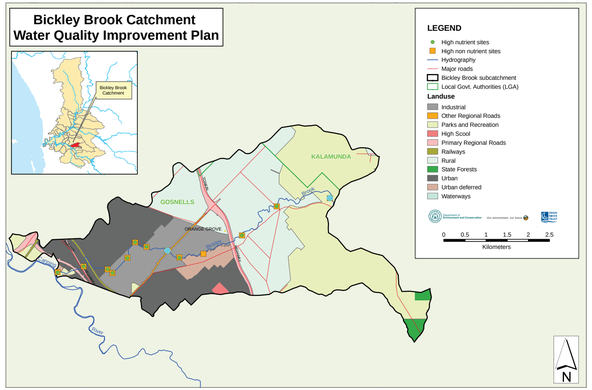
5. Monitoring and review

Strategy	Implementation	Lead organisations	Supporting partners	Timing
How do we measure our success?	• Annual stakeholder meeting to assess progress on programs, identify funding opportunities and determine objectives and actions for next 12 months • Seek funding or support for ongoing water quality monitoring program to quantify catchment condition and effectiveness of strategies and actions	Trust, CoG, Perth Region NRM, DoW	SERCUL, CSIRO, WC, DoP, DEC, AGLG	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.

Stormwater entering Bickley Brook

Water quality issues in Bickley Brook

Inappropriate storage along the banks of Bickley Brook

Partners

This WQIP was developed in consultation with the following stakeholders

Department of Environment and Conservation
Department of Water
Department of Planning

SWAN RIVER TRUST

CITY OF GOSNELLS

SERCUL
South East Regional Centre for Urban Landcare

Armadale Gosnells Landcare Group

Perth Region NRM

WATER CORPORATION

For further information contact

City of Gosnells Ph 9391 3222 www.gosnells.wa.gov.au
Swan River Trust Ph 9278 0900 www.swanrivertrust.wa.gov.au

Caring for the Swan Canning Riverpark

September 2009

Local Water Quality Improvement Plan
Bickley Brook Catchment

GOVERNMENT OF WESTERN AUSTRALIA

SWAN RIVER TRUST

CITY OF GOSNELLS

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 contributing the greatest amount of nutrients. These plans should be reviewed annually and assessed after five years. Under the Healthy Rivers Action Plan (HRAP), the Bickley Brook Catchment is identified as one of eight priority catchments in the Swan Canning Catchment.

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

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.

Bickley Brook Catchment Water Quality Improvement Plan

Bickley Brook is a tributary of the Canning River with its headwaters at the Darling Scarp. It is a combination of a natural system and deeply incised drain entering the Canning River about 6km upstream of the Kent Street Weir.

The Bickley Brook Catchment, an area of 21km^2, begins at the Bickley Reservoir. Most of the catchment has been cleared and land use is a mix of remnant vegetation, semi-rural, residential and light industry.

Bickley Brook has severe erosion and weed infestation problems exacerbated by a lack of native vegetation and illegal storage and disposal of materials. There are also many stormwater outfalls discharging directly into the brook.

The City of Gosnells has worked with catchment management groups since 1998 to develop the Upper Canning Southern Wungong Catchment Management Team (now the Armadale Gosnells Landcare Group (AGLG)). This group has updated its strategic plan with the release of the Armadale Gosnells Landcare Group Strategic Plan 2008-18.

The South East Regional Centre for Urban Landcare (SERCUL) also supports the City of Gosnells and AGLG.

Steps to develop a local WQIP

1. Existing activities

What are we doing to improve water quality?

Local WQIPs link to existing projects and programs in the target area. They draw together activities contributing to improved water quality and target future investment for optimal water quality outcomes. Projects are based on partnerships with local government, community and shared stakeholders.

Examples of key programs in the Bickley Brook Catchment:

Maddington Kenwick Sustainable Communities Partnership Action and Implementation Plan

The Maddington Kenwick Action and Implementation Plan was compiled by the Maddington Kenwick Sustainable Communities Partnership (MKSCP). The plan addresses social, economic, cultural, built and natural environments.

The focus of natural environment actions is to:

- transform waterways and landscapes into living ecosystems;
- better understand and respect the natural environment; and
- appreciate and enjoy the natural environment.

Environmental actions are carried out via the Bickley Brook Project. The project clarifies water quality and quantity issues and addresses ecological diversity, stream morphology, bank stability and revegetation.

Partners: MKSCP, City of Gosnells, AGLG, SERCUL and the Trust

Outcomes: Medium improvement in water quality

Water quality sampling in Bickley Brook Main Drain

Armadale Gosnells Landcare Group

AGLG is an independent local catchment group. They work with local government to coordinate and implement onground actions with a focus on river and bushland management. They work with community to raise awareness of the impacts to waterways from nutrients and human activity. They collaborate with stakeholders to protect the ecological values of the catchment.

Partners: Cities of Armadale and Gosnells and SERCUL

Outcomes: Medium improvement in water quality and high improvement in biodiversity

Light Industry Area Improvement Project

This program raises awareness about stormwater discharge. It provides owners and managers of small and medium enterprises with advice on legal obligations and best practice for stormwater treatment.

