



City of Armadale

State of the Environment Report

2011/2012 to 2015/2016

Endorsed by Council 27 April 2011

Executive Summary

The City of Armadale reviews its State of the Environment Report every five years. This document, the 'City of Armadale State of the Environment Report 2011 to 2016' provides strategic direction for the Environmental Services Department over the next five years. Consequently, it facilitates the achievement of objectives under the 'City of Armadale Strategic Plan 2010', managing environmental assets in a manner that meets expectations and responds to asset condition and threats. The key outcome of this review is a detailed five year work schedule.

The City of Armadale has environmental assets that can be defined into six categories. These include (listed in random order, not in order of importance) biodiversity, water resources, wetlands and watercourses, clean air, unpolluted land, and climate and sustainability. The condition or 'state' of these assets is quantified and documented. The following matters were considered during the development of the five year implementation schedule:

- the state of the asset and urgency for action;
- expectations of the Federal and State Government as well as regional commitments in strategies and plans; and
- the achievability of actions and resources required to implement actions.

Through a prioritisation process and matching of resource levels in the Environmental Services department to resource requirements for action implementation, a schedule of works has been developed (Appendix 1). Consequently, a robust and methodical process has been followed to ensure that key issues are addressed.

The progress of the Environmental Services department in implementing of the State of the Environment Report 2011 to 2016 will be provided annually in the City of Armadale Information Bulletin.

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1.0 Introduction

The contribution of Local Government to Natural Resource Management (NRM) has been recognised locally, regionally and nationally. Local Governments are the closest sphere of government to the community, and are responsible for the good governance and the care and protection of local communities within a framework of sustainable development (Binning *et al.* 1999).

Some of the roles of Local Government in environmental management include:

- Strategic planning through land use zoning and statutory controls;
 - Development control of nearly all activities and works on freehold and crown land (except national parks and state forest) through the development of consent powers (e.g. setbacks, density restrictions, clearing controls, erosion and sediment management, and waste disposal);
 - Enforcement powers for development of consent conditions, waste management and unauthorised land uses e.g. land clearing, drainage, filling, unauthorised construction and some pollutant (including sediment) discharges;
 - Administrative responsibility for State agency coordination through integrated planning, licensing and development concurrence;
 - Stormwater management and control, sewage and drainage works;
 - Pest, plant and animal risk control measures;
 - Influence over land clearance patterns through incentive programs (planning amendments, rate differentials, levies, rural fire management and developer contributions);
 - Management of local open space to restore remnant vegetation and re-create habitat; and
 - Primary advocate for and coordinator of local community groups and interests.
- (Australian Local Government Association in 2001).

This document, known as the **City of Armadale State of the Environment Report 2011/2012** is a broad summary of a larger unpublished reference document (**State of the Environment Reference Document 2011/12**) hereafter referred to as ‘the reference document’.

The City of Armadale State of the Environment Report 2011 to 2016 was endorsed by Council on 27 April 2011.

Document development

The development of the larger reference document provided a mechanism for the evaluation of the current and proposed role of the City of Armadale in environmental management. The process followed for the development of the reference document and the final State of the Environment Report is illustrated in Diagram 1.

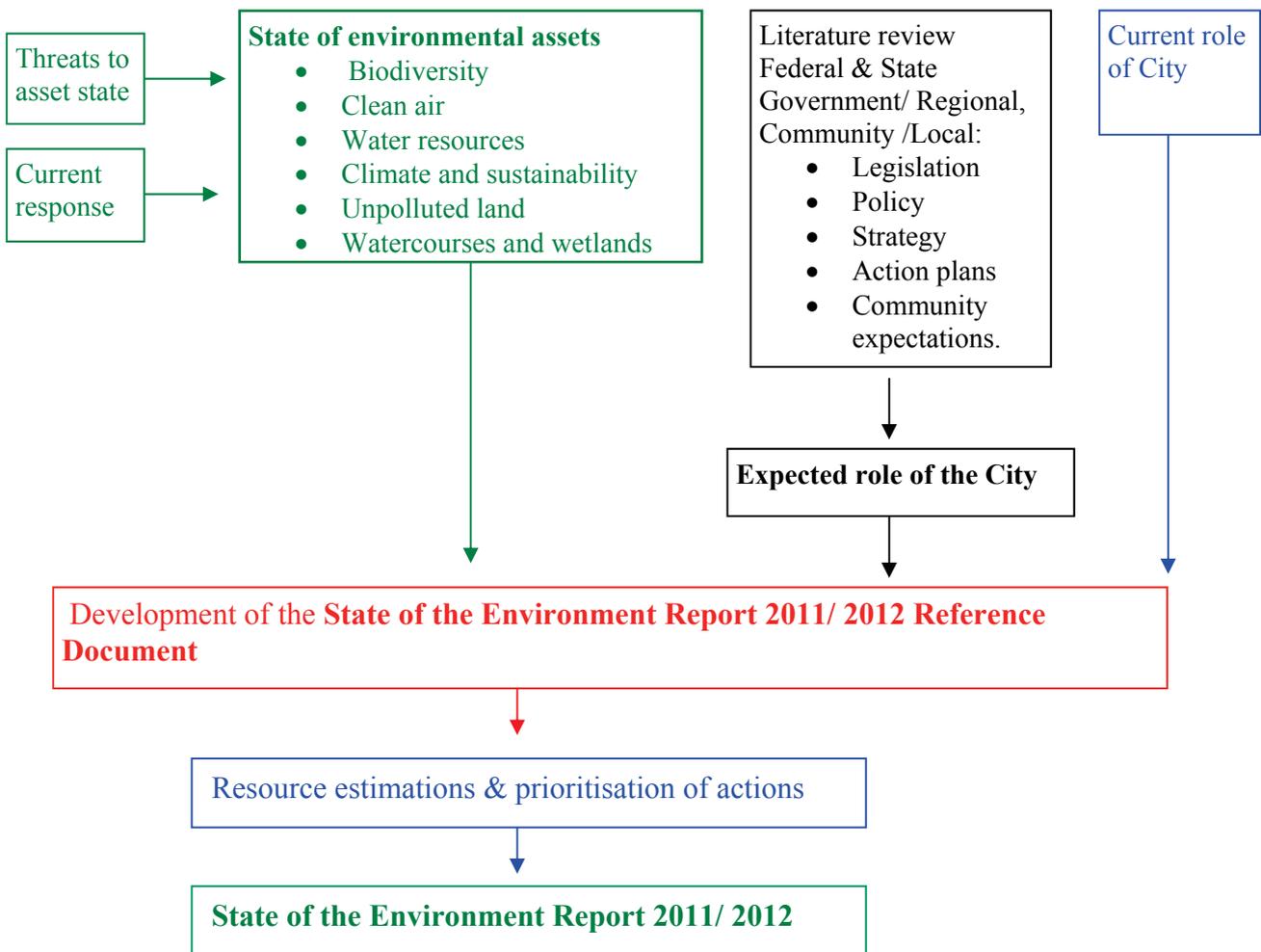


Diagram 1: Process followed to develop the State of the Environment Report 2011/ 2012 Reference Document.

The reference document is intended to provide the basis for the development of a strategic plan for the Environmental Services department for a five year period. The development of the State of the

Environment Report 2011/ 2012 Reference Document and final State of the Environment Report 2011/2012 involved the following key steps.

1. Consideration of the expected role of Local Government in environmental management. This was determined through a literary review of relevant Federal and State Government legislation, policy, strategies and action plans. Local and regional plans were also considered. The reference document contains lists of actions that Local Government are expected to participate in (according to each policy/ strategy or law reviewed). In addition, areas where the City has a confirmed role are identified.
2. Identification of key environmental assets, assessment of their state, threats to their state and current actions to manage the asset. Assets are not presented in order of priority in this report.
3. Analysis of gaps. Information derived in step one and two above was utilised to draw together a list of ongoing and proposed new actions that the City could participate in. An estimation of the resource requirements of each of the ongoing and proposed new actions was undertaken.
4. Prioritisation of actions. Through careful examination of the environmental department's level of resources and the anticipated resource requirements of all the ongoing and proposed actions identified in the reference document, it was determined that the implementation of all actions is not feasible within current resource levels. Each action was ranked using the following scoring system in order to determine which actions are priorities for inclusion into the 5 year work plan.
 - 1 = High priority environmental initiative / priority asset susceptible to irreversible decline over the next five years.
 - 2 = Medium priority environmental initiative / asset susceptible to reversible decline over the next five years.
 - 3 = Lower priority environmental initiative / asset subject to minimal decline.

Ranking provided a means for scheduling an achievable number of actions (within current resource levels of the City of Armadale Environmental Services department) over the 5 year implementation period of the State of the Environment Report. Actions that scored 1 all appear in the five year implementation plan. Some of the actions that scored 2 also appear in the implementation plan.

The proposed 5 year implementation plan is provided in Appendix 1. Appendix 2 details proposed actions (based on asset state or expectations) that scored 2 or 3 and are not included in the implementation plan as they are low priority and additional resources to the environmental department would be required to implement these actions. The City of Armadale State of the Environment Report 2011/ 2012 Reference Document is available for viewing upon request.

