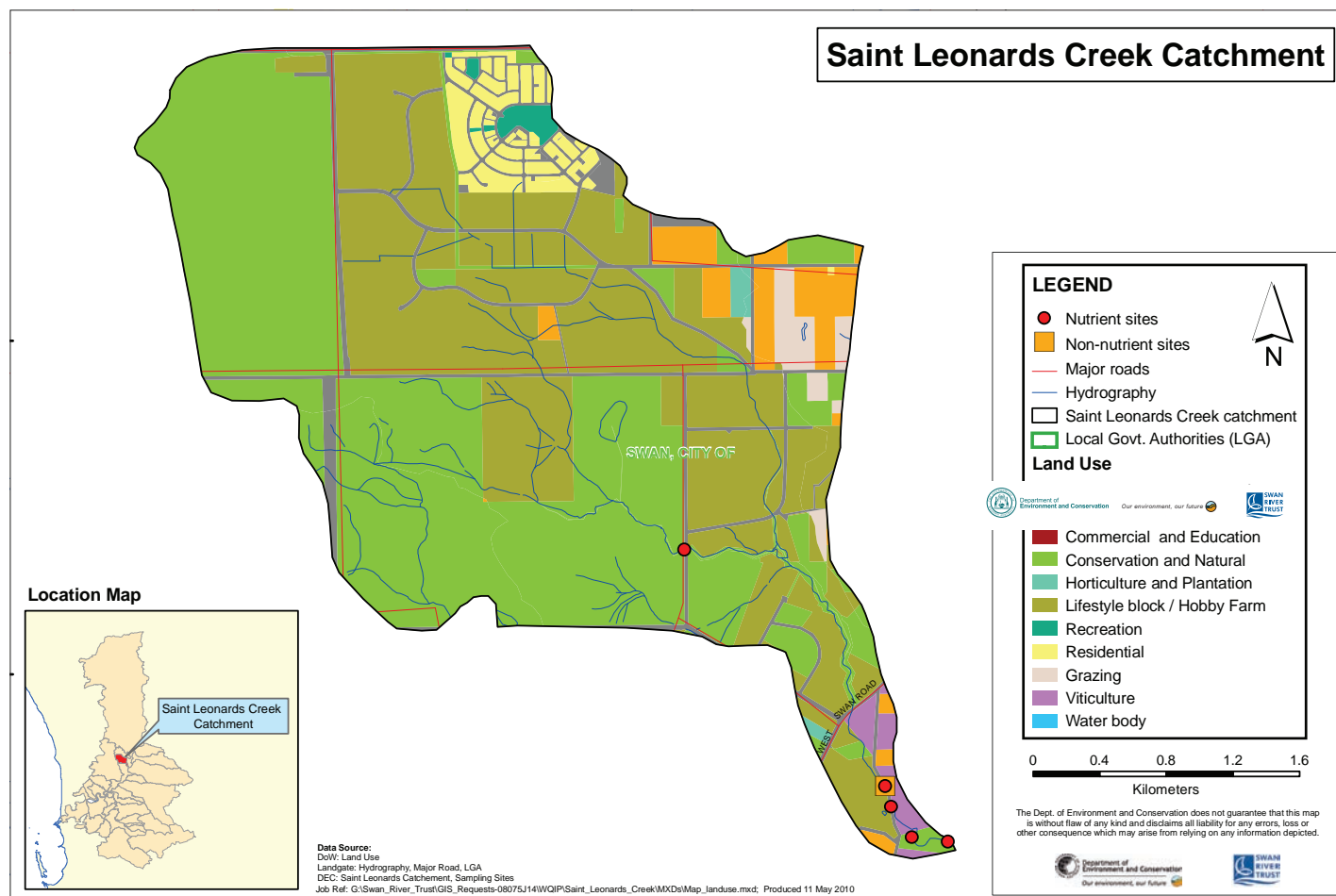


## 5. Monitoring and review

Strategy	Implementation	Lead organisations	Supporting partners	Timing
<b>How do we measure our success?</b>	<ul style="list-style-type: none"> <li>Organise initial stakeholder meeting to determine Key Performance Indicators (KPIs) and annual reviews to assess their progress; identify funding opportunities; and determine objectives and actions for the next 12 months</li> <li>Seek funding and support to ensure ongoing implementation and monitoring of effectiveness of strategies and actions</li> </ul>	Trust, CoS	WC, DoP, DEC, PRNRM, DoW	Starting 2010

