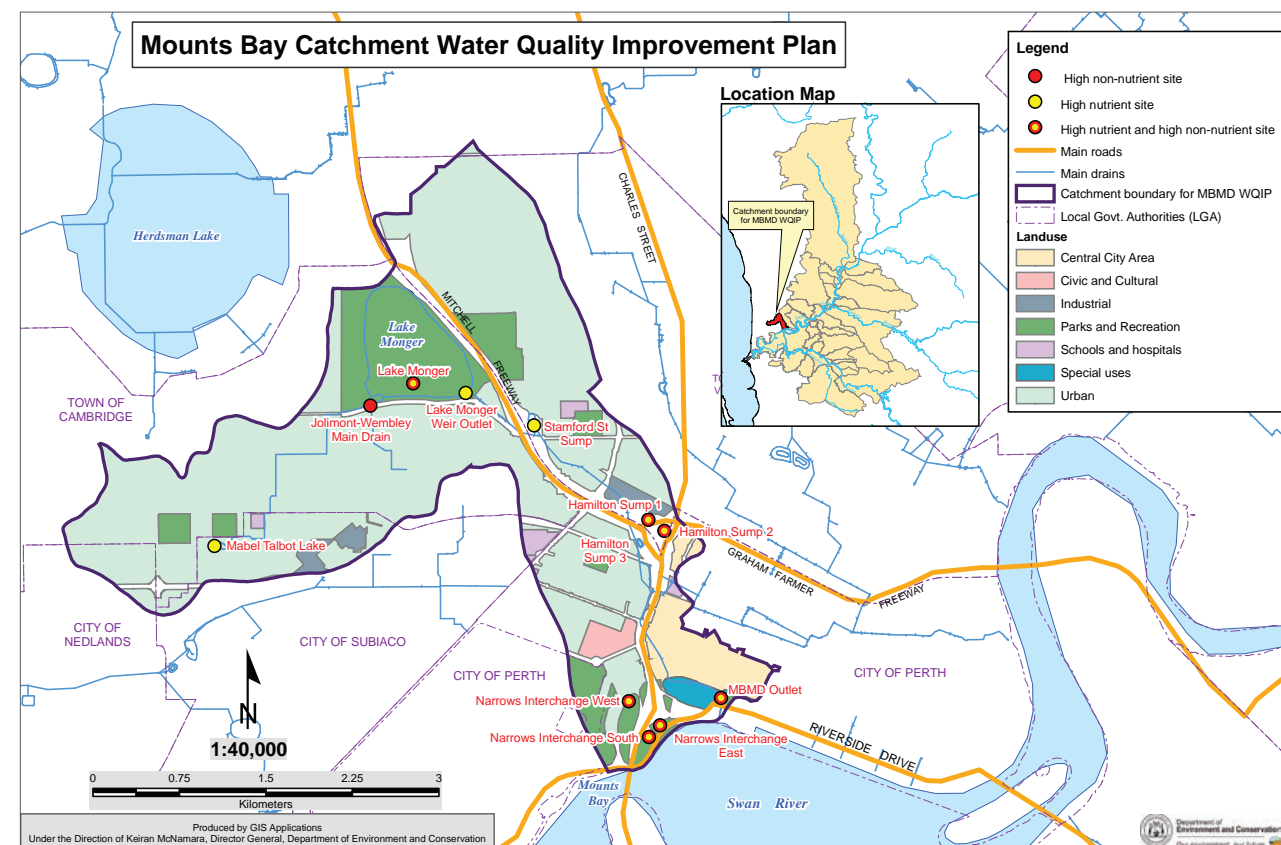


5. Monitoring and review

Strategy	Implementation	Lead organisations	Supporting partners	Timing
Obtaining baseline data	<ul style="list-style-type: none"> Install water flow meters on bores and pumps for the Narrows Interchange lakes recharge and reticulation system Map water-related infrastructure including surface drainage, pipes, pumps, bores and connections Undertake desktop study of water quality, quantity and use information from all agencies to identify areas of concern and areas lacking data Oversee monitoring of areas identified in the desktop study 	MR	CoP	Started 2008
How do we measure our success?	<ul style="list-style-type: none"> Design a water quality monitoring plan and conduct monitoring 2010-11 Annual stakeholder meeting to assess progress on existing and new programs, identify funding opportunities and determine priorities and actions for next 12 months 	MOU stakeholders	DoW, Perth Region NRM	Starting 2010

Maps



Coastal Catchments Initiative

In June 2006 the Swan Canning river system was identified as a hotspot for water quality issues as part of the Australian Government's Coastal Catchments Initiative (CCI). The Trust was responsible for preparing the regional WQIP for the Swan Canning river system.