2.0 Asset: Biodiversity

Biodiversity is the diversity of life forms – different plants, animals, microorganisms and the genes and organisms in which they form part (Saunders *et al.*, 1998). The protection of biodiversity and conservation of natural areas is important to the City of Armadale because:

- Different aspects of natural diversity are interwoven and important for all the processes used to provide the fundamentals of human life. Examples include the production of food & energy and the cycling of air and water.
- The cost of managing a natural area that is degraded or has lost aspects of their ecological function is far higher (i.e.: weed control) than the cost of managing an area that still has intact nutrient cycling, vegetation diversity, flora and fauna and that is disease free.
- Retention of biodiversity is important for human health. International research shows that parks and reserves don't just protect biodiversity and other essential life systems, but are fundamental for human health and wellbeing.

As assemblages of plants in bushland (vegetation) form the foundation for ecological processes and other aspects of biodiversity (such as fauna), the health of bushland is used as an indicator of the state of the “biodiversity asset” in the municipality.

2.1 Biodiversity state

The current state of biodiversity assets in the municipality is summarised as follows.

- In total (as at 2007), vegetated natural areas cover 76% (42,600 ha) of the City's 55,800 hectares. Most of this vegetation is in the Darling Ranges, with only 20%, or 1440 ha of the original 9120 ha of native vegetation remaining on the City's coastal plain (Ironbark, 2009).
- The City of Armadale is managing 44 bushland reserves for their conservation values, totalling approximately 1,000 hectares.
- 13 of the 44 bushland reserves are managed according to their respective Management Plans. The remainder are managed according to Capital Works, Weed Control and Dieback Control Plans (collectively referred to as the Environmental Works Program).
- City managed bushland reserves are mapped with GPS on a three yearly basis to inform the Capital Works, Weed Control and Dieback Control Programs.
- Over 900 hectares of the 44 bushland areas managed by the City of Armadale contains vegetation in a manageable condition (vegetation is of a 'good' or better health or is a threatened ecological community). 56 species of weed have been mapped using GPS as priorities for control in these areas.
- Ongoing implementation of exotic weed control programs in bushland reserves has resulted in notable improvements in vegetation condition.
- 23 of the 44 bushland areas managed by the City of Armadale have been comprehensively mapped for dieback. Almost 700 hectares of bushland is known to be infected with dieback. An area of 308 hectares is known to be free of the pathogen.

Appendix 6 provides a map of natural areas and watercourses that occur in the City of Armadale.

Threats to Biodiversity

The clearing of vegetation poses one of the greatest threats to the conservation of biodiversity and often occurs as part of the land development process. Other major threats to biodiversity are described below.

- Weeds. Plant species that do not normally occur in an area are known as weeds. They can displace native plants and reduce biodiversity through a number of follow on effects.
- Disease. The water mould *Phytophthora cinnamomi* occurs in the City of Armadale and kills a known 2,300 native plant species. Death of the vegetation has flow on effects in the loss of native animal habitat and loss of ecological functions. There is no cure for the disease and treatment of vegetation is ongoing and costly.
- Fire. Frequent fire results in changes to vegetation structure and can eliminate those species from bushland that require long fire intervals. In addition, fire promotes weed growth that can further increase fuel load. However, hazard reduction is an important aspect of bushland management and safety.

Other threats include changing climatic conditions, feral plants and animals, rubbish dumping, changed hydrological regimes, and trampling of plants (for example from incompatible use such as off road vehicles).

2.2 Biodiversity management: current role and key action areas

Local Government has a role in the protection of biodiversity through land use planning, the protection of natural areas through natural resource management (i.e.: preparation and implementation of management plans) and the management of corporate practices (i.e.: road building).

The protection of biodiversity through land use planning and the planning and development process is achieved through the careful preparation, implementation and review of Town Planning Schemes (TPS4), Local Planning Strategies and Local Planning Policies. The recently finalised Local Biodiversity Strategy identifies mechanisms for further protecting biodiversity through TPS4.

On a three yearly basis, bushland reserves managed by the City of Armadale are mapped (using GPS) for vegetation condition and weeds. Other management needs of the reserves such as capital works, revegetation, fire maintenance and dieback control are also considered and recorded. This information is used to develop the Environmental Works Program, which is then implemented by the Environmental Services Department. These on-ground actions are complemented by the work of community volunteers. On average, community volunteers contribute in excess of 5,000 hours annually to biodiversity conservation within the City. A list of the volunteer groups who annually report their volunteer contribution is provided in Appendix 6.

Assisting community volunteers in the undertaking of landcare and bushland management activities is achieved by supporting the Armadale Gosnells Landcare Group and through the implementation of the City of Armadale Friends Group Manual. This process provides clear roles and responsibilities for the

City and its volunteers to work together. It also sets a framework for environmental volunteer recognition events.

The implementation of City policies and procedures such as ENG9 – Managing Phytophthora Dieback and ENG14 – Landscaping ensure that City of Armadale corporate practices minimise impacts on the environment.

A summary of some of the priority actions for implementation are shown in Table 1. Only actions with an estimated resource requirement of more than 50 days over the five year implementation time frame are shown. A comprehensive list of actions appears in Appendix 1 of this report.

Table 1: Some of the key action areas for the City of Armadale Environmental Services Department as relates to biodiversity conservation from 2011 to 2016.

Action Reference	Action	Estimated resource requirement (days)	Implementation schedule
B4a to B4h	Implement the City of Armadale Local Biodiversity Strategy.	95	2011 to 2016
B6a to B6s	Ongoing review and implementation of existing management plans along with the 3 yearly review of the following programs (remapping scheduled spring 2011/2012): <ul style="list-style-type: none"> ○ capital works, ○ weed control and ○ dieback treatment. Annual review and implementation of the fire program.	493	2011 to 2016
B8	Participate in land development processes through the provision of advice and implementation of policy.	125	2011 to 2016
B9	Continue to support environmental volunteering through the support of the Armadale Gosnells Landcare Group and through the implementation of the Friends Group Manual.	160	2011 to 2016
B15	Participate in the City of Armadale Public Open Space Working Group and implement the subsequent Fletcher Park revegetation project.	60	2011 to 2016
B18	Implement the City of Armadale Streamcare Program. Consider opportunities to expand the program to address private land bushland conservation.	125	2011 to 2016
B25	Apply for Clearing Permits as required.	60	2011 to 2016

3.0 Asset: Water resources

The availability of water is of fundamental importance to Western Australia's economic and social wellbeing. With predicted trends in increasing population growth and urban development, demand for a reducing asset will increase.

3.1 Water resources state

Since the 1970's, rainfall has declined in the order of 10% during the average wet season (Department of Water, 2009). This has resulted in a reduced availability of groundwater, environmental flows and dam resource levels. Reduced availability of water resources will have significant implications for the economy, environment, businesses and lifestyles.

If current per capita water consumption rates continue to 2030, demand for public water supply will exceed capacity before 2030 even with a second seawater desalination plant in production in 2011 (Department of Water, 2010).

As demand for water for human use increases, increased abstraction of surface water and groundwater sources eventually results in environmental degradation. Similarly, as the climate becomes drier, lower water-tables and reduced rainfall are likely to result in changes in the condition and species composition of ecosystems. This will be pronounced in those systems that currently rely on groundwater for their survival.

Part of the City of Armadale falls within the Jandakot Water Mound protection area. The volume of water stored in the Jandakot Water Mound has been decreasing since the 1970's (Department of Water, 2010).

Local Government accounts for just 3% of the State's total water budget, the majority of this being used to irrigate public open space (West Australian Local Government Association, 2010).

3.2 Water resource management: current role and key action areas

Water allocation is managed primarily by the State Government. However, guided by State Planning Policies and the *Better Urban Water Manual*, Local Government has a key role in the promotion of Water Sensitive Urban Design during the planning and development process. In addition, Local Government has a role in ensuring water wise corporate water use (for community facilities, recreation areas and corporate buildings).

The City of Armadale has a role in the implementation of the *Perth Peel Region Water Plan 2010 to 2030* (Department of Water, 2010). In this document it is recommended that Local Government undertake a structured approach (such as the Water-Campaign or Water-wise Councils program) in assessing their water consumption and consider how their activities affect water quality.

The Water Campaign or Water Wise Councils Program is a milestone based program being delivered jointly by the Water Corporation and Department of Water. It aims to encourage water use efficiency in Local Government and the local community. Whilst the City does not currently have an overarching water conservation plan, corporate water use and water efficiency is being considered, with various waterwise initiatives being implemented over a number of years.

One of these initiatives is the Water Conservation Plan for public open space (2008). This plan provided a detailed overview of the City’s groundwater usage and irrigated areas. Further to this, the Parks Department are currently preparing a comprehensive Water Position Paper to consider the maintenance of parks in an efficient manner.

In addition, community education relating to the importance of water conservation is provided through the *Switch Your Thinking!* campaign. The *Switched on Staff!* program scheduled for commencement in 2011/2012 will also encourage water-wise and sustainable behaviour by staff across the organisation. A component of this will consider sustainable and water wise purchasing.

The use of water efficiency measures in new buildings is considered through the application of the Building Code of Australia. Increasingly, this code includes sustainability requirements.

The undertaking of a holistic water conservation plan for the City is proposed to tie existing initiatives together and further identify synergies and opportunities.

