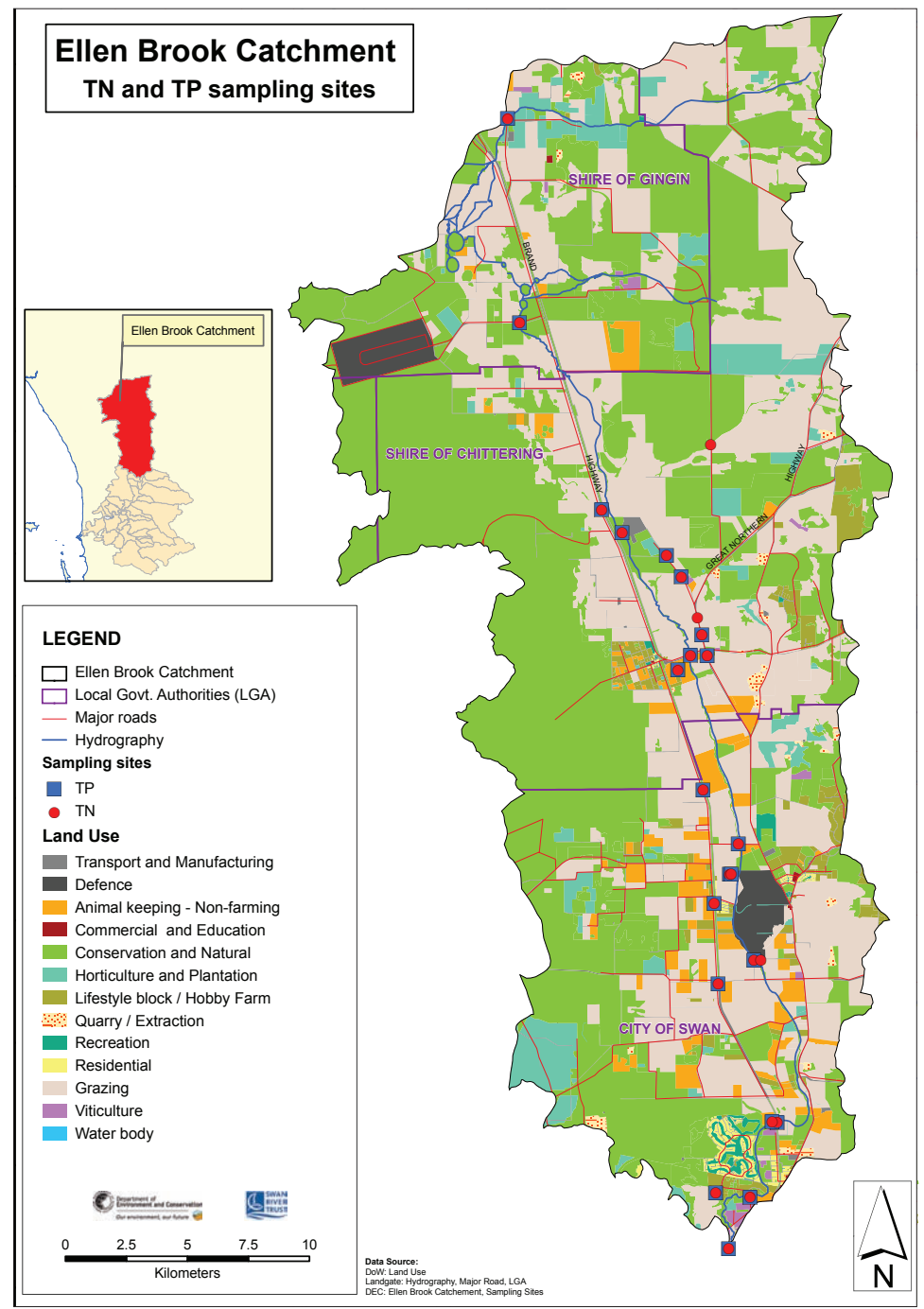


## 5. Monitoring, evaluation, reporting and improvement (MERI)

### How do we measure our success?

- monitor water quality for nutrient loads
- monitor water quality for non-nutrient contaminants in sites of concern
- performance story – reporting on outcomes achievement – behaviour change
- number of people educated
- area of soil amended
- distance/percentage drains and creeks fenced

## 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 CCI. The Trust is 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, CCI and an accredited WQIP will underpin a long-term investment strategy to improve water quality in known hotspots such as the Swan Canning river system.