The regional WQIP provides a roadmap for reducing

nutrient levels in the river system using scientific models and decision support tools prepared under this new initiative.

Integrating science and management actions, an accredited WQIP will underpin a long-term investment strategy to improve water quality in known hotspots such as the Swan Canning river system.



Mounts Bay



Town of Vincent local plants sale



Landscaping with local plants

Partners

This WQIP was developed in consultation with the following stakeholders



For further information contact

Swan River Trust Ph 9278 0900 www.swanrivertrust.wa.gov.au *Caring for the Swan Canning Riverpark*

September 2009

Local Water Quality Improvement Plan Mounts Bay Catchment



Background

The Swan River Trust (Trust) works to reduce nutrients and other contaminants entering the Swan and Canning rivers.

The Trust has developed and is investing in local **Water Quality Improvement Plans (WQIPs)**. These will provide local councils and communities with a mechanism to prioritise recommendations and resources, and seek funding to improve water quality in catchments that contribute the greatest amount of nutrients. These plans should be reviewed annually and assessed after five years.

WQIPs trace nutrient and pollutant pathways through catchments from their source to the discharge point.

Mounts Bay Catchment Water Quality Improvement Plan

The Mounts Bay Catchment covers about 1300 hectares of the City of Perth and northern suburbs. It drains to the middle reaches of the Swan River at Mounts Bay. Water quality in the catchment is poor with pollutants flowing into the Swan River often trapped in the poorly-flushed Mounts Bay.

The upper catchment drains residential areas of the cities of Subiaco and Nedlands and towns of Cambridge and Vincent into Lake Monger which connects to the Swan River via Mounts Bay Main Drain (MBMD).

The MBMD also receives stormwater runoff from areas in the City of Perth and connects to a freeway drainage system with lakes in the Hamilton Interchange. Water from the Hamilton Interchange is pumped to the Narrows Interchange to maintain water levels in ornamental lakes and irrigate parkland.

The City of Perth, Town of Cambridge, Town of Vincent, City of Subiaco, Main Roads, Water Corporation, LandCorp, Department of Planning, Perth Region NRM and the Trust have expressed support to develop a WQIP. This will provide investment guidance and prioritise strategies to improve water quality in the Mounts Bay Catchment and Swan River.

Outcomes

The Water Quality Improvement Plan will:

- identify ecological condition and water quality;
- identify environmental values of water bodies and water quality objectives required to protect the values; and
- identify and commit to a set of cost-effective management measures to achieve and maintain those values and objectives.



Steps to develop a local WQIP

1. Existing activities

What are we doing to improve water quality?

Local government management of drainage, parks and landscaping

The City of Perth, Town of Cambridge, Town of Vincent and City of Subiaco:

- take measures to reduce fertiliser impact on waterways, including the use of phosphate-free or no fertiliser around water bodies and soil or leaf analysis prior to fertilising; and
- have installed gross pollutant traps, sedgebeds, biofilters and gully soakwells and undertake street sweeping to protect water bodies.

Work by the Town of Cambridge to improve water quality in Lake Monger includes replacing exotic, largely deciduous vegetation with indigenous species; maintenance of a nutrient-stripping channel and wetland to treat stormwater entering from the east (co-funded by the Town of Vincent); and community education.

Outcomes: Medium improvement in water quality

Management of urban drainage water bodies

Two compensating basins on the MBMD are owned and maintained by the Water Corporation. Sumps and lakes next to the Mitchell Freeway, at the Hamilton and Narrows Interchanges, are owned and maintained by Main Roads.

The Water Corporation undertakes de-silting and typha removal in compensating basins.

Main Roads has addressed water quality problems in the Narrows Interchange lakes with Phoslock™ treatment, biological treatment and algae removal.

