bulk water supply (to South East Water and other retailers) including managing water supply catchments - Wastewater treatment including trunk sewer network and treatment plants - Manage regional drainage network - Responsible for the management of creeks and waterways (e.g. Port Phillip and Westernport region)
South East Water	- Water supply provider to homes and industry (mains and recycled water) - Manage the local sewer network
EPA Victoria	- Waterway protection including: • Monitoring to identify waterway health and pollution events • Investigating pollution events - Regulate the treatment and use of recycled water from an environmental perspective - Enforcement activities under the *Environment Protection Act 1970*
Parks Victoria, VicRoads and VicTrack	- Contribute to water cycle planning on Council and public lands
Department of Environment, Land, Water	- Manage groundwater, catchments and waterways, infrastructure, water saving and re-use projects, flood management, governance

Stakeholder	Key role(s) relevant to integrated water management
and Planning, Victoria	and water legislation
Department of Health, Victoria	- Research, policy development and education relating to the use of alternative water supplies from a health perspective - Review and endorse recycled water schemes from a health perspective
Department of the Environment, Australia	- Designs and implements the Australian Government's policies and programs to protect and preserve water
Port Phillip and Westernport Catchment Management Authority (PPWCMA)	- Has broad responsibilities as the peak natural resource management body in the region and develops and implements the Regional Catchment Strategy for the Port Phillip and Westernport region
Southern Rural Water	- Manages rural water use - Licenses and monitors groundwater extractions

3 WHY HAS THE INTEGRATED WATER ACTION PLAN BEEN DEVELOPED?

Increasing pressure on drinking water supplies, as well as natural water systems, has led to higher expectations from government agencies and the wider community in regards to integrated water management. Climate change, increasing population and urbanisation have all impacted on the water environment.

In response to the growing requirement for effective long term water planning, Council has developed the IWAP to facilitate a strategic and practical approach to integrated and sustainable water management within the municipality over the next ten years, to deliver economic, environmental and social benefits to Frankston City and the wider region. The Plan will also assist Council in better managing its approach to integrated water management and prioritising actions to achieve the best outcomes.

The **potential benefits** of making this transition include improvements to water security, cleaner and less polluted waterways and bays, protection and enhancements to biodiversity and a city that is more liveable with improvements to local amenity.

3.1 OBJECTIVES

The main **objectives** of the IWAP are to:

- reduce Council's reliance on mains water and associated costs
- provide for greater water security by increasing Council's uptake of fit-for-purpose alternative water sources
- reduce the negative impacts of stormwater pollution on the receiving environment and waterways
- assist in flood mitigation and the reduction in nuisance flooding
- make improvements to the local amenity and liveability
- support planned integrated water management investment by Council for best value and to maximise economic, environmental and social benefits.

3.2 SCOPE

The IWAP covers the key areas of influence that Council has with respect to achieving integrated water management outcomes for the municipality. In particular, projects and activities that achieve multiple integrated water outcomes are the focus of the Plan.

The IWAP includes actions that relate to:

- investing in infrastructure to reduce mains water use and increase alternative water sources
- reducing the load of pollutants and stormwater discharged from both Council assets as well as new developments

- improving the capacity of Council staff and processes to enable for efficient and effective integrated water management
- improving the capacity of community members to increase the uptake of integrated water management activities and initiatives.

Outside of scope

During development of the IWAP, consideration was given to the management of major flooding and drainage issues, biodiversity, as well as litter management and their inter-relationship with water management. However, more detailed analysis of these issues, including future management actions and priorities, will be addressed in the development of Council's new Flood Management Plan and Drainage Strategy, Biodiversity Action Plan and Litter Prevention Action Plan.

3.3 BACKGROUND AND STRATEGIC CONTEXT

Council has previously demonstrated its commitment to water management through the development and implementation of a number of strategic documents including:

1. *Stormwater Management Plan* (2001)
2. *Sustainable Water Use Plan* (2006)

These documents provided valuable insight and direction for improving segments of water management within the municipality, yet the majority of actions within these existing plans are now complete.

Unlike Council's previous water plans, the IWAP covers all aspects of integrated water management, for example, stormwater, wastewater, mains water and groundwater. By looking at all parts of the water cycle together, greater benefits can be achieved than if they were viewed in isolation. This leads to actions that can enhance liveability for the local community, whilst facilitating environmental sustainability outcomes for the municipality.

The IWAP builds on a background technical study undertaken by Council in 2014 called the *Integrated Water and Pollutant Balance Study*. The background study quantifies streams of water entering and exiting the municipality. Stormwater flows and pollutant loads were quantified for each of the eight catchments within Frankston City.

An outline of the relevant policy, legislation, strategy and plans in relation to integrated water management are included in Appendix A.

4 WHY IS INTEGRATED WATER MANAGEMENT IMPORTANT?

4.1 WHAT IS A WATER SENSITIVE CITY?

Water management in Frankston City has historically been focused on providing discrete water supply, sewerage and drainage infrastructure, which was typical in the past for urban communities.

A water sensitive city is a concept of an urban area that has a water system based on holistic planning and management of the integrated water cycle, and emphasises adaptive, multi-functional infrastructure and urban design. Implementing this IWAP will help transition Frankston City into a water sensitive city (refer Figure 4).

The Cooperative Research Centre for Water Sensitive Cities[4] (CRCWSC) states that a water sensitive city is resilient, liveable, productive and sustainable. They define the following three principles of water sensitive cities:

- Cities as Water Supply Catchments: meaning access to water through a diversity of sources at a diversity of supply scales
- Cities providing ecosystems services: meaning the built environment functions to supplement and support the function of the natural environment
- Cities Comprising Water Sensitive Communities: meaning meeting social and economic needs while facilitating water sensitive behaviour in the community.

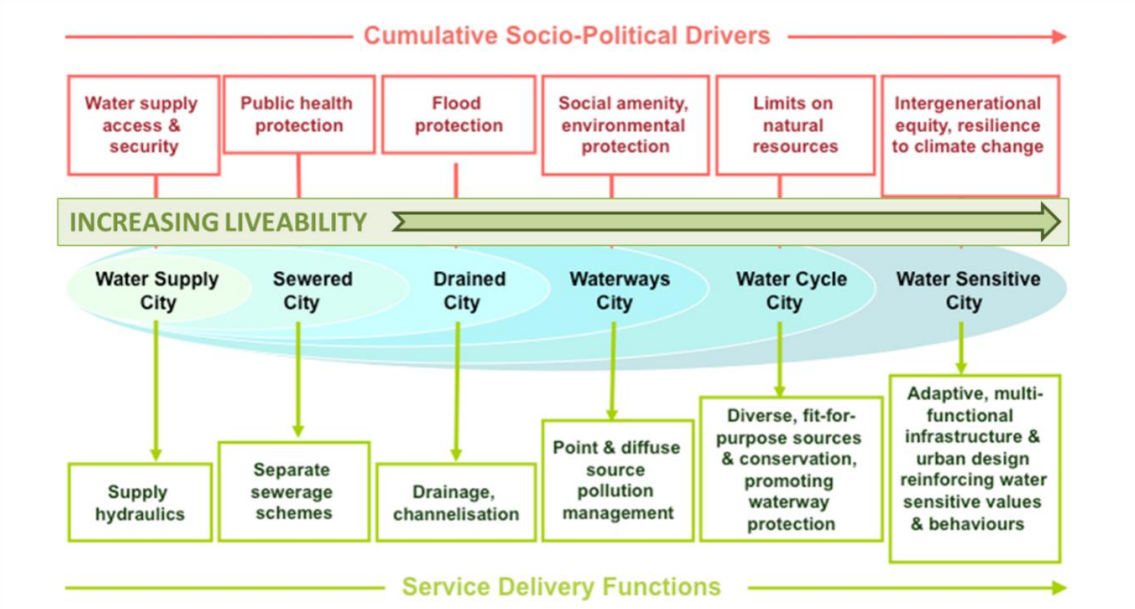

Figure 4 Representation of the transition to a water sensitive city (adapted from Brown et al., 2008)

[4] Source: Cooperative Research Centre for Water Sensitive Cities, watersensitivecities.org.au

4.2 HOW CAN CITIES ACT AS WATER SUPPLY CATCHMENTS?

Urban areas of Frankston City generate excess stormwater that impacts the local waterways and bays (including both Port Phillip Bay and Western Port Bay). These urban areas also generate excess wastewater that impacts the marine environment around the Boags Rock outfall on the Mornington Peninsula. The amount of excess stormwater and wastewater discharged exceeds the total amount of water used within the municipality. Mains water is recommended for uses such as human consumption and food preparation, but treated stormwater and wastewater (e.g. Class A recycled water) are suitable for many water demands including irrigation and toilet flushing.

Frankston City can therefore act as a water supply catchment with excess water that is generated being harvested and used within the local urban area. Using local alternative water sources reduces the demand on Victoria's precious mains water supplies and reduces the impact of urbanisation and associated pollutants on receiving waterways.

Frankston City Council already uses considerable amounts of Class A recycled water (extensively treated wastewater) for irrigation. This IWAP identifies further alternative water use opportunities that make use of Frankston City as a water supply catchment.

4.3 HOW DOES WATER MANAGEMENT IMPACT ECOSYSTEM SERVICES?

Ecosystem services are the benefits provided to humans by natural systems e.g. clean water and climate regulation. Maintaining and restoring natural ecosystems and the services they provide is essential to sustained community wellbeing, economic prosperity and efficiency (Commonwealth of Australia, 2009).

Frankston City relies on mains water that is exported from a remote ecosystem and the community produces concentrated wastewater that is discharged into the marine environment at Boags Rocks on the Mornington Peninsula. A large proportion of the City's drinking water comes from protected or uninhabited mountain ash forests high in the Yarra Ranges east of Melbourne.

Efforts to minimise the amount of water imported and increase the harvesting of water previously considered a waste stream will shift ecosystems closer to the original pattern of natural ecosystems. Improving the quality of water discharged, for example, stormwater runoff and wastewater, will also reduce the impact of stormwater pollutants on local ecosystems.

Frankston City includes sites with significant ecological habitat, as well as recreational and aesthetic amenity. Some of these areas include the Frankston and Seaford foreshore, Kananook Creek, Ramsar Convention[5] listed Seaford Wetlands (part of Edithvale-Seaford Wetlands), Sweetwater Creek, as well as the Frankston Nature Conservation Reserve (formerly the Frankston Reservoir), Pines Flora

[5] The Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Convention was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

and Fauna Reserve and the Langwarrin Flora and Fauna Reserve. Runoff from the municipality is discharged into both Port Phillip Bay and Western Port Bay.

Objectives contained in the *Urban Stormwater Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 1999), are currently adopted as the environmental stormwater standards that must be met for new residential subdivisions and should be aspired to in all new and existing urban areas. The existing standards focus on reducing the mean annual load of pollutants discharged from stormwater runoff from new subdivisions, which is important for fresh and marine receiving environments in Frankston City and beyond.

The Victorian environmental stormwater standards are currently being reviewed by EPA Victoria and the Department of Environment, Land, Water and Planning. There is no fixed timeline for completing the review. The revised standards are likely to consider the impacts of urbanisation on the flow regime (i.e. quantity and timing of flow), in addition to the quality of runoff being discharged.

4.4 HOW DOES WATER MANAGEMENT IMPACT LIVEABILITY?

Designing liveable cities and towns is an emerging focus in many city planning initiatives including the Frankston City *Council Plan 2013-2017.* Liveability is often associated with factors that influence "quality of life" or "wellbeing". The term liveability is frequently used in relation to water management. Water management influences many societal needs including having sustainable water supplies for core functions such as drinking and washing through to supporting vegetation growth in recreation spaces.

During the Millennium Drought (from late 1996 to mid-2010), there was a significant reduction in the amount of water used to irrigate open space within the Frankston municipality. This impacted on both the health and aesthetics of Council's open space assets, as well as the availability of selected sporting reserves – for example, due to water restrictions some sites were no longer irrigated.

Reduced water availability and low vegetation cover also limit evapotranspiration in urban areas. Reduced evapotranspiration and the high thermal mass of impervious surfaces mean that urban areas are often warmer than the surrounding rural areas, especially at night (referred to as the Urban Heat Island Effect). A lack of shade can also lead to higher daytime temperatures in community spaces.

An understanding of the role of vegetation and water in managing the urban climates, and general liveability, has led to a shift in aspirations from minimising water use to minimising mains water use (and using alternative water sources to support vegetation that provides effective shade and evapotranspiration).

Council has begun investing in efficient and diversified water supply options for open space, which will ensure high quality open spaces can be sustained for community health and recreation, even during extended periods of low rainfall.

4.5 HOW DOES CLIMATE CHANGE IMPACT WATER MANAGEMENT?

Research conducted with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), indicates that Frankston City is significantly exposed to climate extremes and natural

hazards such as storm surges and coastal inundation, floods, bushfires and extreme temperatures[6] Council's *Climate Change Impacts and Adaptation Plan* notes that by 2030, the mean annual rainfall volume is likely to decrease by up to 8% and the intensity of extreme rainfall events is likely to increase by up to 1.6%, leading to an increase in flash flooding.

Figure 5 shows a time-series of annual rainfall depths recorded at the Melbourne Regional Office since 1850 (the closest long term rainfall record to Frankston City). It can be seen that the last 20 years have included many consecutive years where the rainfall depth was below the long-term median depth. The dry period from late 1996 to mid-2010 is referred to as the Millennium Drought which lasted for more than a decade. The Drought had considerable effect on private and public assets due to the combined impacts of less local rainfall and statewide mains water restrictions.

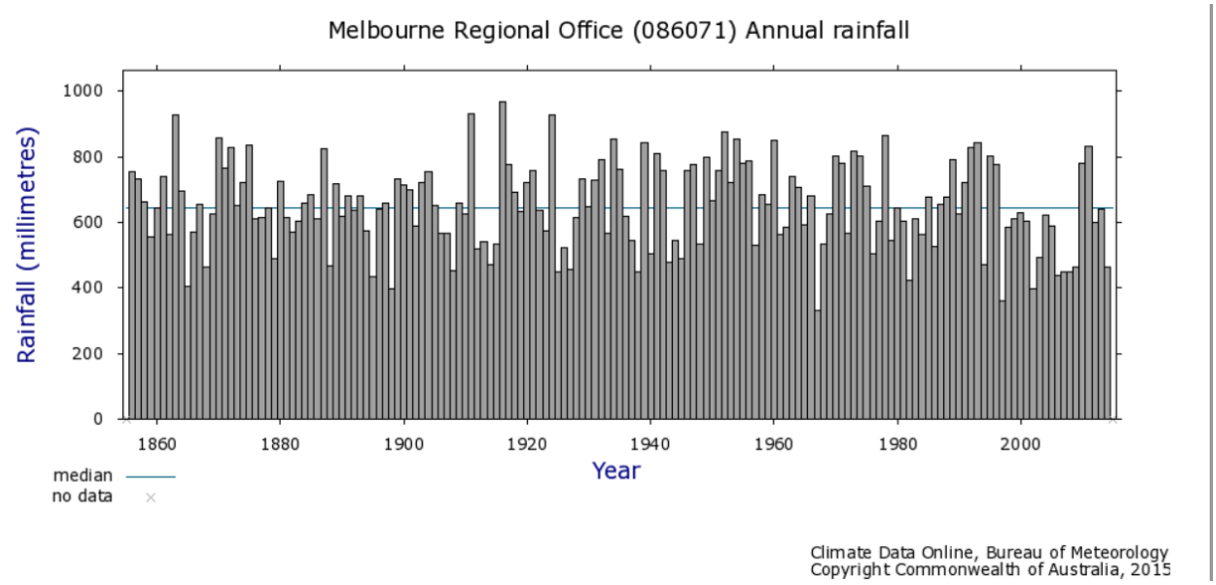

Figure 5 Melbourne Regional Office annual rainfall time-series[7]

Integrated water management involves using a diversity of water sources that are sustainable and fit-for-purpose to ensure a resilient community even during times of drought. Stormwater harvesting schemes can meet a significant proportion of Council's water needs (despite a decrease in the mean annual rainfall) and will help manage runoff volumes and therefore reduce nuisance flooding.

In addition, water bodies and Water Sensitive Urban Design (WSUD) measures that include vegetation, such as swales and raingardens, can assist in mitigating the Urban Heat Island Effect. By retaining water in the landscape, these features can be used to provide local cooling.

[6] Source: Climate Change Impacts and Adaptation Plan, Frankston City Council, 2011, frankston.vic.gov.au

[7] Source: bom.gov.au

5 HOW WATER IS CURRENTLY MANAGED IN FRANKSTON CITY

This section provides a summary of how water is currently managed within the Frankston municipality, and demonstrates how the current water and pollutant balance compares to what it would have been under natural conditions, pre urbanisation.

5.1 WATER AND POLLUTANT BALANCE

An overview of Frankston City's water cycle balance is provided in Figure 6. A detailed description of the method used to develop this balance and a breakdown of inputs and outputs by catchment is provided in Council's *Integrated Water and Pollutant Balance Study*[8].

The estimated current water and pollutant balance is compared to natural conditions in Table 2. Increased population and urban development has led to a greater amount of impervious surfaces, which has changed the way water is imported to, used in and exported from the Frankston municipality.

Under pre-development (natural) conditions, the water balance consisted of rainfall that was discharged as surface runoff, groundwater recharge and evaporation. The majority of surface runoff would have collected in the Carrum Carrum Swamp and eventually made its way to Port Phillip Bay via Kananook Creek.

The key impacts of urbanisation are:

- An increase in the volume of stormwater runoff and increase in the load of pollutants discharged via stormwater runoff. This impacts amenity and aquatic ecosystem health
- Importation of mains water. This impacts on ecosystems in the source catchment
- Net exportation of wastewater. This impacts on the ecosystems where the wastewater is discharged, for example, Bass Strait
- A decrease in evaporation and evapotranspiration due to less vegetation and more hard surfaces. This impacts local temperatures
- A decrease in groundwater supplies due to less infiltration (due to more hard surfaces) and groundwater extractions.

These impacts will continue as the population and development density in Frankston City continue to grow. The IWAP identifies opportunities for reducing these impacts.

[8] Source: Frankston City's Integrated Water and Pollutant Balance Study, Frankston City Council, 2014.

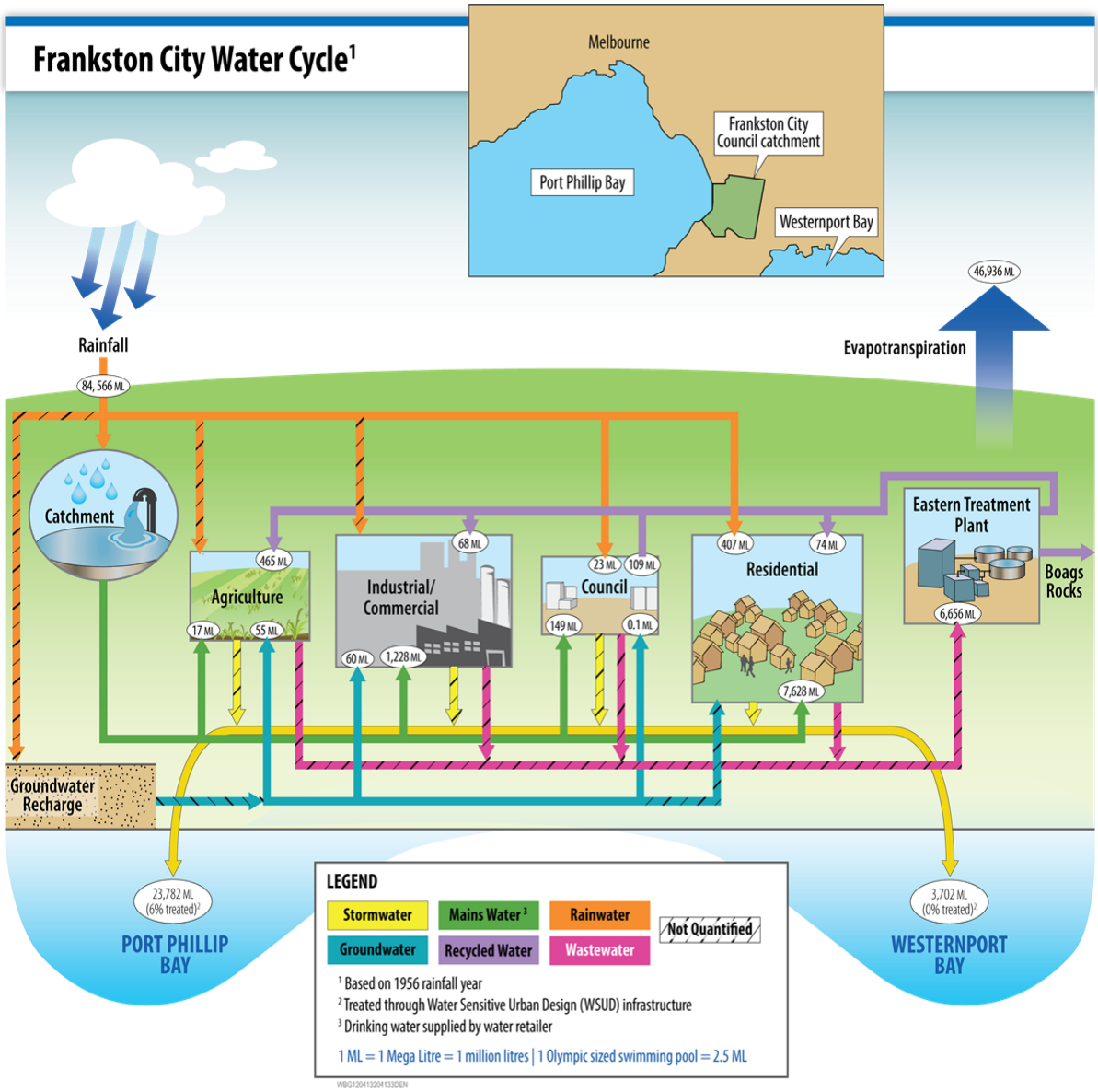

Figure 6 Frankston City Water Cycle Balance Diagram (from Council's Integrated Water and Pollutant Balance Study)

Table 2 Comparison of natural and current water and pollutant balance, Frankston City

Parameters	Natural conditions	Current conditions
Rainfall (Megalitres (ML) ML/yr)	85,000	85,000
Evaporation/evapotranspiration (ML/yr)	60,000	47,000
Stormwater discharged (ML/yr)	460	27,000
Suspended solids discharged (tonnes/yr)	96	3,900
Total phosphorous (tonnes/year)	0.2	8.0
Total nitrogen (tonnes/year)	1.3	64
Groundwater extracted (ML/yr)	-	115
Mains water imported (ML/yr)	-	9,020
Wastewater exported (ML/yr)	-	6,700
Recycled water used (ML/yr)	-	700

NOTE: The remaining rainfall unaccounted for under 'current conditions' in the table above (i.e. 11,000 ML) has not been quantified, but includes rainfall that enters the aquifer through pervious surfaces, as well as rainfall that is harvested for community use.

5.2 STORMWATER

Stormwater from the Frankston municipality discharges into:

a) Port Phillip Bay from Patterson River, Kananook Creek, Sweetwater Creek and Balcombe Estuary

b) Western Port Bay from Watsons Creek and minor tributaries (flowing through City of Casey or Mornington Peninsula Shire).

Frankston City is broken up into eight catchments based on the topography of the landscape and drain alignments, as shown in Table 3. The catchment boundaries are shown in Figure 2.

Table 3 Frankston City catchments

No.	Name	Receiving waterway	Area (ha)
1	Balcombe Creek	Port Phillip Bay	41
2	Boggy Creek (includes Tamarisk Creek)		3,340
3	Eastern Contour Drain		1,776
4	Eel Race Drain		1,566
5	Kackeraboite Creek		50
6	Kananook Creek		3,361

No.	Name	Receiving waterway	Area (ha)
7	Sweetwater Creek		862
8	Watsons Inlet	Western Port	1,869
TOTAL			**12,865**

In 2014, the volume of stormwater and wastewater exiting the Frankston municipality was an estimated 33,700 ML/yr, which was almost four times the estimated mains water demand (9,020 ML/yr).

Management arrangements

Melbourne Water is generally responsible for the installation and maintenance of stormwater drainage systems for catchments greater than 60 hectares, while Council is responsible for assets with smaller catchments.

In the Frankston municipality, Melbourne Water manages around 150 km of drains and channels and Council manages around 1,000 km. Drainage infrastructure associated with major roads is owned and maintained by VicRoads.

Melbourne Water uses Developer Services Schemes (DSS) to manage developer contributions to new drainage infrastructure for flood protection, water quality and waterway health. There are thirteen DSS within the Frankston municipality.[9]

Opportunity for the IWAP

- *The large volume of stormwater and wastewater exiting the Frankston municipality presents an opportunity to harness this resource for non-drinking (not potable) purposes, to reduce Council's and the communities' reliance upon mains water and assist with flood mitigation.*

5.2.1 Stormwater quality

The health of Frankston City's waterways and Port Phillip Bay is directly linked to human activities and catchment management. Urban surfaces containing pollutants wash into receiving waterways when it rains. Council's *Integrated Water and Pollutant Balance Study* shows that more than 85% of the municipality's stormwater and associated pollutants are discharged to Port Phillip Bay via the City's drainage systems and waterways.

Common pollutants include litter, runoff (primarily from roads), sediment (e.g. construction sites), vegetation, as well as dog and other animal faeces. Ageing sewerage infrastructure is also a source of potential pollutants, when sewer pipes or septic tanks fail.

Table 4 shows the stormwater pollutants that were quantified in the *Integrated Water and Pollutant Balance Study.* These pollutants are commonly used as indicators of overall stormwater quality.

[9] Source: melbournewater.com.au/Planning-and-building/schemes/map/Pages/find-your-scheme.aspx

Total Nitrogen (TN) is considered to be the limiting pollutant for urban stormwater (i.e. the hardest to reduce) and so is commonly used as an overall indicator of stormwater quality.