Western swamp tortoise, picture: Perth Zoo



Belhus Reserve, picture: Ellen Brockman Integrated Catchment Group

## Partners

This WQIP was developed in consultation with the following stakeholders



For more information contact  
 Ellen Brockman Integrated Catchment Group  
 Ph 9571 0400  
 Swan River Trust  
 Ph 9278 0900  
 www.swanrivertrust.wa.gov.au

Caring for the Swan Canning Riverpark

September 2009

## Local Water Quality Improvement Plan Ellen Brook Catchment

### Background

The Swan River Trust (Trust) works to reduce nutrients and other contaminants entering the Swan and Canning rivers. The annual contribution from Ellen Brook is modelled at 71 tonnes (28%) of the total nitrogen (TN) and 10 tonnes (39%) of the total phosphorus (TP) entering the Swan Canning river system.

Through the Australian Government's Coastal Catchments Initiative (CCI), the Trust is developing the **Ellen Brook Water Quality Improvement Plan** (WQIP). The Ellen Brook WQIP will provide stakeholders in the Ellen Brook Catchment with a mechanism to prioritise recommendations and resources, and seek funding to improve water quality. This local WQIP should be reviewed annually and assessed after five years. Under the Healthy Rivers Action Plan (HRAP), the Ellen Brook Catchment is identified as one of eight priority catchments in the Swan Canning Catchment.

WQIPs trace the pathway of nutrients through catchments from their source to the discharge point.



### Ellen Brook Water Quality Improvement Plan

Ellen Brook is a natural, ephemeral waterway with its headwaters just south of Gingin. At 71,500 hectares it is the Swan Canning Catchment's largest sub-catchment.

Much of the Ellen Brook Catchment has been cleared for agriculture and urban use. Land use is predominantly cattle grazing and horticulture in the north and urban settlements and small scale light industry in the south. Some remaining areas of vegetation have high conservation value, containing several threatened ecological communities, priority flora and the critically endangered western swamp tortoise.

The Ellen Brockman Integrated Catchment Group (EBICG) has been working with the shires of Chittering and Gingin and City of Swan since 1996 to improve the health of the Ellen Brook Catchment and reduce the amount of nutrients entering the Swan Canning river system.

### 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.

- Major land management issues in the Ellen Brook Catchment include:
- nutrient export
  - salinity
  - wind and water erosion
  - water logging and flooding
  - soil acidification
  - stock access to Ellen Brook



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 direct future investment for optimal water quality outcomes. Projects are based on partnerships with local government, community and shared stakeholders.

Development of the Ellen Brook WQIP was funded by the Australian Government CCI as part of the Swan Canning Water Quality Improvement Plan (SCWQIP).

EBICG coordinates several environmental programs in the Ellen Brook Catchment, partnering with the Trust, Perth Region NRM and local governments to reduce the effects of nutrients and salinity on the waterways. The group's activities are guided by management actions outlined in the Ellen Brook Catchment Management Plan (2000).

In 2008 the Australian Government funded a water quality and biodiversity assessment in Ellen Brook through the development of a performance story. This indicated strong community involvement and visible greening of the catchment as a result of EBICG's activities. Despite external pressures water quality has been maintained since 2000.

Examples of EBICG activities include:

### Water quality management

A holistic approach is taken to managing and improving water quality in the Ellen Brook Catchment through integrated catchment management, including drainage management and remediation initiatives.

To identify priority sub-catchments for remediation EBICG conducts regular water and sediment quality sampling. In 2008, 28 sites along Ellen Brook were tested on four occasions 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).

