



# Armadales Gosnells Landcare Group Strategic Plan 2008 to 2018

Version 3

September 2008



## Armadale Gosnells Landcare Group Strategic Plan 2008 – 2018



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## Abbreviations

AGLG	Armadale Gosnells Landcare Group
ARA	Armadale Redevelopment Authority
CCI	Coastal Catchments Initiative
CoA	City of Armadale
CoG	City of Gosnells
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPC	Department of the Premier and Cabinet
DAFWA	Department of Agriculture and Food Western Australia
DEC	Department of Environment and Conservation
DEWHA	Department of Environment, Water, Heritage and the Arts
DoW	Department of Water
ICM	Integrated catchment management
PAG	Phosphorus Action Group
PBP	Perth Biodiversity Project
NHT	Natural Heritage Trust
NRM	Natural resource management
SCC	Swan Catchment Council
SERCUL	South East Region for Urban Landcare
SRT	Swan River Trust
WALGA	Western Australian Local Government Association
WAPC	Western Australian Planning Commission
WSUD	Water Sensitive Urban Design
WWF	World Wildlife Fund

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## Executive Summary

### *Why review the initial plan?*

The Armadale Gosnells Landcare Group is an independent, local catchment group. The Group has been in existence since 1998 and has been directed by the objectives and actions included in the initial Upper Canning Southern Wungong Catchment Management Plan (Everall Consulting Biologist, 1999). However, that plan is aging and there have been changes to, and advances in, catchment and natural resource management in recent years that the group must consider and incorporate into its future direction.

This document provides a review of the initial plan. It adopts an asset-based approach to natural resource management that includes identification of key threats, review of the current programs and projects that address these threats, and an updated set of objectives and actions for the Armadale Gosnells Landcare Group.

The proposed actions are to be managed within annual workplans to be developed by the AGLG Management Committee. The workplans will outline priority actions for employed staff and committee members.

### *Assets and threats*

The key resource asset categories for AGLG are 'Water', 'Biodiversity', 'Land' and 'People and their Communities'. Water quality continues to be threatened by the sources of excess nutrients, non-nutrient contaminants, sediments and silt. Changes in hydrological processes, in particular stream flow and altered groundwater levels, are reducing the ecological values of waterways and wetlands.

Biodiversity assets are being diminished through habitat quality loss and fragmentation. Although there is increased understanding of the need to adopt sustainable practices to improve our local environment, individuals and the community are often reluctant to embrace these practices.

In addition, climate change and its impacts continue to attract increasing scientific and political interest. Predictions of a reduction in winter rainfalls, an increased frequency of heat spells and some extreme weather events will place additional strain on already stressed local natural resources. Consequently, the Armadale Gosnells Landcare Group will have to consider these impacts and adapt its activities accordingly.

### *What the AGLG have achieved*

The Armadale Gosnells Landcare Group has achieved much in the past 10 years. The group set out with their purpose being to coordinate and implement on-ground actions and awareness raising projects with a focus on river and bushland management. The group is considered by its key stakeholders to be successful in the delivery of on-ground projects and has contributed much to the improvement of the local environment.

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### *Looking to the future*

The AGLG area of operation incorporates the rapidly expanding urban fringe and includes land with considerable environmental assets. The population in the area is set to grow considerably in the next 10 years which will place additional pressure on local natural assets.

In looking to the future, the Armadale Gosnells Landcare Group must consider its capacity and role in addressing the processes that threaten local assets. The Group can achieve much through its initial and successful purpose of coordinating and implementing on-ground and awareness raising projects, and working collaboratively with key partners.

The Group is also capable of contributing to the maintenance of ecological values in the management area through on-ground bushland and river restoration and revegetation activities in conjunction with associated friends groups. The Group has the ability to engender enthusiasm in the community more successfully than a statutory authority such as State or local government due to its closer connection with the community. This opportunity should be harnessed and utilised by the Group and its key stakeholders.

### *A strategic approach*

The revised AGLG Strategic Plan (2008-2018) continues to adopt principles of integrated catchment management and community engagement through targeted investment in a set of priority actions. The actions are derived from the 10 year objectives set for each of the four asset Categories. The expected outcomes for the first 5 years of the period of the Plan are also identified.

Table 1 provides a summary of the objectives and expected outcomes of the AGLG Strategic Plan. The priority for actions proposed to achieve these outcomes is provided in Table 2.

**Table 1. Strategic objectives and expected outcomes from activities proposed for the Armadale Gosnells Landcare Group**

Asset Category	10-year objective/s	5-year outcomes
Water	<ul style="list-style-type: none"> <li>• Improve water quality monitoring networks and distribution of data to guide future investments in water quality improvements</li> <li>• Ensure that river restoration and revegetation activities and other restoration/landscape treatments of foreshores contribute to maintaining the ecological condition of AGLG's priority reaches</li> </ul>	<ul style="list-style-type: none"> <li>• surface and groundwater information for water quality in the AGLG priority catchments is available and relevant to the AGLG and its partner organisations</li> <li>• the potential impacts due to declining water quality are well recognised within the community</li> <li>• the processes and pathways of nutrient and other contaminants is well understood and clearly communicated</li> <li>• measured improvement in water quality provides partial achievement of longer-term targets, attributable to activities undertaken by the AGLG and its partner organisations</li> <li>• river restoration and revegetation activities are prioritised according to baseline data available on ecological condition</li> <li>• the Canning River Surface Water Allocation Plan has been prepared and implemented</li> <li>• riparian habitats that can benefit from environmental water releases are identified</li> <li>• the AGLG has considered and planned for impacts of climate change on restoration activities</li> </ul>
Biodiversity	Priority areas of natural bushland are appropriately conserved, restored and managed to provide a sanctuary for native species	<ul style="list-style-type: none"> <li>• ten priority areas of native vegetation are healthy and regenerating due to restoration activities initiated through the AGLG and its partner organisations</li> <li>• statements of 'best practice' are being adopted for watercourses, wetlands and bushland vegetation management</li> <li>• biodiversity values on public land (State and local government) are managed according to strategies and management plans at levels considered to be acceptable by the AGLG</li> <li>• a high proportion of urban and rural landholders are aware of habitat importance and are adopting practices to enhance these values</li> <li>• there is a containment or reduction in invasive species at ten priority native vegetation sites</li> <li>• improved community understanding of environmental weeds and their impacts</li> <li>• there is an improved understanding of vegetation health</li> <li>• fire management measures are adopted to protect priority assets</li> </ul>
Land	To identify the sources of sediment and extent	<ul style="list-style-type: none"> <li>• the sources of sediment and silt in priority waterways have been mapped and</li> </ul>



Asset Category	10-year objective/s	5-year outcomes
	of sedimentation so that an appropriate erosion and sediment management program can be established to protect priority riparian habitats	measured <ul style="list-style-type: none"> <li>• the rate of sedimentation has been benchmarked</li> <li>• the existing and potential impacts on priority assets (i.e. river pools and reaches) has been evaluated</li> <li>• the AGLG have pursued improvements to manage sediment sources</li> <li>• restoration activities are targeting AGLG's priority assets</li> </ul>
People and their communities	To continually improve people's recognition of, and attitude to, local natural resource management issues that will provide leverage to a greater uptake of sustainable behaviours in the community	<ul style="list-style-type: none"> <li>• more than ten local conservation groups are engaged and participating in delivering actions identified in the Plan</li> <li>• a local community group network for support and information sharing purposes is maintained</li> <li>• capacity of local community groups is built to a level for effective on-ground activity through training and other skills development</li> </ul>

**Table 2. Priorities for proposed actions for the Armadale Gosnells Landcare Group**  
(\*Time frame - S = short term, M= medium term, L = long term)

<b>WATER</b>			
<b>Action No.</b>	<b>Action</b>	<b>Partner organisation</b>	<b>Time Frame*</b>
W1.1	Ensure existing water quality monitoring programs include adequate representative sites in the Upper Canning, Southern and Wungong Rivers to provide information that will guide the priority actions of AGLG and its partner organisations	DoW, SRT, SCC, SERCUL	S
W1.5	Prepare a five-year implementation schedule for river restoration and revegetation activities, as part of the <i>Canning River Critical Habitats Project</i> . The schedule should be based on priorities identified in the <i>Foreshore Management Strategy</i> linked through local government and the SRT's <i>Riverbank</i> processes	CoA, CoG, SRT, SERCUL, SCC	S
W2.1	Encourage the Department of Water to prepare the <i>Canning River Surface Water Allocation Plan</i>	DoW, SRT, SCC	S
W3.1	Develop a list of suitable native species to be used in restoration activities that can withstand the potential effects of climate change including increased average temperatures, lowered groundwater tables and reduced inundation of the floodplain (required for germination)	DEC, CoA, CoG	S
W1.4	Engage in processes for development of the Swan River Trust's regional and local <i>Water Quality Improvement Plans</i> (WQIP's) for Southern River and Bickley Brook	SRT, SERCUL, SCC, CoA, CoG	S-M
W1.6	Pursue completion of the Wungong River management plan that addresses drainage, public access and rehabilitation	CoA	S-M
W1.8	Encourage Council and developers to expand the <i>Community Nutrient Education Program</i> (Nutrient Management - North Forestdale Development) if evaluation proves the program is worthwhile to include additional new urban developments and issues and to ensure the program becomes ongoing		S-M

<b>WATER</b>			
<b>Action No.</b>	<b>Action</b>	<b>Partner organisation</b>	<b>Time Frame*</b>
W1.10	Encourage the expansion of the <i>Drainage Nutrient Intervention Program</i> to include a priority site on Southern River, which may be used as a demonstration site for future local urban developments (possible links to Wungong River Management Plan)	SRT, ARA	S-M
W2.2	Arrange and coordinate a local community information and engagement program for adoption of water use efficiency practices in urban and rural areas	DoW, SCC, CoG	S-M
W2.3	Liaise with Department of Water to ensure that environmental water releases complement river restoration and revegetation activities (i.e. negotiating for pulse releases to maintain restored priority habitats)	DoW, SRT, SCC	S-M
W1.2	Arrange for interpretation of existing water quality information (all sources) to identify point sources and major diffuse source areas for nutrients and other contaminants	DoW, SRT, SERCUL, SCC	M
W1.7	Arrange and coordinate a local community information and engagement program for adoption of low water soluble phosphate fertiliser use in urban and rural areas according to processes and actions of the <i>Fertiliser Action Plan</i> and <i>Sustainable Landscaping Strategy</i>	DEC, Phosphorus Action Group, SRT, SCC	M
W1.3	Encourage relevant authorities to investigate the extent of dryland salinisation in the Upper Canning River and the potential downstream salinity impacts	DoW	L
W1.9	Based on the five-year implementation schedule for river restoration and revegetation, develop and implement annual programs for river restoration and revegetation activities at priority sites (including opportunities for SALP funding)		Ongoing

<b>BIODIVERSITY</b>			
<b>Action No.</b>	<b>Action</b>	<b>Partner organisation</b>	<b>Time Frame*</b>
B1.1	Identify ten priority native vegetation sites in conjunction with Partner Local Governments and friends groups and determine key threatening processes and management response actions required to maintain biodiversity values at these sites ( <i>Links to Swan Region Biodiversity Operational Model</i> )	Friends groups, SERCUL, SCC, CoA, CoG	S
B3.3	Ensure project sites/river restoration and revegetation sites address fire and disease management issues		S
B1.2	Using the information obtain in action B1.1, prepare a five-year implementation schedule for watercourses and bushland management and restoration	CoA, CoG, SERCUL, SCC	S-M
B1.4	Support Councils in developing and completing local biodiversity strategies for public land	SCC, PBP, CoA, CoG,	S-M
B1.5	Review and document cost effective and innovative restoration techniques applicable to the local area in partnership with Serpentine-Jarrahdale Landcare Centre	SJ Landcare	S-M
B1.7	Pursue on-going funding to maintain the <i>Wetland Watch</i> program that provides support and incentives for landholders to manage wetlands that exist on their properties	SCC	S-M
B1.8	Encourage local government and developers to utilise local native understorey species in landscaping to increase biodiversity and establish effective groundcovers to manage erosion ( <i>Link to Water Conservation Plans and Sustainable Landscaping Strategy</i> )	CoA, CoG	S-M
B2.1	Using the information obtained in actions B1.1 and B1.2 and the results of weed surveys undertaken by Council, determine ten priority sites for weed management	Friends groups, CoA, CoG, SERCUL	S-M
B2.2	Prepare weed management and control plans for priority sites that target environmental and invasive weeds	CoG , CoA	S-M
B2.5	Based on the priorities set in B2.2, implement weed management and control plans	Friends groups, CoA, CoG	S-M

<b>BIODIVERSITY</b>			
<b>Action No.</b>	<b>Action</b>	<b>Partner organisation</b>	<b>Time Frame*</b>
B1.3	Encourage Department of Environment and Conservation to prepare a biodiversity management strategy for the Regional Parks of the Darling Range	DEC, SCC, SERCUL	M
B1.6	Support Councils in developing long-term wetland management plans for wetlands within public land. Plans should include identification of priority areas for restoration	CoA, CoG	M
B1.10	Advocate for ecological linkages to be appropriately incorporated into local Structure Plans	CoA, CoG, DEC	M
B1.11	Promote and encourage landholders to use local native species, including understorey species on properties (i.e. reintroduce the overstorey-understorey planting program)	CoA, CoG	M
B1.12	Improve marginal/moderate riparian vegetation by conducting 'in-fill plantings' of understorey species		M
B2.4	Develop and distribute a local community information package for small landholders that identifies significant local environmental and invasive weeds, their impacts and appropriate control methods	SERCUL	M
B3.1	Evaluate relevant natural vegetation survey and mapping information and identify areas where additional information is required for management purposes. Arrange vegetation survey and mapping processes where additional information is required according to local and regional priorities.	CoA, CoG, DEC, SCC	M
B1.9	Pursue opportunities with relevant authorities to develop recovery plans for threatened or iconic native species (i.e. freshwater cobbler)	DEC, DoW	M-L
B3.2	Encourage the development of fire management strategies or measures for priority areas (i.e. close to residential developments, bushland/wetland/river areas in good condition).	CoA, CoG	M-L
B2.3	Pursue improved coordination and on-ground implementation of feral animal control programs	DEC, DAFWA, SERCUL	Ongoing
B3.4	Support the activities of the Dieback Working Group		Ongoing