Priority action as relates to water resource management for the City of Armadale Environmental Services Department is detailed in Table 2.

Table 2: Key action areas for the City of Armadale Environmental Services Department as relates to water resource management from 2011 to 2016.

Action Reference	Action	Estimated resource requirement (days)	Implementation schedule
WR1	Undertake a project that develops a holistic plan for water conservation across the City both corporately and in the community sector.	90	2013 to 2016

4.0 Asset: Wetlands and Watercourses

The importance of wetland and watercourse conservation is recognised at various tiers of government. Within the City of Armadale, there are wetlands of international significance, protected under international treaty (Forrestdale Lake), the upper Canning River and other important watercourses that feed into the Swan Canning River system.

Wetlands and watercourses provide an array of positive attributes and functions such as supporting ecological functions, providing habitat and refuge for flora and fauna, the provision of hydrological balance, provision of water filtering mechanics, positive cultural value and intrinsic natural beauty and recreational value.

4.1 Wetlands and Watercourses state

Within the municipality, there are 980 hectares of non-vegetated wetlands and a further 130 hectares of vegetated wetlands that are considered of conservation significance but are not managed by the State or protected through the Bush Forever Strategy (Ironbark, 2009).

The City falls within the Southern River Catchment. The main watercourses in the catchment include the Canning River, the Southern River/ Wungong River and the Neerigen Brook. Appendix 6 provides a map of natural areas and watercourses that occur in the City of Armadale. The headwaters of both of the Canning River and Wungong River are dammed. Flows to the Canning River are artificially sustained through the release of an environmental water allocation by the Department of Water. The lower reaches of the Canning and Wungong Rivers within the municipality are highly altered natural systems. Clearing of native vegetation has already caused severe weed infestations, erosion and degradation.

Wetlands and watercourses are subject to ongoing threats including clearing, erosion, sediment contribution, nutrient enrichment, invasion by feral flora and fauna, climate change and altered water regimes.

In 2005 the City undertook water quality monitoring of 23 'hot spots' along the stormwater network in the Armadale/ Brookdale area. Results showed that a high proportion of sites had mean total nitrogen concentrations above recommended trigger values. Many sites also had high dissolved phosphorus concentrations (City of Armadale, 2005). The City is currently undertaking a project, in conjunction with the South Eastern Regional Centre for Urban Landcare, to address these high nutrient concentrations in problem areas. Through the North Forrestdale Developer Contribution Scheme, pre- and post development water quality monitoring will be undertaken to determine the effectiveness of nutrient control efforts in the region.

4.2 Wetlands and Watercourse management: current role and key action areas

Local Government has a role in the protection of wetland and watercourse assets through land use planning, the protection of natural areas through natural resource management (i.e.: preparation and implementation of management plans) and through strategic approaches to river and catchment management.

The protection of wetlands through land use planning and the planning and development process is achieved through the careful preparation, implementation and review of Town Planning Schemes (TPS4), Local Planning Strategies and Local Planning Policies. The recently finalised Local Biodiversity Strategy identifies mechanisms for further protecting wetlands and watercourses through TPS4.

The largest wetland in the City is Forestdale Lake, an internationally significant wetland, managed by the Department of Environment and Conservation. The nearby conservation category wetland, Leake St Wetland, is managed by the City of Armadale. A number of additional wetlands will be managed by the City in the future, through the protection of wetlands in public open space as part of the land development process.

The City is responsible for managing a number of reserves adjacent to both the Canning and Wungong Rivers. Management of the Wungong River reserves is undertaken consistent with the Wungong River Management Plan 2010. The management needs of reserves along the Canning River that contain remnant natural features are considered as part of the Environmental Works Program (see Biodiversity assets). Some of these reserves along the Canning River would benefit from detailed management plans.

The City of Armadale also supports the Armadale Gosnells Landcare Group in its efforts to implement the Armadale Gosnells Landcare Group Strategic Plan 2008 to 2018 and undertake revegetation throughout the catchment with the assistance of community volunteers.

To enhance the protection of watercourses and wetlands on private lands, the City annually runs the *Streamcare* Program. This program has run since 2002 and provides technical advice and plants for revegetation to landholders with watercourses or wetlands on their properties. In 2010 the program won the Perth Biodiversity Project Local Government Biodiversity Award for excellent community engagement and support.

In partnership with the State Government and other agencies, the City of Armadale has a role in the implementation of the Healthy Rivers Action Plan 2008 to 2013 and the Southern River Water Quality Improvement Plan (SRWQIP). Two major initiatives of the SRWQIP are a nutrient intervention project and a sediment and erosion project. In addition, six water quality improvement projects have been selected in the City of Armadale under the banner of the Urban Waterways Renewal Project. The federal funded Urban Waterways Renewal Project and State funded Nutrient Intervention Project are anticipated

to bring in approximately 2 million dollars in grant funding into the City to undertake drainage infrastructure upgrades in order to reduce nutrients and pollutants entering the Wungong River system. This project is expected to be completed by 2014 with an ongoing maintenance component.

The Sediment and Erosion Project will bring in the order of \$100,000 to the City of Armadale and Gosnells in the form of a dedicated project officer to address sources of sediment and erosion entering the river system. This project is anticipated to be completed by December 2011.

A summary of some of the priority actions for implementation as relates to watercourse and wetland management are shown in Table 3. Only actions with an estimated resource requirement of more than 50 days over the five year implementation time frame are shown. A comprehensive list of actions appears in Appendix 1 of this report.

Table 3: Some of the key action areas for the City of Armadale Environmental Services Department as relates to wetland and watercourse management from 2011 to 2016.

Action Reference	Action	Estimated resource requirement (days)	Implementation schedule
W4	Development, implementation and review of environmental policies relating to land use planning. Participate in the development of new environmental policies to minimise the impact of land development on water quality.	125	2011 to 2016
W5	Participate in programs that develop and improve Water Sensitive Urban Design technologies aimed at improving river health.	75	2011 to 2016
W6	Participate in projects aimed at reducing erosion and sediment entering watercourses.	55	2011 to 2016
W7	Participate in programs aimed at improving water quality in existing drainage infrastructure.	240	2011 to 2014

5.0 Asset: Climate and sustainability

Greenhouse gases are a natural part of the atmosphere, trapping the sun's warmth and maintaining the earth's temperature at a level necessary to support life. The problem we now face is that human actions, particularly the burning of fossil fuels (coal, oil and natural gas) and land clearing, are increasing the concentrations of these gases and creating the prospect of global climate change.

The table below details the Australian CSIRO and Bureau of Meteorology – average expected scenario in 2030.

<i>Variable</i>	<i>Expected Change</i>	<i>Possible Range</i>
Annual Average Temperature (°C)	+0.8°C	+0.6°C to 1.2°C
No of days over 35°C (currently 28)	35.3	33.1 to 38.7
Annual average rainfall	-6%	-13% to -1%
Annual average potential evaporation	+2%	+1% to +4%
Annual relative humidity	-0.6%	-1.3% to 0%

The anticipated climatic changes are likely to influence all aspects of the natural world and human life. The potential impact of changing climatic conditions on the City's economic, social and natural environment is detailed in the City of Armadale's draft Climate Change Adaptation Plan.

The sustainable use of resources is a major strategy to reduce the generation of waste and greenhouse gas emissions.

5.1 Climate and sustainability state

Measured levels of greenhouse gas emissions provide an indicator as to the potential threat to our climate.

An inventory of corporate greenhouse gas emissions by the City of Armadale was last undertaken in 2006/2007. During this year, the City of Armadale used approximately 42,000 GJ of energy at a cost of \$1.6 million. Approximately 9, 160 tonnes of, (eCO₂) carbon dioxide equivalent greenhouse gases was emitted. This was 17.8% higher than when first recorded in 1999.

Regionally, in 1998/ 1999 it was estimated that across the City of Armadale, City of Gosnells and Shire of Serpentine Jarrahdale, 1.6 million tonnes of equivalent carbon dioxide emissions was contributed by the community sector. Residential emissions were the dominant contributor.

5.2 Climate and sustainability management: current role and key action areas

The management of climate and sustainability by the City of Armadale is primarily driven through the Council endorsed *Switch Your Thinking!* Business Plan and Corporate Greenhouse Action Plan. A draft Climate Change Adaptation Plan is also in preparation.

Community focus – Switch Your Thinking! Program

Working in partnership with the City of Gosnells and Shire of Serpentine Jarrahdale, the City is part of the South East Regional Energy Group (SEREG). This group is working collectively with business, industry and residents to encourage energy efficiency, water-wise and waste reducing behaviour, with the goal of reducing regional greenhouse gas emissions and waste generation. Some recent examples of the reduction of greenhouse gas emissions through the *Switch Your Thinking!* program include:

- Green light fundraiser 2008 to 2010 – savings of 1,035 tonnes of equivalent carbon dioxide per annum for five years (\$130,820).
- Switched on Business and Industry 2008 to 2009 – savings of 440 tonnes of equivalent carbon dioxide per annum for five years, 460,245kWh energy, 66,350 L water, 118,800 L waste (\$68,000).
- Rebates for residents 2008 to 2010 - \$199,500 worth of rebates provided to residents. Savings of 649 tonnes of equivalent carbon dioxide per annum and 7,920kL of water.