Table 4 Key stormwater pollutants

Pollutant	Description
Total suspended solids (TSS)	Litter and sediment washed off urban surfaces including sediment eroded by stormwater flows. **Can smother natural ecosystems and decrease visual amenity.** Sediment can contain other pollutants including heavy metals.
Total phosphorous (TP)	Sources of phosphorous in stormwater include atmospheric deposition, leaves, fertilisers and industrial waste. Phosphorous attaches to sediment and so is often linked to suspended solids. **Elevated phosphorous concentrations in waterways can lead to excessive growth of plants and algae**. As these plants decay they consume oxygen which can lead to very low oxygen concentrations in water bodies which is harmful to aquatic life.
Total nitrogen (TN)	Sources of nitrogen in stormwater include fertilisers, animal droppings, plant debris and atmospheric nitrogen that is picked up by rain droplets in the air. **Increased nitrogen levels can, like phosphorous, contribute to excessive growth of plants and algae.**

Results from the *Integrated Water and Pollutant Balance Study* indicate that the area of a catchment in Frankston City is directly related to its pollutant loads, with the exception of Eastern Contour Drain catchment. The Eastern Contour Drain is the fourth largest catchment, however has smaller pollutant loads (TSS, TP and TN) than Eel Race Drain and Sweetwater Creek, both of which are smaller in size. This result is likely due to the high proportion of pervious land associated with environment and agriculture planning zones and the presence of WSUD assets within the catchment that assist in removing some pollutants from stormwater. This indicates that increasing pervious surfaces within the Frankston municipality should help to reduce pollutant loads. The stormwater treatment opportunities identified in this Plan will also be effective at reducing loads of these pollutants.

Figure 7 shows the estimated TN load generated for each land use type within each catchment of Frankston City in 2014. It can be seen that the majority of TN was generated from residential areas. The Boggy Creek and Kananook Creek catchments have a similar land use profile and catchment area; however Kananook Creek's TN load was higher than Boggy Creek's contribution. This is due in part to a large constructed wetland installed by Melbourne Water at the downstream end of the Boggy Creek catchment, which treats approximately 90% of the water from this catchment, reducing TN by an estimated 7 tonnes per year and resulting in a positive impact for the receiving waters and Port Phillip Bay.

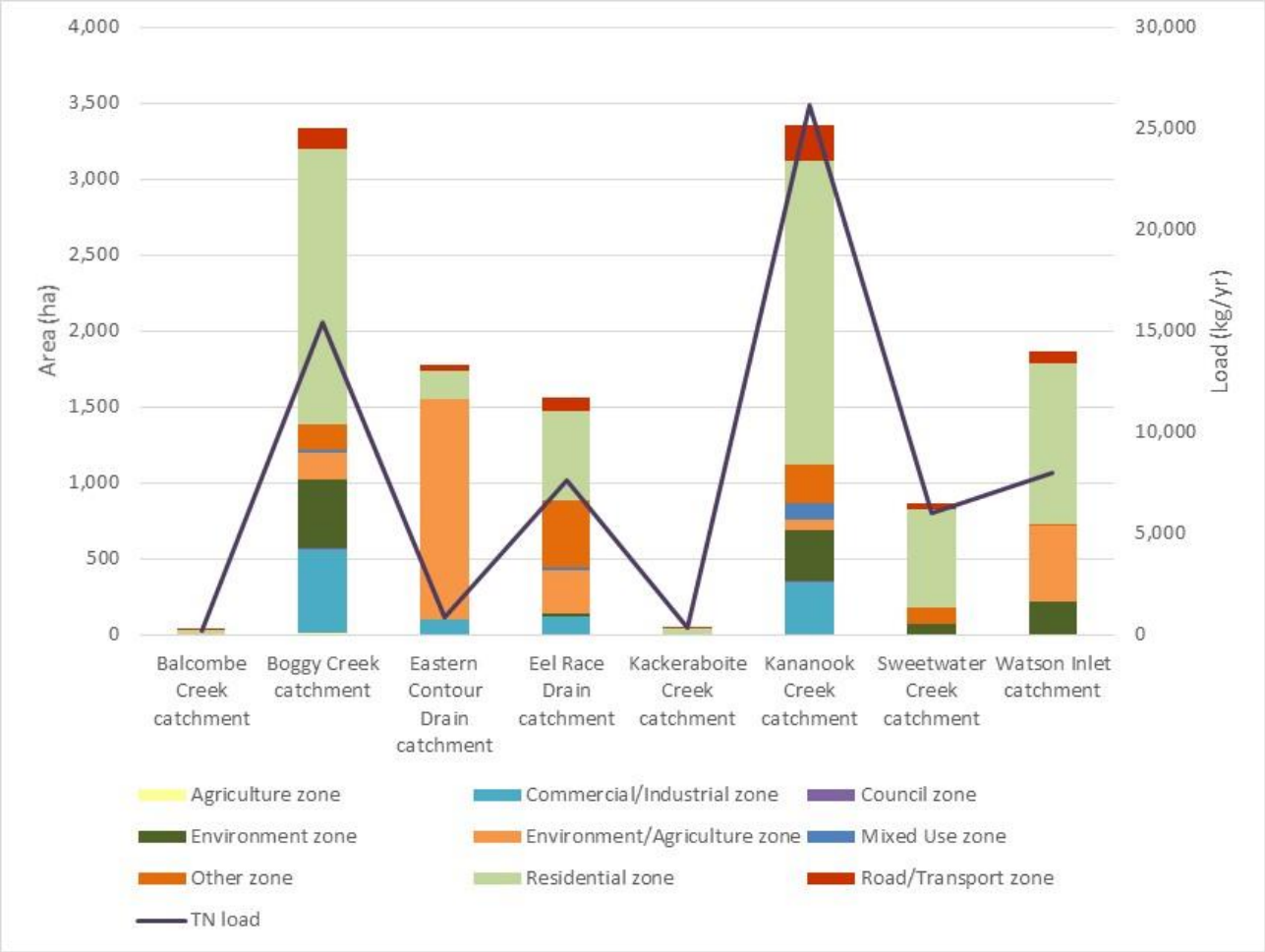

Figure 7 Land use per catchment and TN load, Frankston City (from Council's Integrated Water and Pollutant Balance Study)

Water quality across Frankston municipality is monitored by Melbourne Water. Council also collects specific data regarding litter and gross pollutants removed from street sweeping and emptying of gross pollutant traps (GPTs). In summer, EPA Victoria monitors beach water quality in Frankston City and beyond through their Beach Report. Whilst these sources of data are helpful in understanding aspects of Frankston City's water quality issues, more comprehensive monitoring and reporting would enable improved identification of water pollution issues and trends that affect both public health and high value environments in Frankston City, as well as the appropriate management actions.

Opportunity for the IWAP

- *By installing additional stormwater treatment schemes (e.g. WSUD assets) and increasing the extent of pervious surfaces within in the Frankston municipality, less pollutant loads will enter the City's waterways and bays. This presents an opportunity to increase the installation of these treatment systems in the City's open space, streetscape and car park developments etc. and to work with communities to do the same (e.g. household raingardens).*
- *Advocating to the Victorian Government for a comprehensive water pollution and aquatic species testing regime will enable improved identification of the causes and sources of*

pollution in local waterways and beaches. Following investigations, working in partnership with peak agencies and other stakeholders provides an opportunity to effectively respond to the sources of pollution, for example, through appropriate management actions such as inspections and monitoring, education, infrastructure and enforcement.

- *By continuing to undertake on-ground works such as street sweeping, beach cleaning, drainage maintenance and management, litter removal and provision of public bin infrastructure, Council will continue its efforts in removing many potential pollutants from the City's waterways and Port Phillip Bay.*
- *Council's Building and Works Code of Practice aims to ensure that all personnel who are responsible for building sites and building works understand the minimum acceptable standards under which they operate. By continuing to apply and enforce the Code, Council is ensuring that stormwater contamination from building sites is minimised and managed.*

5.2.2 Existing environmental stormwater management infrastructure

Council has made significant investment in environmental stormwater management infrastructure in recent years (refer Table 5). Of Council's overall land, an estimated 56% is treated through WSUD assets.

Infrastructure includes the installation of rainwater tanks at Council facilities, stormwater treatment systems (such as raingardens), as well as gross pollutant traps in the City's drainage infrastructure, streetscapes and other public space. However, the total volume of stormwater treated by WSUD assets is currently an estimated 34% across the entire Frankston municipality. Of this, 0.4% is Council land and 99.6% is non-Council land. Therefore, Council, water agencies, developers and the community have the opportunity to increase the number of WSUD assets in Frankston City to decrease the pollutants exiting the catchment.

Rainwater tanks provide an alternate to mains water supply. Rainwater is generally used to meet non-potable (non-drinking quality) water demands, such as irrigation and toilet flushing. Currently there are 27 Council sites with rainwater tanks, with this number increasing each year. Many private homes, businesses, health and educational facilities also have rainwater tanks. Rainwater tanks can assist in the reduction in stormwater flows and the frequency of run-off, which in some circumstances may contribute to reducing the risk of nuisance flooding.

Stormwater treatment systems target litter, sediments, heavy metals and nutrients which have the potential to negatively impact water quality, natural aquatic systems and the recreational amenity of the City's beaches and waterways. Council has invested in a number of stormwater treatment systems, including 20 raingardens and 21 gross pollutant traps to reduce stormwater pollutants entering the City's waterways.

Gross pollutant traps use physical processes to trap solid waste such as litter and coarse sediment. They are commonly used as the primary treatment because they mostly remove non-biodegradable large pollutants. Gross pollutant traps aren't really effective in nutrient removal, so they are most often used as part of a treatment train with other stormwater treatment measures such as wetlands or raingardens. As opposed to gross pollutant traps, raingardens are effective in filtering stormwater to reduce the rate and amount of stormwater that enters rivers and creeks after heavy rain.

There are eight Melbourne Water constructed wetlands within the municipality.

Table 5 Current stormwater management infrastructure, Frankston municipality (2016)

Infrastructure type	Number	Owner
Rainwater tanks	27 sites	Frankston City Council
Raingardens	20	Frankston City Council
Gross pollutant traps	21	Frankston City Council
Constructed wetlands	8	Melbourne Water

Note: Above table only includes rainwater tanks at Council facilities.

5.2.3 Main waterways within Frankston City – A snapshot

The main waterways within Frankston City are Kananook Creek (and its tributaries) and Sweetwater Creek. These are the two main waterways that terminate at Port Phillip Bay and are described in more detail below.

5.2.3.1 Kananook Creek

Kananook Creek was originally a natural outlet of the Seaford Wetlands. These wetlands were originally part of the large Carrum Carrum Swamp, which lay behind the coastal dunes and extended from Mordialloc to Frankston. In 1879, Patterson River was cut to drain the swamp (to facilitate agriculture). The constructed opening significantly reduced the catchment of the Seaford Wetlands and therefore the Kananook Creek catchment. To provide an acceptable flow rate along Kananook Creek, salt water has been pumped from Patterson Lakes into the Creek opposite Patterson River Secondary College since 1984. From 1931 to 1953, Kananook Creek was flushed with water pumped from the end of Seaford Pier.[10]

The Seaford Wetlands comprise of a number of discrete water bodies. Wetland inflows consist of:

- base flows pumped from Wadsley Road Drain
- freshwater surcharges from Eel Race Drain (when water level exceeds 1.25 m AHD)
- surcharges from local drains on the west side of the Wetlands (low flows from these drains are intercepted by the James Street pump station)
- groundwater intrusions resulting from historic excavations through a peat layer (that previously sealed the base of the wetlands)
- tidal inflows from Kananook Creek (if a flood-gate and pump system fail).

Wetland outflows enter Kananook Creek via the Weatherston Road Drain. The wetland reserve provides significant flood detention capacity.

Boggy Creek, Eel Race Drain, Tamarisk Creek and Kackeraboite Creek are tributaries of the current Kananook Creek. Under regular conditions, Kananook Creek discharges to Port Phillip Bay adjacent

[10] Stories of Kananook Creek, John A. Douglas, year unknown.

to the Frankston Central Activities Area. During flood events the majority of flow enters the Bay via a second opening (near Riveria Street in Seaford).

Kananook Creek has been dredged since at least 1929. Incentives for dredging include managing flood risk and allowing boat passage.

5.2.3.2 Sweetwater Creek Catchment

Sweetwater Creek is a small waterway located approximately 2 km south of Frankston. The Frankston Nature Conservation Reserve (formerly the Frankston Reservoir) is upstream to Sweetwater Creek.

Until 2006, the Frankston Nature Conservation Reserve was used to store mains water from Cardinia Reservoir for the Frankston area. Diversion infrastructure ensures that urban runoff from the catchment upstream of the Reserve bypasses the Reserve. This diversion was established to avoid the Reserve water being contaminated with stormwater. Now that the Reserve is no longer used to store mains water, this diversion may no longer be necessary.

5.3 GROUNDWATER

Management responsibility for groundwater reserves in the Frankston municipality is shared between Southern Rural Water (SRW) and the Department of Environment, Land, Water & Planning (DELWP). SRW is responsible for licensing bore construction and groundwater extraction. DELWP oversees the management of Victorian water resources including groundwater.

Frankston City's *Integrated Water and Pollutant Balance Study* shows that urbanisation has both decreased the volume of water infiltrating into the ground, as well as led to groundwater being extracted for subsequent use. This means that groundwater is considered a less sustainable water source than stormwater and wastewater (of which there is a surplus in urban areas).

The *Atlas of Groundwater Dependent Ecosystems*[11] shows that there are many groundwater dependent ecosystems within the Frankston municipality, including the internationally significant Seaford Wetlands.

The Frankston Groundwater Management Area (GMA), a management area of the Brighton Group Aquifer, extends from the northern end of the Frankston municipality to Patterson River in the north and across to Cranbourne in the east. Figure 8 shows the groundwater salinity in the Frankston region. It can be seen that the salinity is lowest around Frankston South and over 3,500 milligrams per litre (mg/L) in other parts of the municipality. The lower the salinity the more suitable the site is for irrigation. A number of areas across Frankston City are not ideally suited to ongoing groundwater use and extraction, due to these salinity issues.

[11] Source: bom.gov.au

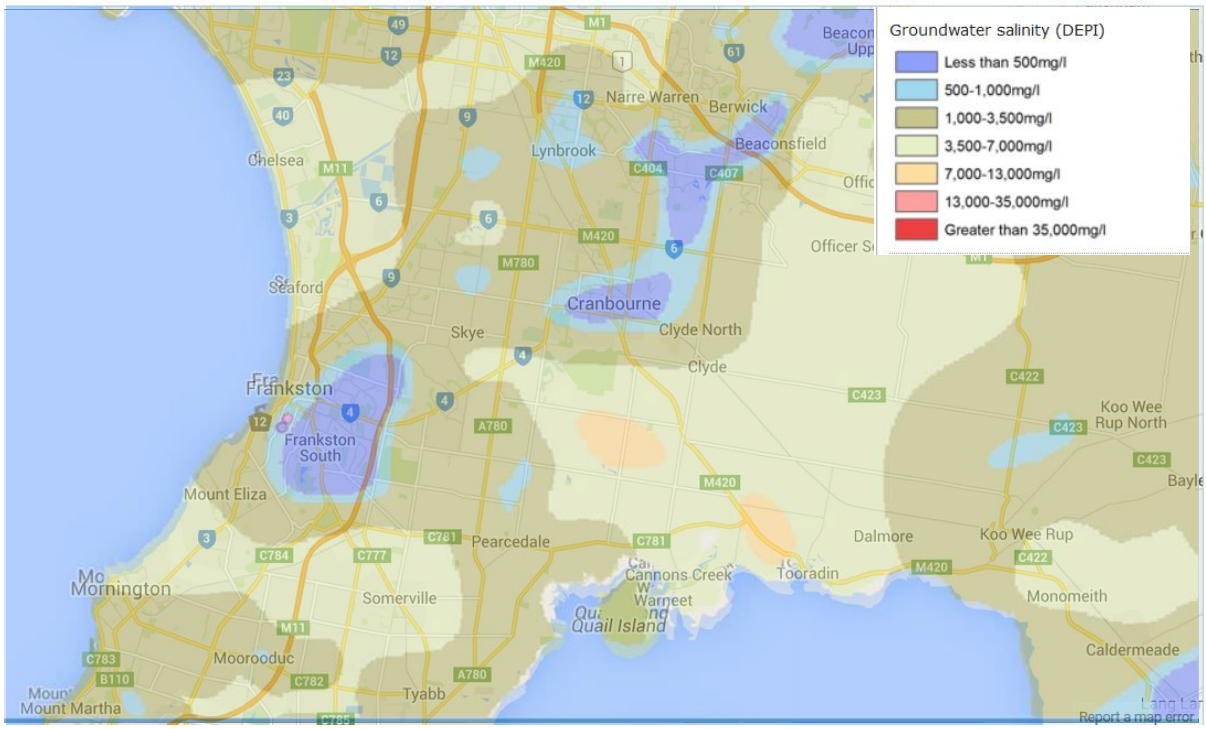

Figure 8 Groundwater salinity across the Frankston region (from maps.cerdi.com.au/vvg)

Currently, the Permissible Consumptive Volume (PCV) associated with the Frankston GMA is 3,200 ML/yr. There is currently authorised extraction of 1,671 ML/yr. Annual groundwater use within the Frankston municipality is estimated at 115 ML/yr. Of this, industry and commercial applications are the biggest users, accounting for approximately 52% of total groundwater use or 60 ML/yr. Agriculture is the next biggest user of groundwater using 55 ML/yr or 48% of total groundwater use on an annual basis. Council groundwater use is approximately 0.1 ML per year or 0.1% of total groundwater use. The amount of groundwater used in residential areas has not been quantified.

Some of the sites within the Frankston municipality that have groundwater bores include Lloyd Park Reserve, Lawton Reserve, Frankston Bowling Club, as well as McClelland College. The increased use of recycled water and adoption of water efficiency measures by Council has reduced the amount of groundwater being used. Several bores are not currently operational. In 2016, Council used groundwater to irrigate Ballam Park (McClelland College), Lawton Reserve and Lloyd Park Reserve.

Opportunity for the IWAP

- *Due to the potential high levels of salinity and the uncertainty regarding the secure supply of groundwater in the future, particularly in a changing climate, this presents an opportunity for Council and communities' to reduce their reliance on groundwater and seek alternative water sources that are more climate resilient (e.g. wastewater, stormwater).*

5.4 MAINS WATER

A large proportion of Frankston City's drinking water comes from protected or uninhabited mountain ash forests high in the Yarra Ranges east of Melbourne. Mains water is supplied in bulk by

Melbourne Water to the local retailer, South East Water, who is responsible for the delivery of safe drinking water to Council, homes and businesses within Frankston City.

Council uses mains water for a range of applications. In 2014-15, Council used 166 ML of mains water. The majority of this mains water use was for open space (71%) (refer Figure 9).

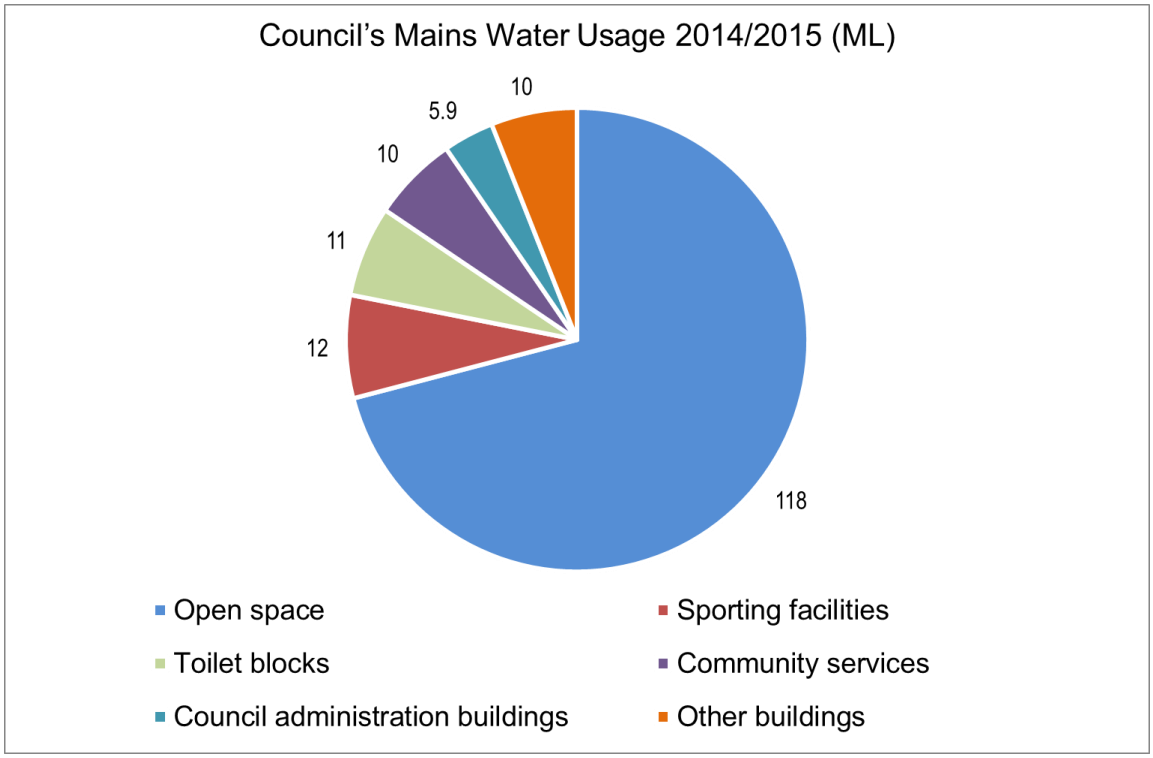

Figure 9 Breakdown of Council's mains water usage, 2014-15

The *Integrated Water and Pollutant Balance Study* also demonstrates that Council's mains water use is only a small proportion of the municipality's mains water usage. In 2014, approximately 9,023 ML of mains water was used within Frankston City. Of this, an estimated 17 ML was used within the agriculture sector (0.2% of the total mains water use), 149 ML within Council buildings and assets (1.6% of total mains water use), 1,228 ML in the industry and commercial sectors (14% of the total mains water use), and 7,628 ML within residential areas (85% of total mains water use).

This indicates that one of the greatest opportunities to reduce the municipality's mains water use is in the residential sector.

Opportunity for the IWAP

- *The large consumption and dependence on mains water for non-drinking (not potable) purposes by Council and the broader community (in particular residents), presents an opportunity to encourage the adoption of water sensitive behaviours and the uptake of more fit-for-purpose alternative water sources for non-potable needs (e.g. flushing of toilets, water for irrigation).*

5.5 WASTEWATER

The majority of domestic, commercial and industrial wastewater from Frankston City is conveyed to the Eastern Treatment Plant in Bangholme via sewerage infrastructure. Council's wastewater is also transferred there for treatment. Treated water is distributed as Class A recycled water or pumped to an ocean outfall at Boags Rocks on the Mornington Peninsula.

The volume of wastewater and stormwater exiting the municipality is significant and is almost four times the demand for mains water. This represents a potential opportunity for Frankston City to target and reuse this water source for non-potable purposes (such as toilet flushing, irrigation and washing) as an alternative to mains water, where fit-for-purpose.

5.5.1 Onsite wastewater treatment systems

Properties which are not serviced by Melbourne Water's sewerage network are required to provide their own wastewater treatment onsite. This is governed by a two stage process under the Victorian Government's *Environmental Protection Act 1970*:

1. EPA Victoria approves manufactured onsite sewage and greywater systems (up to 5,000 litres per day) via a certificate of approval
2. Council issues permits to property owners for the installation, use and maintenance of onsite wastewater treatment systems.

This process is supported by Council's Planning Scheme. When unsewered land is zoned residential, consideration is given to ensuring appropriate land is available for the sustainable treatment and retention of wastewater.

Currently, there are approximately 1,500 houses serviced by onsite wastewater treatment systems in the Frankston municipality. Council receives approximately 20 applications for new onsite wastewater treatment systems each year. The approval process is the responsibility of Council's Community Safety Department.

Council is also in the process of developing a Domestic Wastewater Management Plan, to better manage wastewater and protect public health and the environment. It is expected that this Plan will be developed and implemented over the course of the 10-year Integrated Water Action Plan.

5.5.2 Recycled water

In 2014-15, Council used 209 ML of Class A recycled water for irrigating sporting fields and open space within the municipality. The recycled water is sourced from the Eastern Treatment Plant in Bangholme.

Recycled water is a great alternative to mains water for non-potable purposes. As recycled water is treated wastewater, it is also a more reliable source of water during times of water shortages, for example, during low rainfall and when water restrictions are in place. Environmentally, using recycled water reduces the amount of wastewater and associated pollution that is discharged by Melbourne Water to Bass Strait, via the ocean outfall at Boags Rocks on the Mornington Peninsula.

However, as recycled water contains high nutrient concentrations, it is important that it is carefully managed in Frankston City to prevent overflow and entering watercourses and eventually Port Phillip Bay. Management requirements associated with each site are identified and monitored through Environmental Management Plans.

In 2014, it was estimated that 74 ML of recycled water was used by residential properties within the municipality, 68 ML for industrial and commercial properties and 465 ML for agriculture purposes. Recycled water is used at the Sandhurst Club estate in 600 homes, two golf courses and for irrigating public open space.

In 2010, Council in conjunction with South East Water, delivered the Frankston Recycled Water Project – Eastern and Western schemes. Indicative diagrams for each of the projects are provided in Figure 10 and Figure 11.