## LAND

Action No.	Action	Partner organisation	Time Frame*
L1.6	Encourage Department of Environment and Conservation to update and re-establish the <i>Clean Sites</i> program to improve the dissemination of best practice information to the development and construction industry and local government	SCC, SERCUL, DEC, CoA, CoG	S
L1.1	Support the <i>Canning River Critical Habitats Project</i> , which aims to identify the sources and impacts of erosion on the Canning, Southern and Wungong Rivers including; <ul style="list-style-type: none"> <li>• a base-line study on sediment in river pools</li> <li>• source identification</li> <li>• recommendations to treat the cause</li> <li>• cost of response actions</li> </ul>	SERCUL, SCC, SRT, CoA	S-M
L1.2	Investigate the feasibility of extracting accumulated sediment from priority river pools and its use as a marketable resource	DoW, SRT	M
L1.3	Encourage State government agencies to review and adopt an amended version of the <i>Darling Range Erosion and Sediment Control Manual (2001)</i> to ensure it contains best practice information that is also suitable to the Swan Coastal Plain	SCC	M
L1.4	Advocate for State and Local Government tender documents to require contractors to retain soils on-site during construction	SERCUL	M
L1.5	Support the Swan River Trust in developing sediment management strategies for the Canning River and Southern River	SRT	M
L1.8	Encourage developers to establish a sediment control demonstration site within a greenfield development that demonstrates innovative and effective erosion control measures	Developers, ARA, CoA, CoG, SCC	M
L1.7	Using the results of the <i>Canning River Critical Habitats Project</i> , review priority locations for river restoration and revegetation activities, to protect and enhance habitats most at risk of sedimentation		M-L

PEOPLE AND THEIR COMMUNITIES			
Action No.	Action	Partner organisation	Time Frame*
P1.3	Using the <i>South West Region's Community Engagement in Natural Resource Management Guidelines</i> , work in partnership with SERCUL to develop a local community engagement strategy for the catchment that outlines specific tools to increase public awareness about natural resources and how they should be managed for the future	SERCUL, SCC, CoA, CoG	S
P1.1	Undertake an audit of current community group knowledge, skills and other capacity to identify training appropriate to their needs	SERCUL, friends groups, training provider	S-M
P1.2	Conduct a community awareness and engagement survey to provide benchmark information about current community interest and involvement and also to identify potential for further community group development for environmental management outcomes	SERCUL	S-M
P1.4	Promote the opportunity for AGLG to provide input into sub-regional and local consultative processes for environmental management in accordance with the priority action areas of this Plan	CoA, CoG, SERCUL	Ongoing
P1.5	Using information from the community capacity audit, survey and strategy (actions P1.1- P1.3), arrange a set of engagement activities at a level that maintains and supports ten action-orientated local friends groups. This may include: <ul style="list-style-type: none"> <li>• coordinating targeted training workshops to improve skill base</li> <li>• providing improved accessibility to natural resource management information (i.e. website)</li> <li>• support in developing funding applications</li> </ul>	CoA, CoG, SERCUL	Ongoing
P1.6	Arrange for the <i>Great Gardens</i> program to deliver workshops within the City of Armadale and Gosnells using local information and education tools	SRT, program service providers	Ongoing
P1.7	In conjunction with relevant program service providers, arrange for training courses to be held in the catchment for orchardists, viticulturalists and horse owners	SCC, program service providers	Ongoing

## PEOPLE AND THEIR COMMUNITIES

Action No.	Action	Partner organisation	Time Frame*
P1.8	Develop education and awareness tools that encourage improved land use management and promote the groups activities (i.e. reintroduce the <i>Living on the River</i> newsletter, brochures, website)		Ongoing
P1.9	Seek opportunities for professional development of AGLG staff	CoA, CoG, SERCUL	Ongoing
P1.10	Identify, support and celebrate local champions who lead group development initiatives that apply sustainable management practices	SCC, SERCUL	Ongoing
P1.12	Combine skills training with implementing on-ground projects		Ongoing
P1.13	Encourage and support indigenous communities to be involved in river restoration and revegetation activities	SCC	Ongoing



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## 1. Introduction

### 1.1 Purpose and scope of review

The purpose of the *Armadale Gosnells Landcare Group Strategic Plan* is to provide review and new direction for the activities of the group based on the initial Upper Canning Southern Wungong Catchment Management Plan (Everall Consulting Biologist, 1999).

The initial plan was prepared for the Upper Canning Southern Wungong Catchment Management Team (now AGLG) with support from the Swan River Trust (SRT) and Agriculture Western Australia (now Department of Agriculture and Food Western Australia). It was based on an integrated catchment management approach describing the condition of the catchment at that time, key threats and corresponding strategies and actions. The initial plan provided the Armadale Gosnells Landcare Group (AGLG) with strategic direction to manage its activities.

The plan has also been instrumental in obtaining funding to employ staff and implement activities. The Cities of Armadale and Gosnells have incorporated actions from the plan into their own environmental management plans, demonstrating their support to AGLG.

Many actions included in the plan have been achieved or now require modification. Integrated catchment management involves adaptive management and due to significant changes in the delivery of natural resource management (NRM) in recent years, AGLG decided to review and update the initial plan.

The *Armadale Gosnells Landcare Group Strategic Plan* provides a renewed strategic focus for the next 10 years. The revised plan is not intended as a full catchment management plan (i.e. it does not repeat detailed physical, social or economic information of the catchment) but a revision of the initial plan.

This Strategic Plan retains elements of the initial plan, including the long term objectives and some corresponding actions. This plan provides processes to review, reflect and respond to the key questions that will strategically guide management efforts of the AGLG into the future:

- What natural assets are important to the AGLG and its partners?
- What is threatening these natural assets?
- What is being done by the AGLG and other organisations?
- What needs to be done?
- What can AGLG do and who can it work with?

Responses to these questions are provided within the following sections of the Strategic Plan.

## 1.2 Adapting to a changing environment

The Armadale Gosnells Landcare Group (formerly the Upper Canning Southern Wungong Catchment Team) was established in 1998 in response to community concern about the declining health and degradation of the Canning and Wungong Rivers.

It was at this time when the landcare movement was shifting towards the adoption of integrated catchment management (ICM). The philosophy behind ICM is based on a holistic approach to managing the catchment, involving the community, government and industry working together to achieve outcomes of common interest. At this time, ICM and landcare in Australia were both funded by the Natural Heritage Trust (NHT) with considerable financial input and direction provided by State governments.

In 2001, the Federal government revised the structure of NHT funding and developed the NHT2 framework for a more targeted and accountable approach to natural resource management (NRM). Across Australia, 56 Regional NRM groups were established to prepare and implement regional NRM plans. Locally, this translated into the formation of the Swan Catchment Council as the regional body for the Perth Metropolitan area.

The NHT2 framework saw a shift in functions and resources to a regional level and a significant restructure to the way in which community groups, such as AGLG and its neighbouring catchment groups were resourced. The AGLG's Community Landcare Coordinator position was once funded by the NHT and is now funded by the Cities of Armadale and Gosnells.

More recently, a change in the Federal government has resulted in another change to the resourcing of NRM. *Caring for Our Country* will commence in July 2008 and will adopt a 'business approach' to investment. Exactly what that means for the Swan Catchment Council and its partners was not clear at the time of preparing this plan. However, the Federal government has outlined a focus for achieving strategic outcomes in six priority areas:

- a national reserve system
- biodiversity and natural icons
- coastal environments and critical aquatic habitats
- sustainable farm practices
- NRM in remote and northern Australia
- community skills, knowledge and engagement (Australian Government, 2008)

At a State level, there have been institutional changes to State government departments since 1999, particularly to their roles and responsibilities. The Department of Agriculture and Food Western Australia is no longer involved in soil management in the metropolitan area, and it is presently unclear to many stakeholders as to who is responsible for managing this asset.

The Swan River Trust (SRT) now functions under revised legislation (the *Swan and Canning Rivers Management Act 2006*) with actions arranged through the *Healthy Rivers Action Plan*. The SRT is currently developing the River Protection Strategy and Management Programs through consultative processes.

The Department of Environmental Protection has amalgamated with Conservation and Land Management to form the Department of Environment and Conservation. The Water and Rivers Commission (after an amalgamation and a split with the Department of Environmental Protection) is now known as the Department of Water.

Locally, there have also been changes. Due to the significant growth experienced in Armadale, the Armadale Development Authority was established in 2002 to plan, undertake and coordinate development and redevelopment in the Armadale Development Authority area, which includes a significant portion of the City of Armadale along the Wungong River (Armadale Redevelopment Authority, 2007).

In 2003, the Canning Catchment Coordinating Group evolved into SERCUL. SERCUL is a sub-regional NRM group whose aim is to participate in catchment management through its sub-regional NRM strategy, which focuses on integrated water management, natural diversity and sustainable production. SERCUL provides direction and support to the AGLG and other environmental groups. The role of SERCUL and AGLG is continually evolving, adapting to changes in NRM funding at a State and National level.

Since 1999, relevant new legislation and policies have been developed as a response by the State government to establishing new and improved controls to regional and State natural assets. These include:

- Statement of Planning Policy No. 2: Environment and Natural Resources Policy (Western Australian Planning Commission, 2003)
- Statement of Planning Policy No. 2.9: Water Resources (Western Australian Planning Commission, 2006)
- Environmental Protection (Native Vegetation Clearing) Regulations 2004 (WA)
- Stormwater Management Manual (Department of Water, 2004-2007)
- Natural Resource Management Policy Manual (East Metropolitan Regional Council, 2002)
- Environmental Protection (Unauthorised Discharge) Regulations 2004
- Bush Forever (Western Australian Planning Commission, 2000)
- Swan and Canning Rivers Management Act 2006

In addition to significant governance, funding, institutional and legislative changes in natural resource management, there have also been changes to the importance of existing issues, which may have been emerging, but not of significant importance when the initial plan was published. These include climate change, environmental water provisions, sustainable production and water and energy use efficiencies.

The South East Corridor is undergoing substantial urbanisation. It is forecast that by 2026 the population in the Cities of Armadale and Gosnells would have increased from 153,000 in 2006 to 213,000 in 2026 (Western Australian Planning Commission, 2002). This will place greater demand and pressure on local natural resources that needs to be addressed during land use planning and development.

This population growth pressure has, in part, been acknowledged and there are numerous State, local and Federal government projects focusing on urban water management and water quality protection underway in the Southern-Wungong River catchments.

Considering these changes, the AGLG required the Upper Canning Southern Wungong Catchment Management Plan to be modernised to incorporate these changes to its operating environment.

## 2. Reviewing the initial plan

### 2.1 Methodology

Reviewing the Upper Canning Southern Wungong Catchment Management Plan has involved three stages as described below.

Stage 1 – Review of the initial planning documents

Stage 2 – Identification of the AGLG's strengths and limitations

Stage 3 – Undertake a stakeholder workshop and consultation processes

The outcome is the revision and update of the objectives and actions in the plan to form the *Armadale Gosnells Landcare Group Strategic Plan*, which will provide strategic guidance to the Group from 2008 to 2018.

#### 2.1.1 Stage 1 - Review of initial planning documents

Cr. Pat Hart was instrumental in the development of the Upper Canning Southern Wungong Catchment Management Plan and continues to provide her on-going support and commitment to the Armadale Gosnells Landcare Group. Cr. Hart has provided a brief insight into why the plan was developed.

*"In 1996 there was community concern surrounding the degradation and declining health of the Canning and Wungong Rivers and their tributaries. Following public meetings it became apparent that the issues identified by the community and other stakeholders, involved not only in- river issues but problems away from the waterways as well.*

*It was acknowledged that the only way to achieve significant long lasting environmental improvements was to address the problems strategically using a whole of catchment approach involving both the Cities of Armadale and Gosnells, community and key stakeholders.*

*In partnership with the Swan River Trust, the two Councils, Armadale City Rivercare and Friends of River Canning Environs, funding was applied for from the Natural Heritage Trust. This was to employ a consultant to develop a catchment management plan to cover the two Council areas with some additional funding for its implementation. So the journey began....."*

By Cr. Pat Hart

The initial plan was prepared with an integrated catchment management philosophy in consultation with the (former) Upper Canning Southern Wungong Catchment Team. This was represented by State government, community, local government and interested community groups. The group determined the main issues affecting the catchment at the time. A set of objectives, strategies and actions were developed in response.

The main issues identified in the initial plan included;

- weed invasion
- sedimentation
- soil erosion
- nutrients (Southern/Wungong)
- urban growth and development
- lack of ownership of catchment issues
- clearing and loss of biodiversity
- point source pollution
- bushfires and control practices

Objectives developed in response to these issues were to;

- establish an ICM management structure for the catchment
- improve water quality protection
- further develop the public awareness and advocacy program
- reduce pollution from land use activities
- reduce degradation in the rivers and catchments
- protect, maintain and restore vegetation and biodiversity
- ensure integrated land management in the catchments
- improve strategic and local planning for ICM

These objectives had related actions which provided detail as to how the objectives may be achieved and provided focus for the activities of the AGLG.

