EMRC

Protecting Perth's Eastern Region

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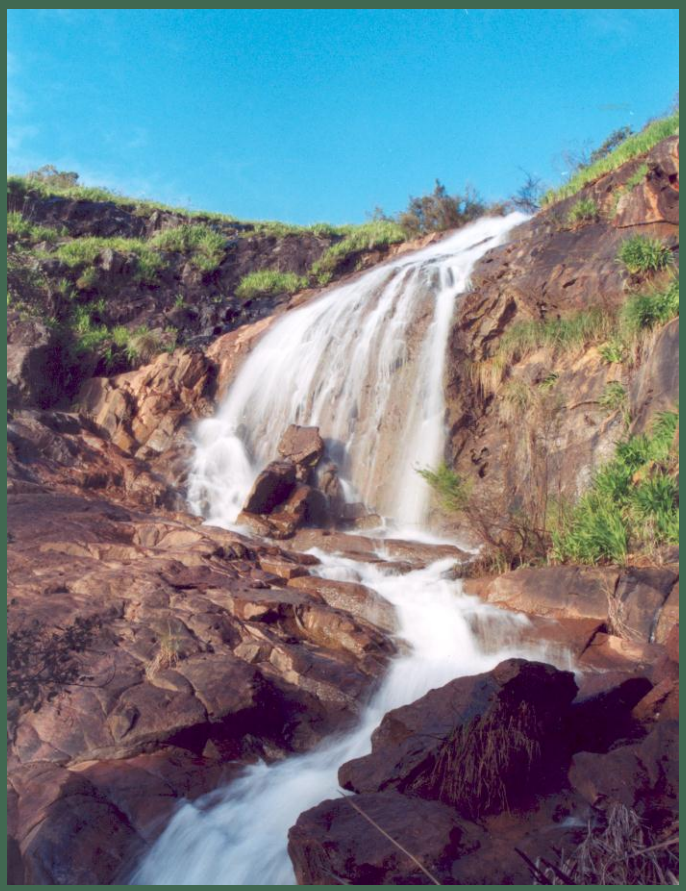
Shire of Kalamunda
Water Action Plan



Produced by EMRC Environmental Services and the Shire of Kalamunda.

September 2009

Acknowledgements

The Shire of Kalamunda recognises the effects of the drying climate induced by climate change and has committed to improving the Shire's and the community's water management through joining the International Council for Local Environmental Initiatives (ICLEI) Water Campaign™ in August 2004.

The Shire in partnership with Eastern Metropolitan Regional Council (EMRC) has developed the Water Action Plan (WAP) to progress through the Water Campaign™ milestone framework and improve water management practices within both corporate and community sectors. The preparation of this report required considerable effort, resources and coordination between the Shire's relevant officers and the EMRC staff.

The Shire of Kalamunda would like to thank its staff members for their contribution and support in this process.

The Shire would especially like to thank the members of the Water Team who provided their valuable time to review and guide the development of the Water Action Plan. The team includes:

Kylie DelFante	Environmental Coordinator
Tex McPherson	Coordinator Building Maintenance
Andrew Fowler-Tutt	Manager Strategic Planning
Markus Botte	Coordinator Engineering Infrastructure
Simon Macri	Parks Supervisor (Horticulture)

Thankyou to EMRC staff members in particular Yulia Volobueva, Environmental Projects Consultant/ Water Campaign™ Support Officer, Nicola Hoey, Environmental Officer, Craig Wansbrough, NRM Officer/ Integrated Water Management and Brendan Nock, Environmental Officer for their assistance in the WAP development process.

The Shire also would like to thank the following staff members who gave up their time and provided a considerable input into Shire's Water Action Plan during officer consultation sessions:

Jonathan Smith	Manager Health Services
Brian Blechynden	Community Development Officer (Recreation)
Craig Garrett	Senior Ranger
Duncan Wilson	Manager Building Services
Dale Allan	Manger Parks Maintenance
Glenda Lawrence	Engineering Technical Officer
Karen Britza	Environmental Reserves Officer

Thankyou to Susannah Raffe, ICLEI Water Campaign™ state manager, for her assistance with facilitation of Milestone 2 and 3 training workshops and information support.

On behalf of the Shire of Kalamunda I would like to express sincere thanks to Rory O'Brien and Giles Glasson for their dedicated effort, support and outstanding commitment during the preparation of the Water Action Plan.

Adoption and implementation of the Water Action Plan will enable the Shire to remain at the forefront of sustainable water management and establish local government leadership.

JAMES TRAIL
Chief Executive Officer
Shire of Kalamunda

Summary

The Water Action Plan (WAP) for the Shire of Kalamunda represents the Shire's commitment to improve water management for both the Shire and its local community. The Water Action Plan has been driven by the Shire's commitment to three programs, the International Council for Local Environmental Initiatives (ICLEI) Water Campaign™, the State Water Strategy (2003) and the State Water Plan (2007).

The Shire's Water Team and other key staff members in partnership with the Eastern Metropolitan Regional Council (EMRC) have produced the Water Action Plan to progress through milestone frame work of the Water Campaign™. This Plan has been designed inline with ICLEI's suggested template that was adopted to reflect the Shire's coordinated approach to water management issues in both corporate and community sectors.

The Water Action Plan outlines the Shire's position regarding water management and focuses on water management in the four areas including:

1. Corporate Water Conservation;
2. Community Water Conservation;
3. Corporate Water Quality; and
4. Community Water Quality.

The Water Action Plan also identifies Shire's four water management target goals and sets out a project pathway for the Shire to achieve these goals by 2012 establishing consistency with the Shire's Strategic Plan (2009-2014).

Corporate Water Conservation Goal: To reduce corporate scheme water consumption by 20 % below base year 2002/03 levels by target year 2011/12.

Corporate Water Quality Goal: To achieve 50 points of actions from the Corporate Water Campaign™ water quality action cards by the strategic year 20011/12.

Community Water Conservation Goal: To reduce annual residential scheme water consumption per household by 15% below base year 2002/03 levels by strategic year 2011/12.

Community Water Quality Goal: To achieve 50 points of actions from the Community Water Campaign™ water quality action cards by the strategic year of 2011/12.

The target goals will be accomplished through the implementation of practical and effective measures to manage the Shire's water resources. A range of positive outcomes are expected from the implementation of the Water Action Plan including reduced operating costs, improved water quality, reduced water consumption, social and environmental benefits.

Section 1 of the Water Action Plan outlines the Water Campaign™ background and Shire's progress through the milestone framework. It also presents the Shire's urban and rural profiles (land use profile) and stormwater runoff management. In addition, this section indicates the Shire's current water management position and highlights the measures that have already been undertaken to improve water quality and reduce scheme water consumption.

Section 2 of the plan includes scheme water consumption inventory results and water quality analysis providing readers with an understanding of the high water consuming activities and sources of water pollutants within the Shire and local community. In addition, this section also identifies base year profiles for corporate and community water conservation modules that best represent the Shire's and community's current water management position.

Section 3 of this document presents statements pertaining to of water management goals that the Shire's Water Team has proposed to achieve during Milestone 2 of the Water Campaign™. This section also outlines goal justification, meaning that each goal is achievable, measurable

and relevant to Shire's operations whilst in keeping with the State water conservation and management recommendations.

Section 4 provides an Executive Summary of the Water Extraction Operating Strategy (2005) and the Water Conservation Plan (2008) including corporate groundwater consumption data, conservation objectives and strategies.

Section 5 highlights a number of strategies that the Shire has undertaken since its base year of 2002/2003 in order to improve water quality and reduce water consumption.

Section 6 lists and prioritises proposed water management actions and policies to be implemented to achieve water management goals and progress the objectives through the Water Campaign™. This section identifies links to existing programs, plans and policies where proposed water management actions are reflected. In addition it also outlines potential benefits and savings that the Shire will gain by implementing proposed actions.

Section 7 outlines the Shire's commitment to an overarching Water Action Plan review. This enables the Shire to keep on track with water management actions meaning that actions remain appropriate and that priority actions are implemented.

Section 8 demonstrates that the Shire of Kalamunda has accepted responsibility for the Water Action Plan and is willing to take the direction outlined in this plan.

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1 Introduction and Local Context

The issue of sustainable water management is one of increasing importance in Western Australia and in particular Perth's Eastern Region, which includes the Shire of Kalamunda.

Figure 1 shows how the inflow to Perth's dams and catchment area has halved since 1975 and again since 1996. The cause for the decrease in rainfall and subsequent reduced dam inflow is under debate within the scientific community however a combination of natural variability and the enhanced greenhouse effect is considered to be a likely cause (Pittock, B. 2003). Analysis of global climate model projections for Western Australia's climate under greenhouse conditions by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) suggests that this change in rainfall coupled with global climatic change has contributed to the drier conditions that Perth has experienced since 1975 (CSIRO, 2001). This decrease is very significant considering the demand for water to supply the Water Corporation's Integrated Water Supply Scheme (IWSS) is nearly twice that of the current dam inflow amount (Water Corporation, 2005). Climate change is not just affecting Perth, in the South West of Western Australia variations are characterised by later winter rains and a significant decrease in rainfall (Water Corporation, 2009). Overall, there has been a 12% drop in rainfall since 1975, which coupled with human activities, has resulted in a 50% decrease in dam inflow.

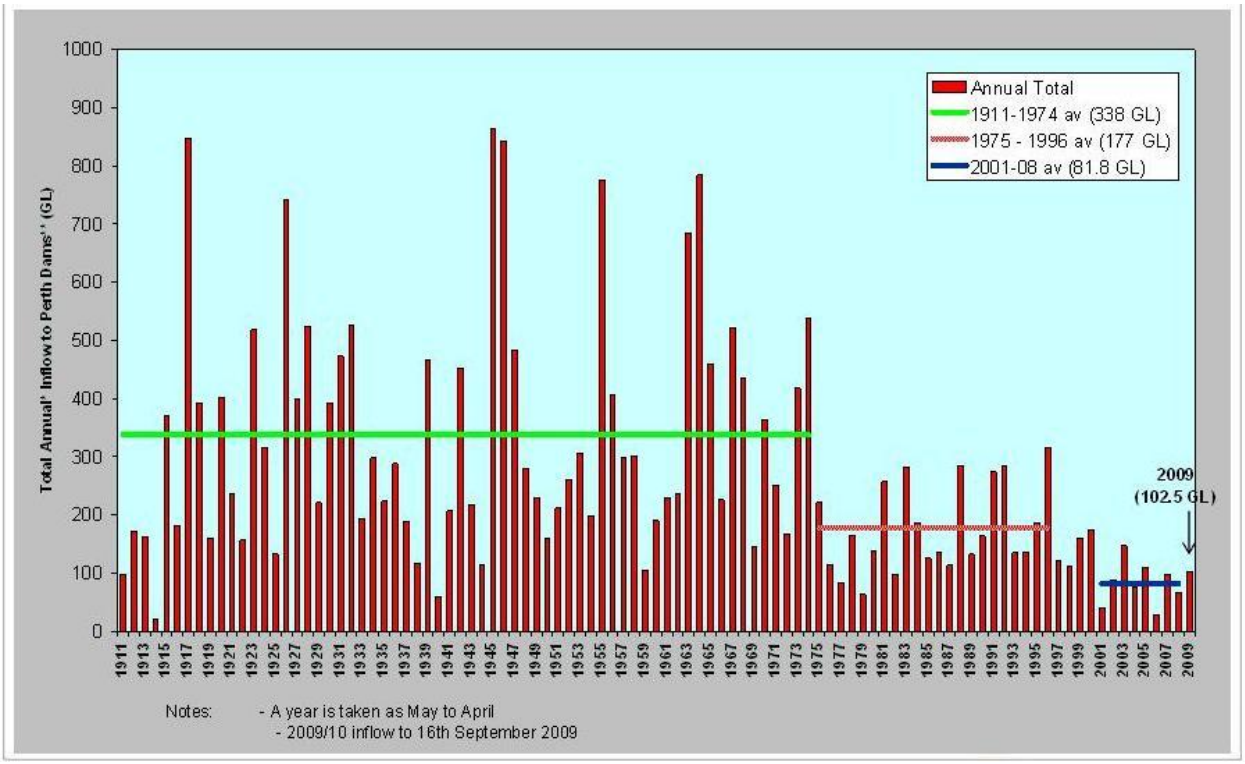

Figure 1: Inflow to Perth's Dams from 1911 to 2009
(Data Source: Water Corporation, 2009)

With the decline in surface water sources, Perth's water supply has been partly sourced from groundwater reserves since 1976 (Flannery, 2005). Approximately 60% of Perth's water supply currently comes from groundwater sources. However the recharge of groundwater supplies has also significantly declined due to a decrease in annual rainfall over the past 30 years (Water Corporation, 2006). Based on the decline in groundwater levels, and other factors, the Environmental Protection Authority (EPA) believes that extraction levels of groundwater supplies are too high and more sustainable extraction limits need to urgently be established to ensure the protection of the environment (EPA, 2004).