Opportunity for the IWAP

- *The large volume of wastewater exiting the Frankston municipality presents an opportunity to harness this resource for non-drinking (not potable) purposes and reduce Council's and the communities' reliance upon mains water.*
- *Mismanaged domestic wastewater treatment systems (e.g. septic tanks) are a potential source of pollutants entering the City's waterways and Port Phillip Bay. By developing and implementing a Domestic Wastewater Management Plan, Council can assist the community to better manage wastewater and protect public health and the environment.*

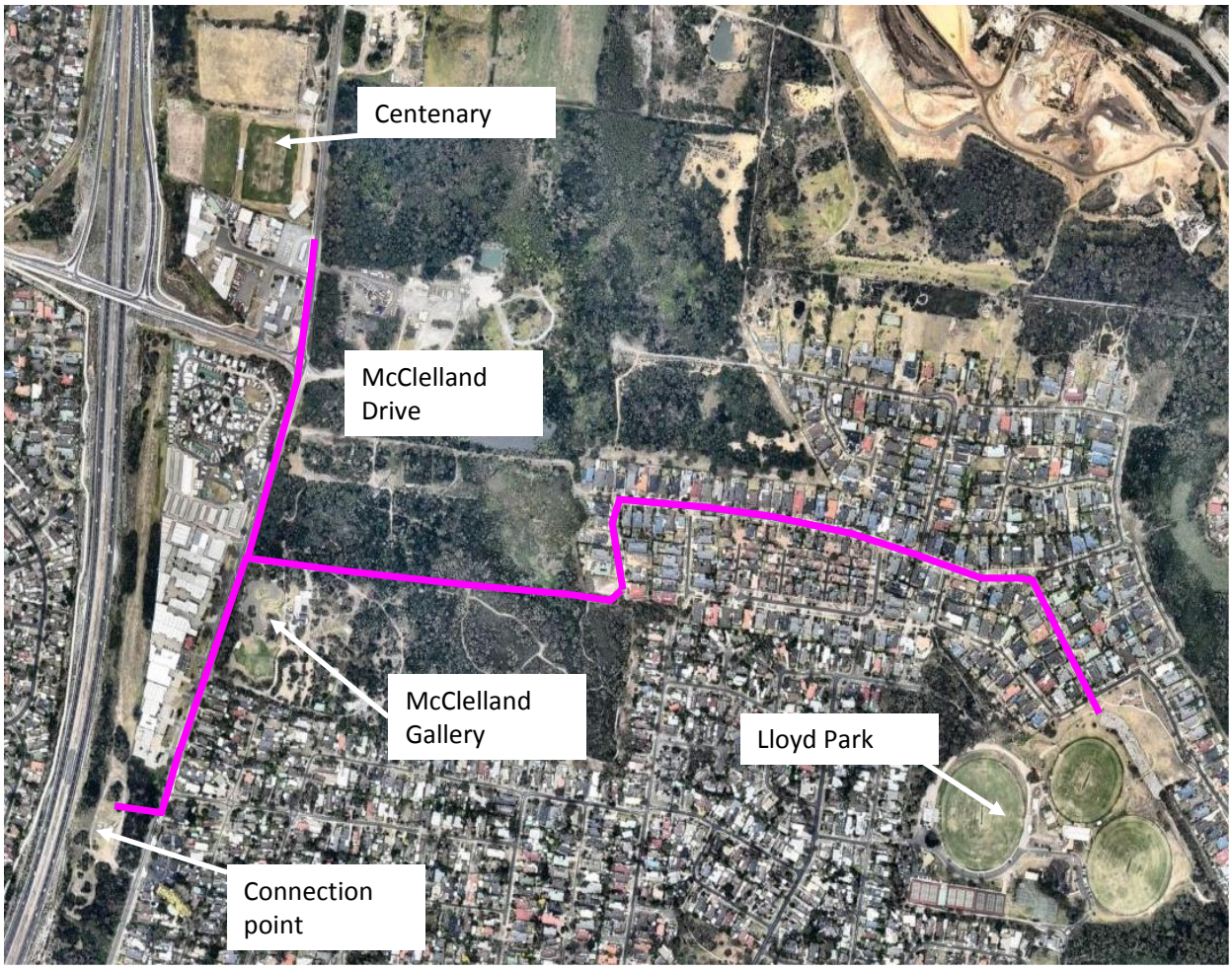

Figure 10 Frankston Recycled Water Project – Eastern Scheme (completed)

Figure 11 Frankston Recycled Water Project – Western Scheme (completed Stages 1 and 2)

During development of the IWAP, detailed proposals were completed for two additional stages of the Frankston Recycled Water Project - Western Scheme (stages 3 and 4), as well as the Monterey and the Robinsons Road Recycled Water Schemes. The funding structure and ongoing cost allocation varies between each scheme. Potential partners include Council, South East Water, Victorian Government as well as private sector partnerships. The schemes are at various levels of development and were included in the infrastructure opportunity identification and evaluation component of this document, detailed in Section 7 of the IWAP.

Council sites currently provided with recycled water are identified in Table 6.

Table 6 Existing Council sites with recycled water use

Site	Water use	Approximate annual recycled water usage (ML/yr)
Belvedere Reserve	Sports ground	27
Ballam Park	Sports ground	13
Jubilee Park	Sports ground	11
McClelland Reserve & Centenary Park Golf Course	Sports ground	63
Baxter Park	Sports ground	6
Carrum Downs Reserve	Sports ground	10
Lloyd Park	Sports ground	13

5.6 PROGRESS TO DATE AND ACHIEVEMENTS

Council has significantly reduced its mains water use by 50% (refer Figure 12) since 2000-01 (331 ML), compared to 2014-15 (166 ML).

In 2014-15, Council used 209.6 ML of Class A recycled water (Figure 12 – noting that recycled water use records are available from 2008-09 onwards). In 2014-15, Council's proportion of recycled water use (as a total percentage of its mains and recycled water use) was 55%.

Council uses recycled water to maintain high quality open spaces for the community, and this investment has resulted in Council's reduction in mains water use and access to a more reliable alternative water source, particularly during times of low rainfall and water restrictions. The emphasis on recycled water investment and the resulting mains water savings was originally prompted by the Millennium Drought.

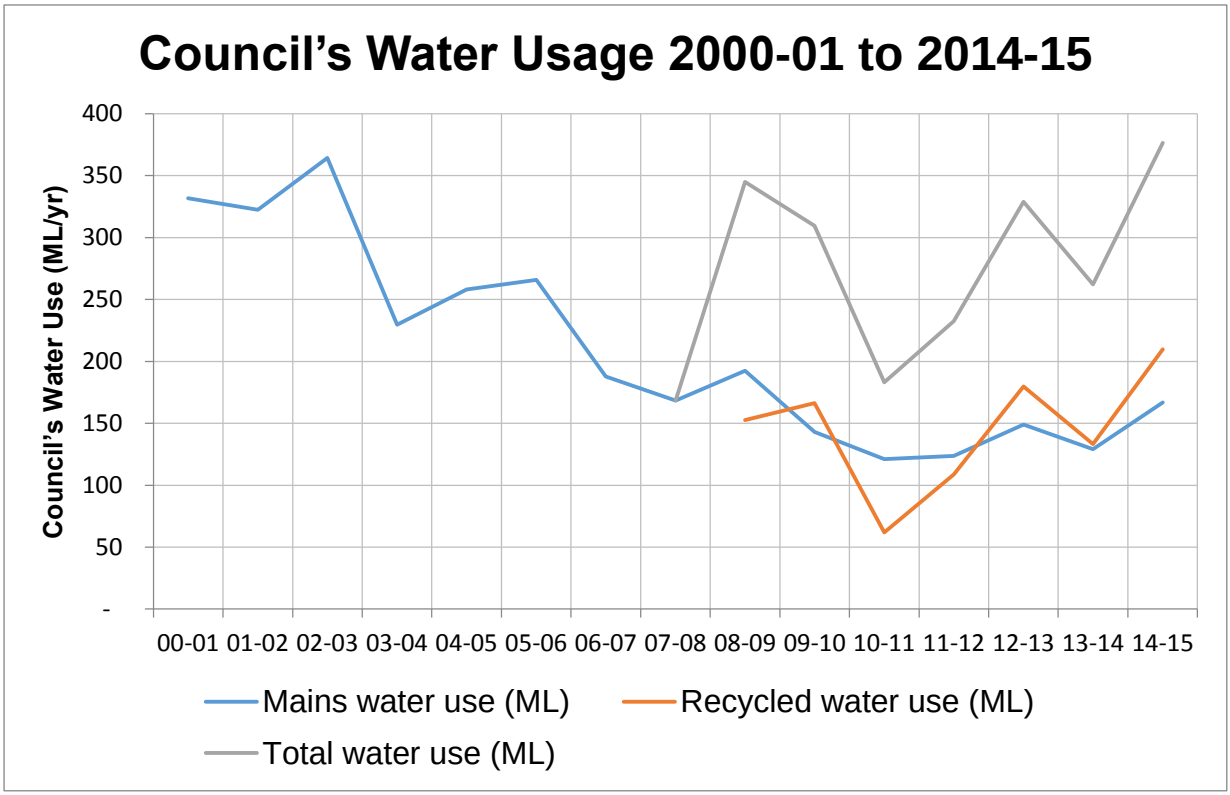

Figure 12 Frankston City Council's mains and recycled water usage, 2000-01 to 2014-15

Since 2006, the majority of actions from Council's *Sustainable Water Use Plan* (2006) have been implemented. Some of these actions include:

- upgrades to Council's irrigation systems and changes to irrigation management, for example, transitioning to warm season grasses as well as applying wetting agents and aeration techniques for Council's sporting reserves
- increasing the supply and use of alternative and fit-for-purpose water sources (i.e. recycled water, stormwater, groundwater) in Council's open space, operations and facilities (e.g. by extending the recycled water pipeline to additional sporting reserves, as well as installing rainwater tanks and a stormwater harvesting scheme)
- installation of water saving measures in Council facilities, such as water efficient showerheads, flow restrictors, dual flush toilets, waterless urinals, push-button timers, spring loaded taps
- early leak detection and analysis by Council staff providing significant mains water and cost savings
- maintaining and further developing Council's internal water reporting system for performance based monitoring of Council's water use and achievement against targets
- implementation of stormwater treatment systems in streetscape and car parking projects (e.g. raingardens and swales)
- use of local indigenous plants with low water requirements in the City's gardens, garden beds, reserves and street trees etc.

A total of 90% of actions from Council's *Stormwater Management Plan* (2001) have been implemented. Some of these actions include:

- installing gross pollutant traps (GPTs) and stormwater treatment schemes to remove pollutants from entering local waterways and beaches
- reviewing Council's street sweeping regime for optimum performance
- providing guidance to developers on best practice stormwater management during the design, construction and building phase
- consulting with the community (residential, commercial and industrial) and developing guidance material relating to preventing litter entering the stormwater system
- working with the EPA to establish a clear protocol for reporting industrial stormwater pollution infringements
- undertaking random inspections of development sites to check for correct sediment and erosion control practices per Council's *Building and Works Code of Practice.*

Development and implementation of Council's Road Management Plan has also led to a more proactive approach in relation to Council's drainage assets – through enhanced asset inspection, defect identification and rectification, programming and implementation of routine and future works, as well as mapping of assets into Council's GIS system. New asset management software allows infrastructure maintenance on the drainage pits, such as pit cleaning, to be programmed as needed rather than being reactive. Drains are cleaned and cleared of debris to allow for the smooth passage of stormwater. These efforts have all contributed to Council's flood intelligence and improved capability at managing flooding and associated drainage events.

A dedicated renewal program has also been established to maintain Council's existing WSUD assets, as part of Council's Capital Works program. This was established a few years ago to help ensure that the assets are operating at optimum performance.

Up to 30 Council staff attended Clearwater training in 2014 and there was positive feedback about the sessions. There is a high level of enthusiasm for integrated water management initiatives across the organisation and for further training and involvement.

A detailed list of Council's existing WSUD assets is included in Appendix B.

5.7 COUNCIL INTERNAL MANAGEMENT PRIORITIES FOR IWM

Council recognises that there are a number of issues and barriers that currently impact more significantly on the organisation's ability to achieve integrated water management outcomes. These include:

Resourcing limitations: Local government in general is facing pressure to justify new expenditure that provides best value to the community, particularly with the introduction of the Victorian Government's municipal rate cap policy. This will impact on Council's ability to effectively implement the IWAP. However, the Victorian Government also has a strong focus on reducing pollutants to receiving water environments (in particular, TSS, TP and TN) throughout Victoria, and therefore provides funding opportunities for local government through programs such Melbourne Water's *Living Rivers* program for this purpose.

Opportunities for the IWAP

- *Actively seek funding through the Victorian Government for the design and construction of the high and medium priority stormwater treatment schemes in this IWAP, to reduce the financial burden to Council and the realisation of the pollution reduction benefits to both parties and the broader community*
- *Actively seek funding from Melbourne Water, for example, through their Living Rivers program, to help build Council's internal capacity to embed integrated water management into Council and to progress initiatives within the IWAP's 10 year Implementation Plan*
- *Develop a 10 year Implementation Plan that identifies and prioritises the stormwater infrastructure projects that will provide best value to Council and the broader community and to achieve multiple integrated water management outcomes. Revisit the business case prior to design to ensure potential changes to water costs (including recycled water) are factored in the whole of life and that new and emerging climate change impacts and other issues or opportunities are considered*
- *Advocate to Melbourne Water for the development and implementation of waterway management plans for Frankston City's priority waterways, to establish a coordinated and strategic direction and to prioritise works for the next 10-15 years, in close consultation with Council and local communities*

Knowledge gap: As the approach to integrated water management is still largely in its infancy and WSUD assets have not been around for long, there are gaps in terms of knowing the best designs to implement and understanding the full WSUD asset lifecycle costs for Council and developers. Selecting the best design is important to achieve optimum performance, whilst minimising the long-term operation, maintenance, renewal, upgrade and disposal costs. Undertaking maintenance of existing WSUD assets also requires a certain degree of skill and experience that is acquired through sharing industry knowledge and learning over time.

Opportunities for the IWAP

- *Develop an intra-council Integrated Water Management working group to facilitate a multi-discipline approach, common understanding and enhanced capacity in this area, and engage with other local councils to share ideas, learnings and resources*
- *Monitor and evaluate Council's WSUD assets to better determine the lifecycle costs, maintenance requirements and to inform optimum design and design standards over time*
- *Support Council staff to participate in WSUD training course and workshops, to assist in upskilling staff in the design, construction, maintenance, renewal, upgrade and disposal of WSUD assets*
- *Ensure Council's WSUD Asset Register and related GIS modules are kept up to date and available and used by all relevant staff and stakeholders.*

Policy and planning limitations: Integrated water management and WSUD are emerging fields. Council's IWM standards, processes, conditions and controls need to be updated over time to reflect

best practice and to ensure consistency between these documents and Council's requirements in this area. Council's existing standards are not always consistent in relation to IWM. In addition, some WSUD assets delivered by developers in the past are considered "cumbersome" and require large amounts of maintenance. These systems and do not necessarily meet with Council's requirements today.

It is difficult for small infill developments to meet stormwater treatment requirements. In these instances, consideration should be given to a stormwater offset process through the planning scheme, where funding can be used on a larger scale and for more regional IWM projects to achieve better and more strategic outcomes.

The Victorian Government also has a role in ensuring state planning provisions are enhanced for achieving integrated water management outcomes for the Victorian community and the environment. Further to this, the role between Victorian Government agencies, such as Melbourne Water and Council is not always clear, particularly in relation to stormwater management. Strategic planning for regional IWM projects needs to be strengthened.

Opportunities for the IWAP

- *Utilise Council's Planning Scheme, Municipal Strategic Statement, planning and building controls, and permit conditions and standards (e.g. WSUD Guidelines) to strengthen integrated water outcomes by developers and the broader community, and ensure that Council's standards are consistently and clearly communicated*
- *Develop standard planning permit conditions for IWM that are clear and specific and consistent with Council's WSUD Guidelines and other requirements*
- *Investigate a stormwater quality offset scheme (i.e. developer contributions to regional stormwater quality infrastructure) in lieu of development scale infrastructure*
- *Continue to liaise with Melbourne Water and the Victorian Government to plan and consider regional scale IWM infrastructure and develop an agreement with Melbourne Water regarding stormwater management in the Frankston municipality, to clarify roles and responsibilities of each organisation.*

6 WATER MANAGEMENT ASPIRATION

6.1 OUR VISION

We live in a water sensitive city, where we are a resilient and healthy community that embraces all parts of the water cycle. We recognise that the economic, environmental and social health of our municipality is strongly connected to our beaches and waterways, and that our decisions and actions impact on communities and environments beyond our municipal boundaries. We take responsibility for our actions to manage water sustainably in our community life; we protect precious water supplies, sustain healthy environments and we are a liveable city.

6.2 PRINCIPLES

We use an integrated water management approach based on the following **principles**:

- Meet community needs and provide best value
- Contribute to liveability and quality of life
- Protect and enhance natural processes and the environment
- Be dynamic and resilient – able to change and modify as needed
- Be connected – bring together all facets of the water cycle and our environment – to achieve strong triple bottom line outcomes

6.3 WATER MANAGEMENT HIERARCHY

Council has developed the following **water management hierarchy** to inform its water conservation priorities and decisions:

1. Prevent water wastage (e.g. preventing and fixing leaks)
2. Reduce water demand (e.g. through water efficiency)
3. Substitute with alternative water (e.g. stormwater, recycled water), and finally
4. Use mains water and groundwater

The highest priority is the prevention of water wastage (e.g. through managing leaks), followed by reducing water demand through water efficiency measures, then substituting the remaining water demand with alternative water sources. Drinking quality water (mains water) and bore water (groundwater) will only be used when all other water saving options have been explored. This is to ensure that mains water is preserved for the main activities that require drinking quality water and to alleviate further pressure on the City's groundwater supplies, which are less secure than alternative water sources such as recycled water.

6.4 OBJECTIVES AND TARGETS

Council's integrated water management targets for the IWAP are shown in Table 7. They have been established and modelled based on the schedule of projects identified in the 10 year Implementation Plan. Should changes be made by Council to the schedule of the proposed stormwater infrastructure actions, then the targets will need to be modified accordingly.

Table 7 Integrated water management targets

Objective	Outcome	Target (by 2026)	Baseline measurement
Reduce Council's reliance on mains water use and associated costs	Reduce Council expenditure on purchasing mains water. Preserve precious drinking quality water.	Council's mains water use is less than or equal to 120 ML/yr.	Council's mains water use in 2014-15 was 166 ML.
Increase Council's fit-for-purpose alternative water use	Increase water security by using a diversity of appropriate water sources. Improve resilience during any future mains water restrictions.	At least 60% of Council's total water use is from sustainable alternative water sources that are fit-for-purpose (i.e. recycled water, rainwater or stormwater).	In 2014-15, 55% of Council's total water use was from alternative water sources.
Reduce the negative impacts of stormwater pollution on the receiving environment (e.g. waterways and bays)	Contribute to cleaner beaches. Reduce sediment loads in Kananook Creek and other waterways. Contribute to healthy plants and animals in waterways and waterbodies.	Council and Melbourne Water's stormwater treatment and harvesting assets in Frankston City remove at least 11.5 tonnes of Total Nitrogen each year.	In 2014-15, Council and Melbourne Water's stormwater treatment assets removed 8.3 tonnes of Total Nitrogen in Frankston City.

7 PROCESS FOR DEVELOPING THE INTEGRATED WATER ACTION PLAN

This section provides an overview of the process used to develop the IWAP.

7.1 CONSULTATION AND ENGAGEMENT

A comprehensive consultation process was undertaken to develop a strategic approach to the IWAP. A Communication and Engagement Plan was created to identify key stakeholders and guide engagement activities throughout the project.

A number of consultation and engagement activities were undertaken throughout the IWAP development. These included an extensive interview process with Council staff responsible for managing services that impact or influence integrated water management outcomes, as well as a number of workshops and meetings with government agencies, Frankston City Councillors and Council staff.

The public exhibition phase included seeking feedback from the broader community on the draft document, as well as government agencies involved in the water industry, e.g. Melbourne Water, South East Water, Southern Rural Water, EPA Victoria and the DELWP.

The outcomes of the consultation have been incorporated into the development of the *Plan.*

7.2 ACTION IDENTIFICATION METHOD

This section describes the process for identifying the actions outlined in the IWAP.

7.2.1 Process and capacity building actions

Process and capacity building opportunities that have the potential to assist in meeting Council's integrated water objectives and targets were identified through stakeholder consultation and a review of Council's existing policies, plans, templates and guidelines.

The process opportunities are organised into five broad groups: governance; policy; development assessment (internal and external); managing existing assets and monitoring performance.

The capacity building opportunities are grouped into those relating to Council staff and those relating to the community.

7.2.2 Infrastructure actions

A range of opportunities for treating stormwater, harvesting stormwater and using recycled water were identified and assessed in order to prioritise recommended stormwater treatment infrastructure actions.

A systematic approach was undertaken to initially identify integrated water management infrastructure opportunities within the Frankston municipality. Opportunities were identified through a desktop analysis, review of existing literature, site investigations and through discussions with Melbourne Water, Councillors and Council staff. Hydrological and geographic models were used

to identify opportunities and predict their performance. The lifecycle cost associated with each opportunity was estimated using published rates and those from previous similar projects.

The opportunities were ranked in accordance with the lifecycle cost relative to the stormwater treatment and harvesting performance. Council staff then refined the ranking using multi-criteria analysis, with consideration of additional environmental and social benefits, maintenance and spatial requirements.

Additional information on the process used to identify infrastructure opportunities is contained in Appendix D: Evaluation of opportunities.

A two stage evaluation method was used to compare and prioritise infrastructure opportunities and inform the selection of infrastructure actions to include in the 10 year Implementation Plan. The first stage involved prioritising opportunities using a financial value/cost ratio. The second stage involved developing and prioritising the opportunities against a Multi Criteria Analysis (MCA).

7.2.2.1 Components of stormwater treatment and harvesting systems

The majority of the infrastructure actions included in the IWAP involve diverting stormwater from existing stormwater drains and treating it to remove pollutants. At many locations, the treated stormwater can be stored and used for irrigating sporting reserves and other open space. Where possible, stormwater will be diverted by a gravity system, avoiding the use of pumps and their associated maintenance and energy use and costs. Where site levels do not allow a gravity diversion, low flows will be pumped into the treatment system.

The proposed stormwater treatment schemes will typically include a grate or other gross pollutant trap to remove gross litter, and following this, stormwater will be filtered through a constructed wetland (refer Figure 13) or a bioretention system (refer Figure 14). These vegetated systems are effective at removing sediments and nutrients, thereby reducing these pollutants entering the waterways. They can also provide attractive landscape features. Bioretention systems are commonly referred to as ‘raingardens’ or ‘biofilters’.

Stormwater harvesting systems can be located above or below ground. Above ground storages are considerably cheaper than below ground storages; however, they have a greater visual and physical impact on the surrounding environment. Below ground storages can be hidden and water can be diverted into them using gravity alone, whereas a pump is needed to transfer treated water into above ground storages.

Figure 13 Example of constructed wetlands

Figure 14 Example of bioretention systems (also commonly referred to as raingardens or biofilters).

7.2.2.2 Value/cost ratio

The value/cost ratio is a ratio of the direct financial benefits of the proposed infrastructure opportunities and the direct financial costs. The value/cost ratio was developed to assess the infrastructure opportunities identified and prioritised during development of the IWAP. The benefits and costs are compared over a 25 year lifecycle. **A value/cost benefit greater than one indicates that there is a net financial benefit for the project.**

The financial benefits included are:

- Avoided cost of mains water (or recycled water if it is currently available at the relevant location)
- Total nitrogen reduction value (as defined by Melbourne Water)

The financial costs included are:

- The capital cost estimate (including contingency and a design allowance)
- The annual operation, maintenance and replacement (OM&R) cost estimate

7.2.2.3 Multiple criteria analysis (MCA) framework

A MCA framework was developed to assess a broad range of potential costs and benefits for each infrastructure project. The MCA framework is based on previous work completed by Melbourne

Water and Council, with consideration of the IWAP purpose, objectives and principles. The adopted MCA framework criteria and weightings are shown in Table 8. The relationship between the MCA criteria and IWAP principles is shown in Table 9. The scoring method for each criterion is shown in Table 10.

For each infrastructure opportunity, the score for each criterion was multiplied by the criteria weighting. The weighted scores were calculated to provide an overall opportunity score expressed as a percentage.

Opportunities with an overall score of:

- **More than 65% were identified as "high" priority opportunities**
- **40% to 65% were identified as "moderate" priority opportunities**
- **Less than 40% were identified as "low" priority opportunities**

Where there were alternative opportunities to meet a particular demand, the alternative with the lowest score was removed from the list of recommended opportunities.

The recommended high and medium priority opportunities are included in the 10 year Implementation Plan. The high priority sites are scheduled first.

Table 8 MCA criteria and weightings for the IWAP

Criteria	Weighting
Catchment characteristics	5%
Downstream values	10%
Site values	5%
Potential to mitigate urban heat island (UHI) effect	5%
Potential to increase amenity and recreation	5%
Community exposure and education	5%
Potential to assist in the reduction of nuisance flooding	10%
Resilience	5%
External funding potential	20%
Financial value/cost ratio	30%

Table 9 Relationship between the MCA criteria and IWAP principles

Criteria	Community needs and best value	Liveability	Natural processes	Dynamic	Connected
Catchment characteristics					
Downstream values					
Site values					
Potential to mitigate urban heat island (UHI) effect					
Potential to increase amenity and recreation					
Community exposure and education					
Potential to assist in the reduction of nuisance flooding					
Resilience					
External funding potential					
Financial value/cost ratio					

Table 10 MCA criteria score method for the IWAP

Criteria	High (1.0)	Medium (0.5)	Low (0.0)
Catchment characteristics	Highly polluted catchment (e.g. >60% impervious)	Standard catchment (e.g. 20% to 60% impervious)	Clean catchment (e.g. <20% impervious)
Downstream values	High biodiversity/amenity waterway	Other open natural waterway	Low value aquatic system
Site values	Enhance and complement existing site biodiversity	Enhance site with adjacent biodiversity values	Site with no particular biodiversity values
Potential to mitigate urban heat island effect	Adjacent current activity centre	Adjacent area proposed for more intense development	Area of limited development
Potential to increase amenity and recreation	Current high use site that will be enhanced	Under utilised site that will be enhanced	Site to remain fenced/excluded site and/or opportunity will not impact amenity and recreation
Community exposure and education	Next to school or public use	Next to other high use site	Isolated site
Potential to assist in the reduction of nuisance flooding	Eliminate flood risk	Some reduction in flood risk	No change
Resilience	Performance independent to climate (e.g. recycled water)	Somewhat influenced by climate	Significantly influenced by climate
External funding potential	Reduces stormwater pollutants and therefore more likely to be eligible for current funding, e.g. Living Rivers Funding		Does not reduce stormwater pollutants and therefore not likely to be eligible for current funding, e.g. Living Rivers Funding
Financial value/cost ratio	>2.0	>1.0 and < 2.0	<1.0

8 ACTIONS TO IMPROVE INTEGRATED WATER MANAGEMENT

8.1 10 YEAR IMPLEMENTATION PLAN

The following 10 year Implementation Plan will be subject to funding and Council priorities. The new actions will be assessed on their merit through the annual budget planning process. Council will proactively seek co-funding for projects wherever possible.