### **2.1.2 Stage 2 – Determining strengths and limitations**

In actioning the initial plan, the AGLG has achieved considerable results as documented in its biannual reports, (UCSWCT, 2001a; AGLG, 2004) and subsequent annual reports. The reports provide specific details on projects, workshops, meetings, events, publications, initiatives and work with stakeholders.

In review of this plan, the AGLG Management Committee listed the Group's major achievements and provided details of specific achievements, as mentioned in the reports, and also holistic achievements. A summary of the AGLG's significant achievements obtained during this process is outlined in Table 3.

**Table 3. Summary of Armadale Gosnells Landcare Group's achievements from 1999 to 2008**

Strategic	On-ground	Community capacity
Established a 'Memorandum of Understanding' with City of Armadale in 2007	Numerous successful planting days* organised with community groups, schools and corporate groups which has contributed to maintaining and potentially improving the water quality and biodiversity of restored sites	Volunteers contributed considerable hours* and effort into on-ground and capacity building activities (annual average ~3,500 hours)
Has matured into an independent, non-government organisation	Significant number of seedlings planted and restoration sites established (annual average of seedlings planted ~60,000, although in 2006-07 100,000 were planted)	Workshops, training seminars and field days well attended
Is a regional environmental advocate, resulting in improvements to major developments	Native seedlings provided to local residents, contributing to revegetation of private land	Created employment opportunities in NRM
Has initiated new projects, which are being implemented by partner organisations	Significant quantities* of weeds removed and treated along watercourses, wetlands and in bushland	Involved local indigenous groups in on-ground activities
Incorporation of AGLG actions into the CoA State of the Environment Report and CoG Environmental Management Plan		Industry audit program extended to include catchment
Attracted over \$2 million of funding from over 13 organisations		Yellow Fish drain stencilling program implemented throughout catchment
Key partner in developing the <i>Darling Range Sediment and Erosion Control Manual</i>		

\* Difficult to determine accurate figures

Whilst it is valuable to acknowledge and celebrate achievements, the review also identifies limitations. An opportunity to reflect enables the AGLG to identify what it has done well and should continue to do and has been its limitations. The AGLG can then avoid these areas in the future or approach them differently.

The first objective in the initial plan was to 'Establish an ICM structure for the catchment'. Over the past 10 years it has become evident that high level NRM/ICM frameworks and structures are complex and require a collaborative approach from all levels of government. Therefore, upon reflection, whilst this was a key emerging issue at the time, this objective was beyond the capacity of a local catchment group to achieve.

Erosion and sedimentation continue to degrade the health of the catchment and receiving watercourses. The AGLG and its volunteers have contributed significant efforts to address this issue through on-ground revegetation projects, but a number of land uses and land practices continue to provide a source of sediment to receiving waterbodies.

The Upper Canning Southern Wungong Catchment Team produced the Darling Range Sediment and Erosion Control Manual (2001b) in partnership with the City of Armadale and the Department of Agriculture and Food (WA). The City of Armadale has also embedded a local erosion and sediment control policy into its Town Planning Scheme No. 4.

However, there is a lack of understanding among the community and developers as to the ecological and economic impacts of erosion. Coupled with a lack of effective legislation, the source of sediment is set to continue and hamper efforts to conserve the few remaining deep pools in the Upper Canning River.

The Canning River is said to be the most weed infested waterway in the South West (Pen, 1999). The AGLG, SERCUL, Partner Local Government's and local friends groups continue to remove significant quantities of weed each year from sites in the catchment. However, due to the opportunistic nature and high regenerative capacity of many weed species, weed invasions persist unless managed continuously over many years. Fluctuations in NHT funding available to the AGLG have resulted in some sites only being able to be managed for one or two years.

Weed management requires effort from landowners, community groups and all levels of government to be effective. Therefore, AGLG operating alone is limited in how successful it can be in managing this issue unless there is a strategic collaborative approach and long-term (5-7 years) funding.

AGLG now has proven capacity for influencing local environmental policy and implementing on-ground works. These were the roles developed to achieve the original purpose of the group. However there have been many changes in regional funding models, partnership arrangements and in local community behaviours. There are limitations to what may be expected as a result of these changes.

In addition, new local communities are forming. The AGLG may not want to continue older projects when their preference is for new projects over which they may claim ownership and pride for their efforts. Many people are willing to make brief contributions to well planned projects but are reluctant to become involved in administrative roles and committee structures. The AGLG needs to respond to changing community behaviour and ensure that projects are arranged in a way that engages people according to their interests.

### 2.1.3 Stage 3 - Stakeholder workshop and consultation

As the purpose of this plan is based on review of previous planning and group achievements, the AGLG Management Committee limited consultation to key stakeholder groups.

A stakeholder workshop was held on 5<sup>th</sup> March 2008 with the purpose of;

- reviewing the AGLG's success and reflecting on changes to NRM since the Upper Canning Southern Wungong Catchment Management Plan was published
- outline and confirm the priority issues affecting local natural resources
- determine how AGLG can contribute to maintaining or improving the state of local natural resources, either individually or in partnership with key stakeholders

The 19 participants represented key stakeholder groups including:

- Armadale Gosnells Landcare Group
- City of Armadale
- City of Gosnells
- South East Regional Centre for Urban Landcare
- Swan River Trust
- Department of Water
- Armadale Redevelopment Authority
- Wildflower Society
- Friends of Forrestdale Lake
- Serpentine-Jarrahdale Landcare Centre

A full list of attendees can be found in Appendix 1.

Three stakeholders provided brief presentations to provide information on relevant programs and projects that would be relevant to the future work of the AGLG. Following this, participants formed focus groups and suggested relevant management actions for the AGLG to address the priority issues of:

1. Declining water quality
2. Terrestrial native species integrity
3. Declining soil condition
4. Low community capacity for NRM

These suggestions have been incorporated into the actions listed in Section 5.

Following the workshop, meetings were held with the Swan River Trust and Swan Catchment Council to obtain additional input into the proposed actions and to identify synergies and potential partnerships with the AGLG. Both of these key stakeholders supported the proposed actions in principle although were mindful of limitations in the Group's capacity.

Comments provided during consultation processes indicated that AGLG is a respected and effective deliverer of on-ground projects. Some comments suggested that AGLG could improve and collaborate more with SERCUL to advocate local environmental improvements, although others felt that the AGLG were already strong environmental advocates.



### 3. AGLG's capacity

When determining the future focus of the AGLG, consideration must be given to their capacity. That is, its ability to perform given tasks, which is influenced by its human and financial resources, support from community groups and volunteers, support from local and State government and regional groups.

In determining the capacity of the Armadale Gosnells Landcare Group, two questions need to be explored:

1. Who are they?
2. What can they do?

#### 3.1 Who are they?

The AGLG are an independent, incorporated local catchment group. The AGLG operates within the Cities of Armadale and Gosnells, the boundaries of which closely align to the Upper Canning, Southern and Wungong River catchments.

The focus of the AGLG to date has been the coordination and implementation of awareness-raising and on-ground action projects, with a focus on river and bushland management. The AGLG also considers itself to be an important environmental advocate and lobbyist in the region. Previously, it has provided impetus for the development of new projects, improved environmental management outcomes and is considered to be an important regional stakeholder, as demonstrated by its representation on selected Steering Committees.

Membership of the AGLG includes elected representatives from the Cities of Armadale and Gosnells, representatives from local friends groups and private landholders. Staff from both Partner Local Governments provide briefings and technical assistance to the group. The AGLG currently meets 10 times each year (mostly monthly) to:

- discuss actions and activities of the group;
- discuss activities of friends groups relevant to the AGLG and vice versa
- organise guest speakers of interesting/controversial topics
- receive briefings from Local Government officers on relevant issues
- organise planting days with friends groups
- discuss and develop actions relating to relevant environmental issues within catchment e.g. bushland destruction, pumping of water from rivers, vandalism, verge mowing and tree lopping

Strategic and staff management of the group is overseen by the AGLG Management Committee which includes the Chair, Secretary and local government representatives. This Committee also meets monthly, usually one week prior to the AGLG meetings.

The Cities of Armadale and Gosnells provide substantial funding to the AGLG and acknowledge the importance of the group and their activities. The two Cities also provide substantial in-kind support to the AGLG, housing and resourcing staff in their offices.

The City of Armadale has recently signed a Memorandum of Understanding with the AGLG that outlines how the City will adopt relevant components of the AGLG plan into their workplans and State of the Environment Report.

The City of Gosnells has endorsed the actions of the initial plan and has adopted relevant components through City's Environmental Management Plans.

### 3.2 What can they do?

The AGLG's resources currently include one full-time Community Landcare Coordinator funded by Partner Local Governments and one full-time Community River Restoration Officer funded by external sources and AGLG.

The Community Landcare Coordinator's role is to work with the AGLG to identify and address strategic priorities in the Upper Canning Southern Wungong Catchment Management Plan. The Community River Restoration Officer's role is to manage and coordinate river restoration and revegetation activities.

The AGLG is supported by the South East Regional Centre for Urban Landcare (SERCUL). Support is offered through project planning assistance, funding, web-hosting and sub-regional advice and advocacy.

The AGLG provides advice and support to the following friends groups, many of whom are members of the AGLG. These groups undertake weed removal, revegetation and maintenance of localised sites, in consultation with the AGLG:

- Roleystone Dieback Action Group
- Palomino Reserve Catchment Group
- Friends of Goolamrup Reserve
- Friends of Wright Brook
- Friends of Westfield Park Heron Reserve
- Friends of Forrestdale Lake
- Friends of Roley Pools
- Kelmscott Primary School Fish Care Site
- Friends of Mary Carroll Park
- Friends of Brixton Street Wetlands
- Brookwood Community Association

Therefore, considering the AGLG's identified strengths and current resources, the Group should continue to focus on on-ground activities and building community capacity, in conjunction with key stakeholders. There is also a recognised need and role for environmental advocacy, although the form and extent of this role should be determined in consultation with the AGLG members and SERCUL.

In considering the capacity of AGLG any risks to its resources should be acknowledged. The AGLG is reliant on external sources of funding and changes to State and Federal NRM programs and funding structures may influence the Group's ability to achieve the objectives listed in this Plan.

## 4. Local natural resource management assets

An asset-based approach to NRM has guided regional strategic planning and investment since the introduction of NHT2 in 2001. This approach identifies high value assets, threatening processes and priority areas for natural resource management groups to obtain major gains through investment. This approach for the Swan Region is provided in the Swan Catchment Council's (2004) Swan Region Strategy for Natural Resource Management.

A simplified asset-based approach has been adopted in this plan to assist the AGLG in developing strategic actions that relate to the regional NRM Plan in a way that protects important local natural assets. A full scale asset-based approach to developing response actions was not considered to be necessary at a local scale or within the capacity of the AGLG.

This section draws upon the results of the review of the initial plan and outcomes of the stakeholder workshop and consultation. This section aims to respond to the following questions, as identified in the introduction:

1. What natural assets are important to AGLG?
2. What is threatening these natural assets?
3. What is being done by AGLG and other organisations?
4. What needs to be done?

Through discussions with the AGLG's Management Committee and consideration of the initial plan, four local asset classes and their corresponding threats were identified. The four asset classes are:

- water
- biodiversity
- land
- people and their communities

This section reviews the programs and projects undertaken by the AGLG or other organisations that address the threats to these assets including those that are currently funded, or planned to occur within 2008. Many of these programs and projects are implemented across the Swan Region and have either sites or sub-projects within the AGLG area of operation.

Within each asset class, the main programs and projects occurring in the management area are listed in a table according to their primary focus:

- resource assessment
- planning
- engagement
- on-ground action

Some of these projects address threats from more than one asset class and may be repeated in other asset classes. For a comprehensive list of relevant programs and projects, please refer to Appendix 2.

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## 4.1 Water

Water assets refer to surface and groundwater ecosystems including watercourses (including drainage networks), floodplains, springs, dams, wetlands and groundwater.

The hydrology of the catchment is distinctly related to landform and soil types, which broadly speaking, is dissected by the Darling Fault. The arterial road network is closely aligned with the Fault line (Figure 1).

East of the Darling Fault, groundwater is localised and the yield limited. Stream flow is predominately fed by surface water and occasional springs (Smith *et al.* 2002). Stream flow is heavily regulated by the four surface water supply dams (Canning, Wungong, Churchman's and Victoria Dams) and two pumpback stations (Bickley and McNess Road) that exist within the catchment, which supplement Perth's public drinking water supply.

In areas west of the Darling Fault, wetlands are scattered in the landscape. Some wetlands are surface expressions of groundwater and are directly linked with the natural and constructed drainage network. Others, such as Forestdale Lake are perched and not directly connected to regional groundwater flow. Wetlands that are hydraulically connected to groundwater systems have a substantial influence over water quantity and quality as they have been found to control peak flows, increase baseflows and act as a nutrient source or sink (Barron, 2008).

There is an extensive network of artificial drains throughout the catchment through rural and residential land. The residential component is increasing due to rapid urbanisation of the Southern-Wungong River catchment. One significant change to local water assets in recent years is the construction of Champion Lakes, a large artificial recreational water body that has been constructed over the naturally occurring intermittent and saline Wright Lake.

### 4.1.1 What is threatening local water assets?

The profile of water resources has risen considerably in the community in the past decade. Various Federal, State and local government programs have provided much needed research, monitoring and funding for on-ground activities and community engagement programs. However, significant threats to water assets remain.

One of the most significant threats in the AGLG area of operation is declining water quality due to erosion and siltation, particularly east of the Darling Fault. This threat provided much of the impetus to developing the initial plan, but despite efforts at a local level, the problem persists (sedimentation and subsequent loss of river pools is addressed in Section 4.3.1).

Declining water quality in surface and groundwater assets due to the accumulation of excess nutrients and other non-nutrient contaminants is also of significant importance, especially in the Southern-Wungong River catchment, which is undergoing further significant urbanisation.