## Maps



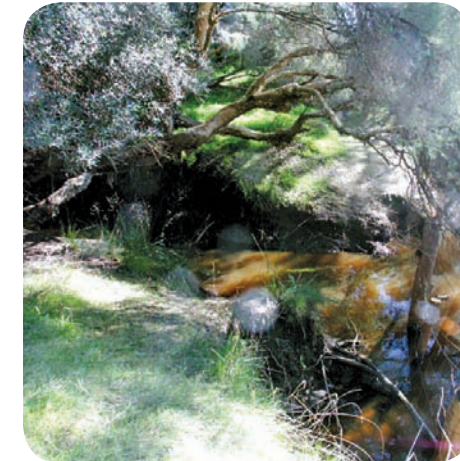
## Coastal Catchments Initiative

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 Water Quality Improvement Plan 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.



Saint Leonards Creek



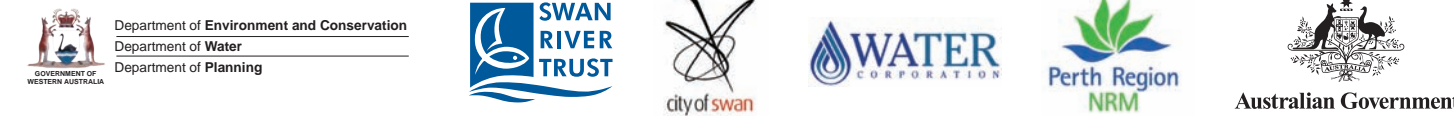
Saint Leonards Creek flowing, September 2004



Sampling Saint Leonards Creek, 2004

## Partners

This WQIP was developed in consultation with the following stakeholders



ANZECC & ARMCANZ 2000, *Australian and New Zealand Guidelines for Freshwater and Marine Water Quality, Volume 1, The Guidelines*, Australian and New Zealand Environmental and Conservation Council and Agricultural and Resource Management Council of Australia and New Zealand.

North East Catchment Committee 2004, *Saint Leonards Creek, Nutrients and Total Suspended Solids Water Quality Investigation*, July-September 2004.

For further information contact

City of Swan Ph 9267 9267 www.swan.wa.gov.au  
 Swan River Trust Ph 9278 0900 www.swanrivertrust.wa.gov.au *Caring for the Swan Canning Riverpark*

March 2011

## Local Water Quality Improvement Plan Saint Leonards Creek 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 contributing the greatest amount of nutrients. These plans should be reviewed annually and assessed after five years. The Saint Leonards Creek Catchment was identified as a catchment of concern by modelling completed for the Swan Canning Water Quality Improvement Plan (SCWQIP).

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

### Saint Leonards Creek Water Quality Improvement Plan

Saint Leonards Creek is located in the north-east Perth metropolitan area and is a seasonal tributary to the Swan River. It typically flows between April and September with this flow dependant on rainfall and an associated rise in the local groundwater table.

It is fed by a semi-rural catchment with a predominant land use of horticultural production. Saint Leonards Creek has a catchment area of approximately 11.6km<sup>2</sup> and is located in the City of Swan.

Damming and the creation of water retention features such as sumps along the creek may have reduced the amount of water reaching the Swan River from this source. Reduced flow from human actions may also be compounded by reduced rainfall and lower groundwater levels.

The Saint Leonards Creek Catchment is in the Urban North Growth Corridor. Rapid development is expected in this catchment.

### Outcomes

The Water Quality Improvement Plan will:

- identify water quality issues and hot spots;
- 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 WQIPs link to existing projects and programs in the catchment. They draw together activities contributing to improved water quality and target future investments for optimal water quality outcomes. Projects are based on partnerships with local government, community and shared stakeholders.

Examples of key existing programs in Saint Leonards Creek include:

### Water quality management

The 2004 Nutrients and Total Suspended Solids Water Quality Investigation for Saint Leonards Creek aimed to provide baseline data on nutrient and total suspended solid concentrations entering the Swan River during first flush events before restoration works along Saint Leonards Creek. The assessment was triggered by a lack of water quality data for the area and to help assess future revegetation projects planned for Saint Leonards Creek.