Infrastructure, process and capacity building actions have been developed and documented in the following Implementation Plan.

8.1.1 Process Actions

A number of process opportunities that have the potential to assist in meeting Council's integrated water management vision, objectives and targets have been identified. These process opportunities are organised into five broad groups: governance; policy; development assessment (internal and external); managing existing assets and monitoring performance.

Table 11 Governance actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
P-Gov-1	Develop an intra-council Integrated Water Management (IWM) working group to progress and periodically review Council's IWM development standards and IWAP implementation.	HIGH	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Infrastructure; Sustainable Assets
P-Gov-2	Participate in regular inter-Council IWM working group meetings to share ideas and resources and learn from each other's experiences.	HIGH	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Infrastructure; Sustainable Assets
P-Gov-3	Develop an agreement with Melbourne Water regarding stormwater management in the Frankston municipality, to clarify the roles and responsibilities of each organisation, including Maintenance Agreements.	HIGH	Existing staff time only	Waterway protection	Year: 2	Operational	Infrastructure; Planning and Environment
P-Gov-4	Evaluate and report back to Council on the IWAP and progress against the 10 year Implementation Plan and targets, per timelines as outlined in Section 8.3: Monitoring and Evaluation.	MEDIUM	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Sustainable Assets; Infrastructure
P-Gov-5	Ensure Council's Water Sensitive Urban Design (WSUD) Asset Register and related GIS modules are kept up to date and available and used by all relevant staff.	MEDIUM	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Infrastructure; Sustainable Assets

Table 12 Policy actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
P-Pol-1	Implement Council's Municipal Strategic Statement (MSS) and update over time to support integrated water management within the municipality.	MEDIUM	Existing budget allocation	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Planning and Environment; Infrastructure; Sustainable Assets
P-Pol-2	Ensure Council's IWM standards are consistently and clearly communicated.	MEDIUM	Existing staff time only	Waterway protection	Year: 1-10	Operational	Infrastructure; Planning and Environment;
P-Pol-3	Define, document and communicate required features of stormwater treatment systems that make them resilient and cost effective to maintain.	MEDIUM	$7,500	Waterway protection	Year: 2	Operational	Infrastructure; Operations; Sustainable Assets
P-Pol-4	Develop enhanced planning controls to require IWM for all development within the municipality - including infill, industrial and commercial development.	MEDIUM	$20,000	Waterway protection Reduce mains water More alternative water use	Year: 5	Operational	Planning and Environment; Infrastructure
P-Pol-5	Create standard planning permit drainage conditions that are clear and specific. Ensure conditions are consistent with Council's WSUD Guidelines and other requirements.	HIGH	$5,000	Waterway protection	Year: 2	Operational	Planning and Environment; Infrastructure
P-Pol-6	Investigate a stormwater quality offset scheme (i.e. developer contributions to the City's stormwater quality infrastructure in lieu of development scale infrastructure).	HIGH	$15,000	Waterway protection	Year 5	Operational	Planning and Environment; Infrastructure
P-Pol-7	Investigate mechanisms for managing filling on rural properties (e.g. to ensure overland flow paths are not blocked).	LOW	Existing staff time only	Waterway protection	Year: 1	Operational	Planning and Environment; Infrastructure
P-Pol-8	Develop planning permit conditions for managing saline groundwater pumped out of car parking basements.	MEDIUM	Existing staff time	Waterway protection	Year: 3	Operational	Planning and Environment
P-Pol-9	Review Council's Flood Management Plan and Drainage Strategies and commence development and a budget bid for new plans/strategies.	MEDIUM	Subject to review	Waterway protection	Year: 2	Operational	Infrastructure; Operations

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
P-Pol-10	Implement Council's *ESD Standards for Council Buildings* to ensure water efficiency and opportunities for rainwater use are embedded into Council's building projects.	MEDIUM	Existing budget allocation	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Capital	Facilities; Sustainable Assets
P-Pol-11	Continue to implement Council's obligations in the Kananook Creek Corridor Management Plan, subject to DELWP's independent review of the management arrangements for Kananook Creek.	HIGH	Subject to review	Waterway protection	Year: 1-4	Operational and Capital	Public Space and Leisure; Planning and Environment
P-Pol-12	Advocate to Melbourne Water for the development and implementation of waterway management plans for Frankston City's priority waterways, to establish a coordinated and strategic direction and to prioritise works for the next 10-15 years, in close consultation with Council and local communities.	MEDIUM	Existing staff time only	Waterway protection	Year: 2	Operational	Public Space and Leisure; Planning and Environment
P-Pol-13	Finalise Council's Coastal Management Plan to identify integrated water management priorities for the foreshore and coastal areas within Frankston City.	MEDIUM	Existing staff time only	Waterway protection	Year: 1	Operational	Public Space and Leisure
P-Pol-14	Advocate to other levels of government for stronger planning controls and regulations to achieve improved IWM outcomes.	HIGH	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Planning and Environment; Infrastructure
P-Pol-15	Develop and implement Council's Domestic Wastewater Management Plan to better manage wastewater and protect public health and the environment.	HIGH	Existing staff time only	Waterway protection	Year: 1-10	Operational	Community Safety
P-Pol-16	Continue to apply and enforce Council's Building and Works Code of Practice to ensure that stormwater contamination from building sites is minimised and managed.	HIGH	Existing staff time only	Waterway protection	Year: 1-10	Operational	Infrastructure

Table 13 Development assessment actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
P-Dev-1	Review Council's WSUD Guidelines to better communicate Council's standards and requirements for external WSUD development projects and to improve developer compliance.	MEDIUM	$5,000	Waterway protection	Year: 3	Operational	Infrastructure; Planning and Environment
P-Dev-2	Ensure proposed designs for stormwater treatment and harvesting systems are referred to Council's Operations Department for feedback before they are approved.	MEDIUM	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 1-10	Operational	Infrastructure; Public Space and Leisure; Operations
P-Dev-3	Ensure maintenance costs for planned IWM assets are estimated by relevant maintenance teams and that these costs are included in relevant maintenance budget forecasts and Council's Project Implementation Plans.	HIGH	Existing staff time only	Waterway protection Reduce mains water More alternative water use	Year: 3	Operational	Operations; Infrastructure; Public Space and Leisure

Table 14 Managing existing assets actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
P-Man-1	Undertake an audit of all Council's existing stormwater treatment and harvesting systems to determine their current condition and expected remaining lifetime.	HIGH	$2,500	Waterway protection	Year: 3	Operational	Sustainable Assets; Infrastructure; Operations
P-Man-2	Following the audit above, develop a maintenance schedule and corresponding budget for Council's existing stormwater treatment and harvesting systems.	HIGH	Existing budget allocation	Waterway protection Reduce mains water More alternative water use	Year: 3	Operational	Operations; Infrastructure; Sustainable Assets
P-Man-3	Develop a clear written agreement between Council, Melbourne Water and Parks Victoria (e.g. Memorandum of Understanding) regarding the management responsibilities of Kananook Creek.	MEDIUM	Existing staff time only	Waterway protection	Year: 4-5	Operational	Public Space and Leisure; Infrastructure; Sustainable Assets
P-Man-4	Develop a hierarchy for water sources to be used for Council's maintenance activities.	MEDIUM	Existing budget allocation	Reduce mains water More alternative water use	Year: 2	Operational	Operations; Sustainable Assets
P-Man-5	Investigate options for capturing sediment removed from pits and pipes and develop a "practice note" or equivalent to describe the adopted method.	MEDIUM	$5,000	Waterway protection	Year: 4	Operational	Infrastructure; Operations; Sustainable Assets
P-Man-6	Assess the environmental impacts of Council's new IWM projects through Project Implementation Plans, to ensure they do not significantly impact threatened species or ecological communities, or significantly disrupt natural processes.	HIGH	Existing staff time only	Waterway protection	Year: 1-10	Operational	Infrastructure; Public Space and Leisure; Planning and Environment
P-Man-7	Develop an IWM asset lifecycle cost database – for Council and gifted assets from private developments – to better understand the full lifecycle cost implications for IWM projects.	LOW	$20,000 once off, then existing staff time to maintain	Waterway protection Reduce mains water More alternative water use	Year: 5-10	Operational	Sustainable Assets; Infrastructure

Table 15 Monitoring performance actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
P- Mon-1	Continue to monitor and report on Council's mains water and alternative (e.g. recycled, stormwater) water usage to track progress against IWAP objectives and targets.	MEDIUM	Existing staff time only	Reduce mains water More alternative water use	**Year: 1-10**	Operational	Sustainable Assets; Operations; Infrastructure
P- Mon-2	Identify opportunities to decrease the time it takes for water usage data to be available to Council (and hence allow leaks to be detected more quickly).	MEDIUM	$20,000	Reduce mains water	**Year: 5**	Operational and Capital	Sustainable Assets
P-Mon-3	Install meters on all of Council's new rainwater tanks and stormwater harvesting schemes to enable reporting, leak detection and feedback, to inform future infrastructure design and size optimisation.	MEDIUM	Include in budget for new projects	More alternative water use	**Year: 1-10**	Capital	Facilities and Infrastructure; Sustainable Assets
P-Mon-4	Advocate to the Victorian Government for a comprehensive water pollution and aquatic species testing regime in Frankston City, to better determine the causes and sources of pollution in local waterways and beaches. Following investigations, work in partnership with peak agencies and other stakeholders to address the sources of pollution through appropriate management actions, such as inspections and monitoring, education, infrastructure and enforcement.	HIGH	Existing staff time only	Waterway protection	**Year 1-10**	Operational	Planning and Environment; Community Safety; Sustainable Assets
P-Mon-5	Develop a prioritised program to install water meters on Council's community leased facilities (e.g. sporting pavilions) as needed, to better allocate water costs to responsible groups and improve reporting and leak detection.	MEDIUM	$15,000	Reduce mains water	**Year: 4-10**	Operational	Facilities; Public Space and Leisure; Operations; Sustainable Assets
P-Mon-6	Continue to identify and review Council's climate change risks in relation to IWM outcomes and implement measures to mitigate and address these risks, as needed.	LOW	Existing staff time only	Waterway protection	**Year: 2**	Operational	Sustainable Assets; Infrastructure; Operations

8.1.2 Capacity building actions

A number of capacity building actions that have the potential to assist in meeting Council's integrated water management vision, objectives and targets have been identified. The capacity building actions are grouped into those relating to Council staff and those relating to the community.

Table 16 Staff capacity building actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
C-Sta-1	Schedule a Clearwater "Maintenance of WSUD Assets Technical Training Package" for Council staff (refer clearwater.asn.au).	MEDIUM	$5,900 per instance Total: $17,700	Waterway protection	**Year: 1, 5, 10**	Operational	Sustainable Assets
C-Sta-2	Sponsor two staff members to attend a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) for local government training course (refer www.ewater.com.au, to: - Ensure monitoring against Council's integrated water management target (Total Nitrogen) - Assist in planning and designing Council's stormwater management systems.	MEDIUM	$12,000 per instance Total: $36,000	Waterway protection More alternative water use	**Year: 2, 6, 10**	Operational	Infrastructure
C-Sta-3	Arrange an internal workshop on lifecycle management of IWM assets. The objectives of the workshop are: - To ensure a common understanding of the role and responsibility of each team within Council in managing IWM assets including any gaps that need to be filled - To agree on how teams will collaborate throughout the lifecycle to ensure high quality cost effective assets	HIGH	$5,000	Waterway protection Reduce mains water More alternative water use	**Year: 3**	Operational	Infrastructure; Sustainable Assets
C-Sta-4	Actively seek funding from Melbourne Water, for example, through their *Living Rivers* program, to help build Council's internal capacity to embed integrated water management into Council and to progress initiatives within the IWAP's 10 year Implementation Plan.	HIGH	Dependent on external funding	Waterway protection Reduce mains water More alternative water use	**Year: 2-10**	Dependent on external funding	Infrastructure; Sustainable Assets
C-Sta-5	Educate staff in Council's *ESD Standards for Council Buildings*, including undertaking the 'Water' assessment for Council building projects, covering water efficiency, rainwater use and sub-metering.	MEDIUM	Existing budget allocation	Waterway protection Reduce mains water More alternative water use	**Year: 2-10**	Operational	Sustainable Assets; Facilities; Infrastructure

Table 17 Community capacity building actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
C-Com-1	Educate community on the environmental and recreation value of natural assets such as Seaford Wetlands, Kananook Creek and Sweetwater Creek.	MEDIUM	$5,000	Waterway protection	**Year: 2-10**	Operational	Planning and Environment; Public Space and Leisure; Sustainable Assets
C-Com-2	Educate the community about links between catchment management, human activities and impacts on water quality.	MEDIUM	Existing staff time only	Waterway protection	**Year: 1-10**	Operational	Planning and Environment; Community Safety; Sustainable Assets
C-Com-3	Compile an information pack for tenants of Council buildings about opportunities for IWM, including how to reduce water bills.	MEDIUM	$5,000	Reduce mains water	**Year: 6**	Operational	Sustainable Assets; Facilities; Commercial Services
C-Com-4	Educate and support the community to encourage the adoption of water sensitive actions and behaviours.	MEDIUM	Existing budget allocation	Reduce mains water	**Year: 1-10**	Operational	Sustainable Assets; Planning and Environment; Community Safety
C-Com-5	Undertake integrated water management capacity building programs for builders and developers in Frankston City.	MEDIUM	$10,000	Waterway protection Reduce mains water More alternative water use	**Year: 5-10**	Operational	Planning and Environment; Infrastructure

8.1.3 Infrastructure actions

A number of stormwater infrastructure actions that have the potential to assist in meeting Council's integrated water vision, objectives and targets have been identified. The infrastructure actions are grouped into those that would be undertaken by Council and those that Council would advocate for Melbourne Water to undertake. Costings (including a 30% contingency) have been estimated based on published data and information by Council and previous experience with the design and construction of similar systems.

All Council actions in this section would be subject to available budget, the annual budgeting process and Council priorities at the time. Some actions (e.g. stormwater treatment systems) may also attract external funding. The process used to prioritise the infrastructure actions is described in Appendix D. The infrastructure opportunities that were allocated a MCA Score of 50% or more are included in the 10 year Implementation Plan (see section 13.2 for further information on the evaluation process). This is to ensure that the projects provide best value to Council and the community, looking at both the financial benefits, as well as a broader range of economic, social and environmental factors. Additional information on each infrastructure opportunity is included in Appendix E – Infrastructure opportunities and Appendix F – Site Sheets.

Table 18 Council stormwater infrastructure actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
I-Inf-1	Allocate a capital works budget for IWM investment in Council's streetscape projects.	HIGH	$50,000/year (in addition to itemised infrastructure actions)	Waterway protection Reduce mains water More alternative water use	**Year: 2-10**	Capital	Public Space and Leisure
I-Inf-2	Ensure Council's future stormwater infrastructure opportunities are assessed in accordance with the MCA Framework included in this IWAP (or equivalent framework adopted by Council). Incorporate benefits of 'avoided flood costs' in new evaluations, where available.	HIGH	Existing budget allocation	Waterway protection Reduce mains water More alternative water use	**Year 1-10**	Operational	Infrastructure; Public Space and Leisure; Sustainable Assets
I-Inf-3	Investigate the feasibility of installing additional Gross Pollutant Traps in Council's stormwater drainage system, to capture litter and coarse sediment and prevent from entering the stormwater system and local waterways.	MEDIUM	Existing budget allocation	Waterway protection	**Year 1-10**	Operational	Infrastructure; Operations

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
F06PBH017 Design and Construct	Progress the design and construction of the Beauty Park and Frankston Park stormwater treatment and harvesting scheme.	HIGH	$574,000	Waterway protection Reduce mains water More alternative water use	**Year: 2-3**	Capital	Infrastructure; Public Space and Leisure; Operations
F06PBH004 Design and construct	Progress the design and construction of the Jubilee Park Option 1 stormwater treatment and harvesting scheme.	HIGH	$686,000	Waterway protection Reduce mains water More alternative water use	**Year: 2-3**	Capital	Infrastructure; Public Space and Leisure; Operations
F04PXH001 Design and construction	Progress the design and construction of the Banyan Reserve stormwater harvesting scheme.	HIGH	$371,000	Reduce mains water More alternative water use	**Year: 3-4**	Capital	Infrastructure; Public Space and Leisure; Operations
F07PBX002 Design and construction	Progress the design and construction of the Rosedale Grove stormwater treatment scheme.	HIGH	$364,000	Waterway protection	**Year: 3-4**	Capital	Infrastructure; Public Space and Leisure; Operations
F00PXW001	Progress the Robinsons Road Recycled Water Scheme Stage 1.	MEDIUM	Existing budget allocation	Reduce mains water More alternative water use	**Year: 1-4**	Capital	Infrastructure; Public Space and Leisure; Operations
F06PBH015 Design and construction	Progress the design and construction of the Ballam Park stormwater treatment and harvesting scheme.	HIGH	$847,000	Waterway protection Reduce mains water More alternative water use	**Year: 4-5**	Capital	Infrastructure; Public Space and Leisure; Operations
F06PBH011 Design and construction	Progress the design and construction of the Peninsula Reserve stormwater treatment and harvesting scheme.	HIGH	$489,000	Waterway protection Reduce mains water More alternative water use	**Year: 5-6**	Capital	Infrastructure; Public Space and Leisure; Operations
F02PBH001 Design and	Progress the design and construction of the Belvedere Reserve stormwater treatment and harvesting scheme.	HIGH	$756,000	Waterway protection Reduce mains water	**Year: 5-6**	Capital	Infrastructure; Public Space and Leisure;

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
construction				More alternative water use			Operations
F06PWX012 Design and construction	Progress the design and construction of the Ebdale Street Retarding Basin stormwater treatment scheme.	HIGH	$498,000	Waterway protection	**Year: 6-7**	Capital	Infrastructure; Public Space and Leisure; Operations
F02PBX005 Design and construction	Progress the design and construction of the Sandfield Reserve stormwater treatment scheme.	MEDIUM	$455,000	Waterway protection	**Year: 6-7**	Capital	Infrastructure; Public Space and Leisure; Operations
F02PWH002 Design and construction	Progress the design and construction of the Botany Park stormwater treatment and harvesting scheme.	MEDIUM	$657,000	Waterway protection Reduce mains water More alternative water use	**Year: 7-8**	Capital	Infrastructure; Public Space and Leisure; Operations
F02PWH007 Design and construction	Progress the design of the Pat Rollo Reserve stormwater treatment and harvesting scheme. NOTE: Progress the construction of this scheme if it was found to be worthwhile as an alternative to, or in conjunction with, the Monterey Recycled Water Scheme.	MEDIUM	$696,000	Waterway protection Reduce mains water More alternative water use	**Year: 8-9**	Capital	Infrastructure; Public Space and Leisure; Operations
F04PBH002 Design and construction	Progress the design and construction of the Carrum Downs Reserve stormwater treatment and harvesting scheme.	MEDIUM	$1,150,000	Waterway protection Reduce mains water More alternative water use	**Year: 9-10**	Capital	Infrastructure; Public Space and Leisure; Operations
F00PXW003	Progress the Monterey Recycled Water Scheme Stage 1.	MEDIUM	$1,800,000	Reduce mains water More alternative water use	**Year: 9-10**	Capital	Infrastructure; Public Space and Leisure; Operations
F00Maintain	Maintain Council's stormwater treatment and harvesting systems installed in accordance with this IWAP. NOTE: The estimated cost is dependent on Council implementing all of Council's infrastructure actions in the IWAP. This cost will	HIGH	$536,510	Waterway protection Reduce mains water More alternative water use	**Year: 3-10**	Operational	Operations

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
	change subject to Council's priorities.						

Table 19 Melbourne Water stormwater infrastructure actions

# Action	Description	Priority	Estimated Cost	Integrated Water Outcomes	Timeline	Budget	Responsibility – lead department appears first
F06WX007 Design and construction	Advocate for the design and construction of a Skye Road Retarding Basin stormwater treatment scheme.	HIGH	None to Council	Waterway protection	**Year: 1-2**	External	Infrastructure – advocacy and consultation
F06WX018	Advocate for the feasibility assessment of, and if viable, the Seaford Wetland Reserve stormwater treatment scheme.	HIGH	None to Council	Waterway protection	**Year 2-5**	External	Infrastructure – advocacy and consultation
F06PWX001 Design and construction	Advocate for the design and construction of a Sandgate Basin stormwater treatment scheme.	HIGH	None to Council	Waterway protection	**Year: 3-6**	External	Infrastructure – advocacy and consultation
F06PWX002	Advocate for the design and construction of a Lee Reserve Retarding Basin stormwater treatment scheme.	MEDIUM	None to Council	Waterway protection	**Year 4-7**	External	Infrastructure – advocacy and consultation
F06PWH010 Design and construction	Advocate for the design and construction of a Miles Grove stormwater treatment and harvesting scheme.	MEDIUM	None to Council	Waterway protection Reduce mains water More alternative water use	**Year: 6-9**	External	Infrastructure – advocacy and consultation
F06PWH013 Design and Construction	Advocate for the design and construction of a Peninsula Boulevard stormwater treatment and harvesting scheme.	MEDIUM	None to Council	Waterway protection Reduce mains water More alternative water use	**Year: 6-8**	External	Infrastructure – advocacy and consultation

8.2 SUMMARY OF 10 YEAR COSTS AND BENEFITS

A summary of Council's potential expenditure involved with each year of the 10 year Implementation Plan is shown in Table 20. Note that this table only includes expenditure that does not have an existing budget allocation. Implementing all of the recommended actions is estimated to cost $10.6M.

It is likely that Council's proposed stormwater treatment schemes (as part of the stormwater infrastructure actions) will attract some external funding, for example, through Melbourne Water's Living Rivers program, so it is anticipated that Council's investment will be lower than the total shown below.

Table 20 Summary of annual expenditure of the IWAP 10 year Implementation Plan

Financial year	Process Actions	Capacity Actions	Infrastructure Actions - Design	Infrastructure Actions - Construct	Infrastructure Actions - Maintain	TOTAL
Year 1	-	$5,900	-	-		$5,900
Year 2	$12,500	$17,000	$147,500	$45,000		$222,000
Year 3	$7,500	$10,000	$100,400	$1,215,000		$1,332,900
Year 4	$7,140	$5,000	$59,000	$754,000	$25,200	$850,340
Year 5	$60,480	$12,570	$120,050	$831,500	$32,550	$1,057,140
Year 6	$5,480	$23,670	$54,700	$1,200,700	$49,490	$1,334,030
Year 7	$5,480	$6,770	$87,400	$930,300	$86,830	$1,116,670
Year 8	$5,480	$6,670	$29,950	$655,350	$96,360	$793,810
Year 9	$5,480	$6,670	$5,000	$691,100	$116,080	$824,320
Year 10	$5,480	$24,570	$5,000	$2,936,200	$130,000	$3,101,240
TOTAL	**$115,000**	**$118,800**	**$609,000**	**$9,259,150**	**$536,510**	**$10,638,450**

A summary of the projected financial value associated with the infrastructure actions in the 10 year Implementation Plan is shown in Table 21. Over the life of the proposed stormwater infrastructure projects (25 year lifecycle), the estimated value of the avoided water costs is $18M (including Melbourne Water projects, where Council would be the beneficiary of the stormwater that is harvested). It can be seen that the financial value of the IWAP stormwater infrastructure actions exceeds the cost to Council of implementing the 10 year Implementation Plan.

Table 21 Summary of lifecycle financial value associated with the stormwater infrastructure actions

Year	Infrastructure action	TN reduction (kg/yr)	TN reduction value	New alternative water use (ML/yr)	Value of avoided water cost[12]	Simple financial payback (years)
COUNCIL ASSETS						
Year 3	F06PBH017 – Beauty Park and Frankston Park Stormwater Treatment and Harvesting	160	$1,063,000	8	$610,000	24
Year 3	F06PBH004 – Jubilee Park Stormwater Treatment and Harvesting Option 1	500	$3,323,000	11.4	$343,000	50
Year 4	F04PXH001 – Banyan Reserve Stormwater Harvesting	30	$199,000	10.9	$831,000	11
Year 4	F07PBX002 – Rosedale Grove Stormwater Treatment	153	$1,017,000	-	-	N/A
Year 4	F00PXW001 – Robinsons Road Recycled Water Scheme Stage 1	-	-	76	$5,750,000	3
Year 5	F06PBH015 – Ballam Park Stormwater Treatment and Harvesting	240	$1,595,000	12.8	$386,000	55
Year 6	F06PBH011 – Peninsula Reserve Stormwater Treatment and Harvesting	150	$997,000	2.3	$175,000	70
Year 6	F02PBH001 – Belvedere Reserve Stormwater Treatment and Harvesting	300	$1,994,000	14.7	$49,000	388
Year 7	F06PWX012 – Ebdale St RB Stormwater Treatment	118	$784,000	-	-	N/A
Year 7	F02PBX005 – Sandfield Reserve Stormwater Treatment	129	$857,000	-	-	N/A
Year 8	F02PWH002 – Botany Park Stormwater Treatment	50	$332,000	14.1	$1,070,000	N/A
Year 9	F02PWH007 – Pat Rollo Reserve Stormwater Treatment and Harvesting	160	$1,063,000	6.3	$480,000	36

[12] The 'value of avoided' water cost is based on the price of water that is currently being used at that site or is available for use at that site. Figure provided is the value over the asset's 25 year lifecycle.

Year	Infrastructure action	TN reduction (kg/yr)	TN reduction value	New alternative water use (ML/yr)	Value of avoided water cost[12]	Simple financial payback (years)
Year 10	F04PBH002 – Carrum Downs Reserve Stormwater Treatment and Harvesting	287	$1,907,115	17.2	$129,200	223
Year 10	F00PXW003 – Monterey Recycled Water Scheme Stage 1	-	-	93	$7,000,000	6
MELBOURNE WATER ASSETS						
Year 2	F06WX007 – Skye Rd RB Stormwater Treatment	280	$1,860,000	-	-	N/A
Year 6	F06PWX001 – Sandgate RB Stormwater Treatment	165	$1,100,000	-	-	N/A
Year 7	F06PWX002 – Lee Reserve RB Stormwater Treatment	160	$1,060,000	-	-	N/A
Year 8	F06PWH013 – Peninsula Boulevard Stormwater Treatment and Harvesting	200	$1,330,000	7.9	$604,000	44
Year 9	F06PWH010 – Miles Grove RB Stormwater Treatment and Harvesting	200	$1,330,000	8.1	$616,000	42
TOTAL		**3,282**	**$21,811,115**	**283**	**$18,043,200**	

Note: Stormwater treatment systems will not have a 'simple financial payback', hence this is shown as 'N/A or Not Applicable', as there is no avoided water cost savings for these projects.