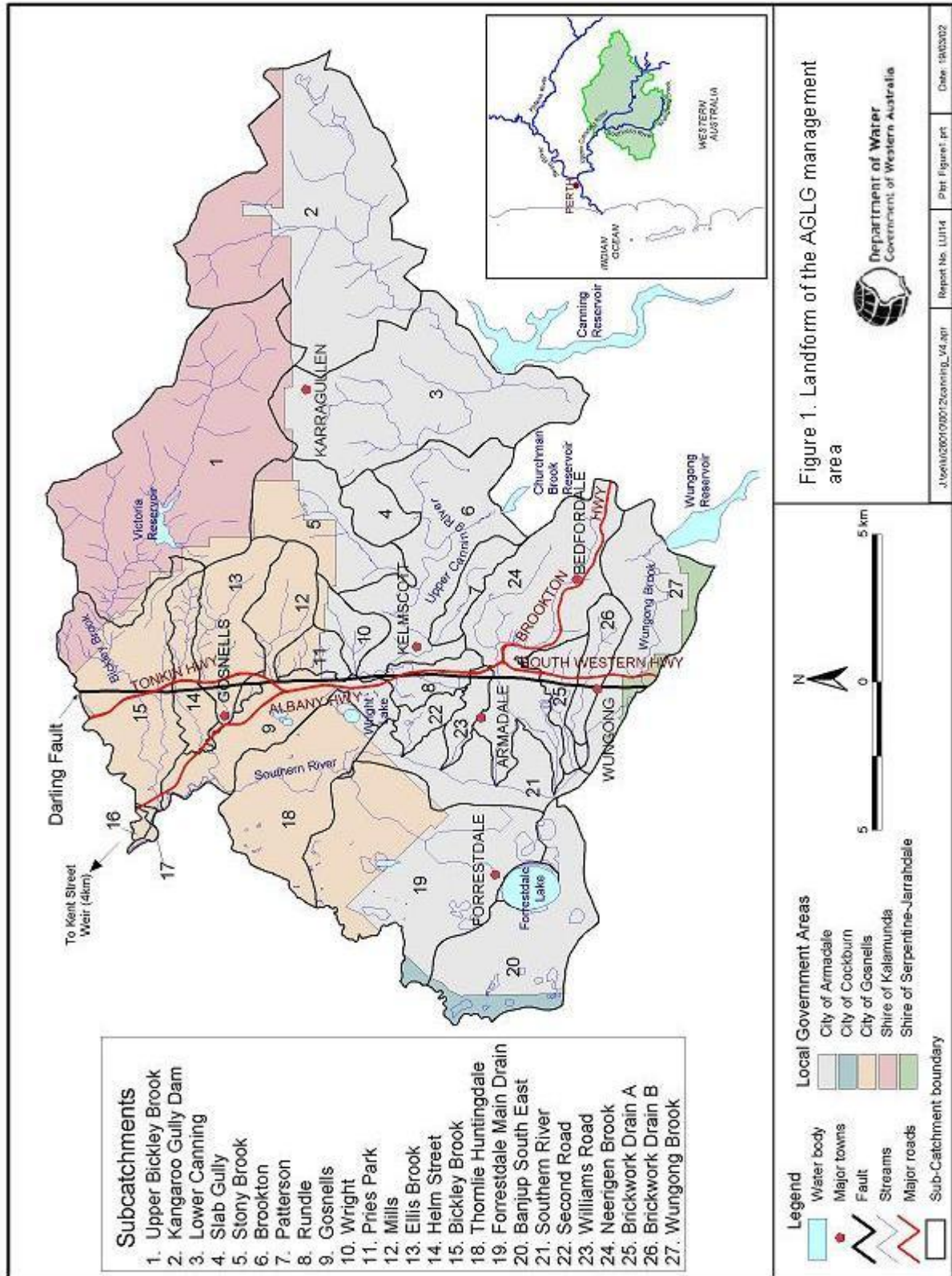


Figure 1. Landform of the AGLG area of operation

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The Southern-Wungong River catchment has a legacy of nutrients in the soil and top few metres of groundwater aquifers that continue to feed nutrients into nearby watercourses (Barron, 2008). The nutrients may be exported by the construction of new drainage systems for urban development, urbanisation and other forms of development which result in increased nutrient inputs.

Wetlands, particularly those listed by the Department of Environment and Conservation's Geomorphic Wetland Dataset as 'Resource Enhancement' or 'Multiple Use' are being destroyed by the process of urbanisation. Suitable land for housing in the Perth Metropolitan area is scarce and is now moving into areas where the land has greater environmental constraints.

There are six surface water supply dams in the AGLG area of operation. The flow regime in local waterways is substantially reduced due to these dams and other private dams located throughout the catchment. Stream flow that does occur is controlled through a number of environmental release points located along the Canning River and one on Wungong Brook. Modification of the natural flow regime has led to a decline in the ecological health of these waterways (Swan River Trust, 2002).

The importance of balancing the competing demands for surface water has heightened in recent years with predictions of climate change and its potential impacts. Through the use of predictive modelling, expert opinion and current climate observations, the Swan River Trust predicts that in the future the Swan and Canning Rivers will experience a reduction in winter rainfall and stream flow, decreases in groundwater levels and consequent flows to drains and streams and an increase in the frequency of heat spells (Swan River Trust, 2007a).

## 4.1.2 What is being done by AGLG and other organisations?

	Program/Project	Lead agency	Purpose
<b>Resource assessment</b>	Water quality monitoring	DoW, SCC, SERCUL, CoG, CoA	Various snapshot and on-going water quality sampling programs within the management area
	Canning River Environmental Water Requirements Study	DoW	To determine the environmental flows required to support the modified environment of the Canning river system. This will be incorporated into the Canning River Surfacewater Allocation Plan.
	Streamflow monitoring	DoW	Stream gauging stations are located on Canning and Southern River that measure stream flow/discharge
<b>Planning</b>	Healthy Rivers Action Plan	SRT	An overarching integrated program that incorporates multiple management programs that form a 'catchments to coast' approach to managing nutrients in the Swan and Canning Rivers
	Swan Canning Rivers Foreshore Assessment and Management Strategy	SRT	Provides a comprehensive understanding by describing foreshores, their pressures and condition, defining responses for management, and identifying target areas for action
	Southern River Water Quality Improvement Plan	SRT	Healthy Rivers Action Plan project that aims to guide investment to reduce nutrient input using a comprehensive decision making framework
	Wungong Urban Water Program	ARA	15 year Master Plan which demonstrates commitment to ecologically sustainable development through the adoption of water sensitive urban design, energy efficiency and natural resource management principles
	Better Urban Water Management	WAPC/ DoW/WALGA & DEWHA	Provides advice to developers on how urban water management issues should be addressed within the planning approvals system. Outlines the level of information required at each stage of the planning approvals process, from district to subdivision level planning
	District and local urban water management plans	Various	Planning documents produced under the Better Urban Water Management framework that identify site constraints of the area to be developed and best practice measures that should be employed to reduce adverse impacts of the development

	<b>Program/Project</b>	<b>Lead agency</b>	<b>Purpose</b>
	State of the Environment Report	CoA	Identifies priority actions to maintain and protect water assets within the City of Armadale
	Environmental Management Plan 2006 - 2009	CoG	Identifies priority actions to maintain and protect biodiversity assets within the City of Gosnells
	Managing land use and shallow groundwater	CSIRO	Premiers Water Foundation Project that is examining the catchment-wide impacts of urbanisation and investigating materials that could remove or control nutrients
	Canning Plain Management Action Plan	SERCUL	Provides a framework for the implementation of actions using an integrated approach to stormwater and groundwater management
	Fertiliser Action Plan	DEC	Identifies actions required to phase out the use of highly water soluble phosphate fertilisers in coastal areas over a period of 4 years
	State Water Plan 2007 and Urban Drainage Initiative	DPC/ DoW	Provides a framework which aims to achieve best practice in water resource management
<b>Engagement</b>	Community Nutrient Education Program (Nutrient Management - North Forestdale Development)	CoA	Behaviour change project that aims to control nutrient loss by changing people's habits and promoting the use of amended soils and mulch mixtures that replaces traditional fertiliser use.
	New WAtEr Ways Program	WALGA	An adaptive capacity building program that aims to develop the skills of practitioners and developers, particularly in water sensitive urban design
	Urban Water Capacity Building Program	DoW	Closely linked to the New WAtEr Ways Program, this program includes a strategy that addresses a number of factors that will facilitate improvements to urban water management (i.e. skills, funding, research, governance)
	Phosphorus Awareness Project	PAG	An awareness project that aims to reduce nutrient loads to the Swan and Canning Rivers
<b>On-ground action</b>	On-ground revegetation activities	AGLG, SERCUL, CoA, CoG and friends groups	On-ground projects that aim to improve and enhance the ecological condition and visual amenity of a particular site
	Streamcare project	CoA	On-ground project working with private land owners to revegetate local waterways



### 4.1.3 What needs to be done?

There are a number of existing programs and projects that target the threats to water assets in the AGLG area of operation. However, these threats have taken decades to evolve and are so diverse that they cannot be dealt with by one project or organisation. Therefore a collaborative, integrated approach is required. Projects should continue to have their own area of focus but project managers need to be aware of the goals and activities of related projects and identify synergies where a partnership approach maybe more effective and economic.

#### *Resource assessment*

Understanding the trends, concentrations and loading of water quality parameters is essential for making informed decisions and guiding investment. However, there are limited long-term monitoring sites in the AGLG area of operation.

In recent years, new surface water and groundwater monitoring sites have been established, either through SERCUL's water quality monitoring program or as part of obtaining baseline data for new urban developments and other projects. There needs to be greater coordination and distribution of this monitoring data and long-term representative sites need to be determined, established and the data analysed. This will assist in establishing new or revised water quality targets to be included in the Swan River Trust's forthcoming Water Quality Improvement Plan for Southern River.

#### *Planning*

Urbanisation in the AGLG area of operation places additional pressure on local natural resources. The State government's Better Urban Water Management initiative sets out a program to improve the land and water planning framework and raise the profile of drainage water as a resource.

However, there is still a need to build the capacity of developers, consultants, engineers and practitioners to ensure best practice is adopted in new urban developments. This is being addressed by the New WAter Ways Program and Department of Water's Urban Water Capacity Building Program. Natural resource management group's such as the AGLG and SERCUL need to continue their 'environmental watchdog' and advocacy role to encourage sustainable developments in the area.

There is also a need for innovative best management practices to be developed and adopted in urban developments in the Southern River catchment that consider its high evaporative losses. As the catchment becomes more urbanised, a greater proportion of land will be sealed, reducing the area available for evaporation which may result in increased inundation of the catchment (Barron, 2008).

Research has shown that organic nutrients comprise up to 90% of the nutrient load in water and that current water treatment materials and infrastructure are largely ineffective in removing these organic nutrients (Barron, 2008). CSIRO are investigating the reuse of mineral based industrial by-products to remove organic nutrients from urban water The AGLG should keep informed of these investigations.

The Department of Water has undertaken considerable work towards environmental water provisions and a surface water management plan for the Canning River system. This plan was highlighted as a priority action in the State Water Plan 2007 (Government of Western Australia, 2007) and needs to be completed to provide security of flows to the environment.

### *Engagement*

Community engagement and participation is critical in natural resource management. There have been many relevant projects targeting community involvement in water resource management, including those of the Swan Canning Cleanup Program (Swan River Trust, 1999).

Proven engagement programs need to continue, particularly those with a focus on behaviour change for source control which requires long term investment to be effective. Of particular interest is the Community Nutrient Education Program for North Forestdale which is funded by urban land developer contributions. Expansion of similar developer-funded programs in other new estates should be considered.

Capacity building programs also need to consider links to existing initiatives, such as the Fertiliser Action Plan and River Guardians Program, which may provide an established structure and funding opportunities for groups such as AGLG and SERCUL.

### *On-ground action*

Although there are limited funding sources for revegetation activities, it has been identified by key stakeholders that this is a role that the AGLG does exceptionally well and should continue. Consideration should be given to developing a 5 year implementation schedule for restoration and revegetation activities, identifying priorities to maintain and improve river health.

This should be linked to other related initiatives such as the Swan and Canning Rivers Foreshore Assessment and Management Strategy (Swan River Trust, 2007b), Swan-Canning Tributary Foreshore Assessment Project and the *Riverbank* Program. This will set out a prioritised medium-term course of investment, which would prove to be a useful resource for attracting funding.

Predicted climate change impacts continue to maintain a high profile across the globe. The AGLG has limited capacity to address this issue on a significant scale, other than supporting the activities of existing local programs such as 'Switch Your Thinking' that specifically target the issue. However, the AGLG should consider the potential impacts that reduced rainfall, reduced flow and altered flood frequencies will have on restoration activities. Appropriate species selection to accommodate these potential changes will ensure greater long-term success.

Smith *et al.* (2002) showed evidence of dryland salinisation in cleared sections of the Darling Plateau (Figure 2), although the extent is expected to remain limited while the catchment is substantially forested. However, these predictions were made under the current climate, with an average annual rainfall of 1000 to 1300 mm. Consideration should be given to the potential threat of dryland salinisation under a drying climate and reduced rainfall.