The State Water Plan (2007) has indicated that reduced rainfalls have resulted in decreased inflows to public water supply dams by more than 50% on average. In some areas, decreased recharge to aquifers has also occurred. In the Perth Metropolitan Area, stream flows have

decreased by two thirds with the 2006 winter being one of the driest on the record (Government of Western Australia, 2007).

With the present potable water scarcity being experienced in Perth, the Shire of Kalamunda has committed to ensuring continual improvement of its water management and to educate and empower the local community to improve their water management.

The Shire of Kalamunda is located on the eastern fringe of the Perth Metropolitan Area and covers 349 square kilometres, more than two-thirds of which consist of State Forest, National and Regional Parks, Priority Water Catchment Areas and local Shire-managed reserves. The remaining 102 square kilometres is used for rural, intensive horticulture and urban purposes. Due to rapid population growth the Shire has been experiencing significant urbanisation over recent years, especially in the foothills suburbs, such as Forrestfield, High Wycombe, Maida Vale and Wattle Grove. With an increasing population, the Shire is experiencing not only a rapid urbanisation of the foothills but also expansion of industrial and transport hub adjacent to Perth airport.

The Shire's town planning process is based on the Local Planning Scheme No 3 (2007) that incorporates appropriate principles of Water Sensitive Urban Design and best practice management initiatives. The Local Planning Scheme No 3 has introduced some changes into residential densities to allow some residences to change from single dwelling to duplex promoting high density housing particularly in High Wycombe and Forrestfield residential areas. This alleviates the pressure to clear bushland for new residential areas in a growing community.

The Shire recognises that rapid urbanisation has the potential to cause many environmental problems without effective planning and management. Therefore the Shire in its Strategic Plan (2009 – 2014) has identified a number of key initiatives related to sound land use planning, addressing the future of the rural sector, and overcoming industrial encroachment of urban areas (Shire of Kalamunda, 2009).

Numerous watercourses within the Shire link to regionally significant water courses, such as the Helena, Swan and Canning Rivers. Of major concern to the quality of water resources is the excessive runoff of nutrients, particularly nitrogen and phosphorus. Land use and human activities have altered the natural level of nutrients in many waterways. The major sources of these nutrients are fertilisers and animal waste from rural lands which washes into rivers and can eventually trigger algal blooms, fish deaths and loss of ecosystem function (Evans, 2000).

The Shire addresses these issues via a number of initiatives, policies and strategies that aim to minimise the impacts of excessive nutrient loads and reduce water recharge to the groundwater table in areas which may possibly be affected by salinity. In addition, the Shire of Kalamunda in partnership with the local community groups and the Swan River Trust undertakes drainage restoration works through the Drainage Nutrient Intervention Program to retrofit drainage systems and sumps to reduce the nutrient discharge into waterways. To provide sound watercourse management the Shire, in collaboration with Eastern Hills Catchment Management Project (EHCMP), undertakes biannual water quality testing and monitoring. The Shire has also installed lysimeters at selected locations to measure and monitor the levels of nutrients and other water quality parameters such as pH and salinity levels.

Figure 2 illustrates a simplified diagram of how water cycles through the Shire's landscape. This diagram also demonstrates various stormwater management principles applied by the Shire to achieve positive outcomes.

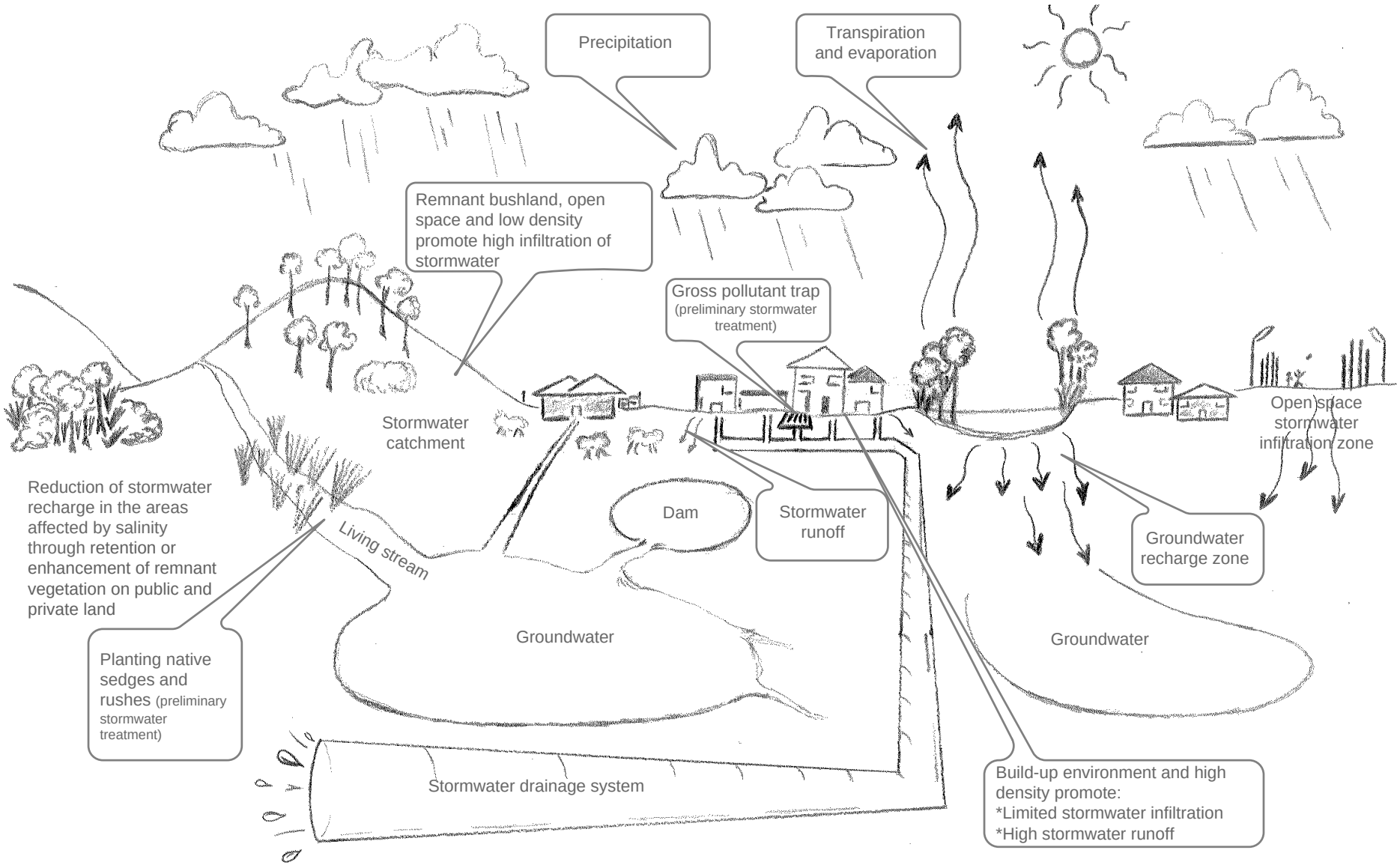

Figure 2: The Water Cycle and Stormwater Management in the Shire of Kalamunda (B. Nock, 2009)

The Shire of Kalamunda recognises the effects of the drying climate induced by climate change and has committed to improving the Shire's Corporate and Community water management through joining the International Council for Local Environmental Initiatives (ICLEI) Water Campaign™.

1.1 ICLEI Water Campaign™

The International Council for Local Environmental Initiatives (ICLEI) oversees the Water Campaign™ which the Shire of Kalamunda has been involved in since October 2004.

The Water Campaign™ addresses water management at the Corporate and Community levels. The Corporate module addresses water management in areas that councils can directly control through their own operations. The Community module addresses how Council can influence their community, mostly through town planning and community education (Water Campaign™, 2005). Both of these levels address two modules - Water Conservation and Water Quality. Within these two modules there are five Milestones that are progressed (Figure 3).

The Milestones in the Water Campaign™ process are:

Milestone 1 Complete an inventory of water consumption data and current practices impacting on water quality;

Milestone 2 Set goals to reduce water consumption and improve practices impacting on water quality;

Milestone 3 Establish a water action plan outlining current and future actions to save water and improve water quality;

Milestone 4 Quantify actions to demonstrate that council is moving towards its goals; and

Milestone 5 Conduct a re-inventory to identify improvements that have been made since the selected base-year.

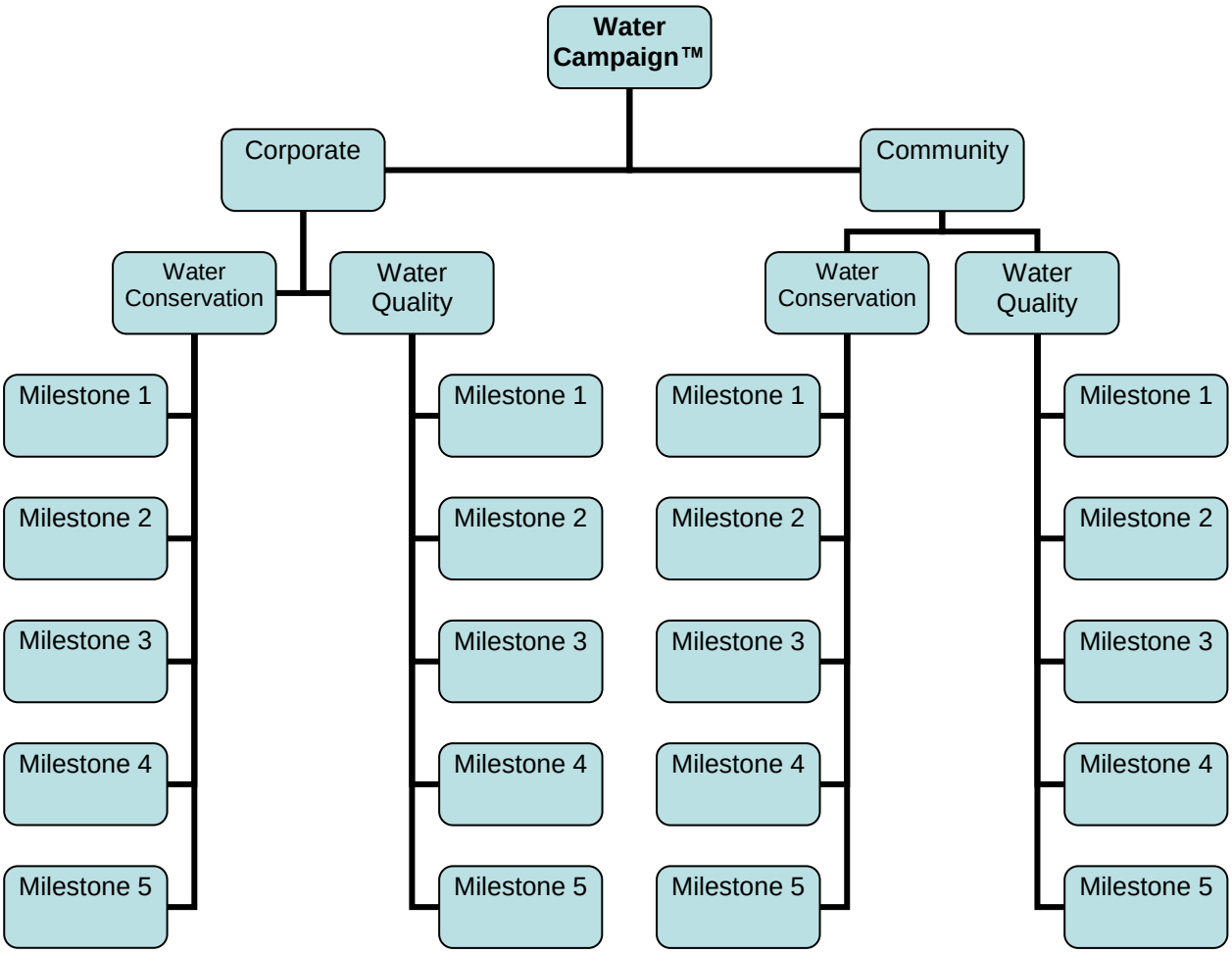

Figure 3: Water Campaign™ Structure

There are 120 Councils participating in the Water Campaign™ program throughout Australia, which includes 40 Councils from Western Australia. The Water Campaign™ program has resulted in significant water use reductions and cost savings for participating Councils and demonstrates Local Government leadership in the management of our precious water resources.

1.1.1 Shire Progress

In August 2004 the Shire of Kalamunda committed its support to undertake the Water Campaign™ through Council Resolution OCM 79/04 (Council Item # 65). In February 2005, the Shire achieved Milestone 1 and completed a scheme water consumption inventory as well as a water quality check list. In November 2006, as part of Milestone 2, the Shire's Water Team proposed water management goals to improve water quality and reduce scheme water consumption in both its Corporate and Community sectors. The Water Team determined the base year for each module from which the Shire's water goals will be measured against. During 2007 and 2008 EMRC's Water Campaign Support Officer undertook a range of actions to establish a corporate culture toward water management by the way of running officer consultation sessions; researching and developing potential actions for the Water Action Plan; carrying out collection and analysis of the water consumption data, reporting to council on the Water Campaign™ progress and developing grant applications to assist in seeking further funding.