Outcomes: Medium improvement in water quality

Community awareness and education

Local government authorities, the Trust, catchment groups and Perth Region NRM provide community education.

The City of Subiaco and Town of Cambridge have completed a three-year community education campaign on effective fertiliser use. They offer subsidised local plants to residents and support demonstration gardens in schools. Earth Carers prepared a local plants guide for residents.

The Town of Vincent promotes the use of local plant species in home gardens through the Local Plants Project providing subsidised local plant sales, wildflower walks, gardening workshops and a Grow Local Plants brochure.

City of Perth and the Trust support the Claise Brook Catchment Group which involves the community in urban landcare activities and raises awareness of urban water quality issues. Community-initiated projects are restoring indigenous plants to urban landscapes.

Provided by the Trust, Ribbons of Blue involves schools in caring for water bodies; Great Gardens workshops help the community reduce environmental impacts from households and gardens; and River Guardians involves the community in activities to keep the rivers healthy.

Perth Region NRM facilitates environmental auditing and education for small to medium enterprises.

Outcomes: Medium improvement in water quality

Planning now for the future

LandCorp is investigating improvements to drainage, stormwater management and reuse as part of the Perth foreshore development to improve water quality entering the Swan River.

Outcomes: Potential for high improvement in water quality if implemented



2. Condition

What are the water quality and quantity issues in the Mounts Bay Catchment?

High levels of nitrogen, phosphorus and non-nutrient contaminants

Water quality data is limited as the Mounts Bay Catchment is not regularly monitored. Data supplied by stakeholders is discontinuous and inconsistent in site selection and parameters analysed.

Data indicates total nitrogen (TN) exceeds the Healthy Rivers Action Plan (HRAP) interim target or Australian and New Zealand Guidelines for Freshwater and Marine Water Quality (ANZECC & ARMCANZ 2000) at nine of 13 sites.

Total phosphorus (TP) exceeds the HRAP interim target or ANZECC & ARMCANZ 2000 guideline at 10 of 13 sites tested.¹

Heavy metals exceeded ANZECC & ARMCANZ 2000 guidelines for ecosystem and recreational health at seven of 11 sites and three of four sites indicated elevated heavy metals in sediments.

The data identifies issues with nutrient and non-nutrient pollutants. A Water Quality Monitoring Plan is required to further investigate the catchment. All data needs to be stored in, and publicly available from the Department of Water's Water Information Network (WIN) database.

Water quality issues	Pollutant indicators
Contaminants <ul style="list-style-type: none"> High nitrogen levels High phosphorus levels High non-nutrient contaminant levels Potential remobilisation of pollutants in sediments Possible acid-sulphate sediments 	Contaminants <ul style="list-style-type: none"> High nutrient and non-nutrient pollutant concentrations High colour, suspended solids and turbidity Acidity Low oxygen levels
Biotic <ul style="list-style-type: none"> Nuisance growth of aquatic plants Algal blooms Odour from decaying algae and hydrogen-sulphide gas Microbial contamination Orange, muddy water (may be due to the presence of iron bacteria) Excess bird faeces 	Biotic <ul style="list-style-type: none"> Frequency and extent of algal blooms Absence of desirable aquatic plants and animals, loss of biodiversity Odour from decaying algae Turbidity Chlorophyll-a Excessive numbers of waterbirds at lakes Sick or dying birds

Pollutants of concern	Where we are	What we are aiming for ¹
Nitrogen	Lakes	0.1 to 5.2mg/L
	Drains	0.1 to 2.3mg/L
Phosphorus	Lakes	0.1 to 1.02mg/L
	Drains	0.06 to 0.19mg/L
Heavy metals	Water	Al, Cr, Cu, Pb and Zn exceed trigger values
	Sediment	As, Pb, Ni and Zn exceed high trigger values Cd, Cr, Cu and Hg exceed low trigger values

¹ for targets see next section

Maintaining seasonal flow variability

The weir outlet at Lake Monger is manually lowered and raised each year, flushing water into the MBMD. Falling catchment groundwater levels may reduce flow from Lake Monger with water retained to maintain summer levels.