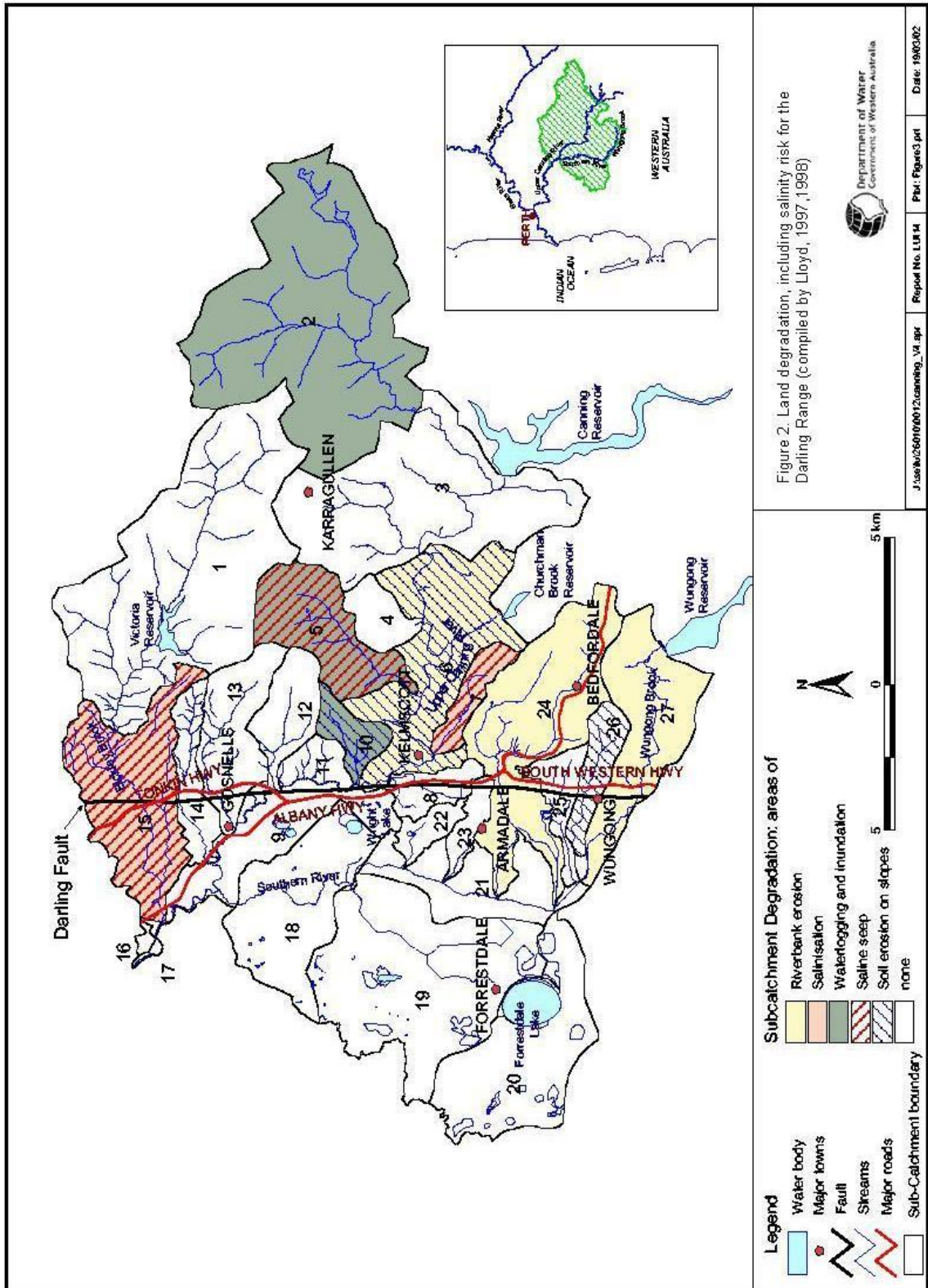


Figure 2. Land degradation, including salinity risk for the Darling Range

## 4.2 Biodiversity

The biodiversity asset class refers to terrestrial and aquatic native flora and fauna found in the AGLG area of operation, including populations that exist within and on watercourses, wetlands and bushland.

The initial plan categorises native vegetation in the catchment as Darling Range vegetation, Coastal Plain vegetation and riparian vegetation and provides a good overview of the dominant species within each category. Similarly, the initial plan describes the native animals found within the management area.

A great proportion of this native flora and fauna is found east of the Darling Fault (shown in Figure 1), within the group of regional parks known as the Regional Parks of the Darling Range and adjacent State forest and catchments.

However, there are also significant stands of remnant vegetation, and consequently populations of native flora and fauna on the Swan Coastal Plain within the AGLG area of operation, including populations of Threatened Ecological Communities, threatened species, regionally significant bushland and priority flora. These populations can be found within private landholdings and public lands.

### 4.2.1 What is threatening biodiversity assets?

A high proportion of the Coastal Plain vegetation within the management area has been cleared, especially land west of the Darling Fault, creating significant pressure on the remaining vegetation. Clearing often results in large vegetation complexes being fragmented which reduces habitat and isolates the species that live in that area. It also results in habitat quality loss and exposes the area to:

- weed infestation
- erosion
- feral animals
- pathogens and insect attack
- changes to fire frequency and severity
- disturbances such as trampling, rubbish dumping and firewood collection

Clearing for urban development in the management area has included a large proportion of low-lying land, some being seasonally inundated wetlands classified by the Department of Environment and Conservation's Geomorphic Wetland Dataset as 'Resource Enhancement' and 'Multiple Use'. Widespread catchment clearing and the subsequent drainage networks required to manage high water tables potentially disturbs the hydrological balance of these areas, which can result in adverse impact to aquatic macroinvertebrates and tree deaths caused by a changed hydro-period (length of time that water is present).

The community benefits from healthy biodiversity assets, although these benefits are not conspicuous (i.e. improved air quality, water purification, pollination, sense of place, landscape amenity). However, community understanding and ownership of biodiversity assets is considered to be low, which presents an ongoing threat and challenge to planning and management efforts.

Climate change and seasonal variability poses a potentially significant threat to biodiversity. Some species may not survive the predicted temperature increases and altered rainfall patterns, especially if they are already stressed by other pressures. Ecological linkages are important to enable species to be able to migrate to adapt to these changes.

#### 4.2.2 What is being done by AGLG and other organisations?

	Program/Project	Lead agency	Purpose
<b>Resource assessment</b>	Perth Biodiversity Project	WALGA	Aims to identify and conserve <i>locally significant vegetation</i> in partnership with local government by protecting these assets through developing and implementing local biodiversity plans
	Biodiversity Planning	CoG, CoA	Applying the Local Government Biodiversity Planning Guidelines to current assets managed by the Council's to facilitate good biodiversity management
	Bushland Mapping	CoA	Mapping of weeds, dieback, fuel loads and infrastructure within City of Armadale bushlands
	Bush Forever	WAPC	This is a policy document that identifies <i>regionally significant vegetation</i> within the Perth metropolitan area
<b>Planning</b>	Conservation Plan for the Swan Region - Biodiversity Operational Model	SCC	Strategic planning tool that is intended to guide future investment through prioritisation of programs and assist in the development of new programs focusing on biodiversity conservation planning in the Swan Region
	Wetland Management Plans (Leake Street wetlands, Champion Drive Estate, North Forrestdale Estates, Lander Swamp, Shreeve Road Reserve Wetland)	CoA	Management plans funded through nearby land development
	State of the Environment Report	CoA	Identifies priority actions to maintain and protect biodiversity assets within the City of Armadale
	Environmental Management Plan 2006 - 2009	CoG	Identifies priority actions to maintain and protect biodiversity assets within the City of Gosnells
	City of Gosnells Strategic Plan 2007-2010	CoG	Provides guidance for the development of projects and activities and outlines the goals of the City
	Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region	WALGA	Guidelines to assist local government in developing local biodiversity strategies that will influence their local planning strategies and town planning schemes
	Various bushland management plans (i.e. Armadale Settlers'	CoA, CoG and friends	Provide an organised and consistent approach to environmental management within these bushland

	Program/Project	Lead agency	Purpose
	Common, Forrestfield Complex Bushland, Ellis Brook, Mary Carroll Park)	groups	areas. Directs activities of Local Government and friends groups.
<b>Engagement</b>	Wetland Watch	WWF	Aims to protect and enhance high value wetlands on private and public land through awareness raising and capacity building
	Sustainable Landscaping Strategy	SCC	Focuses on opportunities for Local Government to promote the use of local native plants within both the residential and commercial communities, through demonstration gardens and subsidised plant sales
<b>On-ground action</b>	Various community projects (weeding, revegetation, maintenance)	BEAC	Projects aim to protect and enhance the values of community assets
	Streamcare Project	CoA	Work with landholders to revegetate watercourses on their property
	Natural area management works program	CoA, CoG	Works program to manage Council land, which includes prioritised weed control, dieback treatment, fire management and capital works to address threats to bushland

### 4.2.3 What needs to be done?

#### *Resource assessment*

Obtaining baseline data on the health of biodiversity assets is instrumental in enabling a prioritisation of these assets. Many biotic factors affect the health of bushland in the AGLG area including Jarrah dieback (*Phytophthora cinnimoni*), Marri canker (*Quambalaria coyrecup*) and insect attack.

The Perth Biodiversity Project has supported the Cities of Armadale and Gosnells in assessment of the health of Council owned lands with the aim of developing local biodiversity management strategies. It is important that this assessment is continued and expanded to include regionally significant bushland, particularly in the Regional Parks of the Darling Range.

This data can then be used to prioritise management efforts at a local scale, which would also feed into the Swan Catchment Council's proposed Conservation Plan for the Swan Region, which aims to prioritise local and regionally significant bushland at a regional level.

#### *Planning*

Most of the regionally significant bushland in the AGLG area of operation is contained within the Regional Parks of the Darling Range or is protected by Bush Forever. During the stakeholder consultation process there was concern raised over the absence of a management plan for the 22,000 hectare Regional Parks of the Darling Range. Consultation for a plan was initiated in 2000 but the plan has not been completed.

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The Conservation Plan for the Swan Region (Biodiversity Operational Model), administered by the Swan Catchment Council will be an important regional tool in enhancing current and future investment in biodiversity assets. The program aims to develop an improved understanding of regional biodiversity assets by assessing existing baseline data and current programs directed at managing threats to biodiversity assets. This information will be used to draw out gaps in knowledge and management which will be used to guide future investment. The local biodiversity planning currently underway in the Cities of Armadale and Gosnells links into this process and there is an opportunity for the AGLG to provide stakeholder input into the Conservation Plan.

As part of the Perth Biodiversity Project, the Western Australia Local Government Association (2004) has developed Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region. These guidelines are designed to assist Councils in developing their own local biodiversity management strategies, which consider mechanisms to protect locally significant bushland areas, supporting private land conservation and bushland sensitive design development.

The City of Armadale has recently initiated the development of their local biodiversity management strategy which is intended to be consistent with the Local Government Biodiversity Planning Guidelines (Western Australia Local Government Association, 2004). The AGLG has indicated a willingness to be represented on the Steering Committee that will assist in preparing these guidelines.

The City of Gosnells indicated in the Environmental Management Plan 2006-2009 that it intended to initiate a local biodiversity planning process in 2006 to 2007. The City has successfully completed its natural area field assessments for Council owned and managed land and will progress to the next phase shortly. The City also requires consultants working for developers in the Southern River area to utilise the Local Government Biodiversity Planning Guidelines in their environmental evaluations.

Weed management continues to pose a significant threat to biodiversity Australia wide. The Swan Catchment Council is working in partnership with the Department of Environment and Conservation to prioritise the management of weed species based on their threat to biodiversity and priorities listed in the Environmental Weed Strategy for Western Australia (Conservation and Land Management, 1999).

At a local level, the AGLG and its friends groups are undertaking a significant role in managing the weed burden at specific sites. However, there is the potential to address this threat more strategically by linking to the work of the Swan Catchment Council, Department of Environment and Conservation and Partner Local Governments. The AGLG should also consider prioritising sites for weed control that links to its 5 year prioritised implementation schedule for restoration and revegetation activities (See Section 4.1.3).

### *Engagement and on-ground action*

Most of the locally significant bushland in the Perth metropolitan area is contained within private land holdings and there is a growing awareness of the importance of private landowner efforts to protect these areas.

Wetland Watch is an important regional program that aims to conserve high value wetlands by working closely with private landowners. This program relies on Federal funding and sub regional NRM groups and local catchment groups should advocate for this program to be continued and provided greater security of funding.

For a number of years the AGLG ran an overstorey-understorey program which supplied free local native seedlings to local landowners. The aim of the program was to encourage local landholders, particularly those living along the river, to establish ecological corridors that had a suitable mix of overstorey and understorey species. Plants are now only available to Streamcare Project participants. Consideration should be given to reintroducing this program and possibly expanding it to urban landowners interested in establishing native gardens.



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## 4.3 Land

The land asset class refers to soils and geological landforms. As described in the Upper Canning Southern Wungong Catchment Management Plan, the management area has two major physical features, the Darling Range and the Swan Coastal Plain.

The initial plan details the soil associations of these two geomorphic zones. The plan also broadly describes the phosphorus retention index (PRI) of these soils, with the heavier soils of the Darling Range and foothills having a high PRI and the sandy soils of the Coastal Plain having a low PRI, indicating why the Southern River sub-catchment may have poorer water quality (Everall Consulting Biologist, 1999).

### 4.3.1 What is threatening land assets?

The most significant threat to land assets is erosion, which also directly threatens water and biodiversity assets.

Soil loss in the AGLG area of operation is caused by water erosion during land development (including individual lots), building and construction, stream bed and bank erosion, grazing, cultivation and exposed soil caused by fire and degradation of vegetation cover.

Erosion of natural soils results in a loss of valuable soil from its initial location, often affecting the productive capacity of the land. Land development in the AGLG area generally involves the importing of significant quantities of expensive clean fill, which often erodes and enters drainage systems.

Sedimentation and siltation are the resultant effects of erosion and are reducing the environmental values and social amenity of riparian ecosystems. Continual input of sediment to watercourses in the management area coupled with a regulated flow regime and a loss of flushing flows means that many of the deep pools that once existed in the Canning, Southern and Wungong Rivers are now choked with sediment.