**Partners:** City of Swan, Department of Environment, Henley Brook West Swan Catchment Group Inc, North East Catchment Committee

**Outcomes:** Low improvement in water quality

Saint Leonards Creek, West Swan



### Community activities and education

Community capacity building programs in the Saint Leonards Creek Catchment include landholder workshops targeting whole-of-property management through increased understanding of soil and nutrient management.

**Partners:** Heavenly Hectares, Perth Region NRM

**Outcomes:** Medium improvement in water quality

### Rehabilitation programs

A section of Saint Leonards Creek on the corner of West Swan Road and Woollcott Avenue was revegetated in 2001.

**Partners:** City of Swan, Eastern Hills Catchment Management Program, landowner

**Outcomes:** Medium improvement in water quality

## 2. Condition

What are the water quality issues in Saint Leonards Creek?

### High levels of nitrogen, phosphorus and non-nutrient contaminants

Baseline data was provided by a 2004 nutrient snapshot of two sites by the North East Catchment Committee. Between 2006 and 2008 the Department of Water monitored one site at Saint Leonards Creek. This included a snapshot of nutrients and metals completed in August 2006. Nutrients were monitored on six occasions between August and October 2007 and once in June 2008.

Parameters for non-nutrients were measured against the *Australian and New Zealand Guidelines for Freshwater and Marine Water Quality* (ANZECC

and ARMCANZ 2000). Freshwater guidelines were exceeded for chromium, copper and zinc and recreational guidelines were exceeded for aluminium, iron and manganese in winter 2006.

There is little data on the Saint Leonards Creek Catchment and proposed urban development means potential increases in total nitrogen and phosphorus are of concern.

Results from water quality sampling at five sites in 2002, 2004, 2006, 2007 and 2008; and main nitrogen and phosphorus sources are shown below.

Nutrient	HRAP targets	Exceed HRAP targets	Range	Median	Mean
Total nitrogen	1.0mg/L	5 sites	1.1 – 3.2mg/L	2.4mg/L	2.36mg/L
Total phosphorus	0.1mg/L	3 sites	0.1 – 0.22mg/L	0.1mg/L	0.11mg/L

### Main nutrient sources\* in Saint Leonards Creek

Nitrogen		Phosphorus	
Farms	60.5%	Farms	29%
Hobby farms	37.9%	Hobby farms	22.8%
Residential	0.6%	Residential	15.7%
Septic	0.3%	Septic	7.4%
		Recreation	5.9%
		Horticulture	5.3%

\*based on SCWQIP modelling

Water quality issues	Pollutant indicators	Pollutants/issues of concern
<b>Contaminants</b> <ul style="list-style-type: none"> <li>Moderate nitrogen and phosphorus levels</li> <li>High non-nutrient contaminant levels</li> </ul>	<b>Contaminants</b> <ul style="list-style-type: none"> <li>Moderate nutrient and non-nutrient pollutant concentrations</li> </ul>	<b>Nutrients</b> <ul style="list-style-type: none"> <li>Anticipated urban development means total nitrogen and total phosphorus levels are modelled to regularly exceed current targets</li> </ul>
<b>Biotic</b> <ul style="list-style-type: none"> <li>Death/stress of desirable aquatic organisms and plants</li> </ul>	<b>Biotic</b> <ul style="list-style-type: none"> <li>Absence of desirable aquatic plants and animals, loss of biodiversity</li> </ul>	<b>Non-nutrients</b> <ul style="list-style-type: none"> <li>Heavy metals: aluminium, chromium, copper, iron, manganese and zinc</li> <li>Sediment (future development issues)</li> </ul>