8.3 MONITORING AND EVALUATION

Monitoring involves collection and analysis of data and information to assist timely decision-making, accountability and provide the basis for assessing progress towards achievement of objectives and targets.

The IWAP will be monitored each year by Council officers to measure progress against the 10 year Implementation Plan and the integrated water management targets. A progress report will be submitted to Council every two years.

A formal review will be undertaken after five years (2021) and at the end of the 10 year implementation period (2026). The outcomes of these reviews will be documented in a report to Council - this will help to identify if adjustments are needed in terms of resourcing, scheduling or project design.

The integrated water targets (section 6.4) in the IWAP will also be reviewed pending completion of a further feasibility assessment and prioritisation of the identified stormwater infrastructure actions.

Should changes be made to the schedule of the proposed stormwater infrastructure actions, then the targets will need to be modified accordingly.

9 REFERENCES

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10 APPENDIX A: RELEVANT POLICY, LEGISLATION, STRATEGIES AND PLANS

The following section provides a summary of federal, regional and local documents relevant to the development of the IWAP and integrated water management.

10.1.1 Federal

Australian Recycled Water Guidelines (2006): The Guidelines are based on a risk management approach, which involves anticipating potential problems associated with recycled water use and preventing them from arising.

National Urban Water and Desalination Plan (2007): This Plan aims to meet the challenge of managing water for urban and rural areas. Significant funding was made available for stormwater harvesting projects as part of the Plan.

Securing our Water Future (2010): The 10 year strategy aims to balance water needs of communities, farmers and the environment. Key priorities of the strategy include using water wisely, securing water supplies and supporting healthy rivers.

10.1.2 State

Local Government Act 1989: The Act governs the powers and functions of local government in Victoria.

State Environment Protection Policy (Waters of Victoria) (2003): Enacted under the *Environment Protection Act 1970*, the State Environment Protection Policy (SEPP) provides strategic goals, measurements and indicators for the preservation of our water environments for present and future users. SEPP documentation has been updated several times since its introduction under the *Environment Protection Act.*

Living Victoria Policy (2012): The Policy vision includes making efficient investment in Victoria's water systems, providing secure and affordable water services, reducing the state's energy and water footprints and helping communities implement local solutions to make the most of alternative water sources.

Victorian EPA Code of Practice Onsite Wastewater Management (2013): The *Environment Protection Act 1970* describes the application of 'septic tank systems' under the Onsite Wastewater Management Code of Practice. The Code of Practice provides standards and guidance to ensure the management of onsite wastewater (up to 5000 litres per day) protects public health and the environment, and uses our resources efficiently.

Victorian Waterway Management Strategy (2013): Developed by the Victorian Government, in consultation with the community, this Strategy provides a policy direction for managing Victoria's waterways over an eight year period.

Guidelines for Environmental Management: Use of Reclaimed Water (2003); Dual Pipe Recycling (2005); Health and Environmental Risk Assessment (2015): These related documents specify the

requirements associated with the implementation and ongoing management of reclaimed water recycling projects.

10.1.3 Regional

Better Bays and Waterways Plan (2009): Developed by EPA Victoria and Melbourne Water in 2009, this Plan sets out actions of more than 30 organisations, including local government, to improve Melbourne's bays and waterways, with a focus on water quality improvement.

Integrated Water Strategy for Melbourne's South East (2012): The broad ranging Strategy was prepared by South East Water, for Melbourne's south east region. It involves the identification and assessment of integrated water supply solutions that provide the greatest community benefit in this region.

Melbourne's Water Future (2013): This Victorian Government strategy adopted an integrated approach to managing the whole-of-water-cycle, to set the framework for urban water management. The framework included the development of regional whole-of-water-cycle plans for metropolitan Melbourne.

Melbourne Water Healthy Waterways Strategy (2013): Melbourne Water's Healthy Waterways Strategy provides a blueprint for the management of rivers, estuaries and wetlands in the Port Phillip and Westernport region.

Melbourne Water Stormwater Strategy (2013): Closely aligned with the Melbourne Water Healthy Waterways Strategy, the Stormwater Strategy identifies the requirement to provide an integrated approach to stormwater management in order to deliver multiple community benefits.

Plan Melbourne (2014): The Victorian Government introduced Plan Melbourne in 2014 to guide Melbourne's growth over the next 40 years. A key outcome of the document was the identification of new housing and business activity areas which can both impact and influence urban water management outcomes.

10.1.4 Local – Council policies, plans and strategies

This IWAP is a key component of Council's Planning Framework (refer Figure 17). The IWAP is one of many Council policies, strategies and plans that will help deliver Council's vision of being *"A sustainable regional capital on the Bay – vibrant, inclusive and a natural lifestyle choice."*

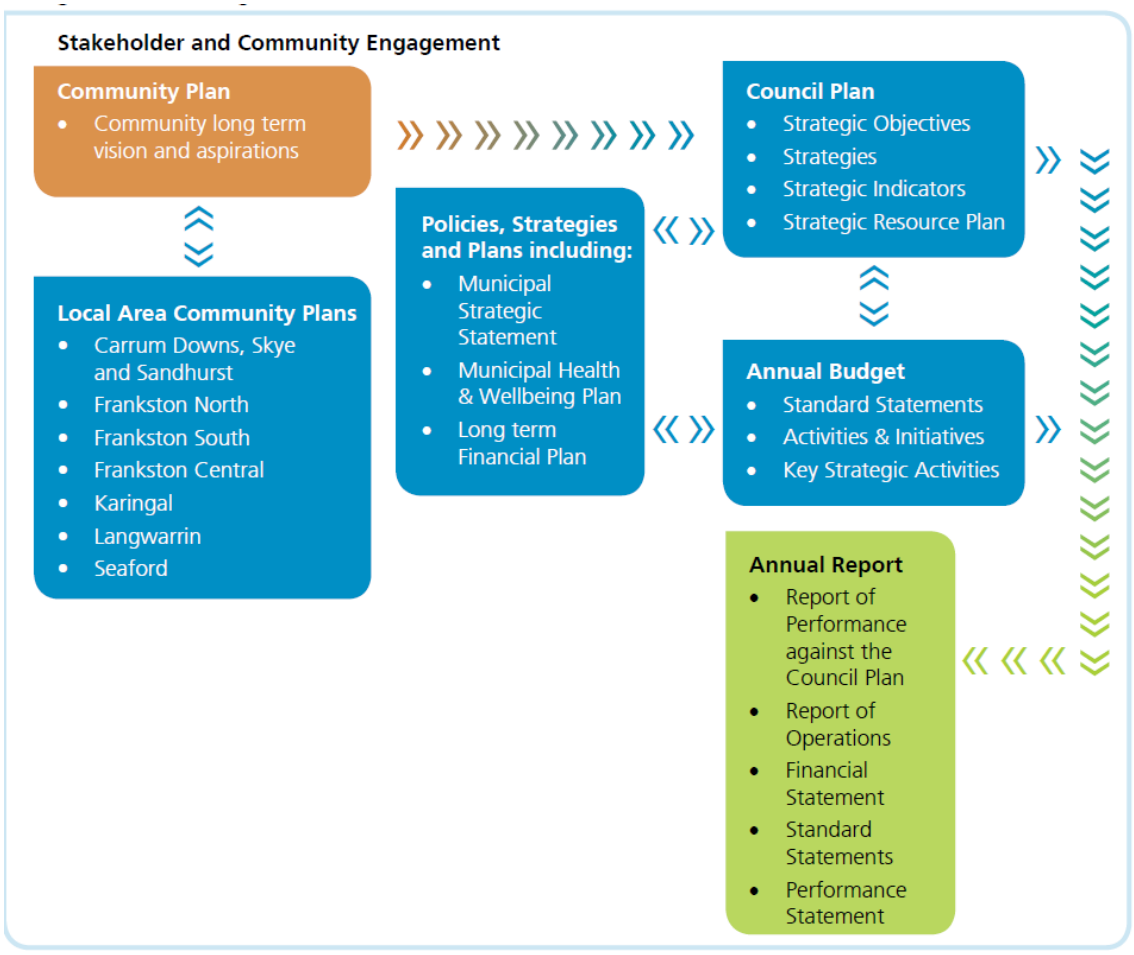


Figure 17 Council's Planning Framework[13]

Community Plan and Vision (2013-2017): The Plan and Vision were developed over three years through consultation with almost 1,500 residents and community groups. The community's vision for a sustainable city is:

"Frankston City embraces diversity and celebrates its natural assets and green spaces. Community connections are enhanced through access to high quality facilities that enable integrated community services to be provided and offer access to ample recreational opportunities. The green and leafy streetscapes, good amenities and environmental assets combine to present a positive City image."

Investigating cost effective ways of efficiently keeping the city's beaches, creeks and waterways clean is identified as an emerging community need in the Community Plan.

Council Plan (2013-2017): The Plan aims to set the strategic objectives, actions and indicators for Council through to 2017. It includes the vision of Frankston City being *"A sustainable regional capital on the Bay – vibrant, inclusive and a natural lifestyle choice."* Three long term community outcomes are identified as:

1. Planned City

[13] Source: Frankston City Council, Council Plan 2013-2017, frankston.vic.gov.au

2. Liveable City
3. Sustainable City

Priority actions for achieving the sustainable city outcome include influencing industry and residents to reduce water use and protecting and maintaining key natural assets.

Municipal Strategic Statement (MSS): The MSS sets out the vision objectives and strategies for managing land use change and development. Frankston City's MSS notes that the municipality's bayside location is a defining feature and that the natural environment encompasses a number of environmentally significant creeks and wetland areas. The MSS identifies that population is expected to grow and the average household size decrease which means that the number of dwellings will increase. Council's Planning Scheme (including the MSS) is reviewed over time to ensure it is consistent with the Council Plan and is consistent with, and gives effect to, state and local policy directions.

Sustainability Policy: This Policy aims to embed triple bottom line decision-making and practices into Council to ensure environmental protection, promotion of local economic prosperity and support for community development, diversity and culture into the future.

Environmental Sustainability Policy: This Policy gives explicit directions to Council regarding environmental actions, including enhancing and protecting the natural environment, using material resources in a highly efficient manner and wherever possible replacing non-renewable resources. The Policy principles include improving the quality of water for future generations and replacing non-renewable resources with renewable resources.

Greening our Future – Frankston City's Environment Strategy (2014-2024): The Strategy identifies actions to deliver Council's Environmental Sustainability Policy and gives an overarching framework for achieving an innovative, environmentally sustainable future. The Strategy illustrates the relationships between Council's existing environmental strategies and plans (including the IWAP) – refer Figure 18. A community Environment Survey was undertaken in 2011 during the development of the Strategy. The survey results show that water quality in creeks was identified as the highest priority environmental management area that the community wants Council to address.

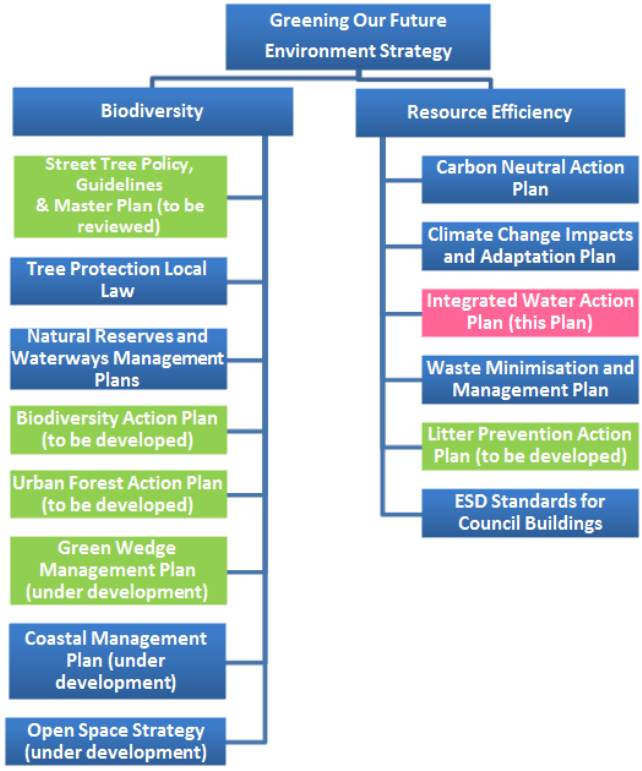


Figure 18 Framework of existing sub-plans and strategies of the Council's overarching Environment Strategy

Stormwater Management Plan (2001): The Plan is an internal Council document to guide improvement in environmental stormwater management. It provides recommendations for protecting and enhancing environmental values in receiving waterways. 90% of the actions from the Plan have been implemented.

Sustainable Water Use Plan (2006): This 10-year Plan outlines Council's commitment to a range of strategies, actions and goals to reduce mains water usage, improve water quality and manage the use of groundwater and recycled water. The majority of actions in the Plan have been implemented and the IWAP will now supersede the Sustainable Water Use Plan.

Water Sensitive Urban Design Guidelines (2012): Developed by Council in 2012, the Guidelines aim to provide clarity and consistency to developers and Council when implementing Water Sensitive Urban Design (WSUD) projects within the municipality.

Open Space Strategy (2016): The Strategy vision is to achieve a green, safe, diverse and connected network of resilient open spaces, that contributes to Frankston's identity, biodiversity value and promotes active and healthy lifestyles, now and into the future. The Strategy includes an action to develop and implement Council's IWAP and has a range of related water targets.

Frankston Housing Strategy (2013): The Strategy focuses on likely population and housing demands in Frankston City to 2031. The Strategy includes an action to continue to include WSUD in the

assessment of new housing developments. It also identifies the need to incorporate environmentally sustainable design (ESD) principles into new and existing residential development.

Frankston City Flood Management Plan (2011): The Plan outlines roles and responsibilities for Melbourne Water and Council to manage the risks associated with flooding. It also aims to foster preparedness for flood events and an ability to respond in an informed and appropriate manner.

Drainage Strategies and subsequent modelling (various): Council has a number of drainage strategies it is implementing, outlining actions to address drainage issues and upgrades to drainage systems within Frankston City, where needed.

11 APPENDIX B: EXISTING WATER MANAGEMENT ASSETS

11.1 RAINGARDENS (ALL COUNCIL ASSETS)

Suburb	Site	Catchment area (m^2)	Completed	Location	Owner
Seaford	Seaford Shopping Centre	7,430	2008/09	Along Nepean Hwy strip parking (2 installed, 1 outstanding)	Council
	Chapman Avenue	1,450	2010/11	Car park	Council
	Broughton Reserve	650	2010/11	Car park	Council
	Boonong Avenue and Dandenong Road West	4,240	2008/09	Dandenong Road	Council
	Keast Park	2,000	2009/10	Keast Park redevelopment, Car Park and Nepean Hwy runoff	Council
	Seaford Lifesaving Club	4,000	2005/06	Car park	Council
Frankston South	Delacombe Park	950	2009/10	Car park	Council
Frankston	Heatherhill Road	3735	2011/12	Car park	Council
	George Pentland Botanic Gardens	2,150	2011/12	Stormwater treatment for pond supply. Series of raingardens from stormwater pipes on Williams Street	Council
	The Mall (Overport Road)	850	2011/12	Car park	Council
	Beach Street East	775	2008/09	Car park	Council
	Bloom Street	1,375	2012/13	Road reserve	Council
		840	2012/13	Road reserve	Council
		900	2012/13	Road reserve	Council
	Roberts Street	1,000	2012/13	Road reserve	Council

Suburb	Site	Catchment area (m^2)	Completed	Location	Owner
		1,000	2012/13	Road reserve	Council
	The Porch	3,800	2004/05	Car park	Council
	The Porch	900	2004/05	Car park	Council
	Frankston-Flinders Service Road	8,000	2012/13	Car park	Council
Langwarrin	Kingston Road	35,000	2005/06	Road reserve	Council
	9 Bevnol Road	250	2004/05	Garden	Private
Carrum Downs	Banyan Reserve			(combined with wetland)	MW

11.2 WETLANDS (ALL MELBOURNE WATER ASSETS)

Suburb	Address	Completed
Carrum Downs	85 Robinson Road	
	105M Colemans Road	
	14S Elite Way	2006
	18S Lakewood Boulevard	2006
	Banyan Reserve (combined with bioretention)	
	Confluence of Boggy Creek and Eel Race Drain	2006
Skye	Sandhurst Boulevard	2005
	19 Niblick Circuit	2005

11.3 GROSS POLLUTANT TRAPS (ALL COUNCIL ASSETS)

Suburb	Address	Constructed	File number
Frankston / Frankston South	3N Pier Promenade	2001	GPT
	Kananook Creek Boulevard	2002	DWG D530
	51N High Street	2001	P111/015
	452 Nepean Highway	2002	DWG D532
	16N Cranbourne Road	2014	B465
	16N Cranbourne Road	2014	B465
	490 Nepean Highway	2001	GPT
Skye	18 Veronica Drive	2001	PSB 974
	Santa Clara Mews	2010	PSB1417
	Santa Clara Mews	2010	PSB1417
Carrum Downs	100 Ballarto Road	2000	PSB 839
Langwarrin	2R North Road	2002	PSB 986
	2R North Road	2002	PSB 986
	36M Apple Berry Avenue	2003	PSB 1046
	Apple Berry Avenue	2004	PSB 1082
	Pindara Boulevard - Snowbush Link	2006	PSB 1128
	Raneen Drive	2009	PSB1369
	4M Pindara Boulevard	2002	PSB 968
	Black Wallaby Drive	2006	PSB 1260/02
	Olive Rose Grove	2011	PSB1494
Seaford	Broughton Street	2000	LITTER TRAP

11.4 RAINWATER TANKS (ALL COUNCIL ASSETS)

Suburb	Location	Capacity (kL)	Catchment (m^2)	Completed	Used for	Potential rainwater available (ML/yr)
Frankston	Meals on Wheels Kitchen	5	185	Jan 11	Toilets	0.096
	Ballam Park Public Toilets	6	630	Mar 06	Toilets	0.325
	Ballam Park Homestead and Open Space	60	290	May 10	Toilets / Irrigation	0.15
	Frankston Park - Grandstand	30	480	Jan 11	Toilets	0.248
	Mechanics Hall	12	140	Jan 12	Toilets	0.072
	George Pentland Botanic Gardens – Administration Area	6	140	Feb 10	Toilets / Nursery	0.072
	George Pentland Botanic Gardens – Administration Area	12.5	140	Jun 08	Toilets / Nursery	0.072
	Montague Park Preschool	7	400	Jan 10	Toilets	0.207
	Karingal PLACE	75	1,400	Dec 09	Toilets / Irrigation	0.723
	Frankston Tennis Club	33.8	268	Feb 08	Tennis Courts / Toilets	0.138
	Peninsula Aquatic and Recreation Centre	400	4,950	2013/14	Toilets	2.5
Frankston North	Pines Forest Aquatic Centre	10	683	Mar 08	Toilets	0.353
	Pines Forest Aquatic Centre	90	531	Nov 04	Toilets / Irrigation	0.274
	Wirilda Preschool	3	100	Oct 10	Toilets	0.052
Frankston South	Frankston South Community and Recreation Centre	62	520	Mar 05	Toilets	0.269
Skye	Skye Recreation Reserve - Pavilion	20	355	Mar 10	Toilets	0.183
	Skye Recreation Reserve (only used for storing bore water)	250	0	Apr 14	Irrigation	Unknown
Carrum	Carrum Downs Library &	5	600	Jun 11	Toilets	0.31

Suburb	Location	Capacity (kL)	Catchment (m^2)	Completed	Used for	Potential rainwater available (ML/yr)
Downs	Lyrebird Community Centre					
	William Road Preschool	2	100	Jul 10	Toilets	0.052
Seaford	Keast Park Community Pavilion	60	260	2010/11	Toilets	0.134
	Seaford Lifesaving Club	10.3	1,600	Nov 08	Wash-down	0.827
	Seaford Lifesaving Club	9.6	400	Nov 08	Wash-down	0.207
	Riviera Maternal & Child Health Centre	5	100	Jun 11	Toilets	0.052
	Frankston BMX Track	2.1	35	Jan 08	Toilets	0.018
	Operations Centre	90	540	Apr 07	Nursery	0.279
	Operations Centre	257	3,155	Oct 07	Various	1.63
	Operations Centre	0.6	235	Jan 01	Toilets	0.121
	Kananook Preschool	5	215	Jun 10	Toilets	0.111
	Belvedere Reserve (only used for storing recycled water)	250	0	Jan 11	Sports ground	16 (recycled water only)
	East Seaford Reserve - Pavilion	2.7	100	Sep 12	Toilets	0.052
Langwarrin	Langwarrin Community Centre	0.6	520	Sep 03	Toilets	0.269
	Lawton Reserve (only used for storing bore water and rainwater)	107	880	Jan 12	Irrigation	0.45 (rainwater only)

11.5 STORMWATER HARVESTING SCHEMES (ALL COUNCIL ASSETS)

Suburb	Site name	Capacity (kL)	Completed	Use for:	In use
Frankston	George Pentland Botanic Gardens	152	Aug 12	Irrigation of lawns and gardens	Yes

11.6 BORES

Suburb	Site name	Application	In use
Seaford	Riviera Link	Test bore - too salty	Not Applicable
Frankston	Ballam Park (McClelland College)	Sports ground	YES
	Samuel Sherlock Reserve	Sports ground	NO
Skye	Skye Recreational Reserve	Sports ground	NO
Langwarrin South	Lawton Reserve	Sports ground	YES
Langwarrin	Lloyd Park Reserve	Sports ground	YES

11.7 CLASS A RECYCLED WATER SITES (COUNCIL)

Suburb	Site name	Completed	Water use	Approx. recycled water usage (ML/yr)
Seaford	Belvedere Reserve	2008	Sports ground	27
Frankston	Ballam Park	2010	Sports ground	13
	Jubilee Park	2010	Sports ground	11
Frankston North	McClelland Reserve & Centenary Park Golf Course	Reserve – 2008. Golf course – pre 2000	Sports grounds	63
Frankston South	Baxter Park	Pre 2000	Sports ground	6
Carrum Downs	Carrum Downs Reserve	Pre 2000	Sports ground	10
Langwarrin	Lloyd Park	2010	Sports ground	13

11.8 MELBOURNE WATER RETARDING BASINS (RB)

No.	Name	Suburb
1	Banyan Reserve	Carrum Downs

No.	Name	Suburb
2	O'Grady's Road	Carrum Downs
3	Miles Grove	Seaford
4	Wells Road	Seaford
5	McCulloch Ave	Seaford
6	Karingal Hub	Karingal
7	Colbert Court	Frankston South
8	Claude Street	Seaford
9	Lee Street	Frankston
10	Long Island	Frankston
11	Sandgate Avenue	Frankston
12	Skye Road	Frankston
13	Wingham Park	Frankston
14	Langwarrin South	Langwarrin South
15	Little Boggy Creek	Langwarrin
16	Nursery Avenue	Frankston
17	Garden Brae Court	Langwarrin South

11.9 MELBOURNE WATER PUMP STATIONS

#	Name	Suburb
1	Kananook Creek	Seaford
2	PARC	Frankston
3	Weatherston Road	Seaford
4	Bardia Avenue	Seaford
5	Wadsley Drain	Carrum Downs
6	James Street	Seaford
7	McCulloch Avenue	Seaford
8	Buna Avenue	Seaford

12 APPENDIX C: PROCESS USED TO IDENTIFY INFRASTRUCTURE OPPORTUNITIES

12.1 METHODOLOGY

The process for identifying the stormwater infrastructure opportunities included the following:

- Background documentation, work plans and information were reviewed and discussions were held with Councillors and a variety of Council staff regarding existing proposals. Projects that were identified as relevant were documented. This included several proposals associated with the extension of existing recycled water networks.
- Aerial photos were analysed to determine a preliminary list of 50 locations likely to be suitable for stormwater treatment. Locations were selected based on the proximity of unencumbered open space, drainage lines and the upstream catchment area. The area available for treatment, including an allowance for batters and hydraulic structures etc. were estimated for each site. The location of each potential treatment system was then located on a GIS layer.
- The location of irrigation and other non-potable demands provided by Council staff were then identified and marked in a GIS layer. Where demands are located within the vicinity of an existing or potential treatment system, a stormwater harvesting assessment was undertaken.
- Comprehensive field inspections were then undertaken for all identified sites to ground-truth their suitability for construction and maintenance. Key considerations for the field inspections were determining the approximate levels of inlets and outlet locations relative to the potential treatment area. Relative levels were assessed visually (i.e. no survey was proposed). Other site specific constraints and opportunities were also considered (e.g. presence of trees or other valuable vegetation, value of land as active space etc.).
- The catchment area for each opportunity was confirmed using drain alignments and contours in Council's GIS files. A GIS layer with catchment names and areas was created. This layer will ultimately be provided to Council to support future projects related to water management and provide a consistent means of tracking future works across the municipality.
- To model stormwater runoff volumes and pollutant loads, an estimate of catchment percentage imperviousness was required. The percentage of imperviousness is commonly estimated based on land use. Previous assumptions from the Frankston City Integrated Water and Pollutant Balance were assessed and adopted for the IWAP.
- The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) was then used to determine reductions in pollutant loads and stormwater runoff volumes for each opportunity.
- In addition to the previously identified recycled water projects, a sewer mining case study was also identified in the options analysis. Council and other local government information was used in the assessment of these opportunities.
- Existing Council data regarding rainwater harvesting infrastructure was also used to develop four case studies for inclusion in the infrastructure opportunity analysis.

- Two raingarden case studies were also included. MUSIC modelling was undertaken at two sites to identify the requirements to meet Best Practice standards.
- An estimate of capital and operational costs for each opportunity was calculated based on published data and information provided by Council and previous experience with the design and construction of similar systems. It was assumed that all stormwater treatment and harvesting opportunities have a 25 year lifecycle. The lifecycle cost was estimated by summing the capital costs and 25 times the annual (operational) cost.