This has resulted in a loss of important aquatic habitat and a decline in water quality due to siltation caused by resuspended fine sediments. Sedimentation has also resulted in modified flow dynamics, causing lateral erosion whereby the sediment deposits divert flow into adjacent banks leading to further bank erosion and sedimentation.

Bushland areas can also suffer from the effects of erosion, particularly if nearby land is cleared for urban development (this threat is discussed in Section 4.2 Biodiversity).

Acid sulfate soils are naturally occurring soils and sediments containing iron sulphides. When they are disturbed and exposed to air the iron sulphides react with water to produce sulphuric acid. In the AGLG area of operation there are many areas having a high to moderate risk of acid sulfate soils. However, the threat of acid sulfate soils is considered to be adequately managed through the Western Australian Planning Commission's (2003b) Planning Bulletin 64, Acid Sulfate Soils and existing development controls.

### 4.3.2 What is being done by AGLG and other organisations?

	Program/Project	Lead agency	Purpose
<b>Resource assessment</b>	Acid sulfate soil risk mapping	DEC	Broad scale mapping of where acid sulfate soils are likely to exist
	Swan Canning Rivers Foreshore Assessment and Management Strategy	SRT	Provides a comprehensive understanding by describing foreshores, their pressures and condition, defining responses for management, and identifying target areas for action
<b>Planning</b>	Darling Range Erosion and Sediment Control Manual	CoA/DAFWA/AGLG	Guidelines to assist in the minimisation of land degradation and water pollution due to land development
	Stormwater Management Manual	DoW	A comprehensive document that provides policies, principles and best practice advice on stormwater design and management
	Town Planning Scheme No. 4: Policy PLN 2.5 - clearing, erosion and sediment control	CoA	Policy document used to promote best practice erosion and sediment control measures
	Foothills Rural Strategy	CoG	Planning document used to guide land use, zoning and development in along the Darling Scarp within the City of Gosnells. It requires revegetation works to protect environmental assets
	Planning Bulletin 64, Acid Sulfate Soils	WAPC	Provide advice and guidance on matters that should be taken into account in the rezoning, subdivision and development of land that contains acid sulfate soils
<b>Engagement</b>	Heavenly Hectares	DAFWA	Involves short workshops that provide small landholders with practical information on weeds, pasture, revegetation, fencing and water management
<b>On-ground action</b>	On-ground revegetation activities	AGLG, CoA, CoG,, friends groups and developers	On-ground projects that aim to improve and enhance the ecological condition and visual amenity of a particular site
	Riverbank	SRT	Funding program that provides financial support to local government to undertake bank stabilisation and revegetation projects in the SRT Management Area, in conjunction with the community

### 4.3.3 What needs to be done?

#### *Resource assessment*

It is evident that there is a need to identify the sources of sediment in the AGLG area of operation. Although natural resource managers understand the topography and soil types at greatest risk of erosion, little work has been done on mapping and measuring the location and extent of sources of sediment in the management area.

The South East Regional Centre for Urban Landcare (SERCUL) is seeking funding to address this gap and undertake the Canning River Critical Habitats Project. This project would identify the sources of sediment in the Canning River, identify priority habitat areas and develop a sediment reduction program in consultation with key stakeholders. This project would also assist in prioritising sites for river restoration and revegetation activities to ensure habitats with high value (i.e. river pools) are maintained or improved.

#### *Planning*

Considering the costs of controlling erosion and remediating its damaging effects, there is little governance and policy that adequately addresses this threat. The *Soil and Land Conservation Act (1945)* provides control options. Soil Conservation Notices can be issued to direct the prevention or control of erosion from specified land. However, as with other legislation, enacting controls and enforcement of actions have limitations. There is a need for regional groups to advocate for improvements to the legislation and governance frameworks that prevents soil erosion.

The Darling Range Erosion and Sediment Control Manual (Upper Canning Southern Wungong Catchment Management Team, *et al.*, 2001b) is a useful resource that outlines suitable measures to control erosion at source. However, the manual was written specifically for the soils and landform of the Darling Range and included best practice at that time. Since 2001, best practice has evolved and there is an identified need for a revised and amended version of the Manual which should also include suitable measures for the Swan Coastal Plain.

#### *Engagement*

Until recently, the Department of Environment and Conservation ran the *Clean Sites* program, which was an education and training program directed at the development and construction industry. This program is considered by many stakeholders to have enormous potential in controlling one of the largest sources of sediment and needs to be re-established.

#### *On-ground action*

Along the Avon River, sediment is mechanically excavated from river pools and utilised as a resource. Through the forthcoming Canning River Critical Habitats Project, priority habitat areas will be identified. The feasibility of excavating sediment from these priority areas should be investigated to maintain their ecological function.

To complement an updated version of the Darling Range Erosion and Sediment Control Manual (Upper Canning Southern Wungong Catchment Management Team, *et al.*, 2001b) and *Clean Sites* program, a local developer should be encouraged to establish a demonstration site that displays appropriate erosion control measures.

## 4.4 People and their communities

People and their communities refer to all the individuals, groups, businesses, organisations and agencies living or operating within the management area. People influence how long it takes to implement change and are integral to natural resource management efforts. Consequently, people, and the communities they live within are considered to be an asset.

The AGLG was founded on an ICM approach and continues to focus heavily on community awareness, support and participation. The AGLG aims to work with all levels of the community including State and Local Government, regional and sub-regional NRM groups, private land owners, friends groups, schools and the private sector. The AGLG has recognised that establishing collaborative partnerships with these key groups is essential to ensuring effective projects, continued community involvement and on-going funding.

The AGLG area of operation has a rich European cultural history. Since 1830 the area has provided for timber cutting, orchards, dairying, market gardening and brick-making (Armadale Visitor Centre, 2008). The area is also significant to Aboriginal people and contains many sites of mythological, spiritual and cultural significance including the Canning River, Neerigen Brook and Forrestdale Lake.

Indigenous cultural heritage is deeply linked to natural resources and is an asset because it links indigenous people with who they are and where they belong. Non indigenous people can learn much about natural resource management from indigenous people and develop a stronger affinity with places by understanding the spiritual connection indigenous people have with the land. Indigenous cultural heritage needs to be appropriately considered when managing other natural resource assets.

### 4.4.1 What is threatening people and community assets?

People's response to the environment depends on their knowledge, awareness, skills, and attitudes and these factors need to be aligned before people will change their practices.

There has been limited research to quantify the general community's knowledge, awareness, skills and attitudes towards NRM. Some natural resource managers believe there is a lack of community understanding of what threatens our natural assets. However, there is an emerging belief that the community's attitudes towards NRM are changing, in light of the recent high profile given to climate change, water and food shortages both globally and locally.

However, research has shown that there is often a lag time between people's attitudinal change and behavioural change and that there are considerable barriers to personally adopting sustainable behaviours. It has been shown that to achieve behavioural change, barriers must be addressed. Once these barriers have been identified natural resource managers can develop appropriate strategies to address them and facilitate change.

The population in the AGLG area of operation is rapidly expanding with the urbanisation of rural land. This is changing the demographics of the area. Urbanisation has resulted in higher density living and an influx of people new to the area, many whom do not have the time or interest to develop a sense of community and participate in voluntary activities.

Busier lifestyles also result in a smaller proportion of the population willing to commit time to voluntary activities. It has been noted by AGLG members that community participation within the City of Gosnells has fallen in recent years and is possibly attributable to these factors.

Those involved in voluntary activities engender enthusiasm and are often very effective in organising events and completing on-ground works. However, it is difficult to maintain voluntary group enthusiasm and also difficult to transfer awareness, knowledge and skills to other groups in order to maintain levels of participation.

In addition, State government and regional groups have developed an expectation that since community groups are at the 'coalface', they have a significant role in capacity building. Community groups are concerned there is an increasing demand for them to administer capacity building programs, although there are no additional resources to assist them.

#### 4.4.2 What is being done by AGLG and other organisations?

	Program/Project	Lead agency	Purpose
<b>Resource assessment</b>	Predicting community reaction to water recycling proposals and developments	CSIRO	Premiers Water Foundation Project that examined the community's acceptability to potable and non-potable reuse of water in the Southern River area.
<b>Planning</b>	Model Industrial Development Guidelines	SCC, CoG	Guidelines designed to encourage the adoption of best practice in the planning, design and operational phases of industrial parks
	Healthy Rivers Action Plan	SRT	An overarching integrated program that incorporates multiple management programs that form a 'catchments to coast' approach to managing nutrients in the Swan and Canning Rivers
<b>Engagement</b>	Great Gardens and Heavenly Hectares	SRT, DAFWA	Involves short workshops that provide gardeners and small landholders with practical information on soil management, pests and diseases and being fertiliser and water wise
	Phosphorus Awareness Project	PAG	An awareness project that aims to reduce nutrient loads to the Swan and Canning Rivers
	Community Nutrient Education Program (Nutrient Management - North Forestdale Development)	CoA	Behaviour change project that aims to control nutrient loss by changing people's habits and promoting the use of amended soils and mulch mixtures that replaces traditional fertiliser use
	New WAtEr Ways Program	WALGA	An adaptive capacity building program that aims to develop the skills of practitioners and developers
	Urban Water Capacity Building Program	DoW	Closely linked to the New WAtEr Ways Program, this program includes a strategy that addresses a number of factors that will facilitate improvements to urban water management

	Program/Project	Lead agency	Purpose
	Indigenous Cultural Heritage Program	SCC	Includes a number of projects that aim to prioritise areas of significance to indigenous people and subsequent management
	Volunteer Strategy	CoA/BEAC	Reward program to encourage environmental volunteering
	Wetland Watch	WWF	Aims to protect and enhance high value wetlands on private and public land through awareness raising and capacity building
	Community support program	SERCUL	Provides support to environmental and catchment groups
	Maddington Kenwick Sustainable Communities Partnership Project	CoG	A collaborative partnership between State and local government to develop sustainable changes to these existing suburbs
<b>On-ground action</b>	On-ground revegetation activities	AGLG and friends groups	On-ground projects that aim to improve and enhance the ecological condition and visual amenity of a particular site. Individual projects involve schools, local community groups and local residents and provide an opportunity to raise awareness

### 4.4.3 What needs to be done?

#### *Resource assessment*

Natural resource managers are often disillusioned over the perceived lack of interest that the general community has in managing its natural resources and engaging in sustainable behaviours. However, there have been few studies or audits in the Swan Region that have quantified what prevents individuals from participating in these activities.

There is a need to establish benchmarks on current community awareness, attitudes, and behaviours towards the management of natural resources in conjunction with SERCUL. This could be achieved by using existing data and additional surveys and will assist greatly in developing effective community engagement activities that utilise appropriate tools for the target audience.

#### *Planning*

Recent research points towards the need for a different approach to community engagement and participation. It appears that people are participating more in non-structured activities and less in traditional forms of participation (i.e. committee's, public meetings). Therefore, group's such as AGLG that rely on community support and participation must consider using new forms of engagement to attract a broader spectrum of the community.

Understanding the demographics and factors that motivate individuals to engage in community or voluntary activities is also important. Research by the Department of the Premier and Cabinet (2001), suggests that as the 'Baby Boomer' generation retires, Western Australia may see a large number of people committing themselves to voluntary activities, in an effort to contribute (or 'give back') to their community.

However, this research has also found that these people are more likely to commit to an organisation that is organised, meaningful and supportive and that truly values its volunteer base.

Landcare SJ Inc in collaboration with the South West Catchments Council and Department of Agriculture and Food developed their *Community Engagement in NRM Guidelines* which include a useful summary of the tools that can be employed to engage the community. These guidelines would be a useful resource in developing a regional community engagement strategy that considers regional demographics, research data on attitudes and motivators and appropriate tools to improve public awareness and participation. This strategy should be developed by or in partnership with regional and sub-regional groups.

#### *Engagement*

In the past, the AGLG has co-hosted training workshops with stakeholders and training service providers. This should continue and the AGLG should utilise the opportunities provided by new training targeted at specific land uses, such as the Swan Catchment Council's forthcoming best management practice training for orchardists, viticulturalists and horse owners.

Friends groups provide a valuable service to the environment and their community through on-ground activities. These groups need continued support to enable them to undertake their work. Support may include organising appropriate training or workshops, which could be determined by conducting a simple audit of training needs.

During the stakeholder consultation process, there was interest in the AGLG re-establishing the *Living on the River* newsletter which is distributed to landowners whose properties encompass riparian areas. There were also suggestions that the AGLG should consider greater utilisation of its website to inform and reach people who are time-poor.

#### *On-ground action*

The AGLG has previously engaged local indigenous groups in planning and undertaking revegetation projects. Involvement in on-ground projects can provide indigenous people with a greater sense of ownership and belonging to their local environment and cultural heritage. Consideration should be given to re-establishing links to local indigenous groups, possibly through the Swan Catchment Council's Cultural Heritage Program.

## 5. Strategic plan

### Asset: Water

#### 10 year objectives:

- **Improve water quality monitoring networks and distribution of data to guide future investments in water quality improvements**
- **Ensure that river restoration and revegetation activities and other restoration/landscape treatments of foreshores contribute to maintaining the ecological condition of AGLG's priority reaches**

**Threat:** Declining water quality in surface and groundwater assets due to accumulation of excess nutrient and other contaminants.

**Intent:** Declining water quality is a threat that is being targeted by a number of organisations. The Department of Water measures stream flow at gauging stations and groundwater in referenced access wells including some water quality parameters. This information is recorded on a database. The Swan River Trust, is aiming to improve water quality through the implementation of the *Healthy Rivers Action Plan (2008)*. A key component of the draft Action Plan is to develop *Water Quality Improvement Plans (WQIPs)* for priority catchments. SRT monitors water quality information in these priority catchments at a level that is suitable for assessment of targeted nutrient reduction levels (i.e. 30% reduction by 2015). City of Gosnells in conjunction with SERCUL and DoW undertake water quality monitoring of Bickley Brook.