In 2007/08 the Shire of Kalamunda was successful in the third round of the Federal Government's Community Water Grants receiving $63,803 for implementation of water management projects. The funding enabled the Shire to treat water from the Perth Airport North sub-catchment. The Shire has retrofitted Norm Sadlier Pavilion public facilities with water efficient appliances reducing scheme water consumption by 50%.

Currently the Shire of Kalamunda is progressing concurrently through Milestone 2 and 3 of the Water Campaign™, finalising water management goals and drafting the Water Action Plan. It is expected that the Shire will successfully progress through the Water Campaign™ milestone framework and achieve Milestones 2 and 3 by the end of 2009. The Shire's Water Team determined that the Shire would start progressing through Milestone 4 during 2009/10 implementing the Water Action Plan over Milestone 2 water management goal lifetime.

The Shire's progress through the Water Campaign™ is managed by the Water Team which meets quarterly or as required to progress Milestones and respond to Shire's Water management issues. The Water Team is made up of the Shire of Kalamunda's staff from a wide range of disciplines selected for their professional knowledge and experience and the Water Campaign™ Support Officer, who facilitate the Shire's Water Campaign™ commitments.

The Shire of Kalamunda, with assistance from the Water Campaign™ Support Officer, is progressing through the Milestone framework developed by ICLEI, which contributes to the Water Action Plan addressing four broad areas:

1. Corporate Water Conservation;
2. Community Water Conservation;
3. Corporate Water Quality; and
4. Community Water Quality.

1.1.2 Purpose of Report

The Shire of Kalamunda's Water Action Plan (WAP) is a strategic report on water management for the Shire's Corporate and Community sectors. This report presents information gathered during Milestones 1, 2 and 3 of the Water Campaign™ and includes the following information:

- The baseline profile;
- The suggested water management goals; and
- The Water Action Plan.

The basis of the report is the presentation of the Water Action Plan (WAP) which sets out the methodology that the Shire can follow to reduce its water consumption and improve the quality of its water resources by 2012 from the base line year of 2002/03. The aim of reducing water consumption and improving water quality can be achieved through the implementation of practical and effective measures to manage the Shire's water resources in both the corporate and community sectors.

Actions and policies that the Shire of Kalamunda already implements are also included in the report to demonstrate the progress that the Shire has already undertaken in the area of water management.

The endorsement of this strategic report and the water management goals by Council will successfully accomplish Milestones 2 and 3 of the Water Campaign™ followed by ICLEI's recognition award that will provide a strategic opportunity for the Shire President and Elected Members to be acknowledged for supporting sustainable water management initiative within the Shire.

1.2 Shire and Water Management

The Shire of Kalamunda understands that the availability of valuable water resources is gradually declining. Sustainable water management will prove to have environmental, economic and social benefits while also meeting Shire's obligations to its residents and ratepayers to provide vision and leadership. It is for these reasons that the Shire has committed to improving its Corporate and Community water management.

The Shire has long been pro-active regarding water issues and undertook in-house and Community directed water management initiatives previous to joining the ICLEI Water Campaign™.

The Shire's organisational water conservation initiatives included:

- Installation of dual flush toilets and other water efficient appliances in the Shire's administration buildings and some public amenities;
- Installation of water wise in ground reticulation systems at Ledger Road Reserve in Gooseberry Hill and Davies Park in Maida Vale;
- Creation of passive reserves and landscaped areas using water wise plant species that have a low water requirement;
- Replacement of irrigated grassed areas throughout the Shire with native plants with low water requirements;
- Application of wetting agents and mulch to retain moisture in the soil;
- Installation of the timers on irrigation equipment and undertaking sprinkler audit to ensure sustainable irrigation of the open space;
- Installation of lysimeters to measure soil moisture levels; and
- Implementation of "dry park" concept, where practical.

In relation to the Shire's organisational water quality initiatives, standard practices were implemented to everyday operations to limit amount of nutrients and contaminants entering local waterways.

These standard practices included:

- Restoration and revegetation of watercourses and wetlands with native plant species;
- Implementation of Commemorative Tree Planting Program throughout the Shire;
- Installation of lysimeters to measure level of nutrients, pH and salinity;
- Implementation of Drainage Nutrient Intervention Program to retrofit drainage systems and sumps within the Shire to reduce nutrient discharges in to waterways;
- Provision of bulk kerbside collection services to local residents;
- Installation and operating of the motor oil recycling facility at Walliston Transfer Station;
- Establishment of waste recycling services to encourage local residents to dispose of their green waste, metal and motor vehicle batteries in an environmentally friendly manner;
- Participation in the Metropolitan Illegal Dumping Taskforce to protect water catchment areas and underground water resources;
- Installation of stormwater pollutant treatment devices such as ECOLITE on Maida Vale Road and other locations;
- Development and implementation of the Flood and Stream Management Policy;
- Development and implementation of Waterways Management Plan;
- Management of the natural environment, bushland and creeks taking in to consideration preservation of wildlife habitats and green corridors;
- Undertaking of water quality testing and monitoring on watercourses with support through EHCMP; and
- Supporting volunteer groups to manage the wetlands and waterways in their neighbourhood.

Prior to the Water Campaign™ commitments the Shire of Kalamunda was proactive in local government strategic environmental planning and targeting water management issues, through the development and implementation of the following strategies and plans:

- District Planning Scheme No. 2. (1984);
- District Conservation Strategy (1995);
- Conservation Atlas (1996);
- Waterway and Catchment Strategy (1997);

- Wildlife Corridor Strategy (1998);
- Shire's Strategic Plan (2000-2025);
- Weed Control Strategy (2002); and
- Bushland Management Plans.

Whilst implementing in-house sustainable water management practices the Shire has also implemented water management initiatives. Influencing community practices through Town Planning was a direct way the Shire can administer sound water management recommendations. An example of this is the Shire's promotion of Water Sensitive Urban Design (WSUD) practices in planning controls for residential developments. Other key initiatives included standard planning approval conditions that require the protection of drainage lines during and post construction and retention of native vegetation in designated areas.

Another method of influencing the community to make sound water management decisions is through education. The Shire currently delivers water wise education messages to its residents and ratepayers through undertaking of various programs including:

- Commemorative Tree Planting Program;
- Plants to Residents Program;
- Free Mulch to Local Residents Program promoting water efficient irrigation;
- Bush Skills for Hills Program coordinated through the EHCMP;
- Environmental Walks Program implemented in partnership with various Friends Groups;
- Bush management and creek restoration program coordinated through the EHCMP; and
- Great Gardens Workshops.

The Shire also employs the services of the EMRC to deliver educational material to its ratepayers on recyclable materials through the R-Gang program and provides information on green waste collection details encouraging local resident to compost at home.

2 Baseline Water Profile

2.1 Water Conservation

In 2004/05 as part of Milestone 1 the Shire of Kalamunda conducted a Corporate (Council operations) and Community (residences, commercial and industry sectors) scheme water consumption inventory using the standard methodology developed by ICLEI. This inventory provided the Shire with a profile of their scheme water usage (four years for the Corporate sector and three years for the Community sector). It also delivered the data set for series of water consumption analyses, which investigated key water consumers, large variations in consumption and identified the need to implement water conservation actions to target high consumers.

The water inventory data analysis forms a major part of the Water Action Plan (WAP) report. The foremost aim of the water conservation section of this report is to identify and target high corporate and community scheme water users. The inventory analysis ensures that the proposed water conservation measures accurately address both corporate and community water management issues.

The following sub-sections of this chapter present the key results from the Milestone 1 scheme water consumption inventory for the Shire's both Corporate and Community sectors.

2.1.1 Corporate Water Conservation

The corporate scheme water consumption inventory data was provided by the Water Corporation in 2004/05. This data identified the amount of scheme water used by the Shire owned facilities, with a total of 85 active accounts within 13 Water Campaign™ facility types assessed (Appendix 1, Table 1 and 2).

The Water Corporation's current data indicates that the number of active scheme water accounts has increased to 93 since last inventory. *Note: According to the Water Corporation's scheme water consumption data report, active scheme water accounts are the accounts that show some water usage during an inventory period. Water accounts with zero consumption are inactive and may be removed upon the Shire's request.*

At Milestone 2 the Shire's Water Team proposed 2002/03 inventory year as a base year, that was the most recent year of data in Milestone 1, which best represented the Shire's ongoing scheme water consumption. The suggested corporate water conservation goal will be measured against 2002/03 levels.

In accordance with the corporate inventory data analysis the Shire of Kalamunda's corporate sector consumed 115,074kL of scheme water in 2000\01 which was the highest consumption on record during the four year inventory period since 1999/00. Therefore at Milestone 3 the Water Team suggested to compare base year consumption data with 2000/01 consumption levels to determine water savings within the corporate sector. During the base year of 2002/03 a total of 74,774kL of scheme water was consumed through the Shire's operations that represented $55,514 of annual water costs. The Milestone 1 inventory data analysis suggests that the Shire of Kalamunda recorded a 40,300kL or 35% reduction in water consumed in 2002/03 compared to the 2000/01 consumption levels and saved $13,489 (Figure 4).

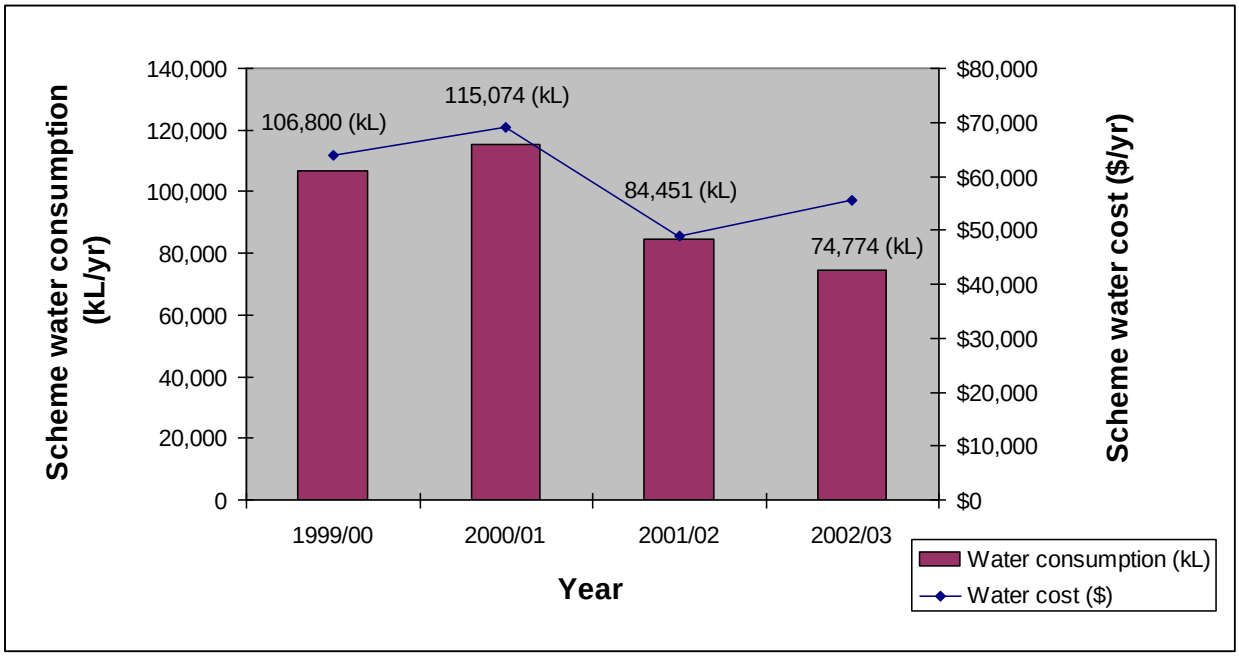

Figure 4: Corporate Scheme Water Consumption and Cost Reductions since 2000/01 (Milestone 1 Data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

The percentage breakdown of the Shire's Corporate scheme water consumption within 13 ICLEI's Water Campaign™ facility types (sectors) is identified in Figure 5. *Note: In many cases the facility type classifications include various scheme water accounts. At Milestone 1 of the Water Campaign™ all corporate scheme water accounts were investigated and classified by the facility type that describes a major water use by the facility (Appendix 2 'Water Campaign™ Facility Type List and Description', Table 4).*