Water pumped from groundwater bores and the Hamilton Interchange lakes to the Narrows

Interchange ornamental western lake maintains water levels and is used for reticulation. Less flow from Lake Monger and failing bores may increase draw from the Hamilton lakes. Forced water movement via bores and pumping may contribute to water quality problems in the catchment.

3. Values, objectives and targets

What water quality improvements would we like to achieve in the Mounts Bay Catchment?

Values	Objectives
Surface water flow Flows are managed to achieve multiple outcomes including nutrient flushing from Lake Monger, maintaining water levels in lakes and parkland reticulation	Minimise water use and improve water flow management to improve environmental values
Aquatic ecosystem health (AH) Water bodies in the catchment, although highly modified, have ecological value Lake Monger is an important feeding and breeding habitat for waterbirds, migratory birds and tortoises and is a drought refuge in summer Other water bodies in the system provide important habitat for native fauna with the Narrows Interchange Western Lake attracting up to 5000 birds every day	Improve water quality in water bodies, drains and receiving waters to support ecosystem health Promote better understanding of water quality issues and improved behaviour in the catchment population
Recreation and aesthetics (RA) Water bodies are important for local and regional recreation Lake Monger is a popular tourist and recreation venue and the Narrows Interchange Western Lake is highly visible from Kings Park Stormwater and groundwater is reused to irrigate parkland, water quality in lakes and Mounts Bay sometimes falls below acceptable standards for human health	Improve water quality to maintain and enhance recreational and aesthetic values of water bodies in the catchment Educate users of recreation areas
Cultural and spiritual (CS) Indigenous The abundant springs along the city's foreshore were once camping places for Aboriginal people Wetlands such as Lake Monger were valued camping sites, rich in food resources and important for mythological reasons. The Enrich Walk Trail, linking Heirisson Island and Kings Park, passes through the catchment European The catchment has sites important to post-settlement history including areas of Perth's earliest settlement, market gardens, early industries and significant transport infrastructure	Protect and recognise cultural and spiritual values of the catchment

Targets
Targets for water bodies are based on Australian New Zealand Guidelines for Freshwater and Marine Water Quality (ANZECC & ARMCANZ 2000)
The HRAP aims to reduce annual load from the catchment by 30% by 2015. In the Mounts Bay Catchment there is insufficient data to determine load so the HRAP interim targets will apply

Contaminant	Target concentration
Nitrogen	
Lakes	1.5mg/L (ANZECC & ARMCANZ 2000 trigger values for wetlands, south-west Western Australia)
Drains	1mg/L (HRAP interim)
Phosphorus	
Lakes	0.06mg/L (ANZECC & ARMCANZ 2000 trigger values for wetlands, south-west Western Australia)
Drains	0.1mg/L (HRAP interim)
Heavy metals	
Water	ANZECC & ARMCANZ 2000. Level of protection: 95% species (various)
Sediment	ANZECC & ARMCANZ 2000 Interim Sediment Quality Guidelines low trigger value (various)

4. Implementation

How do we achieve the water quality targets?