**Partners:** EBICG, Department of Water, the Trust, Perth Region NRM

### Sustainable land use planning

The Shire of Chittering Town Planning Scheme is based on land capability studies completed on behalf of the Western Australian Planning Commission. Capability assessment includes stock management (stocking rates and exclusions), the use of Water Sensitive Urban Design (WSUD) and stormwater management in new developments. The Shire of Gingin and City of Swan deal with sustainable land management in a number of ways, including total water cycle management.

**Partners:** Shires of Chittering and Gingin, City of Swan, EBICG, developers

### Community capacity building

Community capacity building programs in the Ellen Brook Catchment upskill landholders, targeting whole of property management through increased understanding and ability to manage soils and nutrients.

**Partners:** Shires of Chittering and Gingin, City of Swan, EBICG, the Trust, landholders, community

### Implementing Best Management Practices (BMPs)

Throughout the Ellen Brook Catchment the application of BMPs is promoted including perennial pastures, efficient fertiliser management, riparian fencing and revegetation, and the protection and maintenance of remnant vegetation.

**Partners:** Departments of Agriculture and Food WA, Water, and Environment and Conservation, EBICG, landholders





## 2. Condition

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

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

Water quality is monitored fortnightly by the Department of Water (DoW) on behalf of the Trust and reported through nutrient report cards at [www.swanrivertrust.wa.gov.au](http://www.swanrivertrust.wa.gov.au).

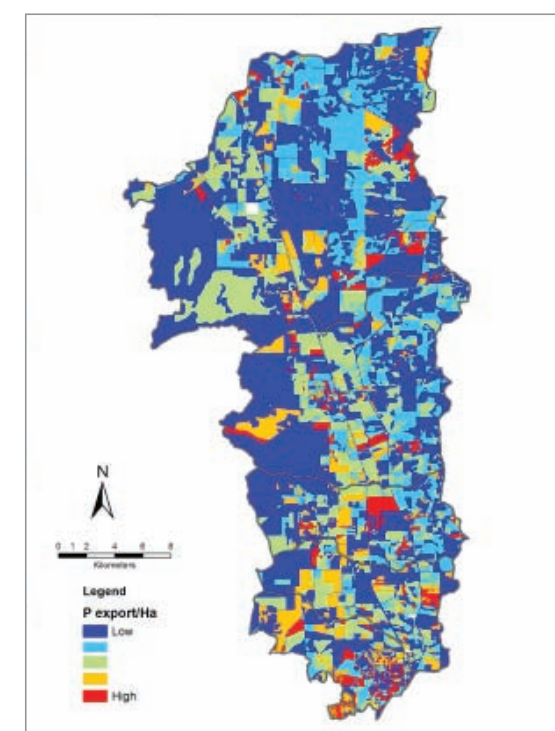
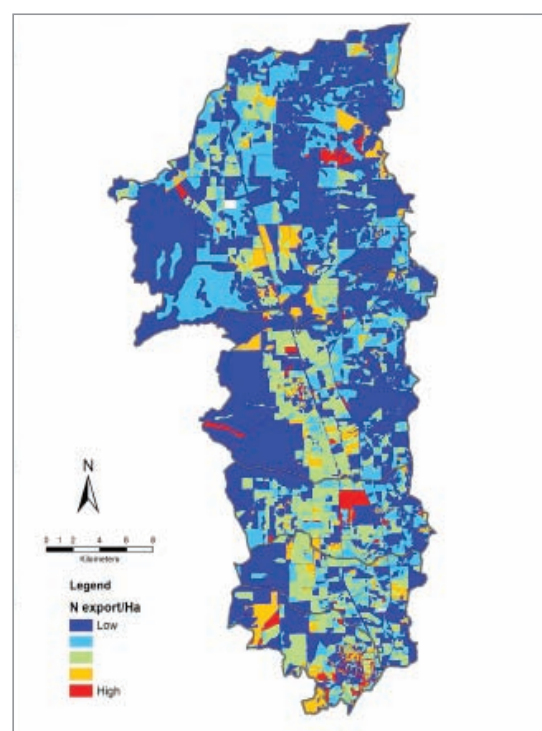
In 2008, EBICG water quality sampling of 28 sites conducted on four occasions showed the following results.