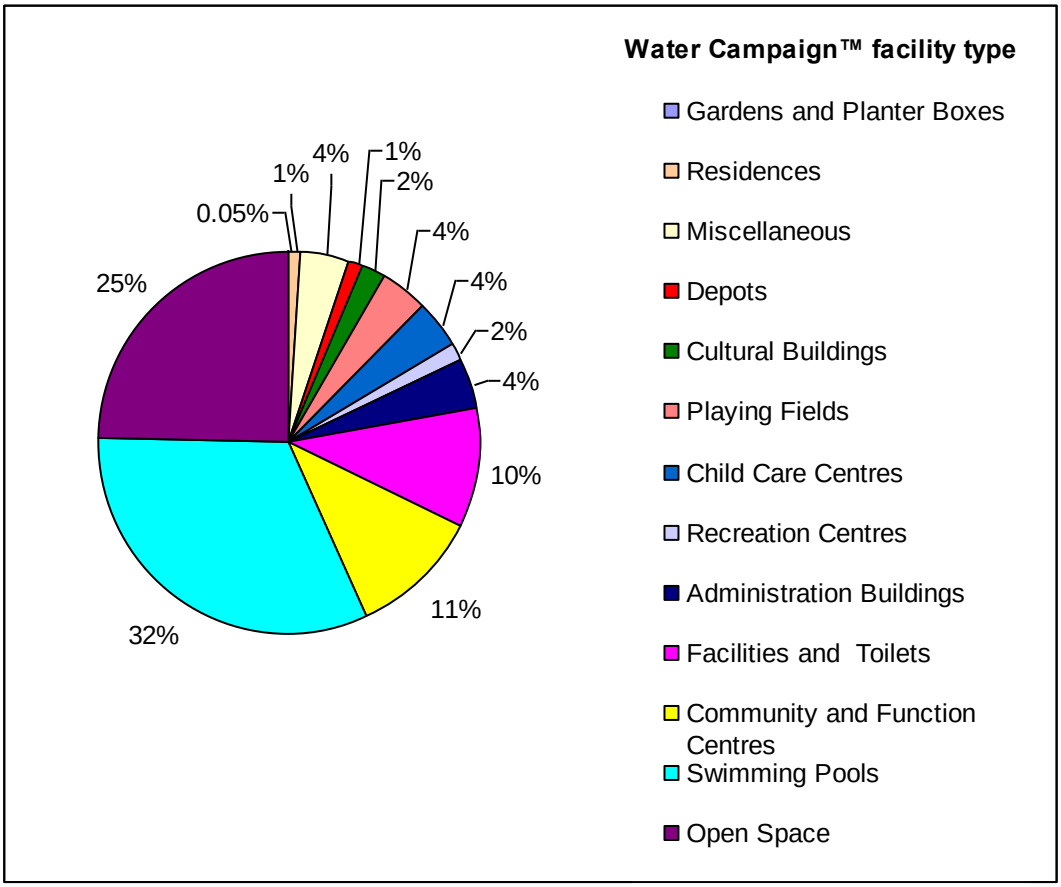

Figure 5: Percentage Breakdown of Corporate Scheme Water Consumption by 13 Water Campaign™ Facility Types for the Base Year 2002/03 (Milestone 1 Data)

(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

In accordance with Milestone 1 inventory data analysis the highest scheme water consumer for the base year was the 'Swimming Pools' sector that includes the Kalamunda Wet and Wild Aquatic Centre, which consumed a total of 23,874 kL of scheme water. The second highest consumer for the base year was the 'Open Space' sector, (18,546 kL), which consists of roundabouts, nature strips, median strips, parks and reserves. The third highest consumer for the base year was the 'Community and Function Centres' sector (8,314 kL) followed by the 'Facilities and Toilets' sector (7,344 kL) which includes public facilities equipped with toilets, water taps and showers.

To address the high consumption within the area of the 'Open Space' sector the Shire of Kalamunda implemented water conservation actions primarily in relation to irrigation including:

- Implementation of water efficient landscaping including the use of native species with low water requirements, application of wetting agents and mulch and the installation of timers on irrigation equipment;
- Installation of lysimeters to measure soil moisture levels; and
- Implementation of "dry park" concept, where practical.

Note: Some scheme water savings within the 'Open Space' sector were attributed due to switching to bore water use.

The Shire has also been proactive conserving water within its corporate and public facilities, evident by implementing actions such as:

- Installation of waterless urinals in male toilets at the administration building; and
- Installation of water efficient appliances including dual flush toilet cisterns, spring loaded taps and efficient showerheads.

These actions significantly reduced scheme water consumption in both the 'Community and Function Centres' and the 'Facilities and Toilets' sectors.

The highest consumer of scheme water within the Shire's Corporate sector is the Kalamunda Wet and Wild Aquatic Centre which is an ageing facility that requires a major refurbishment and retrofitting with water and energy efficient devices. A number of studies have been undertaken to determine the feasibility of the Aquatic Centre and a range of reports was produced advising the Shire on the future options for this facility. At Milestone 3, the Shire's Environmental Coordinator and EMRC's Environmental Consultant undertook a preliminary site assessment of the Aquatic Centre to determine appropriate water conservation measures for the facility that maybe employed in the future. A short report was produced, following the assessment, recommending appropriate measures that could be undertaken to reduce the facility's water consumption. The Shire is yet to address water conservation in its highest scheme water consuming facility. Pending the determination of the ongoing viability of the Aquatic Centre and implementing appropriate actions to reduce the water consumption will be an important step in the achievement of the corporate water conservation goal. There is an opportunity for the Shire to explore possibilities for sound water management within this facility and to consider proposed water conservation actions that are outlined in the Water Action Plan.

A more detailed description of the Shire's water management activities in the area of corporate water conservation is provided in section 5 'Actions and Policies Implemented since the Base Year'.

Key reductions in water consumption over the three years since 2000/01 are shown in Figure 6. The 'Recreation Centres' facility type, which consists of the Lawnbrook Club, Hartfield Park Club, Kalamunda Rollerama (which closed in 2002/03) and the Kalamunda Tennis Club, has achieved the largest water reduction within the Shire's corporate sector, with a 72% or 3,104kL of the scheme water use reduction within a three year period from 2000/01 to 2002/03. The

largest reduction within this facility type has occurred at the Lawnbrook Club. The reasons for the decrease in consumption are noted as unknown in the Milestone 1 inventory database.

Since 2000/01 the 'Open Space' facility type (one of the highest consuming sectors in 2000/01) has reduced scheme water consumption by 60%, or 27,685kL in the base year. Reasons for the drop in consumption may be attributed to the high profile campaign that the Water Corporation has undertaken introducing water restriction measures to reduce scheme water consumption. Furthermore, the implementation of water efficient irrigation practices and use of bore water to supplement or replace scheme water have contributed significantly towards the reduction of scheme water consumption within the 'Open Space' sector.

The third highest reduction has occurred in the 'Administration Buildings' facility type, which includes the Shire's administration building and community offices/ Kalamunda police station. This facility type has reduced its water consumption by 59% or 4,590kL in the period from 2000/01 to 2002/03. The installation of waterless and water efficient appliances in the Shire's administration office has contributed to the majority of scheme water use reduction within this facility type, recording a 3,871kL decrease within the three year period.

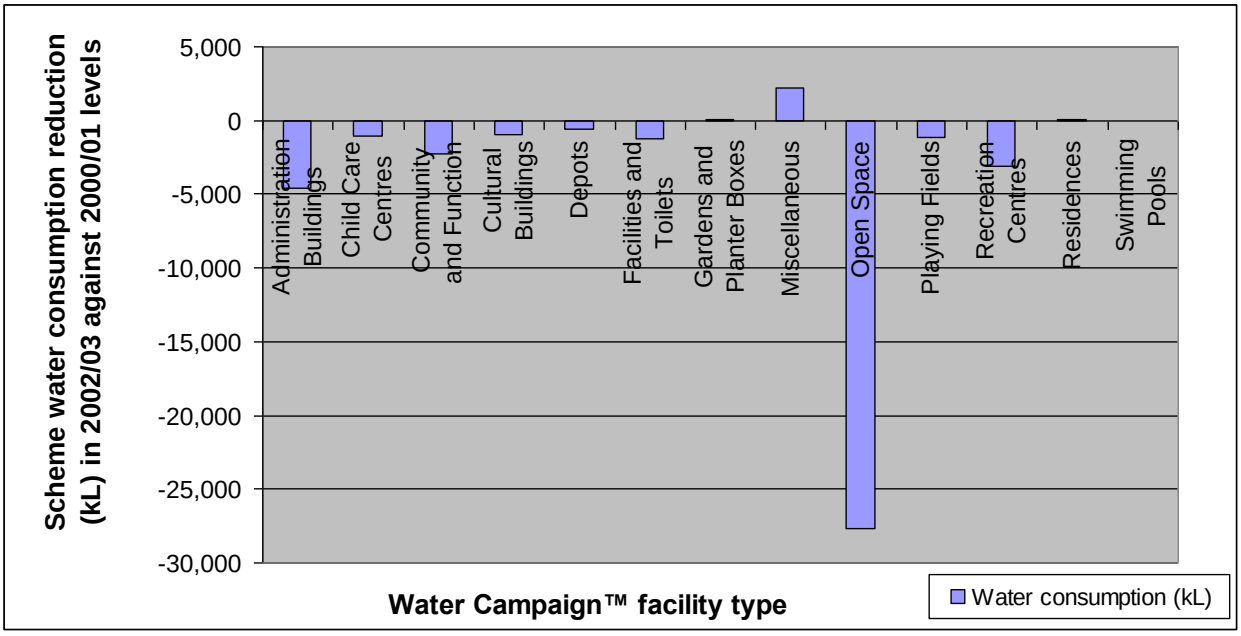

Figure 6: Corporate Scheme Water Consumption Reduction in Kilolitres from 2000/01 to 2002/03 by the Water Campaign™ Facility Type (Milestone 1 Data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Figure 6 demonstrates a 2,199kL increase in scheme water use within the 'Miscellaneous' facility type that includes two standpipes, animal pound, drinking tap, fire station and transfer station (Appendix 1 Table 2). This facility has increased its consumption by 240% within three year period from 2000/01 to 2002/03. According to Milestone 1 inventory data, a high use of water in the Shire's managed standpipe facilities in 2002/03 financial year has significantly contributed to overall increase of the scheme water consumption within the 'Miscellaneous' sector. The Shire's Water Team has proposed a number of water conservation actions to address high water consuming facilities within the corporate sector. These actions are included in the section 6 'Water Action Plan Table'.

Note: At Milestone 1 the ICLEI has provided the Shire with a version of the Water Campaign™ Facility Type List that was different from the current list and did not include 'Standpipes/ Metered Hydrants' category in the facility type. Therefore the Shire was advised to include its standpipe accounts into the 'Miscellaneous' facility type. The current list of the Water Campaign™ Facility Types is included in Appendix 2 of this report.

2.1.2 Community Water Conservation

At Milestone 1 in 2004/05 the Shire of Kalamunda was provided with the community scheme water consumption inventory data by the Water Corporation. This inventory data identified the amount of scheme water being used by the residential (houses and flats) and non-residential (industrial and commercial) sectors within three year period from 2000/01 to 2002/03. The community scheme water consumption inventory includes data for total consumption per sector and total consumption per property. A full account of the of Kalamunda's Community water consumption inventory is given in Appendix 4.

Whilst progressing through Milestone 1 and undertaking inventory for community sector, the Shire of Kalamunda has identified that scheme water accounts outside of the Shire's boundary have been included in the Water Corporation's mapping and billing data for Kalamunda. Participation in the Water Campaign™ has provided an additional benefit for the Shire to identify and investigate any anomalies that may occur in billing and mapping data (Appendix 3 *'*Shire of Kalamunda Suburb Boundary Map*').*

At Milestone 2 the Shire's Water Team proposed 2002/03 inventory year as a base year that was the most recent year of data in Milestone 1 which best represented the community sector's ongoing scheme water consumption. The suggested community water conservation goal will be measured against 2002/03 levels.

In accordance with the community inventory data analysis the Shire of Kalamunda's community sector consumed 7,662,195kL of scheme water in 2000/01 which was the highest consumption on the record during the three year inventory period since 2000/01. Therefore at Milestone 3 the Water Team suggested to compare base year consumption data with 2000/01 consumption levels to determine water use reduction within the community sector.

The residential sector (high and low density dwellings) was the most water intensive sector consuming 6,620,004kL in 2000/01. The non-residential sector consumed in 2000/01 one sixth of this figure with a total of 1,042,191kL (Figure 7). In the three year period since 2000/01 the Shire of Kalamunda's total Community water consumption has decreased by 22% from 7,662,195 kL collectively to 6,281,705kL in the 2002/03 base year.