Implementation strategies of the *Switch Your Thinking!* program are summarised in the South East Regional Energy Group Business Plan 2009/10 to 2011/12.

Corporate focus

The City is implementing a Corporate Greenhouse Action Plan to minimise the greenhouse gas emissions and waste generation of the organisation. This action plan includes a number of actions relating to sustainable purchasing and the use of more sustainable technology.

Whilst the *Switch Your Thinking!* Program and the City of Armadale Corporate Greenhouse Action Plan focuses on the mitigation of greenhouse gas emissions, the City is also considering adaptation strategies to ensure adequate planning is in place in the likelihood of changing climatic conditions. The City is currently preparing a Climate Change Adaptation Plan.

A summary of some of the priority actions for implementation as relates to Climate and sustainability are shown in Table 4.

Table 4: Some of the key action areas for the City of Armadale Environmental Services Department as relates to climate and sustainability management from 2011 to 2016.

Action Reference	Action	Estimated resource requirement (days)	Implementation schedule
C12 & C13b	Participate in the implementation and review of the <i>Switch Your Thinking!</i> Business Plan.	58	2011 to 2016
C1 to C11 and C13	Implement and review the Corporate Greenhouse Action Plan. Includes the development and implementation of a staff education program encouraging sustainable office practices.	188	2011 to 2016

6.0 Asset: Clean air

6.1 Clean air state

Air quality in the City of Armadale is monitored and managed primarily by the Department of Environment and Conservation. However, Local Government can have a role in the management of sources of pollutants such as smoke from wood combustion and other fires, vehicle emissions, odours, sand and dust.

The main air quality issues in the wider Perth region arise from photochemical smog in summer and particle haze during winter. Major sources of pollution are motor vehicles, domestic sources (mainly wood heaters) and industry (for more data see: www.dec.wa.gov.au).

Detailed graphs illustrating concentrations of carbon monoxide, nitrogen dioxide, photochemical oxidants (measured as ozone), sulphur dioxide, lead and inhalable particles are highlighted in <http://www.dec.wa.gov.au/content/view/3420/1576/>.

Air quality complaints are logged by the City of Armadale. In 2008/ 2009 there were thirteen complaints about dust. This number increased to 21 dust complaints in 2009/2010. In 2008/2009 there were 19 complaints regarding smoke, and a further 22 in 2009/2010. There were 8 complaints about odour in 2008/2009 and a further 14 in 2009/1020.

6.2 Clean air management: current role and key action areas

Two potential contributors to poor air quality in the municipality include wind born dust from land development, and smoke from burning. As a condition of development, the City requires the preparation and implementation of air quality management plans.

The implementation of State Government guidelines such as Liveable Neighbourhoods through the planning processes assists the City to promote neighbourhood connectivity and reduce car dependence. In turn, reduced car usage favourably impacts on levels of photochemical smog.

Local Governments undertake a role in community education with regards to air quality, specifically relating to wood heater smoke. The control of smoke from burning activities is managed by the City of Armadale through requirements for burning permits. In 2008, the Department of Environment and Conservation undertook a program in hills areas of the City to promote responsible use of wood heaters. The implementation of further educational programs could reduce the impact of wood heater smoke in this area.

No new actions for the environment services department are proposed to manage air quality in the City of Armadale. Resources are allocated to the ongoing promotion of walking and cycling during planning stages of the land development process. Requirements for the preparation and review of Air Quality Management Plans will continue to be required as part of the land development process.

7.0 Asset: Unpolluted land

7.1 Unpolluted land state

Contaminated land

There are currently 23 contaminated sites registered in the City of Armadale municipality (database search 31 May 2010). None of these sites are owned or managed by the City of Armadale. One site is contaminated with hydrocarbons from a former use as a service station. The other sites occur as a grouping along the Forrestdale main drain, formally contaminated with asbestos. This site is now identified as having 'limited use'. Management of land contamination is undertaken under the *Contaminated Sites Act 2003*. The Department of Environment and Conservation is primarily responsible for administering this legislation.

Acid Soils

Acid Sulfate Soils (ASS) are naturally occurring solids and sediments containing iron sulfides, most commonly pyrite. When ASS are exposed to the air, the iron sulfides in the soil react with oxygen and water to produce a variety of iron compounds and sulphuric acid. The disturbance of ASS has the capacity to directly impact on basic natural assets of soil, water and biota and contaminate land.

The Perth metropolitan region is mapped for potentially occurring ASS. Much of the City of Armadale is identified as potential ASS areas.

Waste

The City of Armadale manages the Hopkinson Road Landfill site which receives community and corporate sector wastes. In 2008/ 2009, this facility received 60,864 tonnes of waste. Of this, 11,810 tonnes was clean fill and soil used at the facility, 8,364 was diverted from the landfill into green-waste

and a further 2,227 tonnes was recycled (metals, plastics, tyres, glass etc). As a result, the landfill site itself received only 38,461 tonnes of waste that was not utilised. In 2009/2010 the landfill received 70,000 tonnes of waste. Of this 31,265 was waste that could not be reused or recycled. Waste management is undertaken by the City of Armadale Waste Services Department.

The dumping of rubbish occurs in natural areas. However, increasing efforts to restrict access of off road vehicles to City managed bushland areas has reduced incidences of rubbish dumping. Complaints relating to the dumping of rubbish in areas not managed by the City of Armadale (such as large sections of the Jandakot Regional Park) are ongoing. The City of Armadale Ranger Services Department provides assistance to other agencies in 'stings' to penalise offenders in these areas.

7.2 Unpolluted land management: current role and key action areas

The City of Armadale has a responsibility under the *Contaminated Sites Act 2003* to report any potentially contaminated sites to the Department of Environment and Conservation.

Potentially polluting industries are licensed by the Department of Environment and Conservation.

The City of Armadale operations depot on Owen Rd in Kelmscott was audited in June 2008 as part of the Green Stamp Program. Fourteen actions were required to ensure compliance Environmental Codes of Practice. Many of the actions are now complete and it is anticipated that Green Stamp accreditation will soon be achieved.

Areas in which potential acid sulphate soils (PASS) are identified and where dewatering, drainage or excavation works are proposed, require an ASS investigation under the Department of Environment and Conservation (DEC) *Identification and Investigation of Acid Sulfate Soils* (Government of Western Australia, 2006) Guidelines. West Australian Planning Commission Planning Bulletin 64/2009 - *Acid Sulfate Soils introduces the Acid Sulfate Soils Planning Guidelines* outline stages of the planning process where the consideration of ASS should occur. The review of ASS management plans during the planning process is the responsibility of the Department of Environment and Conservation rather than Local Government.

The City is also responsible for ensuring that corporate practices such as road and drainage construction are consistent with the *Acid Sulfate Soils Guidelines 2006*.

The following actions will be a priority for implementation for 2011/2012 to 2015/2016.

- Implement the Acid Sulfate Soils Guidelines for corporate practices.
- Report suspected contaminated sites to the Department of Environment and Conservation

8.0 Conclusion

This report has been compiled using the State of the Environment Reporting format to provide a five year work plan for the City of Armadale Environmental Services Department from 1 July 2011 to 30 June 2016 that is:

- achievable and considerate of the current level of resources available for its implementation;
- prioritised so that actions are responsive to asset condition; and
- responds to the expectations of the community and both Federal and State Government legislation, policy and strategy.

The proposed five year work plan is provided in Appendix 1. Success of implementation depends on the accuracy of estimated time requirements for the undertaking of projects.

A number of the proposed projects are currently in design phases or large projects in nature, and therefore difficult to provide estimated time requirements for. The schedule shown in Appendix 1 is therefore intended as a guide. Expected start dates will be variable. It is also anticipated there may be need for the rescheduling of projects where funding is required or whereby opportunities such as partnerships are possible.

A report on the Environmental Services Departments' progress in implementation of the State of the Environment Report 2011 to 2016 will be provided annually in the City of Armadale Information Bulletin.

Comment and endorsement

Appendix 1: Actions proposed for implementation 1 July 2011 to 30 June 2016.