Treatment train approach	Management strategies	Implementation	Lead organisations	Supporting partners	Timing
1. Prevention Land use and planning ↓ 2. Minimisation Ecoefficiency ↓ 3. Reduction Source control ↓ 4. Amelioration Conveyance and transmission ↓ 5. Treatment - Reuse - Disposal	1.1 Prioritise water quality in decision support systems*	<ul style="list-style-type: none"> State and local government prioritise water quality actions in programs and decision-making systems such as International Council for Local Environmental Initiatives, environmental management systems and sustainable management systems (AH) 	MOU stakeholders	Western Australian Local Government Association (WALGA)	Start at MOU signing
	1.2 Implement local planning policies, strategies and planning conditions incorporating best management practices	<ul style="list-style-type: none"> Review policies and strategies to prioritise improved water quality (AH) Local government implement and ensure appropriate enforcement of State Government codes of practice and legislation at the local level (AH) State Government implement and ensure appropriate enforcement of departmental codes of practice and legislation (AH) 	MOU stakeholders	Department of Planning (DoP), WALGA, Department of Water (DoW)	Start at MOU signing
	2.1 Water conservation plans*	<ul style="list-style-type: none"> Local government authorities develop and implement water conservation plans (AH) 	City of Perth (CoP), Town of Cambridge (ToC), Town of Vincent (ToV), City of Subiaco (CoS)	DoW	Started 2008
	3.1 Reduce council output	<ul style="list-style-type: none"> Implement best management practices for management of public open space (AH, RA) Review management practices for street sweeping, litter and sediment management (AH) **Develop and implement a nutrient and irrigation management plan for streetscapes (verges, median strips and roundabouts) (AH) 	CoP, ToC, ToV, CoS, City of Nedlands (CoN)	DoW, Phosphorus Action Group (PAG), Perth Region NRM	Financial year following MOU signing
	3.2 Reduce community output	<ul style="list-style-type: none"> Create community-wide awareness of the catchment's connection to the Swan River (AH, CS) Promote community behaviour change through education programs (AH, CS) Work with local industry to reduce potential contamination of receiving waters (AH) 	MOU stakeholders	Claise Brook Catchment Group (CBCG), Swan River Trust (Trust), Perth Region NRM, Water Corporation (WC), Department of Environment and Conservation (DEC)	Ongoing
	3.3 Sustainable landscaping*	<ul style="list-style-type: none"> Adopt sustainable landscaping practices through policy and management (AH) Require sustainable landscaping as a condition of development approval (AH) Identify exotic vegetation impacting surface water quality and replace with indigenous vegetation (where not in conflict with cultural values) (AH, CS) 	CoP, ToC, ToV, CoS, Main Roads (MR)	CBCG, Perth Region NRM	Start at MOU signing
	4.1 Drainage nutrient intervention projects	<ul style="list-style-type: none"> Maintain nutrient stripping systems at Lake Monger and Mabel Talbot Reserve (AH) Investigate and trial a range of technologies to quantify water quality improvements (AH) ** Develop and implement treatments to address contamination to Lake Monger via groundwater from landfill areas (AH, RA, CS) 	ToC, CoS, ToV, MR	ToV, WC, Trust, tertiary institutions	Ongoing
	Identify and prioritise sites to implement water sensitive urban design (WSUD) features to intercept pollutants and increase infiltration (AH)	<ul style="list-style-type: none"> Identify and prioritise sites to implement water sensitive urban design (WSUD) features to intercept pollutants and increase infiltration (AH) 	MOU stakeholders, CoN	CBCG	Financial year following MOU signing
	Identify and prioritise sites to install nutrient intervention projects to treat low flow and first flush events (AH, RA, CS)	<ul style="list-style-type: none"> Identify and prioritise sites to install nutrient intervention projects to treat low flow and first flush events (AH, RA, CS) 	MOU stakeholders	CBCG	Financial year following MOU signing
	**To complement source control treatments, develop a funding and implementation strategy to install an appropriate intervention system in MBMD prior to discharge into Mounts Bay (AH, RA, CS)	<ul style="list-style-type: none"> **To complement source control treatments, develop a funding and implementation strategy to install an appropriate intervention system in MBMD prior to discharge into Mounts Bay (AH, RA, CS) **Project manage installation of intervention system in MBMD (AH, RA, CS) 	MOU stakeholders, LandCorp	MR, WC	Dependant on Perth Waterfront development
	**Investigate and implement water quality improvement methods at the Hamilton Interchange (before water is pumped to the Narrows Interchange for reuse) (AH)	<ul style="list-style-type: none"> **Investigate and implement water quality improvement methods at the Hamilton Interchange (before water is pumped to the Narrows Interchange for reuse) (AH) 	MR	CoP, DoP, LandCorp, Perth Region NRM, CBCG	Financial year following MOU signing

*new management strategy

**new management actions

(AH) = aquatic ecosystem health, links to values for the catchment in Section 3

The proposed adoption of a Memorandum of Understanding (MOU) with the City of Perth, Town of Cambridge, Town of Vincent, City of Subiaco, Main Roads, Water Corporation, Department of Planning, LandCorp, Department of Water, Perth Region NRM and the Trust will facilitate implementing Mounts Bay Catchment WQIP recommendations. It will also provide a forum to seek funding and report outcomes.

The lead organisations and supporting partners will implement this WQIP in the constraints of existing budgets and resource levels. They are committed to working together to actively seek new resource opportunities.