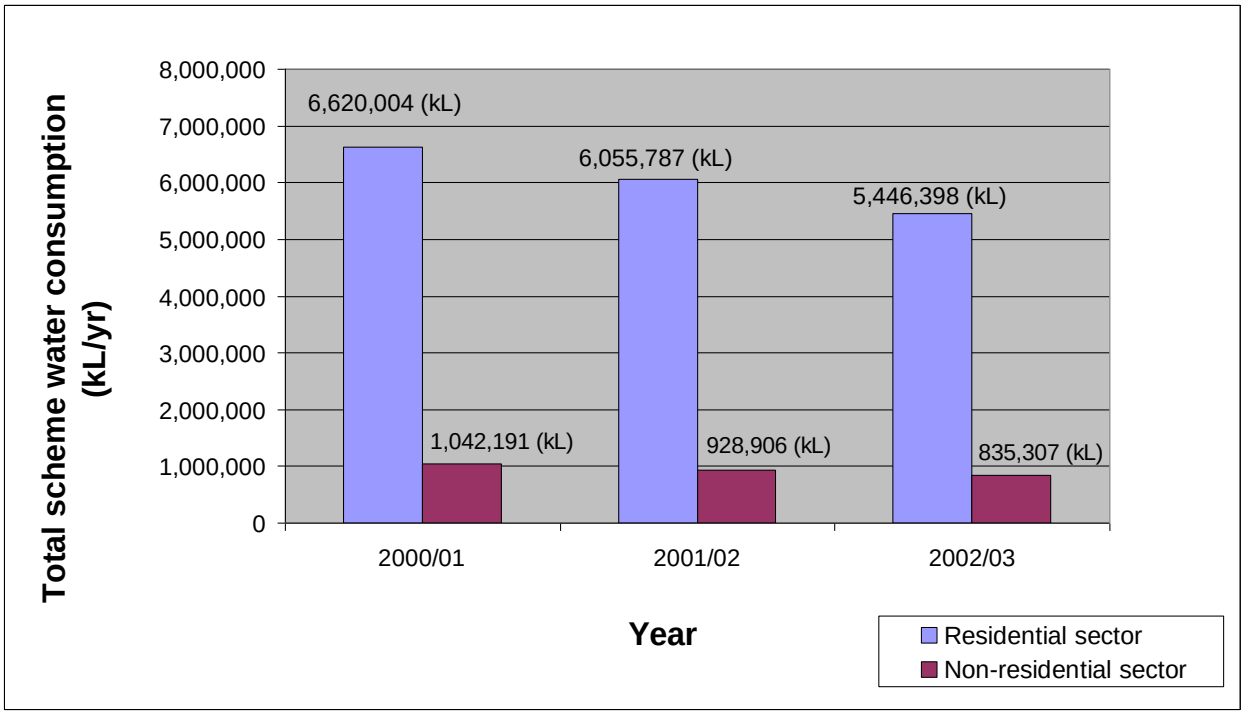

Figure 7: Total Community Scheme Water Consumption, Residential Versus Non-residential since 2000/01 (Milestone 1 Data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

On a per property basis the residential sector has decreased its scheme water consumption by 22% since 2000/01 (Figure 8 and Appendix 4, Table 6). This trend has seen a reduction of 68kL in annual water use from 381kL to 313kL per household. According to the Economic Regulation Authority's statistical data (Appendix 4, Table 7a), the average Perth Metro residential property consumes between 260kL and 289kL per year (Department of Water, 2009). However, Milestone 1 inventory data indicates that the Shire of Kalamunda's residential consumption per property during inventory period was above the Perth Metro average household consumption levels.

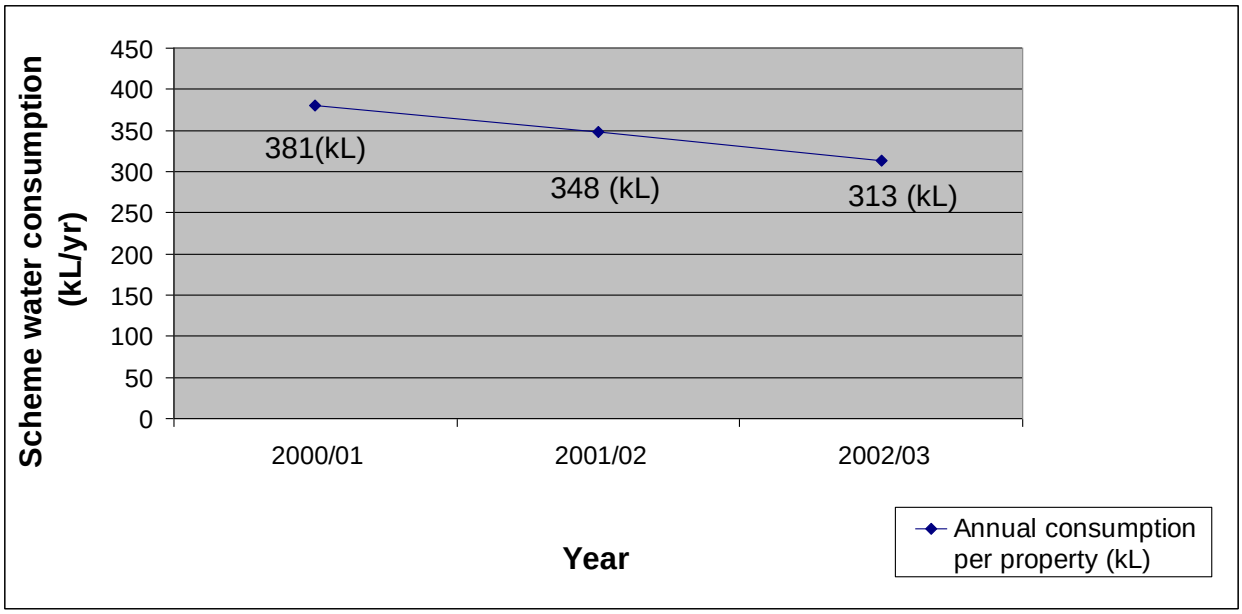

Figure 8: Annual Residential Scheme Water Consumption per Property since 2000/01 (Milestone 1 Data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Scheme water consumption data provided by the Water Corporation in 2008 indicates that residential (including high and low density dwellings) average annual overall water consumption per property was 343kL in 2006/07, which exceeds the Perth Metro average consumption per property (Appendix 4, Table 7). This is mainly due to high scheme water consumption within low density residential area including all Shire's suburbs apart from Walliston. The set of data also shows that the suburbs of Carmel, Forrestfield, High Wycombe, Kalamunda and Maida Vale recorded the average annual consumption in the high density residential area which is inline with the Perth Metro average annual household water consumption.

According to the Australian Conservation Foundation's Consumption Atlas data the consumption patterns of household in wealthiest suburbs accounts for the highest water use among Perth residents. The highest impact areas are the inner city and suburbs along the Swan River. Overall, Perth's water use is about 4% above the state and national per capita average (Australia Conservation Foundation, 2009).

To support further reduction the State Government has recently set a target to reduce annual household use of scheme water in Perth Metro area to less than 100 kilolitres per person by 2012 (Government of Western Australia, 2007). This puts pressure on the Shire and other stakeholders to reduce further scheme water use within residential sector to meet the State Government target.

The State Government suggests that current outdoor and indoor water use practices within the residential sector require a significant improvement to achieve set water conservation targets (Government of Western Australia, 2007). To reduce scheme water consumption within the residential sector the Shire of Kalamunda plans to continue communicating a water

conservation message to local residents through an education campaign focusing on high consuming suburbs, in particular low density areas, through various actions including:

- Encouraging the local community to plant waterwise gardens using native plant species through hosting a range of community education workshops;
- Promotion of the Federal Government's National Rainwater and Greywater initiative and rebate;
- Promotion and support of rainwater tank installation;
- Promotion of the Water Sensitive Urban Design principles;
- Supporting and delivering community education program encouraging the use of water efficient / waterless appliances by the local community;
- Promotion of a household water and energy calculator for local residents to encourage community behaviour change; and
- Promotion of the installation of swimming pool covers.

A more detailed description of the Shire's community water conservation activities is provided in section 5 'Actions and Policies Implemented since the Base Year' of this document.

The Milestone 1 inventory data indicates that the top source of scheme water consumption across the residential sector was the 'Low Density Residential' sector consuming 5,418,976kL in the base year (Appendix 4, Table 6). The 'High Density Residential' sector consumed 27,422kL of scheme water in the base year (Figure 9). Since the 2000/01 inventory year, the 'Low Density Residential' sector's scheme water consumption has decreased by 18% from 6,587,251kL collectively to 5,418,976kL in 2002/03. *Note*: '*High Density' type of housing is a property with two or more dwellings (eg block of flats, a duplex or above). 'Low Density' housing comprises single dwelling properties (eg detached houses). In the Milestone 1 inventory data total consumption of flats is allocated to 'High Density' sector, and 'Low Density' consumption includes consumption of houses (Appendix 4, Table 6).*

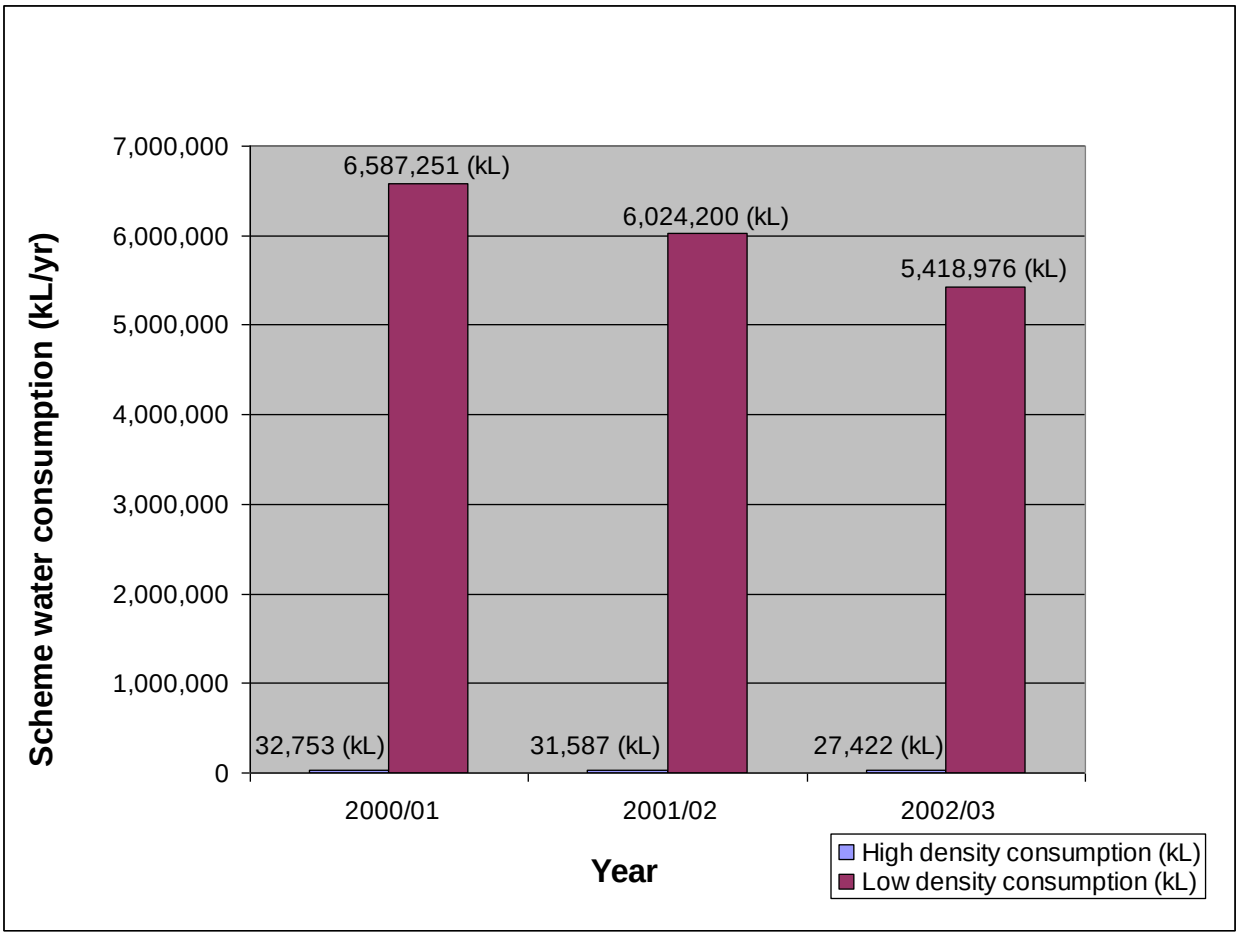

Figure 9: Annual Scheme Water Consumption within Low and High Density Residential Sectors (Milestone 1 data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

In the base year the non-residential sector has decreased its per property water consumption by 20% with a reduction of 323kL in annual water use from 1,626kL to 1,303kL since 2000/01 (Figure 10 and Appendix 4, Tables 8,9 and 10). As there is no indicator for a standard non-residential water account, a comparison of Kalamunda's non-residential consumption per property with the Perth average can not be assessed.