Action Ref	Asset	Business as usual action	Proposed new actions	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B1	Biodiversity	Ongoing review and implementation of the State of the Environment Report.			Annually report on State of the Environment Report implementation (July 2012, July 2013, July 2014 and July 2015) and initiate development of new report in July 2015.	1					
B2	Biodiversity	New policy development	Develop a local planning policy for dieback	Rolled over from 2005 to 2010 State of the Environment Report.	Begin developing a local planning policy for dieback in 2013/2014.	1					
B3a	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement (annually) and review (2014/ 2015) City of Armadale Policy ENG9 – Managing Phytophthora Dieback.	1					
B3b	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement (annually) and review (2014/2015) City of Armadale Policy ENG14 – Landscaping.	1					
B3c	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement (annually) and review (2013/2014) City of Armadale Local Planning Policy PLN2.7 Environmental Management and improvement for constrained land.	1					
B3d	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement (annually) and review (2013/2014) City of Armadale Local Planning Policy PLN2.9 Landscaping.	1					
B3e	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement (annually) and review (2013/2014) City of Armadale Local Planning Policy PLN2.4 Tree Preservation.	1					
B3f	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement (annually) and review (2014/2015) City of Armadale Policy ENG1 - Taking of Flora.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B3g	Biodiversity & Wetlands and Watercourses	Implement and regularly review existing policy.			Implement annually and review (2014/2015) environmental provisions in the City of Armadale annexure to Local Government Guidelines for Subdivisional Development.	1					
B4a	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement actions 1 to 5 of the Local Biodiversity Strategy by making changes to Local Planning Strategy.	1					
B4b	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement action 8 of the Local Biodiversity Strategy and make appropriate changes to the Town Planning Scheme Map and Actions 6 & 7 by making changes to the Intramaps system.	1					
B4c	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement Action 9 of the Local Biodiversity Strategy by developing a Local Planning Policy for Local Natural Areas.	1					
B4d	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement Action 11 of the Local Biodiversity Strategy by considering the creation of a policy to offset the unavoidable loss of Local Natural Areas as part of development approvals.	1					
B4e	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Develop and implement a stewardship program for biodiversity conservation on private lands consistent with Actions 16 to 19 of the Local Biodiversity Strategy. <i>Resourced as part of B18 Potential partnership with DEC through Land for Wildlife.</i>	1					
B4f	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement Actions 21 and 23 of the Local Biodiversity Strategy by preparing a business case for establishment of bushcare crew.	1					
B4g	Biodiversity	Implement the City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement Action 26 of the Local Biodiversity Strategy by collating information on Stirling Swamp and lobbying for the protection of land.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B4h	Biodiversity	Implement City of Armadale Local Biodiversity Strategy.		Council endorsed plan.	Implement Action 27 of the Local Biodiversity Strategy by promoting the strategy to residents.	1					
B6a	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.		Consistent with priorities of the 'Australia's Biodiversity Conservation Strategy 2010 to 2020' and 'Draft 100 Year Biodiversity Conservation Strategy for WA'.	Consistent with Action 29 of the Local Biodiversity Strategy, develop and implement weed control and capital works plan for City managed natural areas. Remap in August 2011 and August 2014.	1					
B6b	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually develop and implement a Dieback Control Plan for City managed natural areas.	1					
B6c	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually develop and implement a Capital Works Plan for City managed natural areas.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B6d	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement and review (2015/ 2016) the Lloyd Hughes Bushland Management Plan.	1					
B6e	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement and review (2015/2016) the Forrestfield Complex Bushland Management Plan.	1					
B6f	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement and review (2015/2016) the Fletcher Park Bushland Management Plan	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B6h	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Prepare and implement management plan for Roley Pools Reserve (2014/2015).	1					
B6l	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement and review (2013/2014) the Armadale Settlers Common Management Plan.	1					
B6m	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement the Bungendore Park Management Plan.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B6n	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually develop and implement fire control and maintenance plans for bushland.	1					
B6o	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Implement relevant actions of the <i>E. balanites</i> and <i>C. huegleii</i> interim recovery plans for occurrences on City managed lands.	1					
B6p	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement and review (2014) the Wungong River Management Plan.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B6q	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Annually implement and review (2013) the Neerigen Brook Management Plan.	1					
B6r	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly review of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.		Species Recovery Plans published by the WA State Government.	Assist in the development, implementation and review of Species Recovery Plans and interim recovery plans that relate to City lands, incorporating actions into bushland management plans.	1					
B6s	Biodiversity	Ongoing review and implementation of existing management plans along with the 3 yearly reviews of the capital works, weed control and dieback programs. Annual review and implementation of the fire program.			Develop a business case for the implementation of bushland management plans and programs.	1					