The AGLG has expressed concern that there is insufficient water quality information in the Upper Canning, Southern and Wungong Rivers to enable quantitative water quality targets to be developed to evaluate performance. The intent of these actions is to ensure that there is adequate and appropriate water quality monitoring to provide the following;

- benchmark water quality information for surface and groundwater in priority catchments
- targets set for water quality improvement in priority catchments (e.g. for the WQIP initiated by SRT)
- water quality monitoring enables identification of significant point and diffuse sources of contaminants (to guide management actions)
- water quality information is available to the AGLG and its partner organisations in a form that assists with local government planning processes and with community information and engagement in environmental management activities
- information about longer term water quality trends that may occur due to climate change and other major environmental and land use change

The proposed actions are also intended to maintain the ecological condition of waterways within the catchment through the continuation of on-ground activities and to build on current nutrient reduction programs relevant to the AGLG area.



**5 year desired outcomes are that:**

- surface and groundwater information for water quality in the AGLG priority catchments is available and relevant to the AGLG and its partner organisations
- the potential impacts due to declining water quality are well recognised within the community
- the processes and pathways of nutrient and other contaminants is well understood and clearly communicated
- measured improvement in water quality provides partial achievement of longer-term targets, attributable to activities undertaken by the AGLG and its partner organisations
- river restoration and revegetation activities are prioritised according to baseline data available on ecological condition

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Resource Assessment</b>	W1.1	Ensure existing water quality monitoring programs include adequate representative sites in the Upper Canning, Southern and Wungong Rivers to provide information that will guide the priority actions of AGLG and its partner organisations	DoW, SRT, SCC, SERCUL	S
	W1.2	Arrange for interpretation of existing water quality information (all sources) to identify point sources and major diffuse source areas for nutrients and other contaminants	DoW, SRT, SERCUL, SCC	M
	W1.3	Encourage relevant authorities to investigate the extent of dryland salinisation in the Upper Canning River and the potential downstream salinity impacts	DoW	L
<b>Planning</b>	W1.4	Engage in processes for development of the Swan River Trust's regional and local <i>Water Quality Improvement Plans</i> (WQIP's) for Southern River and Bickley Brook	SRT, SERCUL, SCC, CoA, CoG	S-M
	W1.5	Prepare a five-year implementation schedule for river restoration and revegetation activities, as part of the <i>Canning River Critical Habitats Project</i> . The schedule should be based on priorities identified in the <i>Foreshore Management Strategy</i> linked through local government and the SRT's <i>Riverbank</i> processes	CoA, CoG, SRT, SERCUL, SCC	S

	Action No.	Action	Partner organisation	Time Frame*
	W1.6	Pursue completion of the Wungong River management plan that addresses drainage, public access and rehabilitation	CoA	S-M
	W1.7	Arrange and coordinate a local community information and engagement program for adoption of low water soluble phosphate fertiliser use in urban and rural areas according to processes and actions of the <i>Fertiliser Action Plan</i> and <i>Sustainable Landscaping Strategy</i>	DEC, Phosphorus Action Group, SRT, SCC	M
<b>Engagement</b>	W1.8	Encourage Council and developers to expand the <i>Community Nutrient Education Program</i> (Nutrient Management - North Forestdale Development) if evaluation proves the program is worthwhile to include additional new urban developments and issues and to ensure the program becomes ongoing		S-M
<b>On-ground action</b>	W1.9	Based on the five-year implementation schedule for river restoration and revegetation, develop and implement annual programs for river restoration and revegetation activities at priority sites (including opportunities for SALP funding)		Ongoing
	W1.10	Encourage the expansion of the <i>Drainage Nutrient Intervention Program</i> to include a priority site on Southern River, which may be used as a demonstration site for future local urban developments (possible links to Wungong River Management Plan)	SRT, ARA	S-M

## Asset: Water

**Threat:** Natural ecosystems are being affected by change in hydrological processes including reduced stream flow, increased waterlogging of soils, reduced groundwater levels or changed hydro-period for wetlands.

**Intent:** Balancing the needs of all water users with environmental requirements is challenging. The Department of Water has lead responsibility to establish this balance through water allocation planning and licensing processes that include consideration of environmental water requirements. This has occurred in a limited way for water resources in the Canning River catchment, however the AGLG remains concerned that current policy documents that strategically guide water use and consumption and determining the impacts of altered groundwater levels are incomplete. This is also a significant concern for the Southern and Wungong River catchments. There are also concerns about the impact that expected climate change might have on catchment hydrology.

The intent is to ensure that consistent information is used to provide a strategic approach to balancing the competing demands for water. The AGLG is seeking to have this information available and acceptable to its partner organisations and the community. Particular interest is expressed about environmental water releases to maintain good quality riparian habitats, including those improved by river restoration and revegetation activities.

### 5 year desired outcomes are that:

- the Canning River Surface Water Allocation Plan has been prepared and implemented
- riparian habitats that can benefit from environmental water releases are identified

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame *
<b>Planning</b>	W2.1	Encourage the Department of Water to prepare the <i>Canning River Surface Water Allocation Plan</i>	DoW, SRT, SCC	S
	W2.2	Arrange and coordinate a local community information and engagement program for adoption of water use efficiency practices in urban and rural areas	DoW, SCC, CoG	S-M
<b>On-ground action</b>	W2.3	Liaise with Department of Water to ensure that environmental water releases complement river restoration and revegetation activities (i.e. negotiating for pulse releases to maintain restored priority habitats)	DoW, SRT, SCC	S-M

## Asset: Water

**Threat:** Natural ecosystems are being affected by the impacts of climate change

**Intent:** Climate change is a significant global issue. The AGLG has limited capacity to significantly address this issue but should make itself aware of the possible risks climate change may have on local natural resources and plan for possible impacts climate change may have on its on-ground activities.

**5 year desired outcomes are that:**

- the AGLG has considered and planned for impacts of climate change on restoration activities

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Planning</b>	W3.1	Develop a list of suitable native species to be used in restoration activities that can withstand the potential effects of climate change including increased average temperatures, lowered groundwater tables and reduced inundation of the floodplain (required for germination)	DEC, CoA, CoG	S

## Asset: Biodiversity

### 10 year objective:

**Priority areas of natural bushland are appropriately conserved, restored and managed to provide a sanctuary for native species**

**Threat:** Biodiversity values are diminished through habitat quality loss and fragmentation caused by, fire, weeds, feral animals, pathogens, altered catchment hydrology, clearing land for residential development and changing climatic conditions.

**Intent:** The intent is to retain and improve biodiversity values by managing the health and resilience (i.e. the long term survival) of native vegetation in wetlands, bushland and on watercourses.

### 5 year desired outcomes are that:

- ten priority areas of native vegetation are healthy and regenerating due to restoration activities initiated through the AGLG and its partner organisations
- statements of 'best practice' are being adopted for watercourses, wetlands and bushland vegetation management
- biodiversity values on public land (State and local government) are managed according to strategies and management plans at levels considered to be acceptable by the AGLG
- a high proportion of urban and rural landholders are aware of habitat importance and are adopting practices to enhance these values (e.g. planting local native plant species )

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Planning</b>	B1.1	Identify ten priority native vegetation sites in conjunction with Partner Local Governments and friends groups and determine key threatening processes and management response actions required to maintain biodiversity values at these sites (Links to <i>Swan Region Biodiversity Operational Model</i> )	Friends groups, SERCUL, SCC, CoA, CoG	S
	B1.2	Using the information obtain in action B1.1, prepare a five-year implementation schedule for watercourses and bushland management and restoration	CoA, CoG, SERCUL, SCC	S-M
	B1.3	Encourage Department of Environment and Conservation to prepare a biodiversity management strategy for the Regional Parks of the Darling Range	DEC, SCC, SERCUL	M

	Action No.	Action	Partner organisation	Time Frame*
	B1.4	Support Councils in developing and completing local biodiversity strategies for public land	SCC, PBP, CoA, CoG,	S-M
	B1.5	Review and document cost effective and innovative restoration techniques applicable to the local area in partnership with Serpentine-Jarrahdale Landcare Centre	SJ Landcare	S-M
	B1.6	Support Councils in developing long-term wetland management plans for wetlands within public land. Plans should include identification of priority areas for restoration	CoA, CoG	M
	B1.7	Pursue on-going funding to maintain the <i>Wetland Watch</i> program that provides support and incentives for landholders to manage wetlands that exist on their properties	SCC	S-M
	B1.8	Encourage local government and developers to utilise local native understorey species in landscaping to increase biodiversity and establish effective groundcovers to manage erosion (Link to <i>Water Conservation Plans</i> and <i>Sustainable Landscaping Strategy</i> )	CoA, CoG	S-M
	B1.9	Pursue opportunities with relevant authorities to develop recovery plans for threatened or iconic native species (i.e. freshwater cobbler)	DEC, DoW	M-L
	B1.10	Advocate for ecological linkages to be appropriately incorporated into local Structure Plans	CoA, CoG, DEC	M
<b>Engagement</b>	B1.11	Promote and encourage landholders to use local native species, including understorey species on properties (i.e. reintroduce the overstorey-understorey planting program)	CoA, CoG	M
<b>On-ground action</b>	B1.12	Improve marginal/moderate riparian vegetation by conducting 'in-fill plantings' of understorey species		M

## Asset: Biodiversity

**Threat:** Invasive species (weeds and feral animals) diminish biodiversity values in native vegetation and revegetated areas.

**Intent:** Contain or where possible reduce the impact of existing weed infestations or feral animals and prevent the establishment of additional invasive species.

**5 year desired outcomes are that:**

- there is a containment or reduction in invasive species at ten priority native vegetation sites
- improved community understanding of environmental weeds and their impacts

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Resource Assessment</b>	B2.1	Using the information obtained in actions B1.1 and B1.2 and the results of weed surveys undertaken by Council, determine ten priority sites for weed management	Friends groups, CoA, CoG, SERCUL	S-M
<b>Planning</b>	B2.2	Prepare weed management and control plans for priority sites that target environmental and invasive weeds	CoG , CoA	S-M
<b>Engagement</b>	B2.3	Pursue improved coordination and on-ground implementation of feral animal control programs	DEC, DAFWA, SERCUL	Ongoing
	B2.4	Develop and distribute a local community information package for small landholders that identifies significant local environmental and invasive weeds, their impacts and appropriate control methods	SERCUL	M
<b>On-ground action</b>	B2.5	Based on the priorities set in B2.2, implement weed management and control plans	Friends groups, CoA, CoG	S-M

## Asset: Biodiversity

**Threat:** Plant disease and inappropriate burning diminish biodiversity values in native vegetation and revegetated areas.

**Intent:** To develop a knowledge base and understanding of diseases that affect native vegetation and the associate affects of fire on ecosystem health.

**5 year desired outcomes are that:**

- there is an improved understanding of vegetation health
- fire management measures are adopted to protect priority assets

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Resource Assessment</b>	B3.1	Evaluate relevant natural vegetation survey and mapping information and identify areas where additional information is required for management purposes. Arrange vegetation survey and mapping processes where additional information is required according to local and regional priorities	CoA, CoG, DEC, SCC	M
<b>Planning</b>	B3.2	Encourage the development of fire management strategies or measures for priority areas (i.e. close to residential developments, bushland/wetland/river areas in good condition)	CoA, CoG	M-L
	B3.3	Ensure project sites/river restoration and revegetation sites address fire and disease management issues		S
<b>Engagement</b>	B3.4	Support the activities of the Dieback Working Group		Ongoing



## Asset: Land

### 10 year objective:

**To identify the sources of sediment and extent of sedimentation so that an appropriate erosion and sediment management program can be established to protect priority riparian habitats**

**Threat:** Soil erosion and transportation of sediments through waterways is reducing the environmental values and social amenity of riparian ecosystems. These processes can also lead to increased risk of localised flooding and assist weed invasion.

**Intent:** To understand the environmental impacts of erosion and sedimentation processes relevant to the area. To identify the extent to which these impacts occur and to develop management guidelines and demonstrated best practice for control of erosion and sedimentation.

### 5 year desired outcomes are that:

- the sources of sediment and silt in priority waterways have been mapped and measured
- the rate of sedimentation has been benchmarked
- the existing and potential impacts on priority assets (i.e. river pools and reaches) has been evaluated
- the AGLG have pursued improvements to manage sediment sources
- restoration activities are targeting AGLG's priority assets

Processes to achieve the expected outcomes are to be aligned with the SRT 'Healthy Rivers' program.