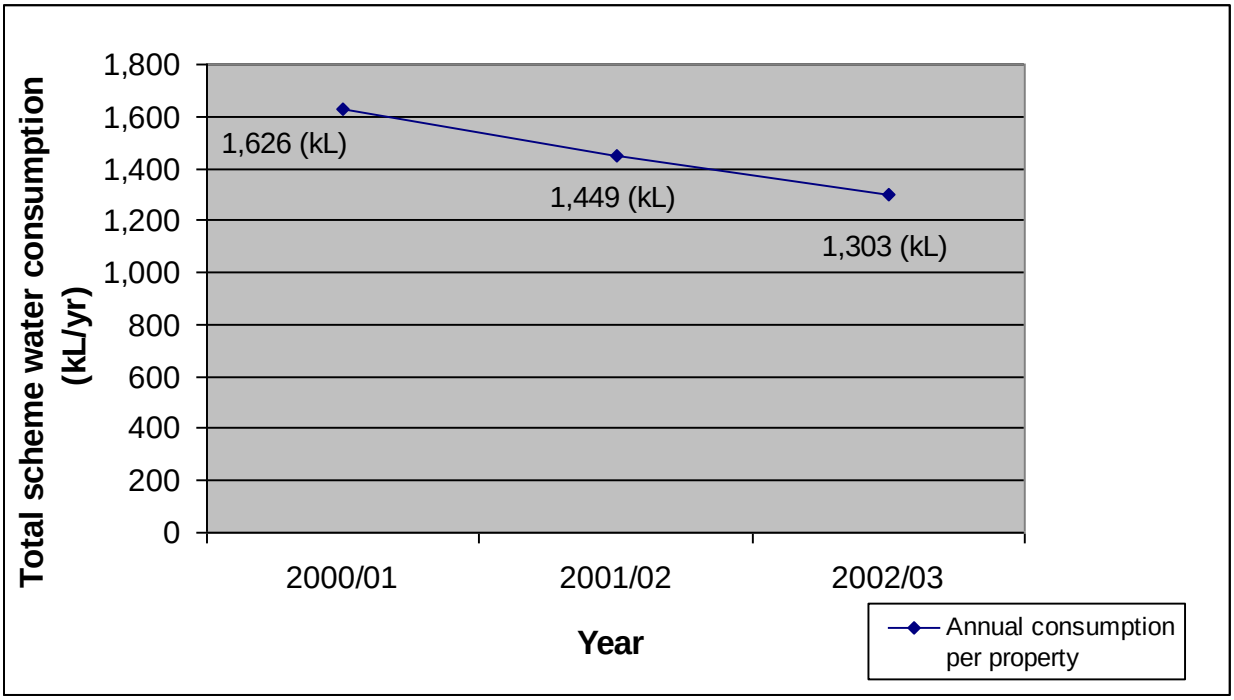

Figure 10: Annual Non-residential Scheme Water Consumption per Property since 2000/01 (Milestone 1 Data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

In 2002/03 base year the top 3 sources of the scheme water consumption across the non-residential sector were the 'Manufacturing and Construction' sector (285,372kL), 'Cultural, Recreational and Personal Services' sector (124,073kL), and the 'Education' sector (117,908kL) (Figure 11 and Appendix 4, Table 10). These 3 sectors consumed 63.13% of the total of the scheme water consumed by the non-residential sector.

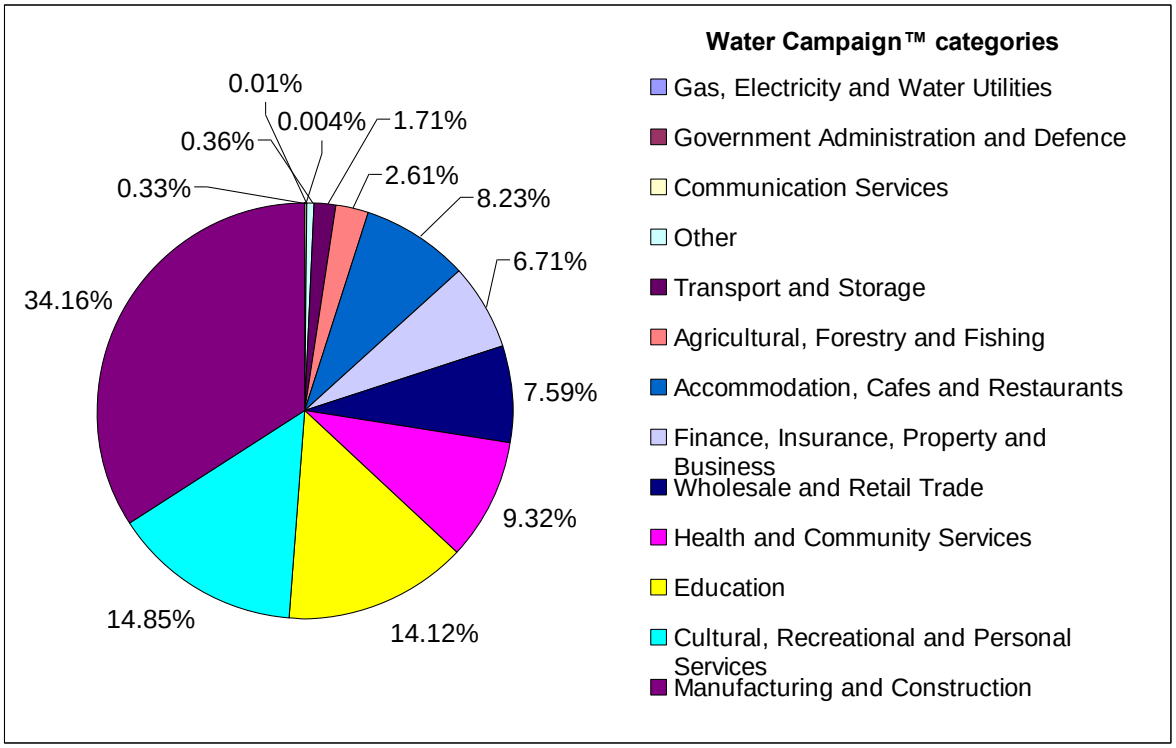

Figure 11: Percentage Breakdown of Non-residential Scheme Water Consumption by Water Campaign™ Categories Types for the Base Year 2002/03 (Milestone 1 Data)
(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

The scheme water consumption reduction within the Community sector is correlated with scheme water consumption restrictions put in place in October 2001 (Water Campaign™, 2005). As groundwater consumption is not extensively metered in WA it was not included within the Milestone 1 Community sector inventory therefore making it difficult to determine if the reduced scheme water consumption within the Community sector is due to a change in source or the water use restrictions (Water Campaign™, 2005).

2.2 Water Quality

At Milestone 1 the Shire's Water Team completed the Water Quality Checklists for both the Corporate (Shire's operations) and Community sectors (residential, industrial and commercial) to assess current water quality management and the impact of community activities on receiving waters within the Shire of Kalamunda (Appendices 5 and 6). In accordance with the ICLEI's requirements the water quality checklists included seven water quality categories:

1. Erosion and sediment control;
2. Gross litter and pollution management;
3. Herbicide, pesticide and fertiliser management;
4. Nutrient management;
5. Swimming pools (Private and Council owned);
6. Wastewater management; and
7. Groundwater management.

In order to set qualitative water quality goals at Milestone 2 the Water Team selected three priority areas from the above categories for both the Corporate and Community sectors. The Water Team also included into the checklists the Shire's specific activities that will add value to each priority area and enable the Shire to strive towards best management practices in the areas which can impact upon water quality (Appendices 5 and 6). These priorities indicate areas of focus for the Shire of Kalamunda and help form the basis of the Water Action Plan.

The following sub-sections present the key results from the Milestone 1 corporate and community water quality inventories.

2.2.1 Corporate Water Quality Priority Areas

At Milestone 1 the Water Team in partnership with key staff members has completed the Corporate Water Quality Checklist and suggested that the Shire addresses the following three corporate water quality priority areas:

1. Erosion and sediment control
   Shire of Kalamunda additional notes:
   Guidelines to determine in which cases an erosion/sediment/water quality control plan should be submitted by applicant.

2. Groundwater management
   Shire of Kalamunda additional notes:
   Guidelines to determine in which cases a surface and ground water quality (hydrology) control plan should be submitted by applicant.

3. Nutrients
   Shire of Kalamunda additional notes:
   Retention of native vegetation and vegetation links.

The Shire of Kalamunda District Conservation Strategy Review and Environmental Sustainability Plan Draft. (2009) indicates that there are soils with a high to moderate potential to become acid sulphate soils occur in interdunal swales, flats and creeklines such as:

- Hatch Crt, Stirling Cres, Adelaide St and Croft Pl;
- Between Berkshire Rd and Nardine Cl; and
- Along Yule Brook south and west of Hartfield Park

Most of the costal plain sands including much of High Wycombe and Wattle Grove and parts of Maida Vale and Forrestfield are identified as being at low to moderate risk that put a pressure on the Shire to respond to this issue accordingly (Shire of Kalamunda, 2008).

The Shire of Kalamunda already implements sound management activities in the priority areas of nutrient management and erosion and sediment control management, mainly through implementation of the following policies and guiding documents:

- Tree and Endemic Vegetation Preservation Policy;
- Flood and Stream Management Policy;
- Protection of the Environment Policy;
- Housing in Environmentally Sensitive Areas Policy;
- Flood and Stream Management Policy; and
- Wildlife Corridors Strategy.

The implementation of these policies demonstrates that the Shire of Kalamunda is committed to working toward achieving its Corporate water quality goal. *Note: Section 5 of this report includes more detailed information on the actions and policies implemented since the base year to address water quality issues within the Corporate sector.*

Next to each Corporate water quality priority area the Water Team allocated specific actions that the Shire is advised to complete to respond to the adjacent priority area. Through an officer consultation process a set of new initiatives has been proposed to address all corporate water quality areas that are outlined in the 'Water Action Plan Table' contained within section 6 of this document.

2.2.2 Community Water Quality Priority Areas

At Milestone 1 the Water Team in partnership with key staff members has completed the Community Water Quality Checklist and suggested that the Shire addresses the following three community water quality priority areas:

1. Groundwater management
   Shire of Kalamunda additional notes:
   Groundwater and surface water quality management (both gross pollutants and nutrient increases).

2. Erosion and sediment control
   Shire of Kalamunda additional notes:
   Sedimentation and erosion control (specifically in upper reaches of creek line systems).

3. Nutrients
   Shire of Kalamunda additional notes:
   Retention of native vegetation.

The Shire currently implements management activities in all three of the above Community water quality priority areas. The implementation of a planning control that maintains a vegetated buffer strip along drainage lines is an example of erosion and sediment control actions. The Shire also implements nutrient and gross litter pollution management, primarily through the provision of waste removal services and education and information distribution to the community. Sound groundwater management is reflected in the Schedule 10 of the Shire of Kalamunda Local Planning Scheme No 3, which details the requirements of soil and groundwater contamination remediation plans. The implementation of these activities again reinforces the Shire of Kalamunda's commitment to sustainable water management and the achievement of the Shire's Community water quality goal. *Note: Section 5 of this report includes more detailed information on the actions and policies implemented since the base year to address water quality issues within the Community sector.*

Next to each Community water quality priority area the Water Team allocated specific actions that the Shire is advised to complete to respond to the adjacent priority area. Through an officer consultation process a set of new initiatives has been proposed to address all community water quality areas that are outlined in the 'Water Action Plan Table' contained within Section 6 of this document.

3 Statement of Water Goals

The water conservation and water quality goals were established as part of Milestone 2 of the Water Campaign™ and form the basis of the 'Water Action Plan' for the Shire of Kalamunda. By endorsing and achieving these goals the Shire will demonstrate a strong leadership and commitment to sound water management and raise community awareness about water quality and water conservation issues.

The proposed goals have been based on analysis of the scheme water consumption and water quality inventories completed for both the Corporate and Community sectors at Milestone 1 of the Water Campaign™, consultation between the Shire's Water Team and stakeholders such as the Swan Canning Cleanup Project, EMRC staff, Eastern Hills NRM officers and ICLEI staff. The consultative process has meant that each goal is achievable, measurable and relevant to the Shire's operations and fits within 'State Water Strategy 2003' and 'State Water Plan 2007' recommendations.

The Shire's Water Team recommends that the Shire of Kalamunda adopts proposed water management goals and endorses the Water Action Plan to achieve concurrently Milestone 2 and Milestone 3 of the Water Campaign™ by December 2009.

The following sub-sections of this report outline a set of proposed corporate and community water management goals.

3.1 Corporate Water Conservation Goal

The corporate water conservation goal is a public statement of the Shire's approach to water conservation that focuses on water use reductions associated with corporate activities. This goal is expressed as a percentage of gross scheme water consumption which is measured against the base year levels.

Shire of Kalamunda's Corporate water conservation goal is:

To reduce corporate scheme water consumption by 20 % below base year 2002/03 levels by target year 2011/12.