Nutrient	Exceed HRAP trigger values	Range
Total nitrogen	27 sites on most sampling occasions	0.25-6.9mg/L
Total phosphorus	20 sites on most sampling occasions	0.007-4.6mg/L

While ANZECC & ARMCANZ 2000 guidelines for non-nutrients were exceeded for aluminium and iron at every site monitored, this is likely to be a reflection of the soil type. A number of sites indicated the presence of acid sulphate soils.

Most nutrients came from sub-catchments to the west of Ellen Brook. YalYal and Lennards Brook catchments to the east also had high nutrient levels. This indicates soil types, geology and land use have a strong influence on nutrient export.

Modelled nitrogen and phosphorus export in the Ellen Brook Catchment, based on land use, is shown in the following maps, derived from the agricultural decision model Support Systems for Phosphorus and Nitrogen Decisions (SSPND).



Nutrient source modelling was conducted for the Ellen Brook Catchment. The main sources of nitrogen and phosphorus are shown in the following table. Modelling of proposed urban expansion predicts a 24% increase in TN and a 29% increase in TP.

Note: nitrogen fixation comprises 34% TN

Nitrogen sources		Phosphorus sources	
Horses, kennels, catteries	19.6%	Farms	64.9%
Farms	17.7%	Horses, kennels, catteries	19.1%
Horticulture	13.9%	Horticulture	8.8%
Residential	7.6%	Residential	2.7%
Point sources	4.0%	Viticulture	1.8%
Septics	2.2%	Point sources	1.1%

## 3. Values, objectives and targets

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

Values	Objectives	Targets
<b>Aquatic ecosystem health (AH)</b> Ellen Brook is a natural tributary valuable for biodiversity conservation, waterbird habitat, maintaining aquatic and riparian ecosystems and native fish breeding The Ellen Brook Nature Reserve provides habitat for one of the last wild western swamp tortoise populations Establishing and maintaining wildlife corridors is critical for the area's biodiversity	<ul style="list-style-type: none"> <li>Maintain and protect ecosystem integrity, structure (biodiversity, biomass, abundance of biota) and function (food chains, nutrient cycles) by achieving short and long-term water quality targets and increasing riparian vegetation protection</li> </ul>	<b>Nutrients</b> <b>Nitrogen</b> *Current annual load 71.4 tonnes <b>Short-term target</b> 30% reduction by 2015 annual load 50 tonnes <b>Long-term target</b> modelled annual load 22.1 tonnes (69% load reduction)
<b>River flow (RF)</b> Flows in Ellen Brook provide an important flushing mechanism and protect environmental values in the system	<ul style="list-style-type: none"> <li>Mimic natural inundation and drying patterns to protect floodplains and wetlands</li> <li>Minimise the impact of dams and extraction on water quality by mimicking natural frequency, duration and seasonal flow</li> </ul>	<b>Phosphorus</b> *Current annual load 10 tonnes <b>Short-term target</b> 30% reduction by 2015 annual load 7 tonnes <b>Long-term target</b> modelled annual load 2.1 tonnes (79% load reduction) *modelled from average annual flow data from 1997-2006  The Ellen Brook Catchment has been passing HRAP interim short-term targets for TN and TP since 2004, but is exceeding HRAP interim long-term targets
<b>Primary industries (PI)</b> A large area of the catchment is used for agricultural activities Ellen Brook has been used for stock water since the mid-1800s, it is now only marginally viable for stock watering purposes Ellen Brook and its tributaries have some value to individual farmers for irrigation	<ul style="list-style-type: none"> <li>Achieving aquatic ecosystem targets will provide water of adequate quality for irrigation and livestock water</li> <li>Increase the use of sustainable agricultural practices</li> </ul>	<b>River flows</b> Flow quantity sufficient to maintain environmental values Extraction compliant with calculated sustainable diversion limits
<b>Recreation and aesthetics (RA)</b> Ellen Brook is used for passive recreation, its use for other water-based activities is limited Aesthetically, the Ellen Brook is generally only accessible to landowners whose properties front the brook	<ul style="list-style-type: none"> <li>Achieving aquatic ecosystem targets will provide water of adequate quality to maintain the recreational opportunities and aesthetic values of the waterways</li> </ul>	<b>Non-nutrients</b> Meet ANZECC guidelines for environmental health at all sites
<b>Cultural and spiritual (CS)</b> Ellen Brook Catchment has a number of identified Aboriginal sites of significance - Aboriginal people used Ellen Brook and adjacent wetlands to gather food, and Lake Chandala was well known to the Nyooongar people	<ul style="list-style-type: none"> <li>Protect and enhance the cultural and spiritual integrity of the waterways through achieving aquatic ecosystem targets</li> </ul>	