Partners: City of Gosnells and Perth Region NRM

Outcomes: Low improvement in water quality for nutrients, medium for non-nutrients

Model Industrial Development Guidelines

The City of Gosnells, in partnership with Perth Region NRM and with funding from the Australian Government, is developing Model Industrial Development Guidelines for future industrial planning and development in the nearby Maddington Kenwick Strategic Employment area. Precinct 1 of this area drains to Bickley Brook. The guidelines will address improved water quality outcomes from new development, and may provide guidance for similar improvements in existing industrial areas in the Bickley Brook Catchment.

Partners: City of Gosnells and Perth Region NRM

Outcomes: Low improvement in water quality for nutrients, medium for non-nutrients

2. Condition

What are the water quality and quantity issues in the Bickley Brook Catchment?

High levels of nitrogen, phosphorus and non-nutrient contaminants

Water quality is monitored fortnightly by the Department of Water on behalf of the Trust and reported through catchment nutrient reports at www.swanrivertrust.wa.gov.au. These reports provide information across a 10-year period on concentrations, nutrient fractions and seasonal variations. Data indicates total phosphorus (TP) has generally been at low levels in this catchment but total nitrogen (TN) continues to be an issue.

SERCUL and the City of Gosnells, with funding from MKSCP, conducted a three-year water and sediment quality sampling program in the Bickley Brook Catchment from 2006-08. In 2007, SERCUL sampled 13 sites along Bickley Brook on five occasions between July and November to determine water quality in the catchment. The parameters for nutrient and non-nutrients were measured against the Australian and New Zealand Guidelines for Freshwater and Marine Water Quality (ANZECC & ARMCANZ 2000). The information presented in this WQIP is based on 2007 data, which is representative of the condition of the catchment but does not adequately reflect several pollution events that were observed and recorded during that period.

The range for TN was 0.17 to 18mg/L with a median reading of 1.0mg/L. TN concentrations varied spatially throughout the catchment. TP ranged from 0.005 to 0.21mg/L with a median of 0.03mg/L and was generally low with the exception of four sites.

ANZECC & ARMCANZ 2000 guidelines for non-nutrients were exceeded at every site for aluminium and iron, and 11 of the 13 sites sampled in July for chromium, copper and zinc.

Water quality issues	Pollutant indicators	Pollutants/issues of concern
Contaminants • High nitrogen levels • High non-nutrient contaminant levels • Potential remobilisation of pollutants from sediments • Possible acid-sulphate soils	**Contaminants** • High nutrient and non-nutrient pollutant concentrations • Acidity • Suspended solids and turbidity	**Nutrients** • Total nitrogen **Non-nutrients** • Aluminium, chromium, copper, iron and zinc • Poly-aromatic hydrocarbons • Microbial hazards • Pollution events
Biotic • Nuisance growth of aquatic plants • Algal blooms in wetlands • Odour from decaying algae and hydrogen-sulphide gas • Microbial contamination • Orange, muddy water (may be due to the presence of iron bacteria)	**Biotic** • Frequency and extent of algal blooms • Absence of desirable aquatic plants and animals, loss of biodiversity • Odour from decaying algae • Turbidity • Chlorophyll-*a* • Sick or dying birds	

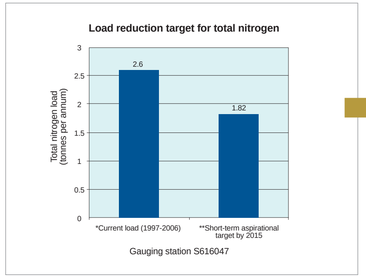
Maintaining seasonal flow variability

The amount of water entering the Canning River from the catchment is important to maintain environmental values in the river. Data collected at the Austin Street gauging station 616047 from 1997-2006 showed Bickley Brook annual flow ranged from 0.85 to 3.5 gigalitres per year. With climate change this variability is likely to continue.

3. Values, objectives and targets

What water quality improvements would we like to achieve in the Bickley Brook Catchment?

Values	Objectives	Targets
River flow (RF) Flows in Bickley Brook protect environmental values in the system and contribute to Environmental Water Requirements for the Canning River	• Mimic natural inundation and drying patterns which protect wetlands and floodplains • Minimise the effect of dams and extraction on water quality by mimicking natural frequency, duration and seasonal flow	No suitable target available for flow as this is a regulated catchment An Environmental Water Requirements study is necessary to quantify target
Aquatic ecosystem health (AH) Bickley Brook is in a reasonably natural condition from Bickley Reservoir to Tonkin Highway It is managed by the Water Corporation as a main drain from Tonkin Highway to the Canning River, and has been considerably altered from its natural form and vegetative condition There are issues relating to adjoining land use, storage of materials and stormwater discharge which are impacting on the ecological health of the brook	• Protect aquatic ecosystem health, recreation and aesthetics, and cultural, spiritual and primary industry values by improving water quality • Reduce annual TN loads by 30% by 2015 and maintain TP levels below HRAP targets	**Nutrients** Bickley Brook Catchment is exceeding HRAP interim long-term targets for TN but passing targets for TP **Non-nutrients** The target for non-nutrient contaminants is to meet ANZECC & ARMCANZ 2000 guidelines for environmental health at monitored sites
Recreation and aesthetics (RA) Bickley Brook has actual and potential recreational and aesthetic value, in its natural state and as part of urban development Storage issues predominantly associated with adjoining industrial activity need to be addressed as part of the WQIP to enhance and protect the brook		
Cultural and spiritual (CS) There are two permanently registered sites of significance in the Bickley Brook Catchment Bickley Reservoir is on the interim register and the brook is a proclaimed Aboriginal site		
Primary industries (PI) A large proportion of the upper catchment is used for agricultural activities Groundwater abstraction needs to be considered to ensure the sustainability of primary industry and ecological values of the area		