Action Ref	Asset	Business as usual action	Proposed new actions	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B7	Biodiversity		Annually request datasets of Specially Protected Species and matters of National Significance to update Intramaps system to ensure their early recognition in the development and building approvals process.	Consistent with priorities of the 'Australia's Biodiversity Conservation Strategy 2010 to 2020.	Annually update datasets to ensure early recognition of areas where specially protected species occur. The environmentally sensitive nature of the information should be considered.	1					
B8	Biodiversity	Participate in land development processes through the provision of advice and implementation of policy.		Consistent with priorities of the 'Australia's Biodiversity Conservation Strategy 2010 to 2020 and Bush Forever 2000.	Participate in land development processes through the provision of advice and implementation of policy. Includes the implementation of Actions 12 to 15, 22 and 28 of the Local Biodiversity Strategy.	1					
B9a	Biodiversity & Wetlands and Watercourses	Continue to support environmental volunteering through the support of Armadale Gosnells Landcare Group and the implementation of the Friends Group Manual.			Support the ongoing contribution of community environmental volunteers.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B9b	Biodiversity & Wetlands and Watercourses	Continue to support environmental volunteering through the support of Armadale Gosnells Landcare Group and the implementation of the Friends Group Manual.			Review the City of Armadale Friends Group Manual (2013/ 2014).	1					
B10	Biodiversity	Continue staff liaison with other environmental professionals to ensue information exchange, and build partnerships with other agencies.			Continue staff liaison with other environmental professionals to ensue information exchange and build partnerships with other agencies. Includes training and capacity building.	1					
B11	Biodiversity	Participate in the development of Natural Resource Management Regional Models.		Consistent with priorities of the 'Australia's Biodiversity Conservation Strategy 2010 to 2020.	Attend South East Regional Centre for Urban Landcare and Perth NRM meetings.	1					
B13	Biodiversity	On a case by case basis, consider opportunities to close unmade road reserves that have conservation values.		Consistent with priorities of Bush Forever 2000	On a case by case basis, consider opportunities to close unmade road reserves that have conservation values.	1					
B15	Biodiversity	Participate in the City of Armadale Public Open Space Working Group.			Participate in the implementation of the Public Open Space Strategy. This includes on ground projects such as Fletcher Park riparian rehabilitation in 2013/2014.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B16	Biodiversity	Provide advice on relevant environment legislation to other City officers. Where required, refer proposals likely to have a significant impact as appropriate under EPBC Act, Wildlife Conservation Act and Environment Protection Act.			Provide advice on relevant environment legislation to other City officers consistent with State and Federal legislation.	1					
B18	Biodiversity & Wetlands and Watercourses	Ongoing implementation of the City of Armadale Streamcare Program.	Consider opportunities to expand program to address private land bushland conservation and consider links with state programs.	Program expansion is an action of the City of Armadale Local Biodiversity Strategy.	Ongoing implementation of the City of Armadale Streamcare Program including expansion of the program in 2014/2015.	1					
B20	Biodiversity	Coordinate the development of wheelchair access facilities in the Armadale Settlers Common.		Action of relevant Management Plan and grant funds received. Grant must be acquitted by August 2011.	Coordinate the development of wheelchair access facilities in the Armadale Settlers Common.	1					
B21	Biodiversity	Implement bushland enhancement plan in Armadale Settlers Common East (weed control, revegetation and signage).		Planting in first 2 years then weed control.	Implement bushland enhancement plan in Armadale Settlers Common East (weed control, revegetation and signage).	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B22	Biodiversity	Utilise cash in lieu funds to implement the Dieback Management Plan in Armadale Settlers Common East.			Arranging signage in year 1 and treatment year 1 then year 5.	1					
B23	Biodiversity	Ongoing implementation of the Fletcher Park Horse Impact Trial.			Ongoing implementation of the Fletcher Park Horse Impact Trial including annual monitoring.	1					
B24	Biodiversity	If required, provide assistance to other government agencies in eradication efforts of declared weeds and weeds of national significance across all land tenures in the City of Armadale.			If required, provide assistance to other government agencies in eradication efforts of declared weeds and weeds of national significance across all land tenures in the City of Armadale.	1					
B25	Biodiversity	Apply for Clearing Permits as required.			Apply for Clearing Permits as required under the Environmental Protection Act.	1					
B26	Biodiversity	Require as a condition of development the preparation of environmental management plans/ wetland management plans where POS is to be managed for conservation values. Ensure land vesting purposes reflect both recreation and conservation values.			Consistent with Action 22 of the Local Biodiversity Strategy, require as a condition of development the preparation of environmental management plans/ wetland management plans where POS is to be managed for conservation values. Ensure land vesting purposes reflect both recreation and conservation values.	1					
B28	Biodiversity		Consider priorities of State Environmental Weed Strategy for inclusion in annual weed control program.		Consider priorities of State Environmental Weed Strategy for inclusion in annual weed control program for City managed natural areas.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
B29	Biodiversity		Consider management needs of reserves where access is limited including Rifle Range.	Undertake remapping year in conjunction with Action B6. Consider lease conditions relating to environmental management.	Consider management needs of reserves where access is limited including Rifle Range.	1					
WR1	Water Resources	Continue to reduce water use by developing and implementing a project designed to use water more efficiently and effectively (Community/ Residential Sector and City of Armadale Corporate).		Action of Perth Peel Water Plan and Healthy Rivers Action Plan 2008 to 2013.	Undertake a project that develops a holistic plan for water conservation across the City both corporately and in the community sector.	1					
W1	Watercourses and wetlands	Participate in the development of environmental policy to minimise the impact of land development on water quality.			Participate in the development of environmental policy to minimise the impact of land development on water quality. Consider the model scheme provisions being developed by the Swan River Trust.	1					
W2	Watercourses and wetlands	Participate in the development of strategies and plans aimed at improving river and catchment health.			Participate in the development of strategies and plans aimed at improving river and catchment health including commenting on, and contributing to, the River Protection Strategy and Action Plan (in development by the Swan River Trust).	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
W4	Watercourses and wetlands	Develop, implement and review environmental policy relating to land use planning.		Includes commenting on planning/development applications.	Develop, implement and review environmental policy relating to land use planning. See B8	1					
W5	Watercourses and wetlands	Participate in programs that develop and improve water sensitive urban design technologies aimed at improving river health.			Participate in programs that develop and improve water sensitive urban design technologies aimed at improving river health, such as providing comment on Urban Water Management Plans.	1					
W6	Watercourses and wetlands	Participate in projects aimed at reducing erosion and sediment entering watercourses.			Participate in the Swan River Trust Erosion and Sediment control program (Includes program until 30 Dec 2011 followed by program outcomes 1 July 2012 to 30 June 2013 and ongoing works from 2013).	1					
W7	Watercourses and wetlands	Participate in programs aimed at improving water quality in existing drainage infrastructure.			Implement the Urban Waterways Renewal Project to improve water quality in drainage infrastructure.	1					
W8	Watercourses and wetlands		Participate in programs aimed at encouraging industry to improve environmental performance.		Assist health services to encourage industry to improve industrial environmental performance as required.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
W9	Watercourses and wetlands	Asses the management needs of new wetlands likely to be managed by the City in the near future. Implement wetland management plans.		Years one and two allows for the consideration of developer produced plans (see B26). Years three, four and five allows for the Cities ongoing management of the wetlands according to the plans	Asses the management needs of new wetlands likely to be managed by the City in the near future. Implement wetland management plans.	1					
W10	Watercourses and wetlands	Educate the community relating to healthy catchments and sustainable behaviours.			Educate the community on healthy catchment sustainable behaviour through the implementation of the Streamcare Program (resourced above) and by assisting in the ongoing undertaking of the North Forrestdale water quality monitoring program and the Fertiliser use education campaign	1					
W11	Watercourses and wetlands	Amend City GIS and Intramaps system to include all vegetated Resource Enhancement Wetlands mapped by the Department of Environment and Conservation.		Action of the Local Biodiversity Strategy.	See B4. Amend City GIS and Intramaps system to include all vegetated Resource Enhancement Wetlands mapped by the Department of Environment and Conservation.	1					
W12	Watercourses and wetlands	Initiate information collation on Stirling Swamp to consider conservation significance.		Action of the Local Biodiversity Strategy.	Implement Action 26 of the Local Biodiversity Strategy by collating information on Stirling Swamp and lobbying for the protection of land. See B4	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
C1	Climate and sustainability	Review Carbon offset strategy (increase purchasing green-power) including investigation use of carbon credits available on the open market.		Action of the Corporate Greenhouse Action Plan.	Review Carbon offset strategy (increase purchasing green-power) including investigation use of carbon credits available on the open market.	1					
C2	Climate and sustainability	Initiate a comprehensive energy audit on Council buildings. Establish and maintain an energy recording and reporting process to guide decision making.		Action of the Corporate Greenhouse Action Plan.	Initiate a comprehensive energy audit on Council buildings. Establish and maintain an energy recording and reporting process to guide decision making (2013/ 2014).	1					
C3	Climate and sustainability	Participate in the development of the asset renewal program to incorporate energy efficiency considerations.		Summary of a few actions of the Corporate Greenhouse Action Plan.	Participate in the development of the asset renewal program to incorporate energy efficiency considerations.	1					
C4	Climate and sustainability	Continue to implement and review the sustainable lighting action plan and in particular progress the sustainable lighting trial to encourage greater choice in public lighting technology.		Action of the Corporate Greenhouse Action Plan. Rolling out will be responsibility of Technical Services Directorate as development proposals are submitted.	Finalise the Sustainable Lighting Action Project.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
C5	Climate and sustainability	Investigate purchasing Green Power for street lighting when the existing street lighting contract is renegotiated.		Action of the Corporate Greenhouse Action Plan.	Investigate purchasing Green Power for street lighting when the existing street lighting contract is renegotiated. Resourced as part of C1.	1					
C6	Climate and sustainability	Investigate using sustainable lighting technology in Council buildings, car parks and parks.		Action of the Corporate Greenhouse Action Plan.	Investigate using sustainable lighting technology in Council buildings, car parks and parks.	1					
C7	Climate and sustainability	Provide advice relating to energy efficiency in tendering and purchasing.			Ongoing provision of advice relating to energy efficiency in tendering and purchasing.	1					
C8	Climate and sustainability	Seek inclusion of flexibility into salary packages for options that potentially reduce greenhouse gas emissions.		Action of the Corporate Greenhouse Action Plan.	Seek inclusion of flexibility into salary packages for options that potentially reduce greenhouse gas emissions.	1					
C9	Climate and sustainability	Develop and implement a staff education, development and rewards program for encouraging sustainable office practices (Switched on Staff program in development).		Summary of a few actions of the Corporate Greenhouse Action Plan.	Develop and implement a staff education, development and rewards program for encouraging sustainable office practices – Switched on Staff program in development.	1					
C10	Climate and sustainability	Consider the need to prepare a sustainable purchasing policy.			Consider the need to prepare a sustainable purchasing policy.	1					
C11	Climate and sustainability		Implement Climate Change Adaptation Plan.	Development of plan part of Corporate Greenhouse Action Plan.	Finalise and implement the draft Climate Change Adaptation Plan.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
C12	Climate and sustainability	Implement the Switch Your Thinking Business Plan		Coordinators time managing the program and attending SEREG meetings etc.	Implement the Switch Your Thinking Business Plan.	1					
C13a	Climate and sustainability	Review of the Corporate Greenhouse Action Plan and Community Greenhouse Action Plan.		Actions of Corporate Greenhouse Action Plan listed separately.	Review and develop a new Corporate Greenhouse Action Plan (and sustainable purchasing plan) in 2012.	1					
C13b	Climate and sustainability	Review of the Corporate Greenhouse Action Plan and Community Greenhouse Action Plan.			Review the Switch your Thinking! Business Plan.	1					
C14	Climate and sustainability	Develop a list of common purchases made by staff and determine which are likely to have the greatest 'greenhouse impact'. Detail any barriers and opportunities that relate to these purchases.		Action of the Sustainable Purchasing Action Plan.	See C9	1					
C15	Climate and sustainability	Initiate system for reporting and recording greenhouse purchasing.		Action of the Sustainable Purchasing Action Plan.	See C9	1					
C16	Climate and sustainability	Maintain an inventory of new sustainable products.		Action of the Sustainable Purchasing Action Plan.	Maintain an inventory of new sustainable products.	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)					
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015	1 July 2015 to 30 June 2016
C17	Climate and sustainability	Establish Green Purchasing Team. Consider having information dissemination goals rather than requiring meeting attendance.		Action of the Sustainable Purchasing Action Plan.	See C9	1					
C18	Climate and sustainability	As opportunities arise, establish partnerships, especially with local business, to trial, demonstrate or prove the performance of sustainable products.		Action of the Sustainable Purchasing Action Plan.	Beginning 2013/ 2014, as opportunities arise, establish partnerships, especially with local business, to trial, demonstrate or prove the performance of sustainable products.	1					
C19	Climate and sustainability	Develop trial and review tools that will assist in applying greenhouse purchasing criteria to purchases in conjunction with a green purchasing team.		Action of the Sustainable Purchasing Action Plan.	See C9	1					
C21	Climate and sustainability	Maintain Sustainable Purchasing Website.		Action of the Sustainable Purchasing Action Plan.	Annually maintain Sustainable Purchasing Website.	1					
C23	Climate and sustainability		Consider the need, and if deemed necessary, develop a policy that considers sustainable technology use.								
W8	Land		Participate in programs aimed at encouraging industry to improve environmental	Also action of the Southern River Water Quality Improvement	Assist in encouraging industry to improve environmental performance. See W8	1					

Action Ref	Asset	Business as usual action	Proposed actions new	Rationale	Action detail	Resource estimate (days)				
						Rank - See section 7.2 for key	1 July 2011 to 30 June 2012	1 July 2012 to 30 June 2013	1 July 2013 to 30 June 2014	1 July 2014 – 30 June 2015
			performance.	Plan.						
A1	Air Quality	Ongoing promotion of walking and cycling undertaken during planning stages of the land development process.			See B8	1				
A2	Air Quality	Ongoing requirements for the preparation and implementation of Air Quality Management Plans as a condition of development.		Undertaken by Health Services. Relates to erosion project.	No resource allocation to Environmental Services.	1				
L1	Land	Implement Acid Sulfate Soils Guidelines for corporate practices.				1				
B14a	Biodiversity & Wetlands and Watercourses	Prepare and implement a management plan for reserves adjacent to the Canning River.		Outstanding action of the State of the Environment Report 2000.	Prepare and implement a management plan for reserves adjacent to the Canning River. Approach Department for Planning and Infrastructure seeking support and partnership to resolve issues with unmanaged crown land along the river. Prepare (2015/2016) a plan to address management requirements of City vested reserves.	2				