### Maintaining seasonal flow variability

The amount of water entering the Swan River from the catchment is important to maintain environmental values in the river. Data collected from 1997-2006 showed annual flow for Ellen Brook ranged from

2.1 to 48.6 gigalitres per year. With climate change this variability is likely to continue. It is a priority to quantify the amount of flow required to maintain environmental values.

## 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	<b>1.1 Policy development and review*</b>	<ul style="list-style-type: none"> <li>**Councils should adopt Local Planning Policy 5.1.2 as developed by Eastern Metropolitan Regional Council and the Swan River Trust which requires developers to incorporate erosion and sediment control measures in local structure plans or outline development plans (<a href="http://www.emrc.org.au/displayfile-ID-87866.asp">http://www.emrc.org.au/displayfile-ID-87866.asp</a>) (AH)</li> <li>**Develop and implement a Fertiliser Reduction Policy for the Bassendean and Yanga soils (100% P export risk) to use best management practices to reduce nutrient and other pollutant outputs which incorporate: (i) tissue analysis and soil sampling prior to broadacre fertilisation; and (ii) the use of low water soluble fertiliser in domestic gardens (AH, PI)</li> <li>Explore the use of alternative policy mechanisms to protect the Ellen Brook and optimise water quality</li> </ul>	City of Swan (CoS), Shires of Chittering (SoC) and Gingin (SoG), Department of Planning (DoP)	Department of Agriculture and Food WA (DAF)	100% compliance by 2015
	1.2 Better Urban Water Management	<ul style="list-style-type: none"> <li>Ensure water sensitive urban design is incorporated into all relevant planning proposals consistent with the requirements of <i>Better Urban Water Management</i> (AH, RF)</li> </ul>	CoS, SoC, SoG, developers, Department of Water (DoW)	EBICG, DoP, Urban Development Institute of Australia (UDIA)	Ongoing
	<b>1.3 Subdivision conditions*</b>	<ul style="list-style-type: none"> <li>**Incorporate fencing and revegetation of all tributaries as a condition of subdivision for all developments (AH, PI, RA, CS)</li> <li>**New developments to be sewered where possible or adopt best practice wastewater treatment technologies, including Muchea and West Bullsbrook townships (AH)</li> </ul>	CoS, SoC, SoG, developers	EBICG, DoP, UDIA, DoW	100% compliance by 2025
	1.4 Water quality monitoring	<ul style="list-style-type: none"> <li>Expand, review and continue water quality monitoring program (AH)</li> <li>**Prioritise sub-catchments with high discharge loads for remediation, as identified by predictive modelling and the Ellen Brook Sub-catchment Water Quality Analysis (EBSWQA) (AH)</li> </ul>	DoW, Trust, Perth Region NRM	EBICG, CoS, SoC, SoG	Ongoing
<b>2. Minimisation</b> Efficiency in nutrient use	<b>2.1 Reduce agricultural industry nutrient output through discharge regulation*</b>	<ul style="list-style-type: none"> <li>**Assess all licensed agricultural industry for compliance, with zero nitrogen and phosphorus discharge (AH)</li> <li>**Develop strategies to prevent any further discharge of water of unacceptable quality from agricultural industry sites which discharge effluent water (saleyards, sewerage plants, feed lots) (AH)</li> </ul>	Department of Environment and Conservation (DEC)	CoS, SoC, SoG	100% compliance by 2012
	<b>2.2 Reduce agricultural industry nutrient losses through fertiliser management*</b>	<ul style="list-style-type: none"> <li>Promote regular soil and groundwater testing by land managers to determine fertiliser application efficiencies for horticulture, viticulture and market gardens through nutrient and water retention in the root zone of plants (AH, PI)</li> <li>**Implement the Fertiliser Action Plan (AH, PI)</li> </ul>	Perth Region NRM, landowners	Trust, DEC	100% compliance by 2015