A clearly formatted spreadsheet was created to record all relevant details for each identified opportunity (e.g. nominal treatment area, recommended treatment type, which of the eight Council catchments it is within, the reduction in pollutant loads achieved, the volume of alternative water supply provided and the estimated project costs (capital and operational). Each infrastructure opportunity was assigned a unique code to identify the location and opportunity type.

Discussion was sought on the proposed opportunities (e.g. additional options and/or modifications to those identified) including dialogue on any assumption relating to the design, capital and maintenance costs.

Where competing alternative supplies were identified, consideration was given to the long term costs and benefits associated with the reuse opportunities and a hierarchy of supply identified.

Finally, the opportunities were ranked by Council's Project Working Group with the results providing an input into future Council work programs.

12.2 ASSET TYPES

12.2.1 Stormwater treatment and harvesting

Fifty stormwater treatment and harvesting opportunities were initially identified using Geographic Information System (GIS) software (MapInfo). These opportunities were further investigated through site audits, pollutant and water modelling (MUSIC) and financial evaluation.

The options were presented to Council staff for feedback and input. This ensured that the stormwater treatment/harvesting scheme did not have an unacceptable bearing on existing or proposed community use or plans in parks and open space. After input from Council stakeholders, these stormwater treatment opportunities were developed and evaluated.

12.2.2 Recycled water

The relative costs and benefits of four opportunities involving extension of the recycled water distribution networks were investigated. This included:

- Robinsons Road Recycled Water Project Stage 1 (in progress)
- Robinsons Road Recycled Water Project Stage 2
- Monterey Recycled Water Scheme
- Frankston Recycled Water Project – Western Scheme Stages 3 & 4

The opportunity for a standalone sewer mining system based on previous Australian experience was also explored and compared amongst the infrastructure opportunities.

12.2.3 Rainwater tanks for Council buildings

Council has previously installed a number of rainwater tanks at varying scales to collect runoff from the roofs of Council buildings. Four realistic rainwater tank scenarios were included in the evaluation of infrastructure opportunities to allow the relative costs and benefits of rainwater tanks to be compared to other infrastructure opportunities.

12.2.4 Street scale raingardens

Small scale raingardens have been implemented by Council within the Frankston municipality for the treatment of stormwater.

Two street scale raingarden infrastructure opportunities were included in the analysis:

1. Installing raingardens as part of the Belvedere Reserve carpark development
2. A hypothetical system in Beach Street.

12.2.5 Passive street tree irrigation

A typical installation of a passive street tree irrigation system was included in the analysis. The system involves diverting low flows from the kerb into an infiltration trench adjacent to street trees to provide soil moisture. These systems have successfully been used by many Victorian councils, including Frankston City Council.

12.2.6 Permeable paving

A typical installation of the use of permeable paving around newly installed street trees was included in the analysis. This technique is already being used by Council to provide a cost effective method for providing adequate water for establishing street trees.

13 APPENDIX D: EVALUATION OF OPPORTUNITIES

Opportunities were evaluated in order to prioritise the IWAP actions. This section describes the methods used to prioritise the process, capacity building and infrastructure opportunities.

13.1 EVALUATION OF PROCESS AND CAPACITY BUILDING OPPORTUNITIES

The likely impact of each process and capacity building opportunity was assessed and scored using the factors described in Table 22. The scores were used to assign a priority to each opportunity (refer Table 23 and following tables).

Table 22 Scoring method for process and capacity building opportunities

Factor	Score = 1	Score = 2	Score = 3
Environmental	Limited positive environmental outcomes	Intermediate positive environmental outcomes	High positive environmental outcomes
Economic	High negative economic impact (unfunded, with a significant outlay and limited quantifiable returns)	Intermediate negative economic impact (unfunded, with a significant outlay but with good return on investment)	Limited negative or positive economic impact (funded, or unfunded (with a small outlay and good return on investment))
Social	Limited positive social outcomes	Intermediate positive social outcomes	High positive social outcomes
Governance	Limited positive governance outcomes	Intermediate governance outcomes	High positive outcomes

Table 23 Relationship between impact score and implementation priority

Total Score	Implementation priority
10-12	HIGH
7-9	MEDIUM
0-6	LOW

Table 24 Governance actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
P-Gov-1	Develop an intra-council Integrated Water Management (IWM) working group to progress and periodically review Council's IWM development standards and IWAP implementation.	2	3	2	3	10	HIGH
P-Gov-2	Participate in regular inter-Council IWM working group meetings to share ideas and resources and learn from each other's experiences.	2	3	2	3	10	HIGH
P-Gov-3	Develop an agreement with Melbourne Water regarding stormwater management in the Frankston municipality, to clarify the roles and responsibilities of each organisation, including Maintenance Agreements.	2	2	2	3	9	MEDIUM
P-Gov-4	Evaluate and report back to Council on the IWAP and progress against the 10 year Implementation Plan and targets.	1	1	1	3	6	LOW
P-Gov-5	Ensure Council's Water Sensitive Urban Design (WSUD) Asset Register and related GIS modules are kept up to date and available and used by all relevant staff.	1	1	1	3	6	LOW

Table 25 Policy actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
P-Pol-1	Implement Council's Municipal Strategic Statement (MSS) and update over time to support integrated water management within the municipality.	2	3	2	2	9	MEDIUM
P-Pol-2	Ensure Council's IWM standards and advice are consistently and clearly communicated.	2	3	1	1	7	MEDIUM
P-Pol-3	Define, document and communicate required features of stormwater treatment systems that make them resilient and cost effective to maintain.	3	2	1	2	8	MEDIUM
P-Pol-4	Develop enhanced planning controls to require IWM for all development within the municipality - including infill, industrial and commercial development.	3	2	1	3	9	MEDIUM
P-Pol-5	Create standard planning permit drainage conditions that are clear and specific. Ensure conditions are consistent with Council's WSUD Guidelines.	3	2	2	3	10	HIGH
P-Pol-6	Investigate a stormwater quality offset scheme (i.e. developer contributions to regional stormwater quality infrastructure in lieu of development scale infrastructure).	3	3	2	2	10	HIGH
P-Pol-7	Investigate mechanisms for managing filling on rural properties (e.g. to ensure overland flow paths are not blocked).	1	1	2	2	6	LOW
P-Pol-8	Develop planning permit conditions for managing saline groundwater pumped out of car parking basements.	3	2	2	2	9	MEDIUM
P-Pol-9	Review Council's Flood Management Plan and Drainage Strategies and	1	2	3	3	9	MEDIUM

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
	commence development of new plans/strategies.						
P-Pol-10	Implement Council's *ESD Standards for Council Buildings.*	3	2	3	2	10	MEDIUM
P-Pol-11	Continue to implement Council's obligations in the Kananook Creek Corridor Management Plan, subject to DELWP's independent review of the management arrangements for Kananook Creek.	3	2	3	3	11	HIGH
P-Pol-12	Advocate to Melbourne Water for the development and implementation of waterway management plans for Frankston City's priority waterways, to establish a coordinated and strategic direction and to prioritise works for the next 10-15 years, in close consultation with Council and local communities.	3	2	3	1	9	MEDIUM
P-Pol-13	Finalise Council's *Coastal Management Plan* to identify integrated water management priorities for the foreshore and coastal areas within Frankston City.	2	2	3	2	9	MEDIUM
P-Pol-14	Advocate to other levels of government for stronger planning controls and regulations to achieve improved IWM outcomes.	3	2	3	3	11	HIGH
P-Pol-15	Develop and implement Council's Domestic Wastewater Management Plan to better manage wastewater and protect public health and the environment.	3	2	3	2	10	HIGH
P-Pol-16	Continue to apply and enforce Council's Building and Works Code of Practice to ensuring that stormwater contamination from building sites is minimised and managed.	3	2	3	3	11	HIGH

Table 26 Development assessment actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
P-Dev-1	Review Council's WSUD Guidelines to better communicate Council's standards and requirements for external WSUD development projects and to improve developer compliance.	2	2	3	2	9	MEDIUM
P-Dev-2	Ensure proposed designs for stormwater treatment and harvesting systems are referred to Council's Operations Department for feedback before they are approved.	2	3	1	2	8	MEDIUM
P-Dev-3	Ensure maintenance costs for planned IWM assets are estimated by relevant maintenance teams and that these costs are included in relevant maintenance budget forecasts and Project Implementation Plans.	3	3	2	2	10	HIGH

Table 27 Managing existing assets actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
P-Man-1	Undertake an audit of all Council's existing stormwater treatment and harvesting systems to determine their current condition and expected remaining lifetime.	3	2	2	3	10	HIGH
P-Man-2	Following the audit above, develop a maintenance schedule and corresponding budget for Council's stormwater treatment and harvesting systems.	3	2	2	3	10	HIGH
P-Man-3	Develop a clear written agreement between Council, Melbourne Water and Parks Victoria (e.g. Memorandum of Understanding) regarding the management responsibilities of Kananook Creek.	3	2	2	2	9	MEDIUM
P-Man-4	Develop a hierarchy for water sources to be used for Council's maintenance activities.	3	2	1	2	8	MEDIUM
P-Man-5	Investigate options for capturing sediment removed from pits and pipes and develop a "practice note" or equivalent to describe the adopted method.	3	2	2	1	8	MEDIUM
P-Man-6	Assess the environmental impacts of Council's new IWM projects through Project Implementation Plans, to ensure they do not significantly impact threatened species or ecological communities, or significantly disrupt natural processes.	3	3	3	3	12	HIGH
P-Man-7	Develop an IWM asset lifecycle cost database – for Council and gifted assets from private developments – to better understand the full lifecycle cost implications for IWM projects.	1	2	1	2	6	LOW

Table 28 Monitoring performance actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
P- Mon-1	Continue to monitor and report on Council's mains water and alternative (e.g. recycled, stormwater) water usage to track progress against IWAP targets.	3	3	1	2	9	MEDIUM
P- Mon-2	Identify opportunities to decrease the time it takes for water usage data to be available to Council (and hence allow leaks to be detected more quickly).	3	3	1	2	9	MEDIUM
P-Mon-3	Install meters on all Council's new rainwater tanks and stormwater harvesting schemes to enable reporting, leak detection and feedback to inform future infrastructure design and size optimisation.	3	3	1	2	9	MEDIUM
P-Mon-4	Advocate to the Victorian Government for a comprehensive water pollution and aquatic species testing regime, to better determine the causes and sources of pollution in local waterways and beaches. Following investigations, work in partnership with peak agencies and other stakeholders to address the sources of pollution through appropriate management actions, such as inspections and monitoring, education, infrastructure and enforcement.	3	3	2	3	11	HIGH
P-Mon-5	Install water meters on Council's community leased facilities (e.g. sporting pavilions) as needed, to better allocate water costs to responsible groups and improve reporting and leak detection.	3	3	1	2	9	MEDIUM

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
P-Mon-6	Continue to identify and review Council's climate change risks in relation to IWM outcomes and implement measures to mitigate and address these risks, as needed	1	1	2	2	6	LOW

Table 29 Staff capacity building actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
C-Sta-1	Schedule a Clearwater "Maintenance of WSUD Assets Technical Training Package" for Council staff (refer clearwater.asn.au).	2	2	2	2	8	MEDIUM
C-Sta-2	Sponsor two staff members to attend a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) for local government training course (refer ewater.com.au, to: - Ensure monitoring against Council's integrated water management target (Total Nitrogen) - Assist in planning and designing Council's stormwater management systems	2	2	1	2	7	MEDIUM
C-Sta-3	Arrange an internal workshop on lifecycle management of IWM assets. The objectives of the workshop are to: - Ensure a common understanding of the role and responsibility of each team within Council in managing IWM assets including any gaps that need to be filled - Agree on how teams will collaborate throughout the lifecycle to ensure high quality cost effective assets	3	3	1	3	10	HIGH
C-Sta-4	Actively seek funding from Melbourne Water, for example, through their *Living Rivers* program, to help build Council's internal capacity to embed integrated water management into Council and to progress initiatives within the IWAP's 10 year Implementation Plan.	3	2	2	3	10	HIGH
C-Sta-5	Educate staff in Council's *ESD Standards for Council Buildings*, including undertaking the 'Water' assessment for Council building projects.	3	1	2	2	8	MEDIUM

Table 30 Community capacity building actions

# Action	Description	Enviro Score	Economic Score	Social Score	Governance Score	Total Score	Priority
C-Com-1	Educate community on the environmental and recreation value of natural assets such as Seaford Wetlands, Kananook Creek and Sweetwater Creek.	2	2	3	1	8	MEDIUM
C-Com-2	Educate the community about links between catchment management, human activities and impacts on water quality.	3	2	2	1	8	MEDIUM
C-Com-3	Compile an information pack for tenants of Council buildings about opportunities for IWM, including how to reduce water bills.	3	2	3	1	9	MEDIUM
C-Com-4	Educate and support the community to encourage the adoption of water sensitive actions and behaviours.	3	2	3	1	9	MEDIUM
C-Com-5	Undertake integrated water management capacity building programs for builders and developers in Frankston City.	3	2	2	1	8	MEDIUM

13.2 EVALUATION OF INFRASTRUCTURE OPPORTUNITIES

Table 31 shows the infrastructure opportunities and their value-to-cost ratio, multiple criteria analysis score and their priority. Opportunities with a:

- MCA Score greater than or equal to 65% are included in the 10 year Implementation Plan as high priority actions
- MCA Score greater than or equal to 50%, but less than 75%, are included in the 10 year Implementation Plan as medium priority actions
- MCA Score less than 50% but involve stormwater harvesting and/or have the potential to mitigate nuisance flooding, are not included in the 10 year Implementation Plan, but are still included in Appendix E as potential future opportunities.

Table 31 Prioritised stormwater infrastructure opportunities using the MCA score (including financial value/cost ratio)

Code	Location	Value/cost ratio	MCA Score	Priority
F06PBH004	Jubilee Park Stormwater Treatment and Harvesting Option 1	3.56	90%	HIGH
F06PBH017	Beauty and Frankston Park Stormwater Treatment and Harvesting	1.94	78%	HIGH
F07PBX002	Rosedale Grove Stormwater Treatment	2.23	78%	HIGH
F06PBH015	Ballam Park Stormwater Treatment and Harvesting	1.56	73%	HIGH
F06PWX007	Skye Road Retarding Basin Stormwater Treatment (MELBOURNE WATER ASSET)	1.76	70%	HIGH
F06PBH011	Peninsula Reserve Stormwater Treatment and Harvesting	1.37	68%	HIGH
F02PBH001	Belvedere Reserve Stormwater Treatment and Harvesting	1.54	65%	HIGH
F06PWX012	Ebdale Street Retarding Basin Stormwater Treatment	1.26	65%	HIGH
F06PWX001	Sandgate Retarding Basin Reserve (MELBOURNE WATER ASSET)	1.24	65%	HIGH
F04PXH001	Banyan Reserve Stormwater Harvesting	2.22	63%	HIGH
F02PBX005	Sandfield Reserve Stormwater Treatment	1.51	63%	MEDIUM
F06PWH010	Miles Grove Retarding Basin Stormwater Treatment (MELBOURNE WATER ASSET)	1.26	63%	MEDIUM
F02PWH002	Botany Park Stormwater Treatment and Harvesting	1.22	63%	MEDIUM
F06PWH013	Peninsula Boulevard (MELBOURNE WATER ASSET)	1.21	63%	MEDIUM

Code	Location	Value/cost ratio	MCA Score	Priority
F02PWH007	Pat Rollo Reserve Stormwater Treatment and Harvesting[14]	1.48	60%	MEDIUM
F04PBH002	Carrum Downs Reserve Stormwater Treatment and Harvesting	1.01	60%	MEDIUM
F06WH003	Jubilee Park Stormwater Treatment and Harvesting Option 2[15]	0.88	58%	MEDIUM
F00PXWP003	Monterey Recycled Water Scheme Stage 1	2.89	50%	MEDIUM
F00PXW001	Robinsons Road Recycled Water Project Stage 1	4.59	50%	MEDIUM
F06PWX002	Lee Reserve Retarding Basin (MELBOURNE WATER ASSET)	0.95	50%	MEDIUM
F02PBX003	Carrum Downs Rotary Park Stormwater Treatment	0.99	48%	LOW
F02PWX004	Rotary Reserve – Greenwood Drive	0.73	45%	LOW
F08PWH001	Baxter Park Stormwater Treatment (MELBOURNE WATER ASSET)	0.56	43%	LOW
F00PXS001	Large scale sewer mining[16]	1.60	35%	LOW
F00PXW002	Robinsons Road Recycled Water Project Stage 2	1.82	33%	LOW
Various	Rainwater tanks on Council	0.59 (average)	26%	LOW

[14] Note that the Pat Rollo Reserve stormwater harvesting scheme provides irrigation water that would also be met as part of the Monterey Recycled Water Scheme. It is recommended that the stormwater and recycled water scheme are progressed in parallel to enable a more detailed comparison of the benefits of using stormwater and/or recycled water to meet the irrigation demand.

[15] Note that the Jubilee Park stormwater treatment and harvesting scheme - Option 2 was not included in the 10 year Implementation Plan, as the Jubilee Park stormwater treatment and harvesting scheme - Option 1 scored significantly better in the MCA.

[16] Note that the large scale sewer mining opportunity was not included in the 10 year Implementation Plan, as the Robinsons Road Recycled Water Scheme scored significantly better in the MCA.

Code	Location	Value/cost ratio	MCA Score	Priority
	buildings			
Various	Passive street tree irrigation	0.55	48%	LOW
F00PXW004	Frankston Recycled Water Project - Western Scheme Stages 3 & 4	0.39	20%	LOW
Various	Streetscape scale raingardens	0.28 (average)	38%	LOW

14 APPENDIX E: INFRASTRUCTURE OPPORTUNITIES

14.1 SUMMARY

During development of the IWAP, many stormwater infrastructure opportunities were identified, compared and prioritised. Some of the stormwater opportunities involve infrastructure on Melbourne Water land that would become Melbourne Water (MW) assets. Melbourne Water would therefore be the lead agency in designing and constructing these assets. The IWAP 10 year Implementation Plan includes actions for Council to advocate for the construction of these MW assets, and work with Melbourne Water to ensure they deliver best value to Frankston City.

14.1.1 Council

Table 32 shows the original Council stormwater infrastructure opportunities that were found to be feasible based on a desktop assessment, site visits and in consultation with Council.

Table 32 Council stormwater infrastructure opportunities

Location and code	Description
Belvedere Reserve (F02PBH001)	Flow is diverted from the existing Melbourne Water drain via a 20 L/s pump. The diverted stormwater is then distributed over a 450 m^2 bioretention cell located between two existing ovals. Once treated, the flows enter a 500 kL below ground tank where it will provide 75% of the site's annual irrigation demand.
Botany Park (F02PWH002)	Botany Park currently operates as a flood retarding basin. Under low flow conditions a 40 L/s pump diverts flows from the existing Melbourne Water drain to a 1,300 m^2 constructed wetland at the western end of the park. The wetland is set down in the landscape to ensure that it doesn't negatively impact on the parks function as a retarding basin or as a sporting field. Once the water passes through the wetland it is diverted into a 200 kL below ground tank where it provides 72% of annual irrigation demand.
Carrum Downs Rotary Park (F02PBX003)	Low flows from an existing Melbourne Water drain are diverted to a 450 m^2 bioretention cell via a 20 L/s pump. Once treated in the bioretention cell, the water is diverted via gravity back to the Melbourne Water drain. (This opportunity is not included in the 10 year Implementation Plan as it has an MCA score of less than 50%).
Rotary Reserve (F02PWX004)	A 3,200 m^2 constructed wetland is located in the south eastern corner of Rotary Reserve. Water is directed to a wetland via a pumped 40 L/s diversion from the local Melbourne Water drain. Once treated, the flows are returned to the Melbourne Water drainage network. (This opportunity is not included in the 10 year Implementation Plan as it has an MCA score of less than 50%).
Sandfield Reserve	Water is gravity diverted from an existing Melbourne Water drain located to the east of the park. The flows are then transferred to the surface of a 600 m^2

Location and code	Description
(F02PBX005)	bioretention cell in the south of the park. The treated water is then diverted back to the Melbourne Water drain.
Pat Rollo Reserve (F02PWH007)	Two local Council stormwater drains deliver water to a 3,000 m^2 constructed wetland via gravity diversions. Once treated through the wetland the water is transferred via gravity to a 200 kL below ground storage tank where it provides 81% of the local annual irrigation demand.
Banyan Reserve (F04PXH001)	An existing Melbourne Water constructed wetland/bioretention is located within Banyan Reserve. Currently, after treatment the water is diverted back to the drainage network. Under this scheme the treated water is stored in a 300 kL below ground storage tank before it is used to irrigate the sports oval and areas of the neighbouring school providing 81% of the annual irrigation demand.
Carrum Downs Reserve (F04PBH002)	A 40 L/s pumped diversion from the existing Melbourne Water drain delivers flows to the surface of a 750 m^2 bioretention cell within the reserve. The treated flows are then diverted into a below ground tank and used to provide up to 76% of the irrigation demand associated with the surrounding playing surfaces.
Jubilee Park Option 1 (F06PBH004)	Stormwater is diverted via gravity from the existing Melbourne Water drain to a 3,000 m^2 bioretention system. Once treated in the bioretention cell the water is diverted to a 200 kL below ground storage tank where the water is used to meet 79% of the local irrigation demand of the surrounding ovals and open space.
Jubilee Park Option 2 (F06WH003)	At Jubilee Park, an existing water body is retrofitted with wetland vegetation to increase pollution removal efficiency. The treated stormwater is then diverted to a 100 kL below ground tank where the water is used to provide 79% of the annual irrigation demand of the surrounding sports grounds. (This opportunity is not included in the 10 year Implementation Plan as it has a lower MCA score than Jubilee Park Option 1).
Peninsula Reserve (F06PBH011)	A 20 L/s pumped diversion from Council stormwater drains is diverted into a series of tiered bioretention cells that have a total treatment area of 300 m^2. In addition, there is an 850 m^2 biofiltration swale running north - south along the eastern boundary of the reserve. Treated stormwater flows from both treatment systems is diverted into a storage tank where it is then used to meet 80% of the ovals irrigation demand.
Ebdale RB (F06PWX012)	A Council retarding basin provides the opportunity to locate a 3,000 m^2 constructed wetland in the base of the system. Two local Council drains are diverted into the wetland via gravity. After undergoing treatment, the water is returned to the Council drainage network.
Ballam Park (F06PBH015)	Stormwater is gravity diverted to an 800 m^2 bioretention cell. Once treated through the bioretention cell the water is diverted to an 800 kL storage tank. The

Location and code	Description
	water is then used to irrigate 80% of the local sporting ovals irrigation demand.
Beauty and Frankston Park (F06PBH017)	Stormwater is diverted via gravity from the existing Council stormwater network. Once treated in the 400 m^2 bioretention system the treated flows are diverted into the existing drainage network which connects to the downstream pond. A diversion system located under the boardwalk at the Beauty Park pond provides an alternate water supply to Frankston Park. Diverted flows stored in a 500 kL below ground tank meet up to 81% of Frankston Park's annual irrigation demand.
Rosedale Grove Stormwater Treatment (F07PBX002)	Low flows from Council stormwater infrastructure is gravity diverted into the base of an existing retarding basin from three diversion points. The water is treated in a 700 m^2 bioretention basin located in the bottom of the basin. Treated flows are then diverted into the existing Council drainage network located to the west of the system.
Robinsons Road Stage 1 (F00PXW001)	A public-private partnership scheme consisting of 90 and 110 diameter polyethylene recycled water pipelines and a new stand alone (system) pump station at Baxter Park. The new pump station will pump Class A recycled water from Baxter Park to the target sites at Robinsons Park and Frankston Golf Club (private property). The recycled water scheme provides up to 76 ML of recycled water per annum for irrigation purposes to the two sporting facilities. The Scheme is in the final stages of its implementation.
Robinsons Road Stage 2 (F00PXW002)	The second stage of the Robinsons Road project extends the recycled water network an additional 2.3 km to Lawton Reserve where it is used to irrigate sporting fields with an annual demand of 25 ML. (This opportunity is not included in the 10 year Implementation Plan as it has an MCA score of less than 50%).
Monterey Scheme (F00PXWP003)	The Monterey Recycled Water Scheme provides recycled water for sporting fields and a golf course with an annual irrigation demand of 93 ML. The system intercepts and diverts treated wastewater from Melbourne Water's outfall that is normally discharged to Boags Rocks on the Mornington Peninsula. Once diverted, the flow is filtered and pumped to a number of users along a 2 km recycled pipeline.
Frankston Western Scheme Stage 3 & 4 (F00PXW004)	The extension of the existing Frankston Recycled Water Project from Jubilee Park to Frankston Park provides an alternate water supply to a number of irrigation demands along the way, including the George Pentland Botanic Gardens and Frankston Park. This is achieved with the provision of 2.1 km of recycled water pipeline. (This opportunity is not included in the 10 year Implementation Plan as it has an MCA score of less than 50%).
Large Scale	Sewer mining (local treatment and reuse of wastewater) was included as an

Location and code	Description
sewer mining (F00PXS001)	option to allow costs and benefits to be compared. A sewer mining project in Pennant Hills, NSW was used to provide indicative costs and performance data. Completed in 2003, the Pennant Hills project provides an indication of the costs associated with sewer mining and treatment. The membrane plant produces 100 ML/yr for golf course irrigation. It is used in the IWAP for the purpose of comparison with the Robinsons Road Recycled Water Scheme. (This opportunity is not included in the 10 year Implementation Plan as it has an MCA score of less than 50%).
Rainwater tanks on Council buildings (Various examples)	Four case studies involving harvesting runoff from the roofs of Council facilities were investigated. Harvested water was assumed to be used for toilet flushing and pool top-up (where applicable). Case studies were based on real buildings to allow realistic performance and costing data to be used.
Streetscape scale raingardens (Various examples)	Two case studies involving streetscape scale raingardens were investigated. Case studies were based on a real car park and streetscape projects to allow realistic performance and costing data to be used.
Passive street tree irrigation (F00PIX001)	Stormwater collected in street gutters is diverted via a grated pit into gravel lined excavations via a perforated pipe. The trenches are filled with 20 mm gravel left unlined to promote infiltration. After construction, the top of the trenches are re-established with grass. The trenches can be retrofitted to provide a passive form of irrigation for existing trees or implemented in conjunction with new trees.
Permeable pavement (F00PPX001)	*Permeable pavements* is the term given to a range of pavement materials that allow stormwater to move through them while providing a trafficable surface. Within Frankston municipality, permeable pavements have been successfully used to establish trees in areas which receive heavy pedestrian traffic. The life of permeable pavement is limited to 3 to 5 years. After this time an alternate surface such as granitic sand can be applied around the tree.