Appendix 2: Actions not proposed to be included in the implementation schedule

Action Ref	Asset	Business as usual action	Proposed new actions	Rationale	Rank - See report for ranking details
B17	Biodiversity		Develop and implement a feral bee control program for priority reserves.	Priority of Draft 100 Year Biodiversity Conservation Strategy for WA and also an outstanding action of bushland management plans	2
B19	Biodiversity		Further monitor successes in bushland management actions through adaptive management trials. Consider increasing monitoring of vegetation condition.		2
B6i	Biodiversity		Prepare and implement a management plan for Sylvannia Park.		3
B6j	Biodiversity		Prepare and implement a management plan for Warwick Savage Park.		3
B6k	Biodiversity		Prepare & implement a management plan for Leake St wetland.		3
B12	Biodiversity		If invited, assist the state to develop models for	Consistent with the 100 year Biodiversity Conservation Strategy for	3

Action Ref	Asset	Business as usual action	Proposed new actions	Rationale	Rank - See report for ranking details
			biodiversity conservation, methods for estimating values, information sharing databases, and communication and education plans.	WA. State seen as leader, LGA as providing support.	
B30	Biodiversity		Prepare a mapping and control plan for three species of nationally significant weeds known to occur in City of Armadale lands not bushland (Boneseed, Lantana, Bridal Creeper, Blackberry and willow sp.).		3
C20	Climate and sustainability	Join Sustainability Officers Network			3
C22	Climate and sustainability		Where opportunities arise, provide support with regards to regional waste management initiatives		3
A3	Air Quality		Participate in air quality improvement education program in hills areas as relates to smoke.		3

Appendix 3: Public comments and response

Comments received during the draft State of the Environment Report 2011 to 2016 public comment period, and subsequent changes made to the report.

Submitter	Comments received	Response	Changes made to report
Department of Water	“supports the City of Armadale in actions to identify and protect waterways, and supports the finalising and implementing of the draft water conservation plan.”	Noted.	Nil.
Department of Planning	“Document noted. The City should highlight areas that require attention when assessing or referring proposal to the WAPC.”	Noted.	Nil.
Friends of Forrestdale	“generally welcome the report, supporting the retention of all bushland, wetlands and biodiversity within the City, both vested in and those not”	Noted.	Nil.
Friends of Forrestdale	Grateful that report acknowledges Leake St Wetland, Stirling Swamp and Forrestdale Lake and supports action to “initiate information collation on Stirling Swamp...”	Noted.	Nil.
Friends of Forrestdale	“No mention is made in the draft SoE Report to the biodiversity of the Anstey-Keane wetlands (Bush Forever Site 342)”...	The State of the Environment Report Reference Document includes a map of City of Armadale “Natural Areas and Watercourse Reserves” (Appendix 2). This includes the Anstey-Keane Wetlands and other sites of conservation significance that are both vested in the City of Armadale and vested in or owned by other agencies.	The “Natural Areas and Watercourse Reserves” map is now also provided in the State of the Environment Report. Reference to the map is included on pages 8 and 12.

**Comments received during the draft State of the Environment Report 2011 to 2016 public comment period,
and subsequent changes made to the report.**

Submitter	Comments received	Response	Changes made to report
Friends of Forrestdale	Believes that the lack of reference to the City of Armadale’s proposal to construct a currently unmade section of Keane Rd, is a serious omission and should be rectified in the final State of the Environment Report.	<p>The purpose of the State of the Environment Report is to prepare a 5 year work plan for the Environmental Services Department. To develop this work plan, the more detailed and accompanying Reference Document was prepared. The Reference Document identified environmental assets, threats to the assets and proposed a response. The feasibility, urgency and achievability of the response was then factored into a draft work schedule.</p> <p>The SoE report does adopt a “whole of Government approach”. This submission is seeking this report to be biased and exercise the very selective form of assessment it is criticising.</p> <p>Biodiversity and environmental programmes will not be funded without economic sustainability in the future. That means economic development today. The City’s “right and left hands” have to work together if this report’s future strategies are to be deliverable.</p> <p>The development of north Forrestdale, including the Keane Road link, will be integral to the City of Armadale’s environmental capability in the future.</p> <p>The City of Armadale is currently undertaking a Public Environment Review for a proposal to develop an unmade portion of Keane Rd. There is no reference to this proposal in the draft State of the Environment Report or the Reference Document because:</p> <ul style="list-style-type: none"> • Council has already considered the proposal and following Councils resolution, the City has initiated a Public 	No changes to the State of the Environment Report 2011 are proposed, as there is no resource implications for the Environmental Services Department.

**Comments received during the draft State of the Environment Report 2011 to 2016 public comment period,
and subsequent changes made to the report.**

Submitter	Comments received	Response	Changes made to report
		Environmental Review; and: <ul style="list-style-type: none"> the proposal has no resource implications for the Environmental Services Departments' work plan. 	
Friends of Forrestdale	Call on the City of Armadale to cede its vestings of the Keane Rd Reserve between Anstey and Skeet Roads to become part of the Jandakot Regional Park.	The potential environmental impact of the proposal to build an unmade portion of Keane Rd has previously been considered by Council. The proposal is currently being progressed through the formal Public Environmental Review process. This suggestion would be the equivalent of an economic development report ignoring any environmental considerations. The Keane Road link is an important economic and social link that is undergoing appropriate environmental considerations before construction.	Nil.
Friends of Forrestdale	"SoE report should adopt a whole of government approach... whereby the development and environment sections of the City should talk to each other instead of the current situation wherein the left hand does not know what the right hand is doing. Conserving biodiversity cannot and should not be considered in isolation from other pressures, such as development and construction of a road and their potential impacts".	The development of the State of the Environment Report was undertaken consistent with a Council endorsed approach, with rigorous consultation within the organisation. The pressure that development can pose to biodiversity conservation is recognised in the draft State of the Environment Report which includes many actions to implement to the City of Armadale Local Biodiversity Strategy. The focus of the Local Biodiversity Strategy is to develop mechanisms for the protection of important biodiversity values during the development process. See Comment above.	Nil.
Friends of	"the report on page 7 states the retention of	The purpose of the State of the Environment Report is to recognise	Nil.

**Comments received during the draft State of the Environment Report 2011 to 2016 public comment period,
and subsequent changes made to the report.**

Submitter	Comments received	Response	Changes made to report
Forrestdale	biodiversity is fundamental for human health and wellbeing yet the City of Armadale is proposing to destroy biodiversity when it has the power to conserve it. This is a gross contradiction and contravenes the very principles it supposedly upholds”.	and identify the environmental values of the municipality and develop a five year work plan to protect these values, where achievable and consistent with the wider objectives of the City of Armadale Strategic Plan. To achieve the objectives of the City of Armadale’s Strategic Plan, a balanced approach is required. Council has previously considered the potential impacts of the proposal to built Keane Rd on biodiversity, and has resolved to initiate a Public Environmental Review.	
Department of Environment and Conservation	Supports the intent of the document and its proposed objectives and actions.	Noted.	Nil.
Department of Environment and Conservation	Encourages partnerships between DEC and the City of Armadale, in particular joint management actions and activities for conservation reserves in close proximity and also road reserves adjacent to DEC-managed lands.	Noted. The City of Armadale manages its bushland reserves consistent with DEC Regional Park Management Plans where they exist. Opportunities for joint management of reserves in close proximity is considered at the stage of management plan development for individual reserves. The City also seeks DEC and authorities responsible for creating wetland and biodiversity reserves to appropriately resource their management and impact on the surrounding community.	Nil.
Department of Environment	It is important that protection of DEC managed lands, threatened species and	The City of Armadale regularly updates its mapping of conservation estate, threatened species and communities and	Nil.

**Comments received during the draft State of the Environment Report 2011 to 2016 public comment period,
and subsequent changes made to the report.**

Submitter	Comments received	Response	Changes made to report
and Conservation	communities and significant wetlands is given appropriate consideration and recognition in strategic planning assessments to ensure long term protection of conservation values.	significant wetlands with datasets provided by the DEC. These datasets are considered during the undertaking of planning assessments. Proposals with environmental impacts are often also referred to the DEC for consideration where appropriate.	
Department of Environment and Conservation	Suggests that the review of actions and management plans every three years is too frequent and a five year rotation may be more affective.	The Environmental Services Department undertakes weed and vegetation condition mapping on a three year rotation in order to develop weed control and capital works plans. Environmental Officer experience indicates that three yearly is more appropriate as often by the third year, the information is outdated.	Nil.
Department of Environment and Conservation	It is suggested that the City of Armadale develop a Dieback Local Planning Policy as early as possible ie:2012/13 rather than 2013/14 as listed, as dieback is considered by DEC to be a high level conservation threat.	To facilitate the earlier commencement of the preparation of the Local Planning Policy for Dieback, approximately 15 extra days would be required in 2012/2013. This is considered in detail above in the "Discussion" section.	Nil.
Department of Environment and Conservation	Action item B4e Biodiversity – DEC recommends that the stewardship program for biodiversity conservation on private lands be linked to DEC's Land for Wildlife program.	Noted. City officers will contact the DEC to identify synergies and opportunities when this action commences.	Potential partnership with DEC is now referred to in the State of the Environment Report.
Department of Environment and Conservation	DEC would like to recommend that a Roadside Vegetation Conservation Policy be included in the document.	Previous assessments of the City of Armadale's roadside vegetation has identified that many of the roadsides contain scattered and disturbed vegetation that is now difficult to maintain for conservation. The City implements Policy ENG9 which minimises the impacts of road works on roadside vegetation as relates to dieback. It is not recommended that roadside vegetation	Nil.