Justification

The Shire of Kalamunda completed scheme water consumption inventory within corporate sector in February 2005 and selected base year as a financial year of 2002/03 that was the most recent year of data in Milestone 1 which best represented the Shire's ongoing scheme water consumption. In accordance with the ICLEI's requirements the suggested corporate water conservation goal will be measured against 2002/03 levels.

The total scheme water consumption across all facilities for base year was 74,774kL. Because the Shire has set a goal of 20% reduction by 2012, it therefore aims to save 14,955 kL of scheme water by the target year.

Base year consumption (corporate sector) = 74,774kL
Reduction goal of 20% = 14,955kL
Target year = 2012
Target consumption = 59,819kL

Based on the Shire of Kalamunda having quantified a 35% reduction in water use in the base year 2002/03 from the 2000/01 levels (Appendix 1, Table 1), the Water Team suggested that a further 20% reduction from 2002/03 levels by 2012 is achievable. The Shire of Kalamunda has already recorded a 7% reduction (Appendix 1, Table 3) within the Corporate sector in 2006/07 from 2002/03 levels and saved 5,094kL. This was due to a number of reasons, namely improvement in the Shire's water conservation management. For example sealing previously unknown leaking mains throughout the Shire's operations, the establishment of waterwise plantations and the implementation of "dry park" concepts contributed to reduction in scheme water consumption within the Corporate sector. A change from scheme water to bore water use for irrigation purposes also attributed to reduction in scheme water consumption (eg scheme water irrigation systems at Viv Robinson Reserve and Emms Reserve in High Wycombe have been replaced with bore water supply (Shire of Kalamunda, 2005). *Note: Section 5 of this report includes more detailed information on the actions and policies implemented since the base year in the area of water conservation within the Corporate sector (Section 5, Table 1).*

It is the Water Team's opinion that further 13% reduction of scheme water use from 2006/07 levels is achievable by the target year 2011/12 (Figure 12). Figure 12 demonstrates actual and projected trends in the Corporate scheme water consumption and water savings. This figure also illustrates an increase in scheme water consumption during 2007/08 that was caused by high scheme water use within a number of the Shire's corporate facilities including: Gooseberry Hill Hall, Wet and Wild Aquatic Centre, Central Hall, Ray Owen Reserve, Palm Terrace public toilets, Bill Shaw Reserve, Flora Terrace Reserve and Kalamunda Library.

In order to reach the goal the Shire's relevant departments will have to implement a range of the Corporate water conservation actions that cumulatively save 14,955kL of water calculated at the target year. Most of the Corporate water conservation actions outlined in the 'Water Action Plan Table' contained within section 6 of this document will target high consuming corporate facilities and lead to the Shire achieving its conservation goal.

The implementation of the water conservation actions will also support and enhance the profile of the Shire's 'Strategic Plan (2009-2014)'.

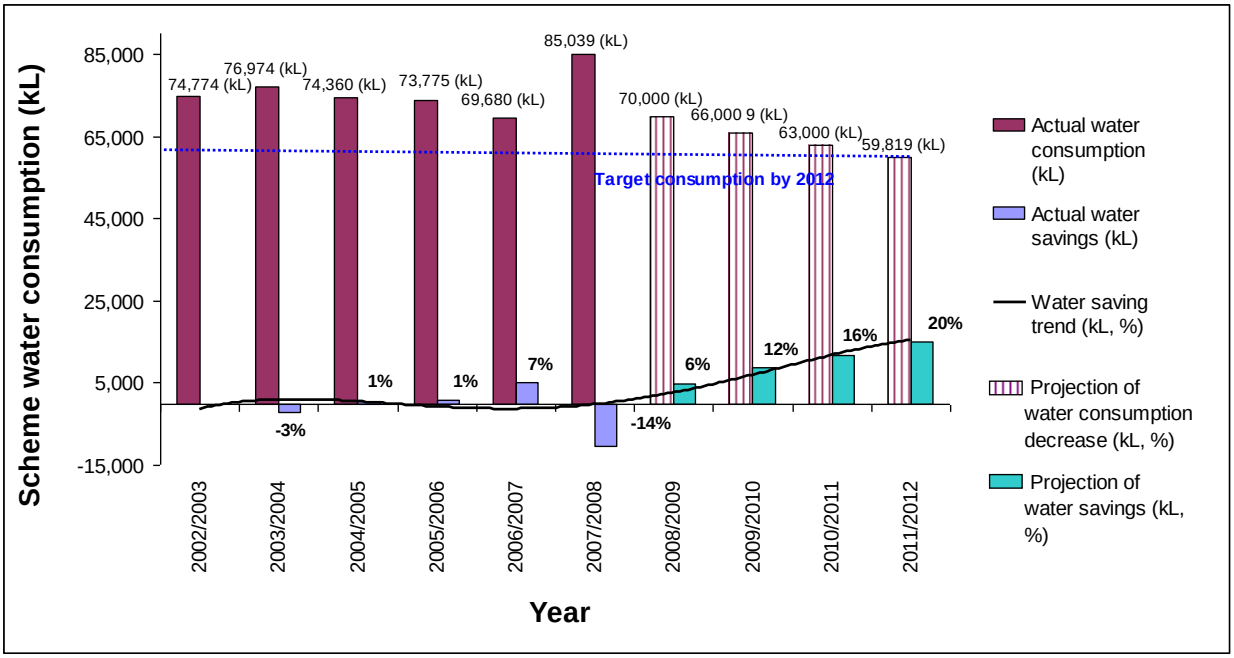

Figure 12: Trends in Corporate Scheme Water Consumption (kL) and Savings (%) from 2002/03 by the Target Year 2012
(Data Source: Water Corporation, 2004 and 2008 and ICLEI Oceania, 2004)

The Shire of Kalamunda has been proactive in the recent years retrofitting the administration building and various public facilities with water efficient appliances. The Shire is currently conducting trials with waterless urinals at the administration building, Hartfield Park and the Visitors Centre facilities. If these trial projects prove to be successful then it is expected that the Shire will replace all existing urinals with waterless urinal systems through out these facilities.

In 2007/08 the Shire has received funding via the Community Water Grants program to implement a range of water conservation actions within its corporate sector. Utilising this funding, the Shire is aiming to reduce scheme water consumption at the Norm Sadlier Pavilion public facility by 50%, saving 580,000 litres per year. In early 2008/09 the Shire established waterwise gardens around the administration building area aiming to reduce water consumption and promote native gardens to the community. These recently implemented projects will contribute to overall reduction in scheme water and groundwater use by the target year.

According to the Water Campaign™ goal setting approaches, the Shire of Kalamunda has chosen the goal to make the commitment and to aim for water conservation improvements within the Corporate sector. The 2011/12 financial year was chosen as the target year to coincide with the 'WA State Water Strategy' and 'WA State Water Plan'. The 'WA State Water Plan' is the guiding action plan for the State Government's response to a drying climate therefore the Shire's water management activities should be consistent with this Plan. Working towards the achievement of the Corporate water conservation goal the Shire of Kalamunda will provide leadership in the implementation of water conservation measures within the Perth's Eastern Region and aim to save 14,955kL of scheme water by the target year.

3.2 Corporate Water Quality Goal

The Corporate water quality goal is a public statement of the Shire's approach to improving water quality. This goal relates to how the Shire can improve its management practices to bring about improvements in the quality of water that leaves the Shire's operations including public land and enters receiving waters.

The Corporate water quality goal is expressed as a number of action points and set in relation to the ICLEI Water Campaign™ points based system. Each key initiative in the corporate water quality module of the 'Water Action Plan' carries with it a stipulated number of points that can be credited towards the target goal. The key initiatives implemented since the base year will be attributed towards the Corporate water quality goal. *Note: It is a requirement that water quality goal is set in relation to the ICLEI's points based system, with 50 points as a minimum goal.*

At Milestone 1 and 2 the Shire of Kalamunda completed corporate water quality inventory and selected 2004/05 as a base year for the corporate water quality module. *Note: According to the ICLEI's requirements the base year for the Corporate and Community water quality modules is the year of joining the Water Campaign™. As the Shire of Kalamunda committed its support to undertake the Water Campaign™ in August 2004 therefore the Water Team identified 2004/05 as a base year.*

The Corporate water quality module of the 'Water Action Plan' identifies series of actions that when implemented will deliver significant water quality improvements within the corporate sector and address three corporate water quality priority areas as outlined in section 2.2.1'Corporate Water Quality Priority Areas'.

The Shire of Kalamunda's Corporate water quality goal is:

To achieve 50 points of actions from the Corporate Water Campaign™ water quality action cards by the strategic year 20011/12.

Justification

The Shire of Kalamunda has been proactive and has already implemented a large number of the Corporate water quality actions since the base year that will be credited towards the Corporate goal (Section 5 'Actions and Policies Implemented Since the Base Year'). In 2007/08 the Shire was successful in the third round of the Federal Government's Community Water Grants receiving $49,334 to improve water quality of Poison Gully Creek by installing vegetation filters, clearing rubbish, undertaking weed control and re-vegetation. This funding enabled the Shire to reduce pollution loads and severe erosion as well as to treat water from the Perth Airport North sub-catchment which is one of the 31 major sub-catchments in the Swan Canning River System.

In accordance with the WAP water action table there are about 39% of the corporate water quality management actions that are ongoing or have already commenced that carry a stipulated number of 96.5 points that could be credited towards the target goal. Therefore the Water Team through an analysis of current and proposed Shire's corporate water management activities believes that a total achievement of 50 points is a realistic goal that will meet ICLEI's requirements and inspire continual water management improvement in the corporate sector. In order to achieve this goal, the Shire's relevant departments will be required to implement a range of the corporate water quality actions outlined in the 'Water Action Plan Table' contained within section 6 of this document.

3.3 Community Water Conservation Goal

The community water conservation goal is a public statement of the Shire's approach to improving water management within the community sector that focuses on water use reductions associated with community activities.

The water conservation goal is expressed as a percentage of annual gross water consumption per household which is measured against the base year. *Note: At Milestone 2 the Shire's Water Team suggested to target only high scheme water consumers within the community sector therefore the community water conservation goal was set to address high consumption within residential sector only. The non-residential sector was not considered due to insignificant consumption during inventory period (Figure 7).*

The Shire of Kalamunda's community water conservation goal is:

To reduce annual residential scheme water consumption per household by 15% below base year 2002/03 levels by strategic year 2011/12.

The Shire of Kalamunda plays a primary role in facilitating the planning and development of its district. Therefore, the Shire has significant influence over the long-term function of its community via planning and development mechanisms in relation to sustainable water management. In addition to this function, the Shire plays a very important role in educating the community about activities that affect water quality and water consumption. There are also many organisations that may be involved in these water management initiatives within the Shire. This is particularly the case in water conservation education initiatives and enforcement / regulation. Therefore, it is important to note that the community water conservation goal set at Milestone 2 is seen as a goal that the Shire will be contributing to achieving rather than achieving on its own.

Justification

The Shire of Kalamunda completed community scheme water consumption inventory in February 2005 and selected base year as a financial year of 2002/03 that was the most recent year of data in Milestone 1 which best represented the community sector's ongoing scheme water consumption. In accordance with the ICLEI's requirements the suggested community water conservation goal will be measured against 2002/03 levels.

In 2002/03 the average residential scheme water consumption was 313kL per household (Figure 8). Because the Shire has set a community conservation goal of 15% reduction by 2012, it therefore aims to encourage its residents to reduce annual scheme water consumption to less than 266kL per household. This will enable the Shire to coincide with the State Government target and achieve a domestic scheme water consumption average of 100kL per person per annum within residential sector by 2012. *Note: Shire of Kalamunda's community profile data indicates that an average household size in the Shire of Kalamunda is 2.66 persons.*

Base year consumption per property (residential sector) = 313kL
Reduction goal of 15% = 47kL
Target year = 2012
Target consumption per property = 266kL
Target consumption per capita = 100kL

At Milestone 1 the Shire of Kalamunda has already recorded a reduction of 22% in scheme water use per property within the residential sector (Figures 8 and 13). Therefore the Water Team suggested that further 15% reduction by 2012 below 2002/03 levels, is achievable through strong waterwise influence on residential sector focusing on high consuming suburbs such as Hacketts Gully and Wattle Grove (Figure 13 and Appendix 4, Table 11).