14.1.2 Melbourne Water

Table 33 shows the Melbourne Water infrastructure opportunities that were found to be feasible based on a desktop assessment, site visits and in consultation with Council and Melbourne Water representatives.

Table 33 Melbourne Water infrastructure opportunities

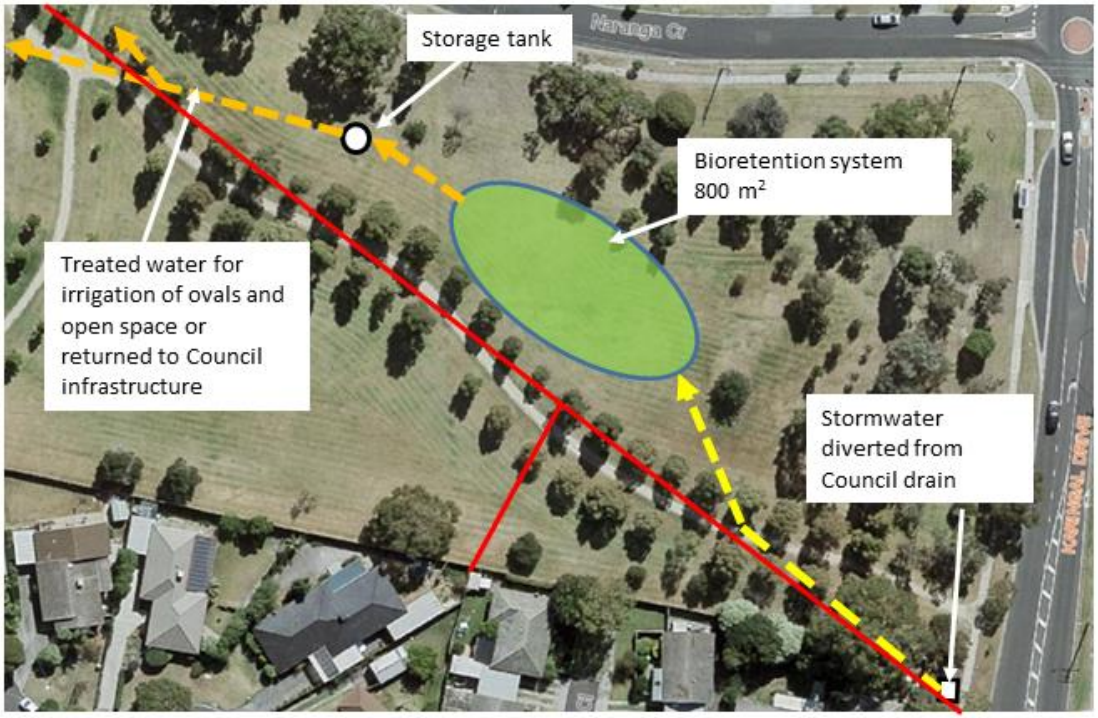
Location and code	Description
Sandgate Basin Reserve (F06PWX001)	Sandgate Basin Reserve currently functions as a retarding basin. Under this proposal, water is diverted via gravity from existing Melbourne Water drainage infrastructure into a 4,000 m^2 constructed wetland located in the base of the basin. This does not impact the functionality of the retarding basin. Stormwater diverted into the wetland undergoes extensive treatment before it is diverted back into the Melbourne Water drainage network.
Lee Reserve RB (F06PWX002)	A large Melbourne Water retarding basin is located at Kimba Avenue. Stormwater flows are gravity diverted into the 3,000 m^2 wetland in the base of the retarding basin. After treatment, the water is diverted back into the existing Melbourne Water drainage network.
Skye Road RB (F06PWX007)	A large Melbourne Water retarding basin is located in close proximity to the Peninsula Country Club golf course. Water is intercepted at two different diversion points into a 5,000 m^2 wetland located in the base of the retarding basin. Once treated in the wetland, the water is stored in a neighbouring dam where it is used to meet the majority of the golf course's annual irrigation demand. Note that untreated stormwater is currently used for golf course irrigation.
Miles Grove (F06PWH010)	Water is diverted via gravity into a 5,000 m^2 constructed wetland in the base of an existing retarding basin. Here the water undergoes extensive treatment before being directed into a 200 kL tank for local reuse or pickup by Council vehicles. Any additional flows are re-diverted into the Melbourne Water drainage network.
Peninsula Boulevard (F06PWH013)	A 4,200 m^2 wetland is located in the base of a Melbourne Water retarding basin. Water is diverted into the system from existing Melbourne Water infrastructure. Treated flows are diverted to a 200 kL tank where the water is available for local industrial use or for topping up Council vehicles.
Baxter Park (F08PWH001)	Low flows are pumped from a Melbourne Water drain into a 3,000 m^2 constructed wetland located within Melbourne Water land adjacent to Baxter Park. Treated stormwater is stored in a 1,200 kL underground tank and used to meet 80% of the irrigation demand for seven ovals within Baxter Park. The stormwater will supplement the existing recycled water supply at Baxter Park. (Advocating for this opportunity is not included in the 10 year Implementation Plan as it has an MCA score of less than 50%).

15 APPENDIX F: INFRASTRUCTURE ACTIONS – SITE SHEETS

15.1.1 Council stormwater infrastructure actions

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Bioretention
Treatment Area (m^2)	800
Storage (kL)	800
Owner (drainage/land)	FCC/FCC
Land manager	FCC
Catchment area (ha)	48

Capital Cost ($)	$850,000
OM&R Cost ($/yr)	$17,000
Water purchase savings ($/yr)	$15,000
SS reduction (kg/yr)	29,000
TP reduction (kg/yr)	48
TN reduction (kg/yr)	240
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	12.80 (80% of total site demand)
Value/cost ratio	1.56
MCA Score	73%



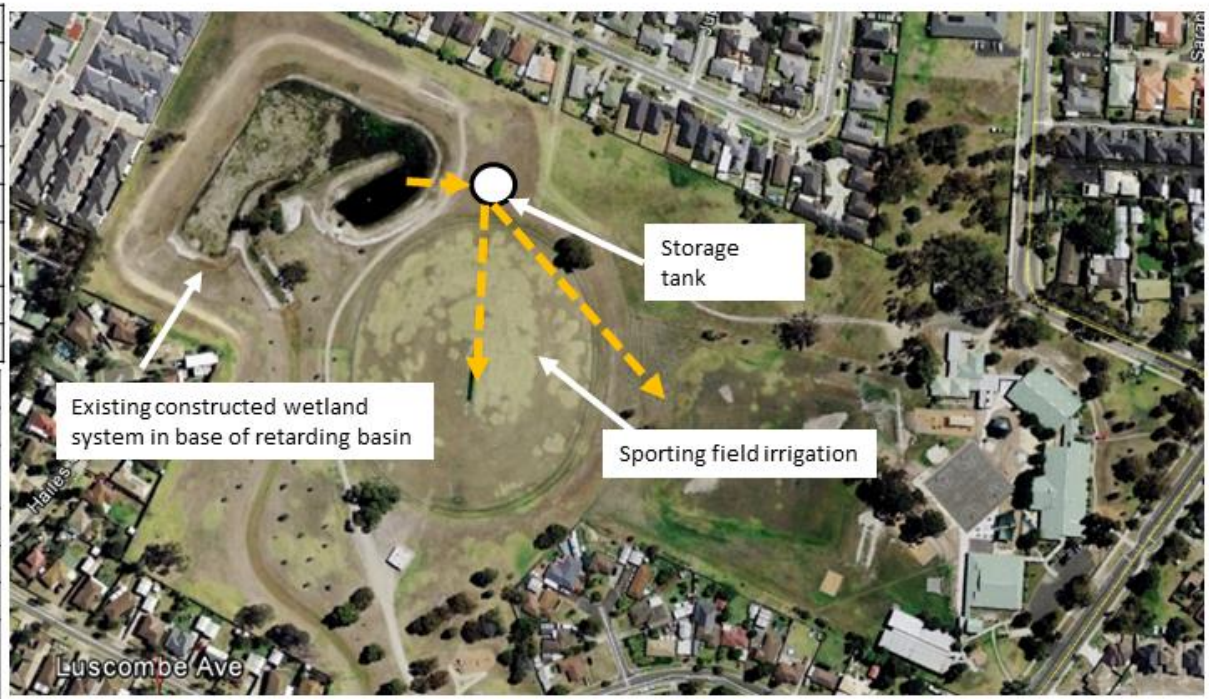
Description

Stormwater is gravity diverted to a 800 m^2 bioretention cell. Once treated through the bioretention cell the water is diverted to a 800 kL storage tank. The water is then used to meet 80% of the local sporting ovals irrigation demand. There is a good opportunity to incorporate education about stormwater treatment and harvesting into the design for this site. An existing recycled water pipeline may run through this park and should be taken into consideration when confirming the bioretention layout.

Ballam Park Stormwater Treatment and Harvesting (F06PBH015)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Eel Race Drain
Diversion type	Gravity
Treatment type (existing)	Wetland/ bioretention
Treatment Area (m^2)	NA
Storage (kL)	300
Owner (drainage/land)	MW/FCC & MW
Land manager	FCC
Catchment area (ha)	247

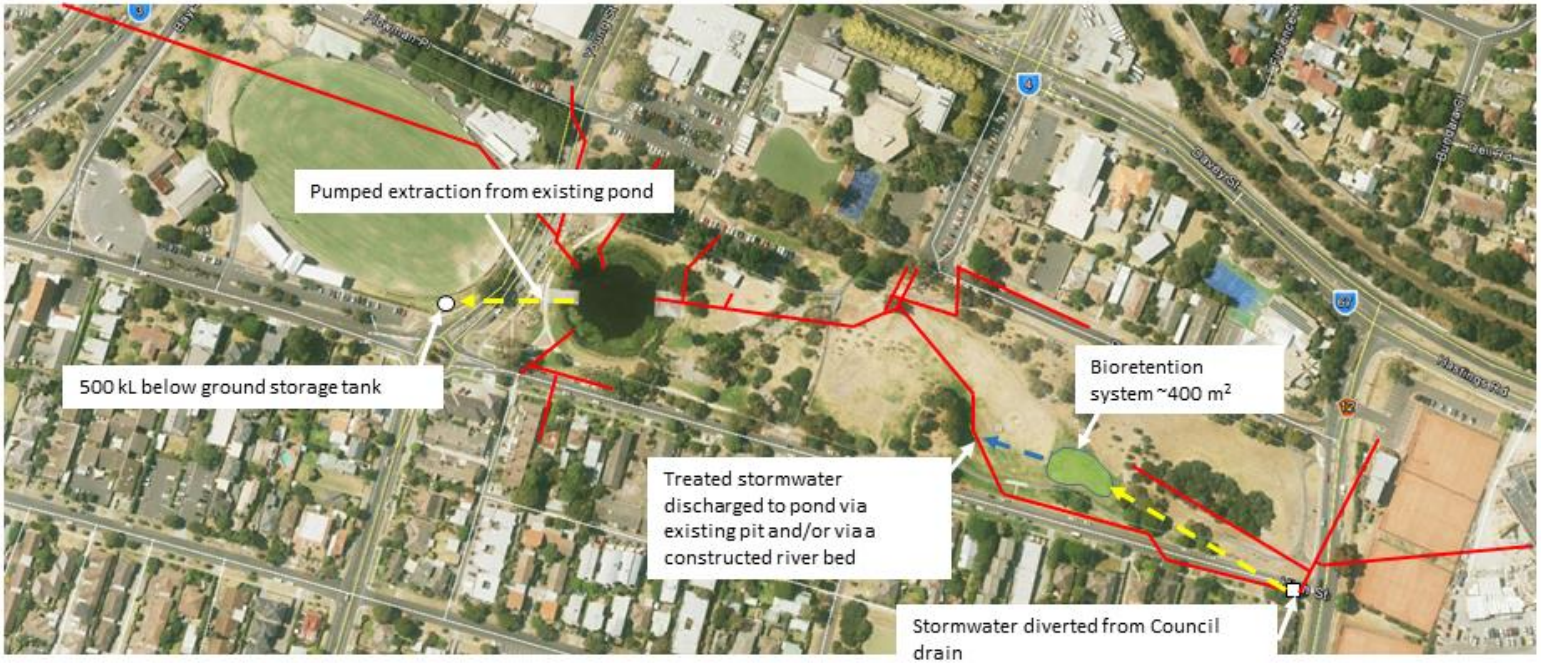
Capital Cost ($)	$375,000
OM&R Cost ($/yr)	$3,700
Water purchase savings ($/yr)	$33,000
SS reduction (kg/yr)	2,000
TP reduction (kg/yr)	4
TN reduction (kg/yr)	30
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	10.9 (81% of total site demand)
Value/cost ratio	2.22
MCA Score	63%



Description

An existing Melbourne Water constructed wetland/bioretention is located within Banyan Reserve. Currently, after treatment the water is diverted back to the drainage network. Under this scheme the treated water is stored in a 300 kL below ground storage tank before it is used to irrigate the sports oval and areas of the neighbouring school providing 81% of the annual irrigation demand. Melbourne Water and the Carrum Downs Primary School are key stakeholders and should be consulted during the design process. There is a good opportunity to incorporate education about stormwater treatment and harvesting into the design for this site.

Banyan Reserve Stormwater Harvesting (F04PXH001)	Frankston IWAP infrastructure actions	DesignFlow



Description

Stormwater is diverted via gravity from the existing Council stormwater network. Once treated in the 400 m² bioretention system the treated flows are diverted into the existing drainage network which connects to the downstream pond, where it is available for use on Frankston Park. A diversion system located under the boardwalk at the Beauty Park pond provides an alternate water supply to the Frankston Park. Diverted flows stored in a 500 kL below ground tank meet up to 81% of Frankston Park's annual irrigation demand. Note that the design of the treatment and harvesting system should be undertaken in conjunction with a flood assessment of the whole precinct with particular focus on the flooding issues on the south east side of the park. The design should also consider the war memorial within the Park. An underground filter could be considered as an alternative treatment option if the bioretention system is found to have an unacceptable impact on available open space.

Beauty and Frankston Park Stormwater Treatment and Harvesting (F06PBH017) Page 1	Frankston IWAP infrastructure actions	DesignFlow

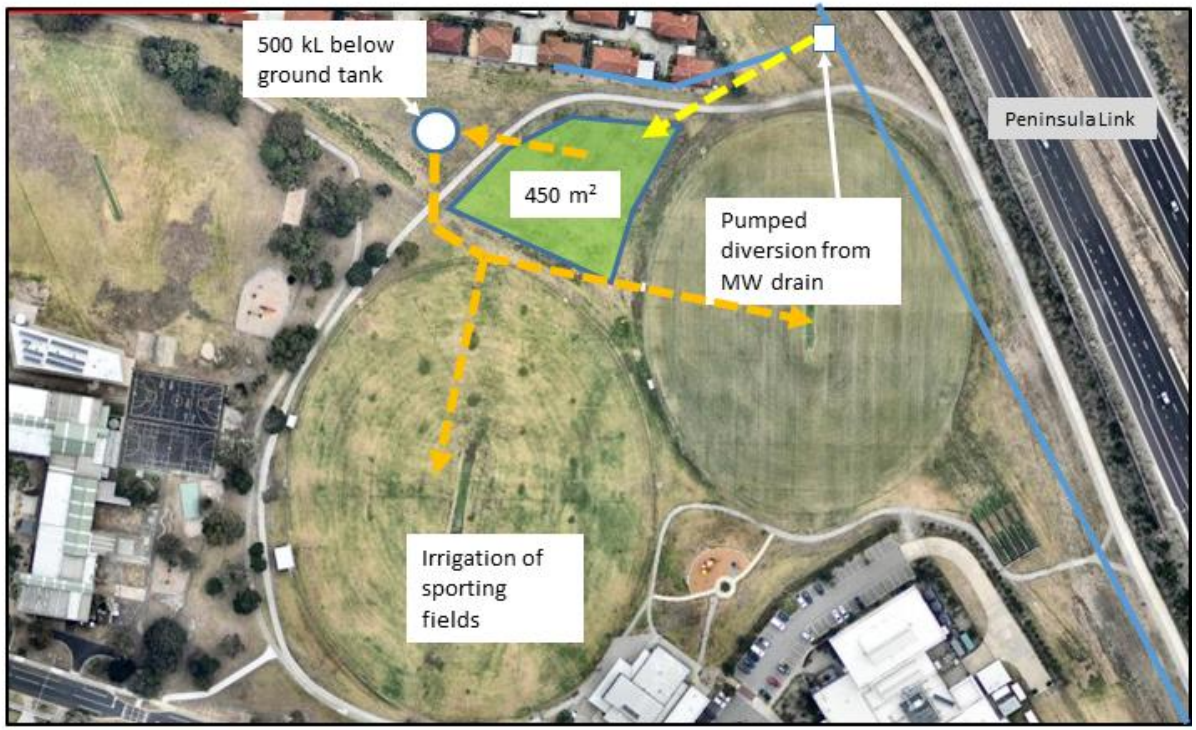
Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Bioretention
Treatment Area (m^2)	400
Storage (kL)	Tank (500)
Owner (drainage/land)	FCC/Crown land
Land manager	FCC
Catchment area (ha)	81

Capital Cost ($)	$575,000
OM&R Cost ($/yr)	$11,000
Water purchase savings ($/yr)	$24,000
SS reduction (kg/yr)	30,000
TP reduction (kg/yr)	50
TN reduction (kg/yr)	160
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	8.0 (81% of total site demand)
Value/cost ratio	1.94
MCA Score	78%

Beauty Park Stormwater Treatment and Harvesting (F06PBH017) Page 2	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Boggy Creek
Diversion type	Pumped
Treatment type	Bioretention
Treatment Area (m^2)	450
Storage (kL)	500
Owner (drainage/land)	MW/FCC
Land manager	FCC
Catchment area (ha)	1,867

Capital Cost ($)	$760,000
OM&R Cost ($/yr)	$23,000
Water purchase savings ($/yr)	$2,000
SS reduction (kg/yr)	10,000
TP reduction (kg/yr)	40
TN reduction (kg/yr)	300
Upstream of known flooding hotspot (for 20 yr ARI event)?	No
Alternative water supplied (ML/yr)	14.6 (75% of total site demand)
Value/cost ratio	1.54
MCA Score	65%



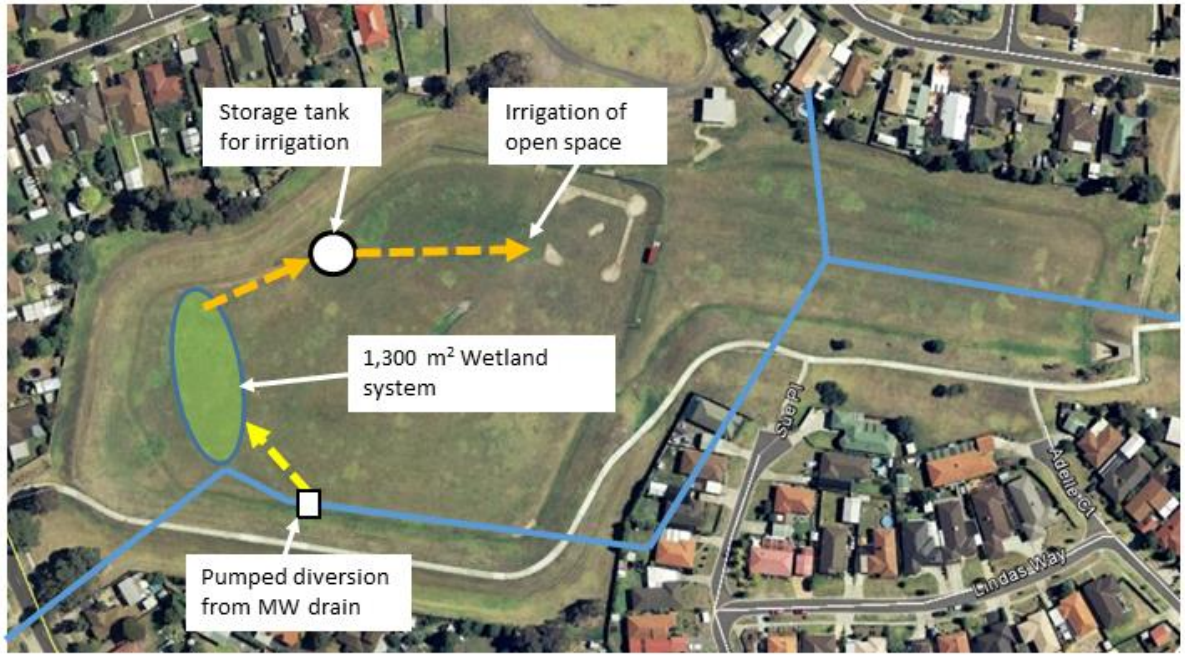
Description

Flow is diverted from the existing Melbourne Water drain via a 20 L/s pump. The diverted stormwater is then distributed over a 450 m^2 bioretention cell located between two existing ovals. Once treated, the flows enter a 500 kL below ground tank where it will provide 75% of the site's annual irrigation demand. This site is located near the former St Kilda club rooms. The stormwater treatment and harvesting scheme design should be developed in conjunction with a masterplan for this area.

Belvedere Reserve Stormwater Treatment and Harvesting (F02PBH001)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Boggy Creek
Diversion type	Pumped
Treatment type	Wetland
Treatment Area (m^2)	1,300
Storage (kL)	200
Owner (drainage/land)	MW/FCC & MW
Land manager	FCC
Catchment area (ha)	155

Capital Cost ($)	$660,000
OM&R Cost ($/yr)	$20,000
Water purchase savings ($/yr)	$43,000
SS reduction (kg/yr)	2,000
TP reduction (kg/yr)	6
TN reduction (kg/yr)	50
Upstream of known flooding hotspot (for 20 yr ARI event)?	No
Alternative water supplied (ML/yr)	14 (72% of total site demand)
Value/cost ratio	1.22
MCA Score	63%



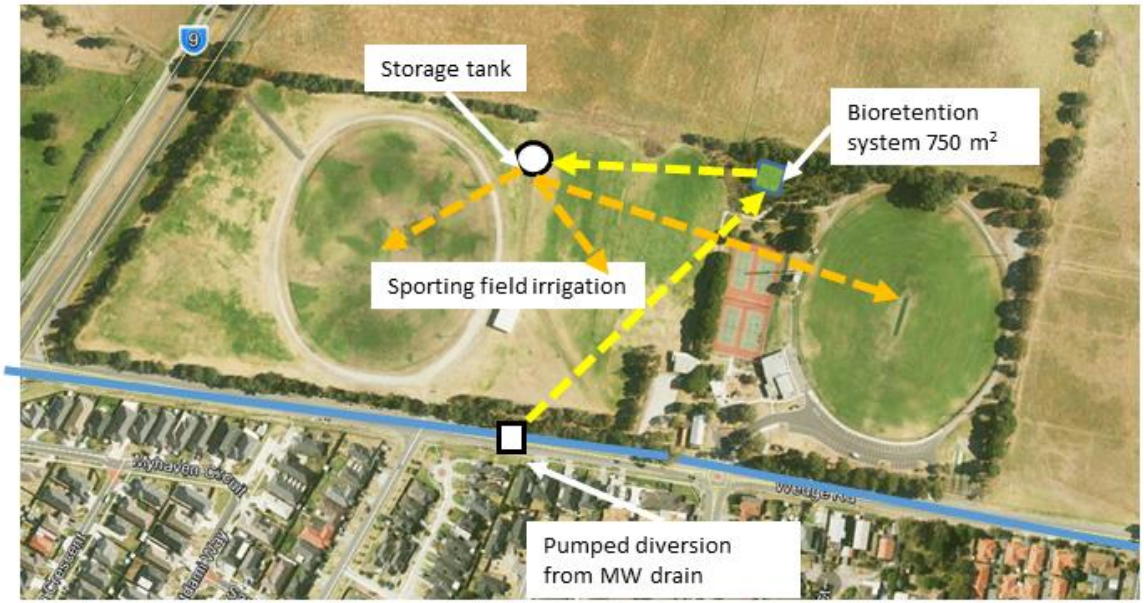
Description

Botany Park currently operates as a flood retarding basin. Under low flow conditions a 40 L/s pump diverts flows from the existing Melbourne Water drain to a 1,300 m^2 constructed wetland at the western end of the park. The wetland is set down in the landscape to ensure that it doesn't negatively impact on the parks function as a retarding basin or as a sporting field. Once the water passes through the wetland it is diverted into a 200 kL below ground tank where it provides 72% of annual irrigation to the area. Consideration will be given to the retarding basin function and competing demands for open space (e.g. cricket) during the design process.