### Maintaining seasonal flow variability

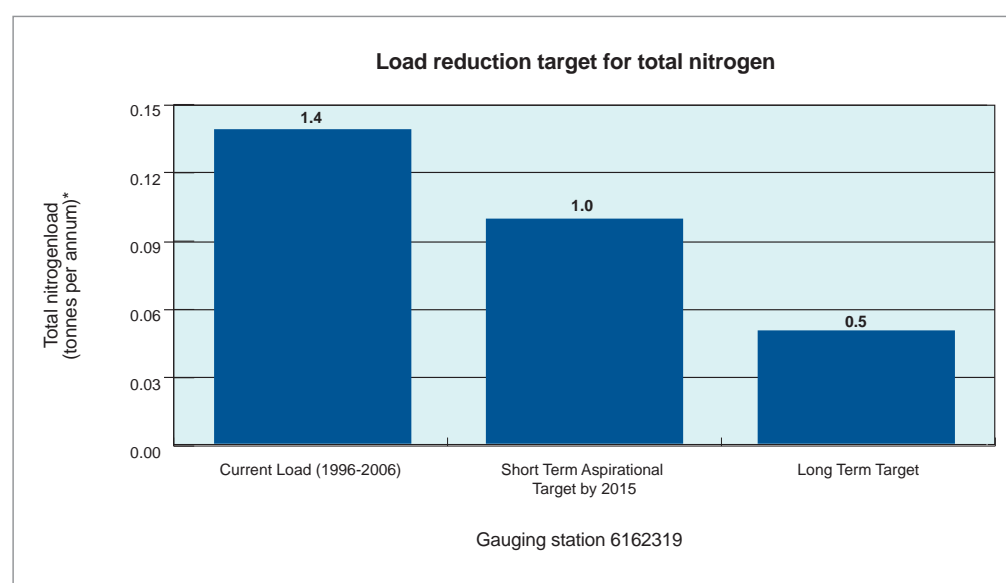
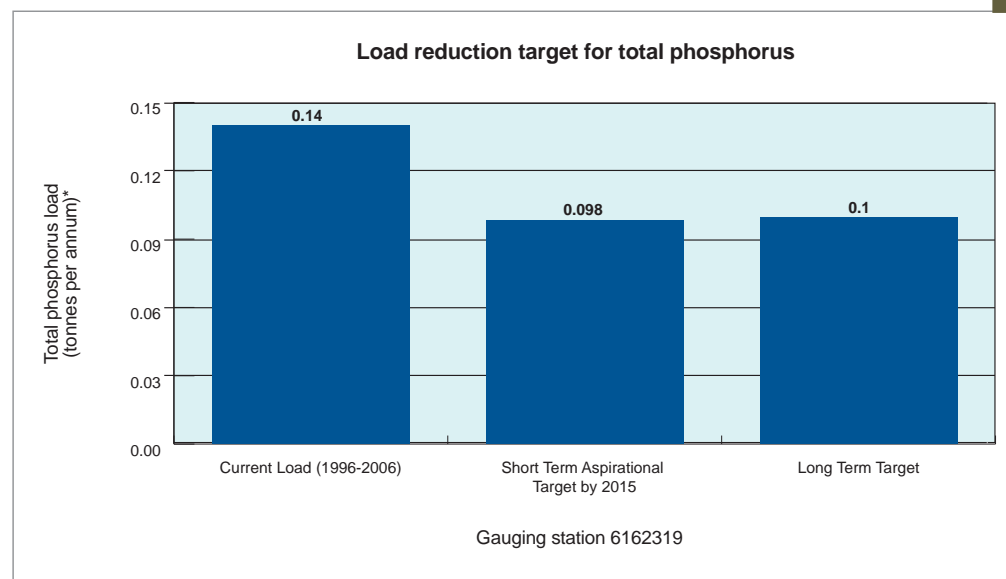
The amount of water entering the Swan River from the catchment is important to maintain environmental and recreational values in the river. There is no data on annual flow for Saint Leonards Creek. The flow data used to determine annual load for

Saint Leonards Creek Catchment for the load reduction graphs and the SCWQIP was modelled on a catchment with similar rainfall and physical characteristics.

## 3. Values, objectives and targets

What water quality improvements would we like to achieve in Saint Leonards Creek?

Values	Objectives	Targets
<b>River flow (RF)</b> Flow in Saint Leonards Creek protects environmental values in the system and contributes to Environmental Water Requirements for the Swan River	<ul style="list-style-type: none"> <li>Mimic natural inundation and drying patterns which protect wetlands and floodplains</li> <li>Minimise the effect of dams and extraction on water quality by mimicking natural frequency, duration and seasonal flow</li> </ul>	<b>River flow</b> Sufficient flow to maintain environmental values  <b>Nutrients</b> The short-term aspirational target is to reduce average TN and TP loads by 30% by 2015. Predictive modelling from the SCWQIP has demonstrated that a 30% reduction of annual TP load is required to achieve short and long-term targets. A reduction of 64% is required to meet the long-term TN target.  <b>Non-nutrients</b> The target for non-nutrient contaminants is to meet ANZECC guidelines for environmental health at all sites
<b>Aquatic ecosystem health (AH)</b> Saint Leonards Creek is a natural tributary; however there are issues with damming and modifications along the creek line which are affecting its ecological health	<ul style="list-style-type: none"> <li>In order to enhance and protect aquatic ecosystem health, recreation, aesthetics, and cultural and spiritual values it is necessary to improve water quality</li> <li>The target is a 30% reduction in TN and TP annual loads by 2015</li> </ul>	
<b>Recreation and aesthetics (RA)</b> Saint Leonards Creek has recreational and aesthetic value, both in its natural state and as part of urban development  Many properties cross the creek and limit access in some sections. With future development of the north west portion of the creek, recreational use is likely to increase		
<b>Cultural and spiritual (CS)</b> Saint Leonards Creek and its surrounding catchment have a number of identified Aboriginal sites of significance		