Total phosphorus

***Annual load:** 0.11 tonnes
****Target annual load by 2015:** 0.11 tonnes (no reduction required)

**Based on average annual flow data from 1997-2006 and applies to annual river discharge loads similar to 1997-2006*

***Target to achieve 30% reduction by 2015 for TN and maintain TP levels below HRAP targets*

4. Implementation

How do we achieve the water quality targets?

The Bickley Brook Catchment WQIP aims to reduce nutrient loads entering the Canning River through nutrient intervention and changed management practices. By using a treatment train approach, a combined set of management actions are applied along nutrient pathways to minimise nutrient and contaminant losses to waterways.

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

Treatment train approach	Management strategies	Implementation	Lead organisations	Supporting partners	Timing
1. Prevention Land use and planning	**1.1 Review planning processes***	• **Develop a planning process to review: - incorporating water quality outcomes to redevelop existing industrial area; - compliance with planning conditions and provisions of Town Planning Scheme 6; - practices regarding storage, containment and disposal of waste; and - retrofitting of water sensitive urban design where appropriate (AH)	City of Gosnells (CoG)	Department of Planning (DoP)	Starting 2009-10
	1.2 Implement local planning policies, strategies and planning conditions incorporating best management practices	• **Develop policy for land use activities located in the Bickley Brook Catchment to implement best management practices to reduce nutrient and other pollutant outputs as part of approval conditions for development and redevelopment (AH) • Continue to implement the draft Foothills Rural Strategy (AH, RA)	CoG	South East Regional Centre for Urban Landcare (SERCUL), Armadale Gosnells Landcare Group (AGLG)	
	1.3 Water Quality Monitoring Program	• Continue water quality monitoring program initiated by MKSCP Bickley Brook Project	Perth Region NRM, Department of Water (DoW)	CoG, SERCUL	
2. Minimisation Efficiency in nutrient use	2.1 Reduce industry output though regulation and education (including hobby farms)	• Continue to expand the Light Industry Area Improvement Project to progressively incorporate all small to medium enterprises in the Bickley Brook Catchment with an emphasis on storage and disposal of hazardous materials (AH) • **Review Model Guidelines for Sustainable Industrial Development being developed by MKSCP and where appropriate apply to new and retrofitted premises (AH) • Enforce Unauthorised Discharge Regulations (AH) • **Implement program to map links between stormwater outfalls and source industrial premises	Perth Region NRM, Department of Environment and Conservation (DEC)	CoG, SERCUL, AGLG	Starting 2009-10
	2.2 Nutrient reduction through best management practices*	• Encourage primary industries to use slow-release low water-soluble phosphorus and nitrogen fertilisers (PI) • Identify opportunities/sites to link to Water Wise on the Farm Program • Develop and source funding to encourage adoption of best management practice for specific industries (AH, PI)	Perth Region NRM	DEC, CoG, Swan River Trust (Trust)	
3. Reduction Source control	**3.1 Reduce council output through local management practices**	• Extend soil and leaf testing, use of soil amendments and minimal water use to all public open space across the catchment (AH, CS) • Implement water conservation plans (AH, RA) • Increase local plants in landscaped areas (AH, CS, RA)	CoG	DoW, DEC, SERCUL	Starting 2009-10
4. Amelioration Conveyance and transmission	**4.1 Nutrient intervention and improved drainage***	• Develop a series of living stream projects to enhance nutrient-stripping in Bickley Brook (AH, RF) • Implement at-source management strategies and water sensitive urban design when retrofitting drainage, and as new development and retrofitting occurs	CoG, DoW	Trust, SERCUL, AGLG, Water Corporation (WC)	Starting 2009-10
		• Develop a partnership with a research institution to determine ecological values to be maintained as part of nutrient-stripping and living stream projects in the catchment (AH)	CoG, DEC	Research institutions	
		• Prioritise sites for implementing Healthy Wetland Habitat Program (AH, CS)	DEC	CoG	
5. Treatment - Reuse - Disposal	5.1 Full connection to infill sewerage	• Full connection of industrial areas to existing infill sewerage and infrastructure to connect new residential and industrial areas (AH) • Increase management and maintenance of infrastructure to reduce sewage spills to the stormwater system (AH, CS, RA)	WC	CoG	Ongoing

***new management strategy** ******new management actions (AH) = aquatic ecosystem health, links to values for the catchment in Section 3