Botany Park Stormwater Treatment and Harvesting (F02PWH002)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Eel Race Drain
Diversion type	Pumped
Treatment type	Bioretention
Treatment Area (m^2)	750
Storage (kL)	1,000
Owner (drainage/land)	MW/FCC
Land manager	FCC
Catchment area (ha)	111

Capital Cost ($)	$1,155,000
OM&R Cost ($/yr)	$35,000
Water purchase savings ($/yr)	$5,200
SS reduction (kg/yr)	17,200
TP reduction (kg/yr)	36
TN reduction (kg/yr)	287
Upstream of known flooding hotspot (for 20 yr ARI event)?	No
Alternative water supplied (ML/yr)	17.2 (76% of total site demand)
Value/cost ratio	1.01
MCA Score	60%



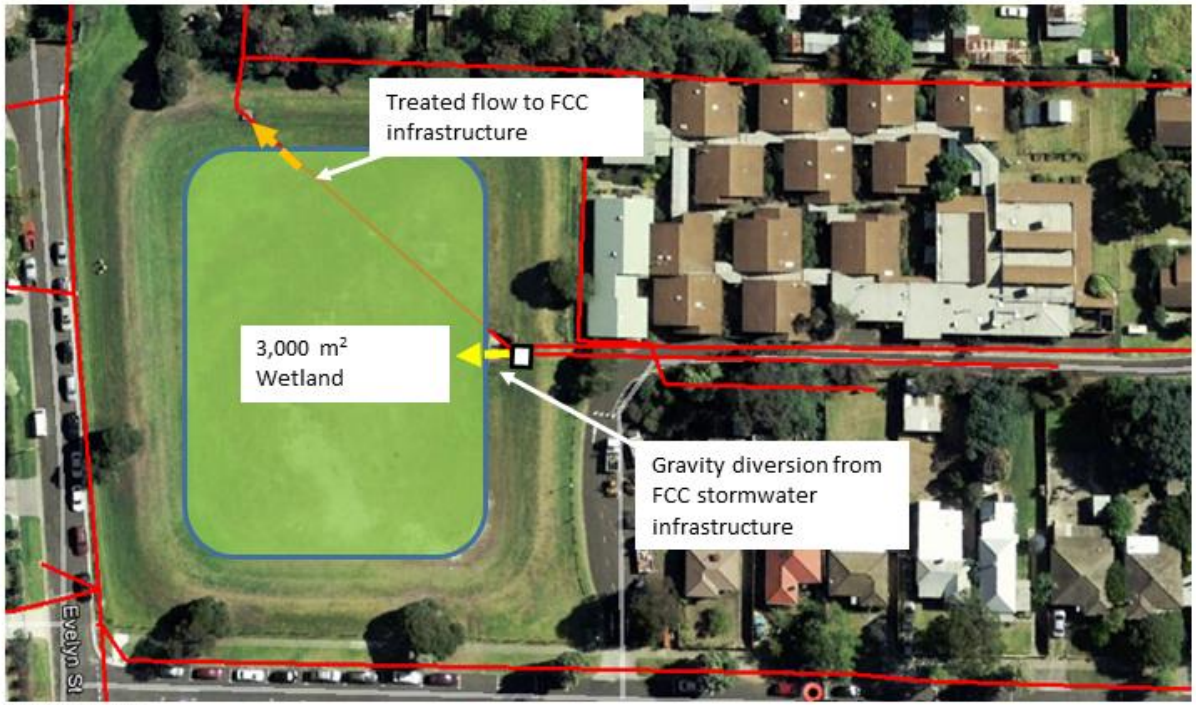
Description

A 40 L/s pumped diversion from the existing Melbourne Water drain delivers flows to the surface of a 750 m^2 bioretention cell within the reserve. The treated flows are then diverted into a below ground tank and used to provide up to 76% of the irrigation demand associated with the surrounding playing surfaces. This reserve is currently irrigated using recycled water. The treatment systems has been nominally located in accordance with the reserve Masterplan. The treatment location can be refined in conjunction with the design of other parts of the reserve.

Carrum Downs Reserve Stormwater Treatment and Harvesting (F04PBH002)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Wetland
Treatment Area (m^2)	3,000
Storage (kL)	NA
Owner (drainage/land)	FCC/FCC
Land manager	FCC
Catchment area (ha)	45

Capital Cost ($)	$500,000
OM&R Cost ($/yr)	$5,000
Water purchase savings ($/yr)	NA
SS reduction (kg/yr)	17,900
TP reduction (kg/yr)	30
TN reduction (kg/yr)	118
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	NA
Value/cost ratio	1.26
MCA Score	65%



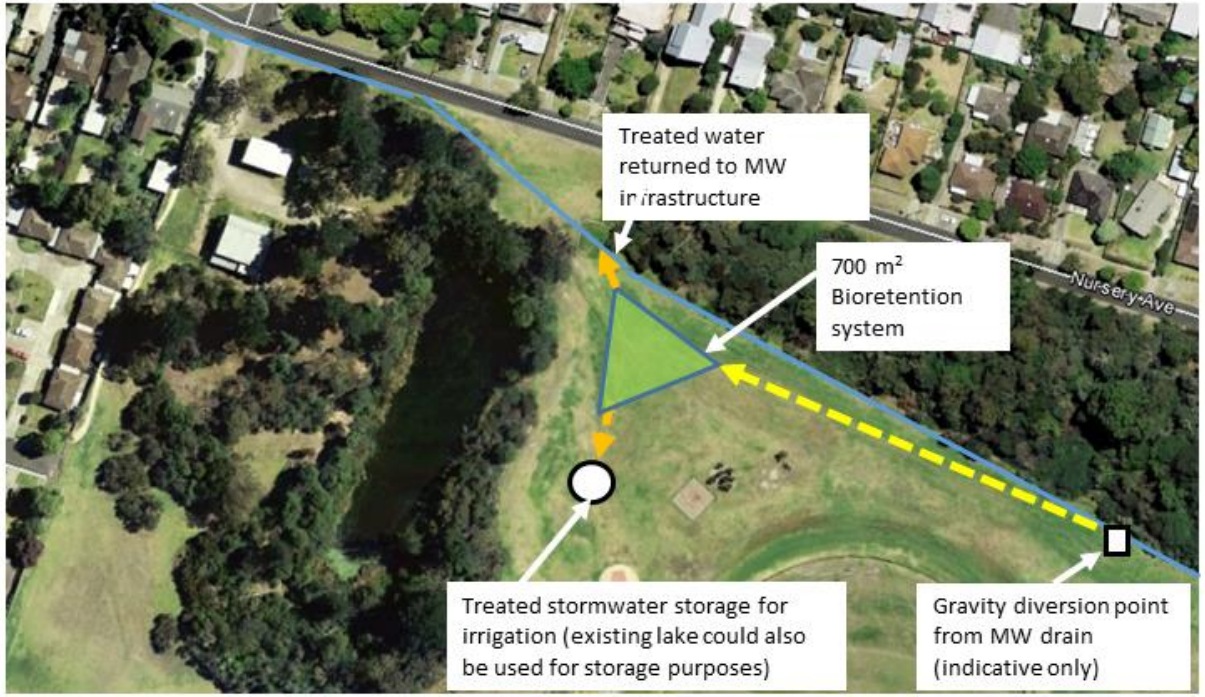
Description

A Council retarding basin provides the opportunity to locate a 3,000 m^2 constructed wetland in the base of the system. Two local Council drains are be diverted into the wetland via gravity. After undergoing treatment, the water is returned to the Council drainage network. The treatment system should be designed with consideration of proximity to houses, Council's aspiration to increase car parking in this vicinity and the function of the retarding basin. Consideration will be given to included a gross pollutant trap (GPT) in the treatment train design.

Ebdale Street Retarding Basin Stormwater Treatment (F06PWX012)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Bioretention
Treatment Area (m^2)	700
Storage (kL)	200
Owner (drainage/land)	MW/FCC
Land manager	FCC
Catchment area (ha)	362

Capital Cost ($)	$690,000
OM&R Cost ($/yr)	$14,000
Water purchase savings ($/yr)	$14,000
Best practice	No
SS reduction (kg/yr)	73,000
TP reduction (kg/yr)	116
TN reduction (kg/yr)	500
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	11.4 (79% of total site demand)
Value/cost ratio	3.56
MCA Score	90%



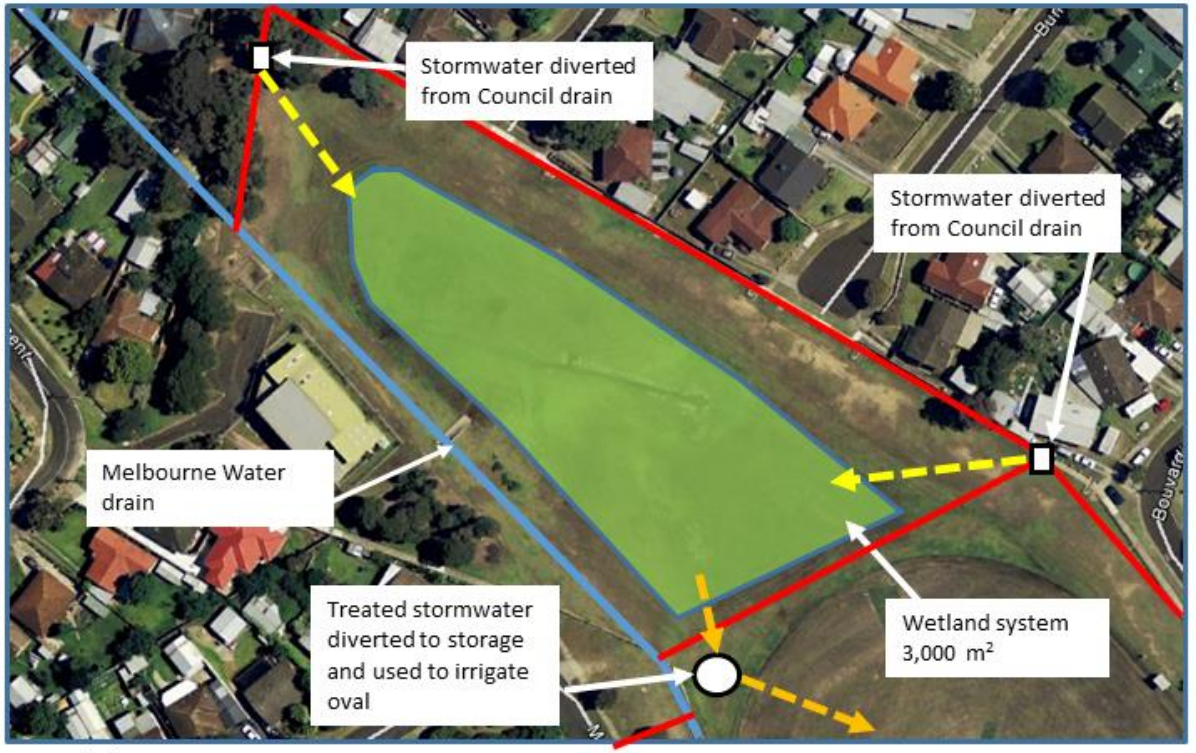
Description

Stormwater is diverted via gravity from the existing Melbourne Water drain to a 3,000 m^2 bioretention system. Once treated in the bioretention cell the water is diverted to a 200 kL below ground storage tank where the water is used to meet 79% of the local irrigation demand of the surrounding ovals and open space. The bioretention location and layout should be designed in conjunction with any changes to the area, e.g. new playground.

Jubilee Park Stormwater Treatment and Harvesting Option 1 F06PBH004	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Boggy Creek
Diversion type	Gravity
Treatment type	Wetland
Treatment Area (m^2)	3,000
Storage (kL)	200
Owner (drainage/land)	FCC/FCC
Land manager	FCC
Catchment area (ha)	156

Capital Cost ($)	$700,000
OM&R Cost ($/yr)	$14,000
Water purchase savings ($/yr)	$19,000
SS reduction (kg/yr)	26,000
TP reduction (kg/yr)	45
TN reduction (kg/yr)	160
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	6.3 (81% of total site demand)
Value/cost ratio	1.48
MCA Score	60%



Description

Two local Council stormwater drains deliver water to a 3,000 m^2 constructed wetland via gravity diversions. Treated water is transferred via gravity to a 200 kL below ground storage tank where it provides 81% of the local annual irrigation demand. The proposed treatment system is consistent with the masterplan for the site which includes rainwater harvesting and WSUD.

Pat Rollo Reserve Stormwater Treatment and Harvesting (F02PWH007)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Pumped
Treatment type	Bioretention
Treatment Area (m^2)	300
Storage (kL)	100
Owner (drainage/land)	FCC/FCC
Land manager	FCC
Catchment area (ha)	105

Capital Cost ($)	$490,000
OM&R Cost ($/yr)	$15,000
Water purchase savings ($/yr)	$7,000
SS reduction (kg/yr)	10,400
TP reduction (kg/yr)	21
TN reduction (kg/yr)	150
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	2.3 (80% of total site demand)
Value/cost ratio	1.37
MCA Score	68%

Description

A 20 L/s pumped diversion from Council stormwater drains is diverted into a series of tiered bioretention cells that have a total treatment area of 300 m^2. In addition, there is an 850 m^2 biofiltration swale running north - south along the eastern boundary of the reserve. Treated stormwater flows from both treatment systems is diverted into a storage tank where it is then used to meet 80% of the ovals irrigation demand.

Peninsula Reserve Stormwater Treatment and Harvesting (F06PBH011)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Sweetwater Creek
Diversion type	Gravity
Treatment type	Bioretention
Treatment Area (m^2)	700
Storage (kL)	NA
Owner (drainage/land)	FCC/FCC
Land manager	FCC
Catchment area (ha)	26

Capital Cost ($)	$364,000
OM&R Cost ($/yr)	$3,600
Water purchase savings ($/yr)	NA
Best practice	Yes
SS reduction (kg/yr)	17,700
TP reduction (kg/yr)	30
TN reduction (kg/yr)	153
Upstream of known flooding hotspot (for 20 yr ARI event)?	No
Alternative water supplied (ML/yr)	NA
Value/cost ratio	2.23
MCA Score	78%

Description

Low flows from Council stormwater infrastructure is gravity diverted into the base of an existing retarding basin in Christopher Reserve (adjacent to Rosedale Grove) from three diversion points. The water is treated in a 700 m^2 bioretention basin located in the bottom of the basin. Treated flows are then diverted into the existing Council drainage network located to the west of the system.

Rosedale Grove Stormwater Treatment (F07PBX002)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Boggy Creek
Diversion type	Gravity
Treatment type	Bioretention
Treatment Area (m^2)	600
Storage (kL)	NA
Owner (drainage/land)	MW/FCC
Land manager	FCC
Catchment area (ha)	22

Capital Cost ($)	$455,000
OM&R Cost ($/yr)	$4,600
Water purchase savings ($/yr)	NA
SS reduction (kg/yr)	14,600
TP reduction (kg/yr)	25
TN reduction (kg/yr)	130
Upstream of known flooding hotspot (for 20 yr ARI event)?	N0
Alternative water supplied (ML/yr)	NA
Value/cost ratio	1.51
MCA Score	63%

Description

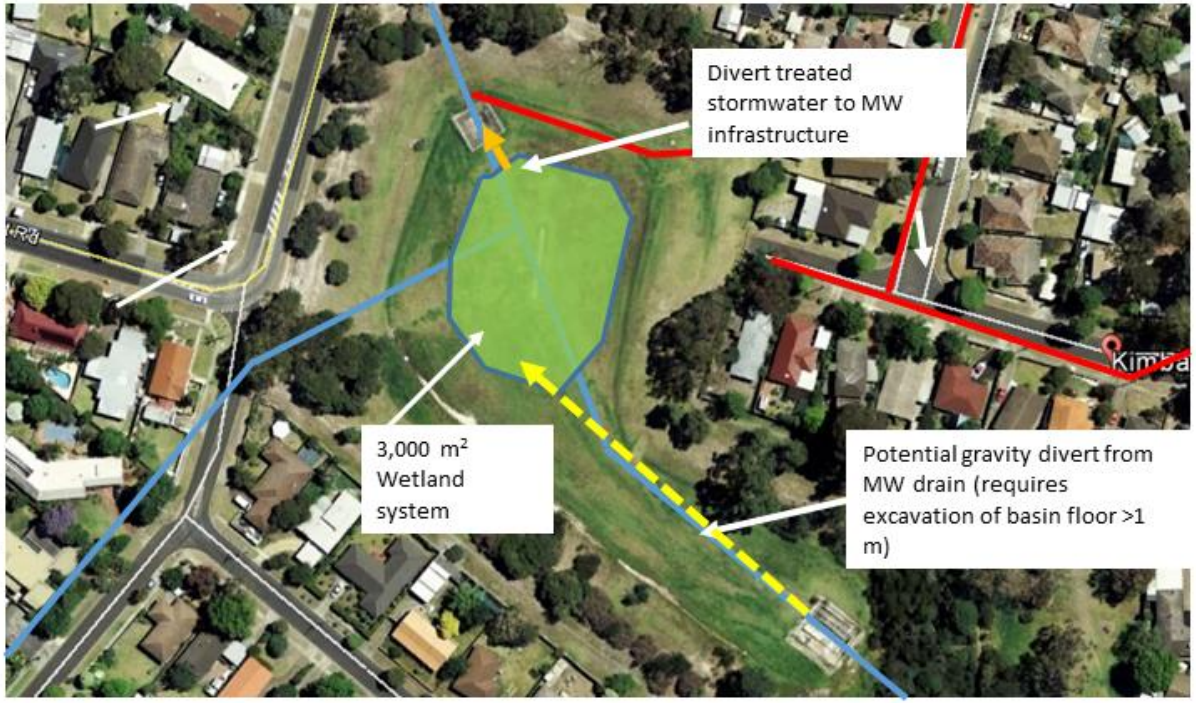
Water is gravity diverted from an existing Melbourne Water drain located to the east of the park. The flows are then transferred to the surface of a 600 m^2 bioretention cell in the south of the park. The treated water is then diverted back to the Melbourne Water drain. There is a history of vandalism at this site that should be considered in the design process. A variety of treatment system configurations (e.g. a linear, tiered system) can also be considered during the design process.

Sandfield Reserve Stormwater Treatment (F02PBX005)	Frankston IWAP infrastructure actions	DesignFlow

15.1.2 Melbourne Water stormwater infrastructure actions

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Wetland
Treatment Area (m^2)	3,000
Storage (kL)	NA
Owner (drainage/land)	MW/MW
Land manager	MW
Catchment area (ha)	337

Capital Cost ($)	$895,000
OM&R Cost ($/yr)	$8,900
Water purchase savings ($/yr)	NA
SS reduction (kg/yr)	37,000
TP reduction (kg/yr)	57
TN reduction (kg/yr)	160
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	NA
Value/cost ratio	0.95
MCA Score	50%



Description

A large Melbourne Water retarding basin is located at Kimba Avenue. Stormwater flows are gravity diverted into the 3,000 m^2 wetland in the base of the retarding basin. After treatment, the water is diverted back into the existing Melbourne Water drainage network.

Lee Reserve Retarding Basin Stormwater Treatment (F06PWX002)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Wetland
Treatment Area (m^2)	5,000
Storage (kL)	200
Owner (drainage/land)	MW/MW
Land manager	MW
Catchment area (ha)	111

Capital Cost ($)	$1,035,000
OM&R Cost ($/yr)	$21,000
Water purchase savings ($/yr)	$25,000
SS reduction (kg/yr)	47,000
TP reduction (kg/yr)	69
TN reduction (kg/yr)	200
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	8.1
Value/cost ratio	1.26
MCA Score	63%

Description

Water is diverted via gravity into a 5,000 m^2 constructed wetland in the base of an existing retarding basin. Here the water undergoes extensive treatment before being directed into a 200 kL tank for local reuse or pickup by Council vehicles. Any additional flows are re-diverted into the Melbourne Water drainage network.

Miles Grove Retarding Basin Stormwater Treatment (F06PWH010)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Wetland
Treatment Area (m^2)	4,200
Storage (kL)	100
Owner (drainage/land)	MW/MW
Land manager	MW
Catchment area (ha)	122

Capital Cost ($)	$1,065,000
OM&R Cost ($/yr)	$21,000
Water purchase savings ($/yr)	$24,000
SS reduction (kg/yr)	33,300
TP reduction (kg/yr)	50
TN reduction (kg/yr)	200
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Reuse supplied (ML/yr)	7.94
Alternative water supplied (ML/yr)	1.21
MCA Score	63%

Description

A 4,200 m^2 wetland is located in the base of a Melbourne Water retarding basin. Water is diverted into the system from existing Melbourne Water infrastructure. Treated flows are diverted to a 200 kL tank where the water is available for local industrial use or for topping up Council vehicles.

Peninsula Boulevard Retarding Basin Stormwater Treatment (F06PWH013)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Pumped
Treatment type	Bioretention
Treatment Area (m^2)	4,000
Storage (kL)	500
Owner (drainage/land)	MW/FCC
Land manager	FCC
Catchment area (ha)	67
Capital Cost ($)	$710,000
OM&R Cost ($/yr)	$7,100
Water purchase savings ($/yr)	NA
SS reduction (kg/yr)	26,000
TP reduction (kg/yr)	43
TN reduction (kg/yr)	165
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	NA
Value/cost ratio	1.24
MCA Score	65%

Description

Sandgate Basin Reserve currently functions as a retarding basin. Under this proposal, water is diverted via gravity from existing Melbourne Water drainage infrastructure into a 4,000 m^2 constructed wetland located in the base of the basin. This does not impact the functionality of the retarding basin. Stormwater diverted into the wetland undergoes extensive treatment before it is diverted back into the Melbourne Water drainage network.

Sandgate Reserve Retarding Basin Stormwater Treatment (F06PWX001)	Frankston IWAP infrastructure actions	DesignFlow

Catchment	Kananook Creek
Diversion type	Gravity
Treatment type	Wetland
Treatment Area (m^2)	5,000
Storage (kL)	500
Owner (drainage/land)	MW/MW
Land manager	MW
Catchment area (ha)	555

Capital Cost ($K)	850
OM&R Cost ($/yr)	$8,400
Water purchase savings ($/yr)	NA
SS reduction (kg/yr)	69,000
TP reduction (kg/yr)	108
TN reduction (kg/yr)	280
Upstream of known flooding hotspot (for 20 yr ARI event)?	Yes
Alternative water supplied (ML/yr)	NA
Value/cost ratio	2.20
MCA Score	85%

Description

A large Melbourne Water retarding basin is located in close proximity to the Peninsula County Club golf course. Water is intercepted at two different diversion points into a 5,000 m^2 wetland located in the base of the retarding basin. Once treated in the wetland, the water is stored in a neighbouring dam where it is used to meet 81% of the golf courses annual irrigation demand (note that stormwater is already used to irrigate this golf course so it is not considered a new alternative water supply).

Skye Road Retarding Basin Stormwater Treatment (F06PWH007)	Frankston IWAP infrastructure actions	DesignFlow

15.1.3 Council recycled water actions

Water demand (ML/yr)	76
Owner (land)	FCC / FGC
Capital Cost ($)	$700,000
OM&R Cost ($/yr)	$22,000
Water purchase savings ($/yr)	$230,000
Cost of water ($/ML)	150
Value/cost ratio	4.59
MCA Score	50%

Scheme Demand: 76 ML/year

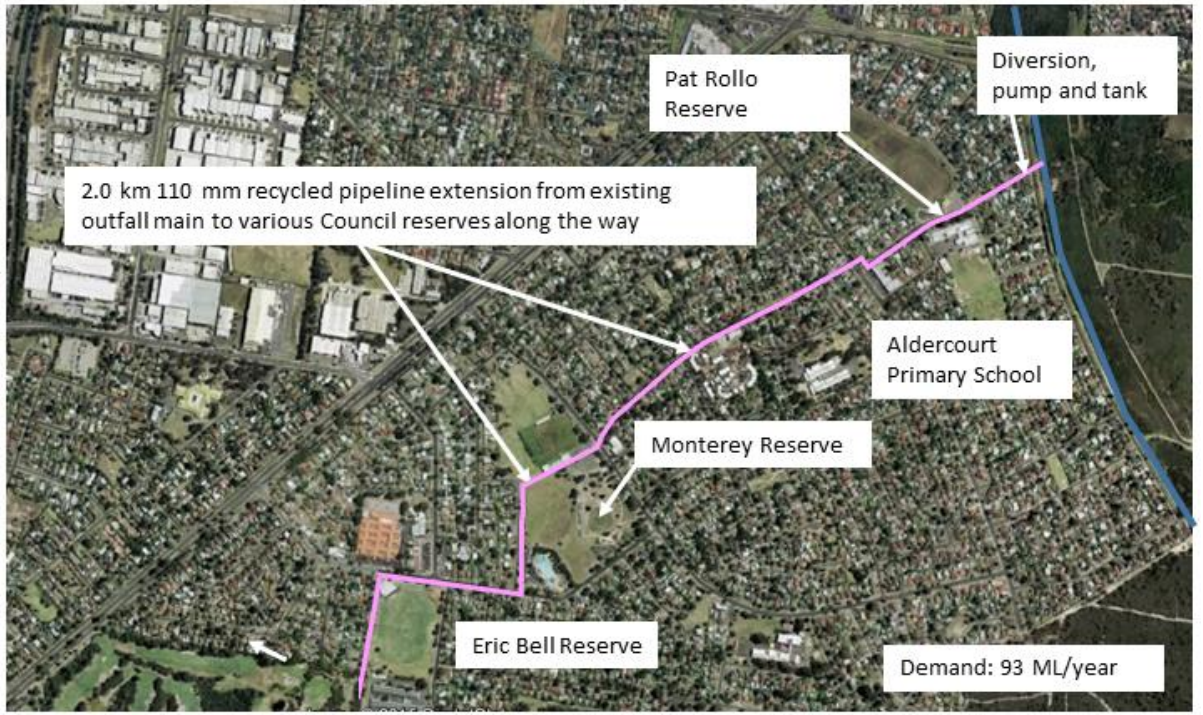
4.75 km of 90 and 110 mm diameter polyethylene recycled water pipe line from Baxter Park to Robinsons Park and Frankston Golf Club

Description

A public-private partnership scheme consisting of 90 and 110 diameter polyethylene recycled water pipelines and a new stand alone (system) pump station at Baxter Park. The new pump station will pump Class A recycled water from Baxter Park to the target sites at Robinsons Park and Frankston Golf Club (private property). The recycled water scheme provides up to 76 ML of recycled water per annum for irrigation purposes to the two sporting facilities. The Scheme is in the final stages of its implementation.

Robinsons Road Recycled Water Project Stage 1 (F00PXW001)	Frankston IWAP infrastructure actions	DesignFlow

Water demand (ML/yr)	93
Owner (land)	FCC/ possible private partnerships (e.g. golf course)
Capital Cost ($)	$1,820,000
OM&R Cost ($/yr)	$25,000
Water purchase savings ($/yr)	$280,000
Cost of water ($/ML)	150
Value/cost ratio	2.89
MCA Score	50%



Description

The Monterey Recycled Water Scheme provides recycled water for sporting fields and a golf course with an annual irrigation demand of 93 ML. The system intercepts and diverts treated wastewater from Melbourne Water's outfall that is normally discharged to Boags Rocks on the Mornington Peninsula. Once diverted, the flow is filtered and pumped to a number of users along a 2 km recycled pipeline.

Monterey Recycled Water Scheme (F00PXW003)	Frankston IWAP infrastructure actions	DesignFlow

Cover images feature:

- Frankston City, image by Skypics
- Kananook Creek
- Rainwater Tank

Inside cover image:

- Sweetwater Creek

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