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

## 4. Implementation

How do we achieve the water quality targets?

Treatment train approach	Management strategies	Implementation	Lead organisations	Supporting partners	Timing	
<b>1. Prevention</b> Land use and planning	1. Application of Water Sensitive Urban Design (WSUD)	<ul style="list-style-type: none"> <li>Ensure WSUD is incorporated into all relevant planning proposals consistent with the requirements of Better Urban Water Management, State Planning Policy 2.9 Water Resources and local environmental conditions (AH)</li> <li>Ensure the planning process for retrofitting incorporates WSUD principles as stated in the Stormwater Management Manual for Western Australia (AH)</li> </ul>	Department of Planning (DoP), City of Swan (CoS)	Department of Water (DoW)	Starting 2010-11	
	1.2. Assess and enhance tributary condition	<ul style="list-style-type: none"> <li>Complete an assessment (consistent with the Trust <i>Tributaries Foreshore Assessment Project</i>) of Saint Leonards Creek to assess condition, identify issues and prioritise areas for revegetation (AH, CS, RA) **</li> <li>Develop a policy to revegetate and fence creek line in partnership with landowners and developers (AH, RA) **</li> </ul>	CoS	DoW, Perth Region NRM (PRNRM)	Starting 2010-11	
	1.3 Monitor water quality in the catchment	<ul style="list-style-type: none"> <li>Design and implement a water quality monitoring program to establish baseline data (AH)</li> <li>Seek funding to expand, review and continue the water quality monitoring program (AH)</li> </ul>	Trust	DoW, CoS	Starting 2010-11	
<b>2. Minimisation</b> Efficiency in nutrient use	2.1 Reduce community output	<ul style="list-style-type: none"> <li>Improve fertiliser management in urban and rural areas</li> <li>Develop and implement an education program to promote fertiliser efficiency and environmental best management practice for landowners and specific industries (AH, RA)</li> <li>Implement an education program for horse owners to promote environmental best management practice (AH, RA)</li> </ul>	Department of Environment and Conservation (DEC)	Trust, DoW, Department of Agriculture and Food WA (DAFWA)	Ongoing	
	<b>3. Reduction</b> Source control	3.1 Maintain natural hydrological flow	<ul style="list-style-type: none"> <li>Manage unauthorised modifications and riparian extraction of Saint Leonards Creek (AH, RF)</li> </ul>	CoS	landowners, developers	Ongoing
		<b>4. Amelioration</b> Conveyance and transmission	4.1 Nutrient intervention and improved drainage*	<ul style="list-style-type: none"> <li>Develop a Saint Leonards Creek protection and enhancement program to:                             <ul style="list-style-type: none"> <li>identify and prioritise sections for revegetation and fencing</li> <li>develop partnerships with stakeholders</li> <li>seek funding (AH, RF, CS)</li> </ul> </li> </ul>	CoS	landowners, developers, Trust
<b>5. Treatment - Reuse - Disposal</b>	5.1 Monitoring new treatment systems	<ul style="list-style-type: none"> <li>Develop and implement a monitoring program to determine the effectiveness of aerobic treatment units (AH) **</li> </ul>	CoS	Trust, DoW	Ongoing	

\*new management strategy

\*\*new management actions

(AH) = aquatic ecosystem health. Links to values for the catchment in Section 3

The Saint Leonards Creek WQIP aims to reduce nutrient loads entering the Swan River through nutrient intervention and new management practices. By using a treatment train approach, a combined set of management actions are applied along nutrient pathways to minimise nutrient and non-nutrient contaminant losses to waterways. 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.