	2.3 Reduce outputs through increasing community capacity	<ul style="list-style-type: none"> <li>Develop and implement fertiliser efficiency education and provide opportunities for landowners to examine alternative farming practices (including but not exclusively tree farming, alternative cropping and pastures, farming bush foods and maintenance of remnant vegetation) (AH)</li> </ul>	DEC	Trust, DoW, DAF, EBICG	Ongoing
<b>3. Reduction</b> Source control	<b>3.1 Reduce agricultural industry nutrient losses through best management practices*</b>	<ul style="list-style-type: none"> <li>**Land managers on land units identified as having high discharge loads shall undertake actions including streamlining and revegetation, fertiliser management and alternative production regimes to reduce nutrient export (AH, PI, RA, CS)</li> <li>**Landowners in the Bassendean and Yanga soil types to trial soil amendments <i>in-situ</i> to determine effectiveness in reducing nutrient run-off and groundwater contamination (AH, PI)</li> <li>Implement soil amendment based on results from trials and land use change to perennial pastures (AH, PI)</li> <li>**Replace annual pastures with perennial pastures on all erosion-prone and high-leaching soils (PI)</li> </ul>	Landowners, EBICG	DoW, Trust, DAF, CoS, SoC, SoG	100% compliance by 2025
		<ul style="list-style-type: none"> <li>**Landowners in the Bassendean and Yanga soil types to trial soil amendments <i>in-situ</i> to determine effectiveness in reducing nutrient run-off and groundwater contamination (AH, PI)</li> <li>Implement soil amendment based on results from trials and land use change to perennial pastures (AH, PI)</li> </ul>	Landowners, DAF, EBICG	DEC, Trust, WC	100% compliance by 2015
		<ul style="list-style-type: none"> <li>**Replace annual pastures with perennial pastures on all erosion-prone and high-leaching soils (PI)</li> </ul>	Landowners, EBICG, DAF	CoS, SoC, SoG	50% broadacre properties compliance by 2015
<b>4. Amelioration</b> Conveyance and transmission	<b>4.1 Nutrient intervention and improved drainage*</b>	<ul style="list-style-type: none"> <li>**Implement nutrient interventions: (i) where "off paddock drains" enter Ellen Brook to prevent nutrient export (ii) to major waterways where appropriate (iii) to treat groundwater in drains where suitable (AH)</li> <li>Seek funding to continue fencing and revegetation of Ellen Brook tributaries until all are protected from stock incursion (AH, PI, RA, CS)</li> </ul>	Landowners, Trust	EBICG, DEC, DoW	Nutrient load reduction targets met by 2025
		<ul style="list-style-type: none"> <li>Seek funding to continue fencing and revegetation of Ellen Brook tributaries until all are protected from stock incursion (AH, PI, RA, CS)</li> </ul>	Landowners, EBICG	Trust	
<b>5. Treatment - Reuse - Disposal</b>	<b>5.1 Full connection to inflill sewerage</b>	<ul style="list-style-type: none"> <li>Ensure full connection of all properties to deep sewerage in the Muchea and West Bullsbrook townships (AH)</li> </ul>	CoS, SoC, Water Corporation	EBICG	100% compliance by 2025

\*new management strategy

\*\*new management actions

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

The Ellen Brook Catchment WQIP aims to reduce nutrient loads entering the Swan River through nutrient intervention and changed management practices. An integrated approach to implementation will produce the most effective outcome. 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.