**Comments received during the draft State of the Environment Report 2011 to 2016 public comment period,
and subsequent changes made to the report.**

Submitter	Comments received	Response	Changes made to report
		be considered further from a conservation perspective in the City of Armadale.	
Department of Environment and Conservation	DEC would encourage and support such measures to 'green' the City of Armadale with priority use of local native plant species in particular in public parks and the promotion of native plants in residential gardens.	<p>The City of Armadale Landscaping Policy ENG14 sets targets for the use of locally native plants in new developments areas. Review and implementation of ENG14 is accounted for in the draft Report.</p> <p>The City also publishes information to residents about the importance of native plants in gardens and appropriate species for selection. These brochures are provided for residents on the City website, the libraries, at the administration centre and are also provided in 'welcome packs' for new residents.</p> <p>Through the Streamcare Program, the City assists private landowners to revegetate watercourses on their properties using local plants.</p> <p>The City also supports volunteer groups including the Armadale Gosnells Landcare Group to revegetate natural areas.</p>	Nil.
Internal comment	Updated list of environmental volunteer groups provided.	Updated in report.	Updated in report.
Verbal feedback	No resource allocation to further progress the Kelmscott Canning River Walk Trail.	The Environmental Services Department has previously assisted in the development of a scoping document and conceptual plan for a walk trail along the Canning River in Kelmscott. Further	Nil. If the project is funded in the future, the Environmental Services Department will seek Councils support to reconsider priorities and further assist on the

**Comments received during the draft State of the Environment Report 2011 to 2016 public comment period,
and subsequent changes made to the report.**

Submitter	Comments received	Response	Changes made to report
		progression of the project is currently unfunded and there is no resource commitment required from the Environmental Services Department, therefore the project is not shown in the five year work plan.	project.
Internal consideration	Need to allocate resources in the work plan to actions that were intended to be complete before the commencement of the new State of the Environment Report that now, may no longer be completed in time.	It was anticipated that both the Forrestfield Complex Management Plan and Lloyd Hughes Management Plan would be finalised prior to 30 June when the new State of the Environment Report work plan commences. This deadline is unlikely to be met given the recent fire events in Kelmscott/ Roleystone.	An additional 5 days has been added to the 2011/2012 work plan to allow for the completion of the Forrestfield Complex Management Plan. An additional 7 days has been added to the 2011/2012 work plan to allow for the completion of the Lloyd Hughes Bushland Management Plan.
Councillor comment – City Strategy meeting 18 January 2011	The threat of reducing availability of water resources is understated in the draft report (version for public comment).	The threat of reduced water availability from drying climate and increasing demand is addressed in detail in Section 2 of the draft Reference Document and summarised in Section 3 of the draft State of the Environment Report. The current format of the State of the Environment Report does not rank environmental assets and threats. However, it does rank proposed actions. Actions relating to water resources score the highest rank: “High priority environmental initiative – priority asset susceptible to irreversible decline over the next five years”.	Following comments from Councillors at the City Strategy Committee meeting on 18 January 2011, the Water Resources section of the State of the Environment Report (see page 10) has been expanded to emphasise, to a greater extent, the potential impacts of reduced rainfall and water availability on the City.

Appendix 4: References and resources

The following documents were reviewed in order to compile this report and the City of Armadale State of the Environment Reference Documents 2010.

- *Armadale Gosnells Landcare Group Strategic Plan 2008 to 2018*. Armadale Gosnells Landcare Group 2008
- *National Local Government Biodiversity Strategy*, Australian Local Government Association 1998
- *The environment and Australia's future: Local Government's role land capacity to deliver Natural Resource Management* Australian Local Government Association 2001.
- *Beyond Roads, Rates and Rubbish: Opportunities for Local Government to conserve native vegetation*. Binning, C., Young, M. and Cripps, E. 1999.
- *Armadale – Brookdale Water Quality Monitoring Program Report*. City of Armadale
- *City of Armadale Strategic Plan*. City of Armadale 2010
- *Corporate Greenhouse Action Plan 2009 to 2012*. City of Armadale 2009.
- *City of Armadale State of the Environment Report 2000*. City of Armadale 2000.
- *City of Armadale Sustainable Purchasing Action Plan*. City of Armadale unpublished report.
- *Draft 100 Year Biodiversity Conservation Strategy for WA*. Department of Environment and Conservation.
- *Land Development sites and impacts on air quality – guidelines for the prevention of smoke and dust from land development sites in WA*. Department of Environmental Protection 1996
- *Perth Metropolitan Transport Strategy 1995 – 2029* Department of Transport 1995
- *Foreshore Policy 1 – Identifying Foreshore Areas*. Department of Water.
- *Perth – Peel Regional Water Plan 2010 – 2030 responding to our drying climate*, Department of Water 2009.
- *State Waterways Initiative 2008 to 2011*, Department of Water 2008.
- *Evaluating options for water sensitive urban design – a national guide*. Department of Water, Heritage and the Arts 2009.
- *Draft 100 Australia's Biodiversity Conservation Strategy 2010 to 2020*). Department of Water, Heritage and the Arts.
- *Guidance Statement 10: Guidance for the assessment of environmental factors – Level of assessment for proposals affecting natural areas within the System Six region and Swan Coastal Plain portion of the System 1 region*. Environmental Protection Authority 2006.
- *Environmental Protection Biodiversity Conservation Act 1999*
- *National Greenhouse Strategy*. Government of Australia 1998.
- *Bike head Strategy for the 21st Century*. Government of Western Australia 1995.
- *Bush Forever*. Government of Western Australia 2004.
- *Contaminated Sites Act 2003*
- *Environmental Protection Act 1986*.

- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*. Government of Western Australia 1992.
- *Evaluating Options for water sensitive urban design*. Government of Western Australia 2009.
- *Identification and investigation of Acid Sulfate Soils*. Government of Western Australia 2006.
- *Implementing Perth Air Quality Management Plan*. Government of Western Australia 2002.
- *Identification and Investigation of Acid Sulfate Soils*. Government of Western Australia 2006.
- *State of the Environment Report 2007 Western Australia*. Government of Western Australia 2007.
- *State Waterways Initiative 2008 to 2011*. Government of Western Australia 2008.
- *Swan and Canning Rivers Management Act*. Government of Western Australia 2006.
- *WA Draft Greenhouse Strategy*. Government of Western Australia 2003.
- *Wetlands Conservation Policy for Western Australia*. Government of Western Australia 1997.
- *Wildlife Conservation Act*. Government of Western Australia 1950.
- *Vegetation Complexes of the Darling System, Western Australia*, Heddl, E.M., Loneragan, O.W. and Havel, J.J. 1980.
- *City of Armadale Local Biodiversity Strategy*. Ironbark 2009.
- *Integrating NRM into Local Government Core Business*. Lonsdale, A & Hamilton, B 2008.
- *Better Urban Water Management*. Planning Western Australia
- *Statement of Planning Policy 2.9 Water Resources*. Planning Western Australia
- *Environmental Indicators for National State of the Environment Reporting – Biodiversity*, Saunders, D., Margules, C. and Hill, B. 1998.
- *SEREG Business Plan 2009/2010 – 2011/2012*. South East Regional Energy Group 2009.
- *Healthy Rivers Action Plan 2008 to 2013*. Swan River Trust 2007.
- *River Protection Strategy* Swan River Trust.
- *Southern River Catchment Water Quality Improvement Plan*. Swan River Trust 2009.
- *Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region*. Western Australian Local Government Association 2004.
- *Water for Public Open Space Policy Discussion Paper*. Western Australian Local Government Association 2010.
- *Bushland Policy for the Perth Metropolitan Region (draft)*. West Australian Planning Commission 2004.
- *Statement of Planning Policy 2 – Environment and Natural Resources*. West Australian Planning Commission 2003.
- *Statement of Planning Policy 2.10 – Swan – Canning River System*. West Australian Planning Commission 2006.

Appendix 5: Environmental volunteer groups who annually report their volunteer contribution

- Armadale City River Care Group
- Armadale Gosnells Landcare Group
- Armadale Settlers Common Working Group
- Brookdale Residents Association
- Bungendore Park Working Group
- Churchman's Bushland Association
- Cooliaberra Reserve Bushland Group
- Friends of Armadale Shale Quarry
- Friends of Forrestdale
- Friends of Goolamrup
- Friends of Hall Road Bridle Trail
- Friends of Lloyd Hughes Reserve
- Friends of Martin Street Reserve
- Friends of Neerigen Brook
- Friends of Roley Pools
- Friends of Wright Brook
- Hillandale Bushcare
- Palomino Reserve Catchment Group
- Roleybushcare
- Wildflower Society—Armadale Branch
- Fire Management and Volunteer Fire Brigades