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Resource Assessment</b>	L1.1	Support the <i>Canning River Critical Habitats Project</i> , which aims to identify the sources and impacts of erosion on the Canning, Southern and Wungong Rivers including; <ul style="list-style-type: none"> <li>• a base-line study on sediment in river pools</li> <li>• source identification</li> <li>• recommendations to treat the cause</li> <li>• cost of response actions</li> </ul>	SERCUL, SCC, SRT, CoA	S-M

	Action No.	Action	Partner organisation	Time Frame*
	L1.2	Investigate the feasibility of extracting accumulated sediment from priority river pools and its use as a marketable resource	DoW, SRT	M
<b>Planning</b>	L1.3	Encourage State government agencies to review and adopt an amended version of the <i>Darling Range Erosion and Sediment Control Manual</i> (2001) to ensure it contains best practice information that is also suitable to the Swan Coastal Plain	SCC	M
	L1.4	Advocate for State and Local Government tender documents to require contractors to retain soils on-site during construction	SERCUL	M
	L1.5	Support the Swan River Trust in developing sediment management strategies for the Canning River and Southern River	SRT	M
<b>Engagement</b>	L1.6	Encourage Department of Environment and Conservation to update and re-establish the <i>Clean Sites</i> program to improve the dissemination of best practice information to the development and construction industry and local government	SCC, SERCUL, DEC, CoA, CoG	S
<b>On-ground action</b>	L1.7	Using the results of the <i>Canning River Critical Habitats Project</i> , review priority locations for river restoration and revegetation activities, to protect and enhance habitats most at risk of sedimentation		M-L
	L1.8	Encourage developers to establish a sediment control demonstration site within a greenfield development that demonstrates innovative and effective erosion control measures	Developers, ARA, CoA, CoG, SCC	M

## Asset: People and their communities

### 10 year objective:

**To continually improve people's recognition of, and attitude to, local natural resource management issues that will provide leverage to a greater uptake of sustainable behaviours in the community.**

**Threat:** People involved voluntarily in environmental actions through groups engender enthusiasm and are often very effective in organising events and completing on-ground works. It is however difficult to maintain voluntary group enthusiasm and also difficult to transfer awareness, knowledge and skills to other groups in order to maintain levels of participation. Local government has a key role in representing the interests of their local communities. It is important that local government maintains a high priority for environmental management and the capacity to support the community in taking the appropriate environmental management actions.

**Intent:** For local community enthusiasm, initiative and effectiveness for environmental management action through engagement processes and with support from local government for the purpose of achieving the expected outcomes of the AGLG Strategic Plan.

### 5 year desired outcomes are that:

- more than ten local conservation groups are engaged and participating in delivering actions identified in the Plan
- a local community group network for support and information sharing purposes is maintained
- capacity of local community groups is built to a level for effective on-ground activity through training and other skills development

(\*Time frame - S = short term, M= medium term, L = long term)

	Action No.	Action	Partner organisation	Time Frame*
<b>Resource Assessment</b>	P1.1	Undertake an audit of current community group knowledge, skills and other capacity to identify training appropriate to their needs	SERCUL, friends groups, training provider	S-M
	P1.2	Conduct a community awareness and engagement survey to provide benchmark information about current community interest and involvement and also to identify potential for further community group development for environmental management outcomes	SERCUL	S-M

	Action No.	Action	Partner organisation	Time Frame*
<b>Planning</b>	P1.3	Using the <i>South West Region's Community Engagement in Natural Resource Management Guidelines</i> , work in partnership with SERCUL to develop a local community engagement strategy for the catchment that outlines specific tools to increase public awareness about natural resources and how they should be managed for the future	SERCUL, SCC, CoA, CoG	S
	P1.4	Promote the opportunity for AGLG to provide input into sub-regional and local consultative processes for environmental management in accordance with the priority action areas of this Plan	CoA, CoG, SERCUL	Ongoing
<b>Engagement</b>	P1.5	Using information from the community capacity audit, survey and strategy (actions P1.1- P1.3), arrange a set of engagement activities at a level that maintains and supports ten action-orientated local friends groups. This may include: <ul style="list-style-type: none"> <li>• coordinating targeted training workshops to improve skill base</li> <li>• providing improved accessibility to natural resource management information (i.e. website)</li> <li>• support in developing funding applications</li> </ul>	CoA, CoG, SERCUL	Ongoing
	P1.6	Arrange for the <i>Great Gardens</i> program to deliver workshops within the City of Armadale and Gosnells using local information and education tools	SRT, program service providers	Ongoing
	P1.7	In conjunction with relevant program service providers, arrange for training courses to be held in the catchment for orchardists, viticulturalists and horse owners	SCC, program service providers	Ongoing
	P1.8	Develop education and awareness tools that encourage improved land use management and promote the groups activities (i.e. reintroduce the <i>Living on the River</i> newsletter, brochures, website)		Ongoing
	P1.9	Seek opportunities for professional development of AGLG staff	CoA, CoG, SERCUL	Ongoing
	P1.10	Identify, support and celebrate local champions who lead group development initiatives that apply sustainable management practices	SCC, SERCUL	Ongoing
<b>On-ground action</b>	P1.12	Combine skills training with implementing on-ground projects		Ongoing

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	<b>Action No.</b>	<b>Action</b>	<b>Partner organisation</b>	<b>Time Frame*</b>
	P1.13	Encourage and support indigenous communities to be involved in river restoration and revegetation activities	SCC	Ongoing

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## Further reading

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## Appendix 1. List of attendee's for the stakeholder workshop on 5th March 2008

<b>Name</b>	<b>Group</b>
Crystal Mclvor	Community Landcare Coordinator, AGLG
Matt Grimbley	Community River Restoration Officer, AGLG
Cam Clay	Chairperson, AGLG
Pat Hart	Secretary, AGLG
Julie Robert	South East Regional Centre for Urban Landcare
Gwen Watson	Streamcare coordinator and AGLG General Committee Member
Ron Van Delft	City of Armadale
Corrine Omacini	City of Armadale
Wayne van Lieven	City of Gosnells
Jodee Lysaght	SJ Landcare
Bill Scott	Community resident, attended on behalf of Cr. Keith Lethbridge (City of Armadale)
Janet Green	AGLG General Committee Member and Friends of Westfield Park Heron Reserve
Mike Kelly	Department of Water
Deanne Barnes	Armadale Redevelopment Authority
Sue Williams	AGLG General Committee Member and Friends of Wright Brook
Kim Fletcher	Wildflower Society
Debbie Besch	Swan River Trust
David James	Friends of Forrestdale Lake
Carolyn Legrange	Bungendore Park
Lucy Sands	Facilitator, BlueSands Environmental
Viv Read	Facilitator, Viv Read & Associates

Appendix 2. Programs and projects that are relevant to the activities of Armadales Gosnells Landcare Group

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
Acid sulfate soil risk mapping	DEC	Broad scale mapping of where acid sulfate soils are likely to exist			ü	
Better Urban Water Management	DoW/WALGA & DEWHA	Provides advice to developers on how urban water management issues should be addressed within the planning approvals system. Outlines the level of information required at each stage of the planning approvals process, from district to subdivision level planning	ü			
Biodiversity Planning	CoG, CoA	Applying the Local Government Biodiversity Planning Guidelines to current assets managed by the Council's to facilitate good biodiversity management		ü		
Bush Forever	WAPC	This is a policy document that identifies <i>regionally significant vegetation</i> within the Perth metropolitan area		ü		
Bushland Mapping	CoA	Mapping of weeds, dieback, fuel loads and infrastructure within City of Armadale bushlands		ü		
Canning Plain Management Action Plan	SERCUL	Provides a framework for the implementation of actions using an integrated approach to	ü			

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
		stormwater and groundwater management				
Canning River Environmental Water Requirements Study	DoW	To determine the environmental flows required to support the modified environment of the Canning river system. This will be incorporated into the Canning River Surfacewater Allocation Plan.	ü	ü		
City of Gosnells Strategic Plan 2007-2010	CoG	Provides guidance for the development of projects and activities and outlines the goals of the City	ü	ü		ü
Community Nutrient Education Program (Nutrient Management - North Forestdale Development)	CoA	Behaviour change project that aims to control nutrient loss by changing people's habits and promoting the use of amended soils and mulch mixtures that replaces traditional fertiliser use.	ü			ü
Community support program	SERCUL	Provides support to environmental and catchment groups				ü
Conservation Plan for the Swan Region - Biodiversity Operational Model	SCC	Strategic planning tool that is intended to guide future investment through prioritisation of programs and assist in the development of new programs focusing on biodiversity		ü		

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
		conservation planning in the Swan Region				
Darling Range Erosion and Sediment Control Manual	CoA/DAFWA/AGLG	Guidelines to assist in the minimisation of land degradation and water pollution due to land development			ü	
District and local urban water management plans	Various	Planning documents produced under the Better Urban Water Management framework that identify site constraints of the area to be developed and best practice measures that should be employed to reduce adverse impacts of the development	ü			
Great Gardens and Heavenly Hectares	SRT, DAFWA	Involves short workshops that provide gardeners and small landholders with practical information on soil management, pests and diseases and being fertiliser and water wise	ü	ü	ü	ü
Healthy Rivers Action Plan	SRT	An overarching integrated program that incorporates multiple management programs that form a 'catchments to coast' approach to managing nutrients in the Swan and Canning Rivers	ü			ü
Indigenous Cultural Heritage Program	SCC	Includes a number of projects that aim to prioritise areas of significance to indigenous	ü	ü		ü

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
		people and subsequent management				
Environmental Management Plan 2006 - 2009	CoG	Identifies priority actions to maintain and protect biodiversity assets within the City of Gosnells	ü	ü	ü	
Fertiliser Action Plan	DEC	Identifies actions required to phase out the use of highly water soluble phosphate fertilisers in coastal areas over a period of 4 years	ü			
Foothills Rural Strategy	CoG	Planning document used to guide land use, zoning and development in along the Darling Scarp within the City of Gosnells. It requires revegetation works to protect environmental assets	ü	ü	ü	
Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region	WALGA	Guidelines to assist local government in developing local biodiversity strategies that will influence their local planning strategies and town planning schemes		ü		
Maddington Kenwick Sustainable Communities Partnership Project	CoG	A collaborative partnership between State and local government to develop sustainable changes to these existing suburbs	ü			ü

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
Managing land use and shallow groundwater	CSIRO	Premiers Water Foundation Project that is examining the catchment-wide impacts of urbanisation and investigating materials that could remove or control nutrients	ü			
Model Industrial Development Guidelines	SCC, CoG	Guidelines designed to encourage the adoption of best practice in the planning, design and operational phases of industrial parks	ü	ü		ü
Natural area management works program	CoA, CoG	Works program to manage Council land, which includes prioritised weed control, dieback treatment, fire management and capital works to address threats to bushland		ü		
New WAtEr Ways Program	WALGA	An adaptive capacity building program that aims to develop the skills of practitioners and developers, particularly in water sensitive urban design	ü			ü
On-ground revegetation activities	AGLG, SERCUL, CoA, CoG and friends groups	On-ground projects that aim to improve and enhance the ecological condition and visual amenity of a particular site	ü	ü	ü	ü
Perth Biodiversity Project	WALGA	Aims to identify and conserve <i>locally significant vegetation</i> in partnership with local		ü		

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
		government by protecting these assets through developing and implementing local biodiversity plans				
Phosphorus Awareness Project	PAG	An awareness project that aims to reduce nutrient loads to the Swan and Canning Rivers	ü			ü
Predicting community reaction to water recycling proposals and developments	CSIRO	Premiers Water Foundation Project that examined the community's acceptability to potable and non-potable reuse of water in the Southern River area.	ü			ü
<i>Riverbank</i>	SRT	Funding program that provides financial support to local government to undertake bank stabilisation and revegetation projects in the SRT Management Area, in conjunction with the community	ü	ü	ü	
Southern River Water Quality Improvement Plan	SRT	Aims to guide investment to reduce nutrient input using a comprehensive decision making framework, which will complement other SRT initiatives	ü	ü	ü	
State of the Environment Report	CoA	Identifies priority actions to maintain and protect natural assets within the City of	ü	ü	ü	

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
		Armadale				
State Water Plan 2007 and Urban Drainage Initiative	DPC/ DoW	Provides a framework which aims to achieve best practice in water resource management	ü			ü
Stormwater Management Manual	DoW	A comprehensive document that provides policies, principles and best practice advice on stormwater design and management	ü			
Streamcare Project	CoA	Work with landholders to revegetate watercourses on their property.	ü			ü
Streamflow monitoring	DoW	Stream gauging stations are located on Canning and Southern River that measure stream flow/discharge	ü			
Sustainable Landscaping Strategy	SCC	Focuses on opportunities for Local Government to promote the use of local native plants within both the residential and commercial communities, through demonstration gardens and subsidised plant sales		ü		ü
Swan Canning Rivers Foreshore Assessment and Management Strategy	SRT	Provides a comprehensive understanding by describing foreshores, their pressures and condition, defining responses for management, and identifying	ü	ü		



Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
		target areas for action				
Town Planning Scheme No. 4: Policy PLN 2.5 - clearing, erosion and sediment control	CoA	Policy document used to promote best practice erosion and sediment control measures			ü	
Urban Water Capacity Building Program	DoW	Closely linked to the New WATER Ways Program, this program includes a strategy that addresses a number of factors that will facilitate improvements to urban water management (i.e. skills, funding, research, governance)	ü			ü
Various bushland management plans (i.e. Armadale Settlers' Common, Forrestfield Complex Bushland, Ellis Brook, Mary Carroll Park)	CoA, CoG and friends groups	Provide an organised and consistent approach to environmental management within these bushland areas. Directs activities of Local Government and friends groups.		ü		
Various community projects (weeding, revegetation, maintenance)	BEAC	Projects aim to protect and enhance the values of community assets		ü		ü
Volunteer Strategy	CoA/ BEAC	Reward program to encourage environmental volunteering				ü
Water Quality Monitoring	DoW, SCC, SERCUL, CoG, CoA	Various snapshot and on-going water quality sampling programs within the management area	ü			
Wetland Management Plans (Leake Street wetlands,	CoA	Management plans funded through nearby land	ü	ü		

Program/Project	Lead agency	Purpose	Water	Biodiversity	Land	People and their communities
Champion Drive Estate, North Forrestdale Estates, Lander Swamp, Shreeve Road Reserve Wetland)		development.				
Wetland Watch	WWF	Aims to protect and enhance high value wetlands on private and public land through awareness raising and capacity building		ü		ü
Wungong Urban Water Program	ARA	15 year Master Plan which demonstrates commitment to ecologically sustainable development through the adoption of water sensitive urban design, energy efficiency and natural resource management principles	ü			