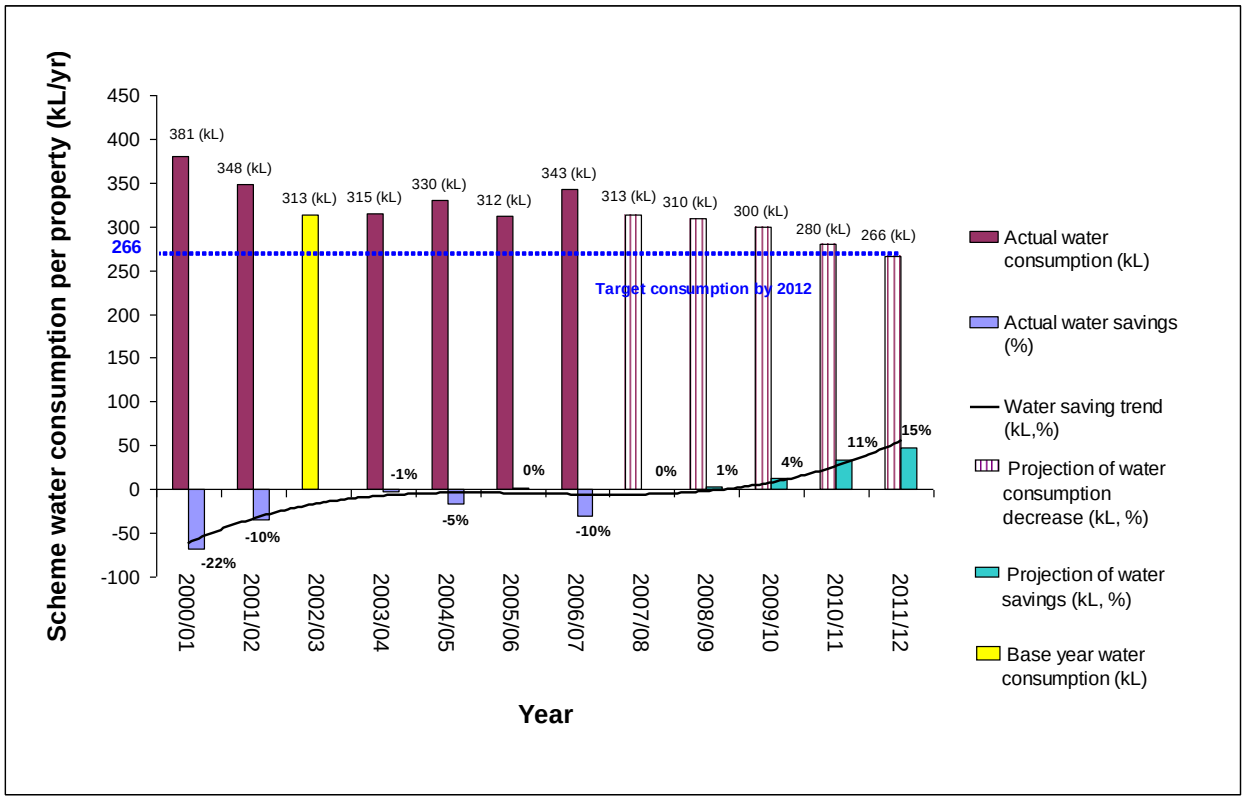

Figure 13: Trends in Community Sector's Residential Scheme Water Consumption per Household (kL) and Savings (%) from 2002/03 by the Target Year 2012
(Data Source: Water Corporation, 2004 and 2008 and ICLEI Oceania, 2004)

Figure 13 illustrates residential scheme water consumption (per household) trends and demonstrates potential water savings by the target year. The residential scheme water consumption inventory data demonstrates an increase in total residential consumption in 2006/07 that was caused mainly by high scheme water use within low density of the residential sector (Appendix 4, Tables 6 and 6a). This set of data also indicates that within four year period from 2002/03 there has been an increase of 8% in the number of properties connected to scheme water from 17,387 (in 2002/03) dwellings to 18,754 (in 2006/07) due to significant urbanisation over recent years that allowed new residential subdivisions and development to occur especially in the foothills suburbs, such as Forrestfield, High Wycombe, Maida Vale and Wattle Grove. This explains the increase in consumption within residential sector. Due to rapid population growth the Shire's Water Team proposed to consider scheme water use reduction per residential property rather than total reduction throughout entire residential sector.

In reaching the community goal the Water Team resolved that the Shire will concentrate on the residential sector for the following reasons:

- The residential properties are the highest scheme water consumers within the Shire's community sector;
- There has already been a 22% reduction in scheme water use achieved within the residential sector in 2002/03 below 2000/01 levels (Appendix 4, Table 11);
- There is a higher potential for a residential property to reduce its water consumption;
- It is easier for the Shire to influence residential sector through planning and development mechanisms and education campaigns; and
- The residential scheme water consumption can be easily measured Water Corporation, therefore providing a quantitative means for monitoring and evaluation.

The Shire of Kalamunda supports the community to conserve water, in particular via a number of education campaigns and town planning mechanisms. Specific examples of these strategies include:

- Hosting Great Gardens and Living Smart workshops for local residents encouraging the use of water wise plants;
- Plants to Residents Program providing free native species;
- Free Mulch to Local Residents Program promoting water efficient irrigation;
- Promoting installation of water efficient appliances and installation of rainwater tanks through implementation of the '5 Star Plus Efficiency Standards for Sustainable Housing in Western Australia';
- Encouraging the use of grey water recycling; and
- Promoting water sensitive urban design and best practice management initiatives through the implementation of the Local Planning Scheme No 3.

The State Water Plan 2007 suggests that the Perth metropolitan residential water use averaged 106kL a year a person. However households are being urged by the State Government to conserve more water to further reduce Perth's demand to less than 100kL a year a person. This requires ongoing maintenance and improvement of current outdoor watering practices and water efficiency measures within residential sector.

According to the Water Campaign™ goal setting approaches, the Shire of Kalamunda selected the goal to make a commitment to aim for water conservation improvements within the Community sector. The 2011/12 financial year was chosen as the target year to coincide with the 'WA State Water Strategy' and 'WA State Water Plan'. Working towards the achievement of the community water conservation goal the Shire of Kalamunda will provide leadership in the implementation of water conservation measures within the Perth's Eastern Region and encourage its residents to reduce annual scheme water consumption to less than 100kL per person to coincide with the State Government water reduction target.

In order to achieve this goal, the Shire's relevant departments will be required to implement and quantify a range of the community water conservation actions outlined in the Water Action Plan that cumulatively contribute to a 15% reduction in per household, annual consumption based on 2002/03 consumption data. Implementation of the community water conservation actions will support and enhance the profile the Shire's 'Strategic Plan (2009-2014)' as well as provide consistency with the 'State Water Plan 2007'.

3.4 Community Water Quality

The Community water quality goal is a public statement of the Shire's approach to improving water quality. This goal relates to how the Shire's community sector can improve its management practices to bring about improvements in the quality of water that leaves the private land and enters receiving waters.

Consistent with the Corporate water quality goal the Community water quality goal is also expressed as a number of goal points set in relation to the ICLEI's points based system with 50 points as a minimal goal. Each key initiative in the Community water quality module of the 'Water Action Plan' carries with it a stipulated number of points that can be credited towards the target goal. The key initiatives implemented since the base year will be attributed towards the goal.

At Milestone 1 and 2 the Shire of Kalamunda completed community water quality inventory and selected 2004/05 as a base year for the community water quality module. *Note: According to the ICLEI's requirements the base year for the Corporate and Community water quality modules is the year of joining the Water Campaign™. As the Shire of Kalamunda committed its support to undertake the Water Campaign™ in August 2004 therefore the Water Team identified 2004/05 as a base year.*

The Community water quality module of the 'Water Action Plan' identifies series of actions that when implemented will deliver on significant water quality improvements within community sector and address three community water quality priority areas outlined in section 2.2.2 'Community Water Quality Priority Areas'.

The Shire of Kalamunda's Community water quality goal is:

To achieve 50 points of actions from the Community Water Campaign™ water quality action cards by the strategic year of 2011/12.

Justification

It is recognised by the Water Team that the community water quality goal will not be achieved entirely through the efforts of the Shire of Kalamunda as there are other external stakeholders involved in various water management initiatives within the community. In achieving the community goal the main actions from the Shire will be influencing the community through planning, development and community education.

The Shire of Kalamunda in partnership with other stakeholders has been proactive and already implemented a large number of the Community water quality actions since base year that will be credited towards the Community goal (Section 5 'Actions and Policies Implemented since the Base Year').

In accordance with the WAP water action table there are about 44% of community water quality actions either have already commenced or are ongoing that carry a stipulated number of 112.5 points that could be credited towards the target goal. Therefore the Water Team through an analysis of current and proposed Shire's water management activities believes that a total achievement of 50 points is a realistic goal that will meet ICLEI's requirements and inspire continual water management improvement as well as demonstrate a commitment to the improvement of water management in the community sector. In order to achieve this goal, the Shire's relevant departments will be required to implement a range of the community water quality actions outlined in the 'Water Action Plan Table' contained within section 6 of this document.

4 Groundwater Conservation

The Shire of Kalamunda extracts groundwater to maintain public recreation reserves and landscaping around buildings. The number of bores at each reserve varies according to water outputs and reserve size. The extraction and delivery of groundwater is organised via submersible or centrifugal pump from the water source, via below ground pipes to in ground sprinklers for distribution onto target areas such as grassed areas and garden beds. The water extraction localities in the Shire of Kalamunda do not contain any notified environmentally sensitive areas. The groundwater extraction occurs at two Bush Forever sites including Pioneer Park and Hartfield Park in Forresfield (Shire of Kalamunda, 2005).

In 2005 the Shire of Kalamunda developed the 'Water Extraction Operation Strategy' to ensure sustainable extraction and use of groundwater resources (Shire of Kalamunda, 2005). This strategy focuses in particular on accuracy of consumption reporting through installation of approved meters and groundwater quality testing and monitoring.

In 2008 the Shire of Kalamunda upon the Department of Water's request, produced the 'Water Conservation Plan' (WCP) to address groundwater consumption within the Shire's Corporate sector. A major component of the WCP is the collection, validation, collation and reporting of groundwater use and efficiency data. The implementation of the 'Water Conservation Plan' will help the Shire conserve groundwater and improve water use efficiency contributing to the sustainable management of the Shire's Public Open Space (POS) under the drier and warmer conditions we are experiencing. The WCP also aims to maintain the usefulness and attractiveness of POS while being more efficient in groundwater use.

This report provides an executive summary of the Shire's 'Water Extraction Operation Strategy' and 'Water Conservation Plan' and includes groundwater consumption data, conservation objectives and strategies.

4.1 Corporate Groundwater Consumption Profile

In accordance with the 'Water Conservation Plan 2008' the Shire of Kalamunda's groundwater consumption is under allocated licence limits therefore in the future there is room for the Shire to increase the size of the area which is sustainably irrigated and / or participate in a groundwater trading scheme.

The Shire of Kalamunda extracts groundwater in accordance with the licensing authority's regulatory instructions and requirements. The Shire presently operates 36 bores which extract groundwater from the Superficial and Leederville aquifers under four licences.

The breakdown of use and allocation by water resource for the Shire of Kalamunda's licensed allocation for 2007/08 is shown in the Tables 1 and 2.

Table 1: Groundwater Allocation and Use within the Corporate Sector of the Shire of Kalamunda for all Sites and Licences Combined in 2007/08.

		Total number of licences:	4
Total number of sites:	36	Number of meters:	16
Total licensed area (ha)	100.34	Total licensed allocation (kL)	864,575
Total irrigated area (ha)	86.85	Total usage 07/08 (kL)	455,870
Irrigated area data quality	1.0	Usage data quality index	1.7
Area usage (kL/ha)	5,249	Area usage% over/under	-47.3

(Data Source: Shire of Kalamunda, 2008)

Table 2: Groundwater Allocation and Use within the Corporate Sector of the Shire of Kalamunda for each Licence in 2007/08.

License number	Groundwater resource	Number of sites	Number of meters	Licensed area (ha)	Licensed allocation (kL)	% over/ under allocation
156453	Leederville aquifer	1	1	5.70	10,300	-21.7
158077	Superficial aquifer	33	15	92.87	841,000	-47.9
162948	Superficial aquifer	1		0.77	5,775	-16.9
165529	Superficial aquifer	1		1.00	7,500	-30.7

(Data Source: Shire of Kalamunda, 2008)

Tables 1 and 2 indicate that currently the Shire of Kalamunda uses significantly less groundwater than the statutory limits. In accordance with the 'Water Conservation Plan', the demand for groundwater within the Shire's corporate sector over the next 5 years is not expected to increase significantly, however irrigated POS is being established requiring extra water for irrigation.

As part of the 'Water Conservation Plan' the Shire of Kalamunda has identified a number of major groundwater conservation issues that the Shire may face over the next 5 years that are listed in order of priority below.

- Use/ overuse of groundwater by sporting grounds by organised sporting clubs or groups;
- Aging infrastructure across the Shire's operations;
- Community safety;
- Budget constraints;
- Community asset degradation; and
- Risk of weed growth and spread to private property.

4.2 Corporate Groundwater Conservation Objectives

The Shire of Kalamunda recognises its significant role in the area of sustainable groundwater management therefore the Shire has included four major groundwater conservation objectives in the 'Water Conservation Plan' aiming to achieve these objectives over the next 5 years.

These objectives are listed below:

- To ensure the Shire of Kalamunda is at all times operating within the statutory limits and license conditions of the groundwater extraction licenses issued under section 5C of the Rights in Water and Irrigation Act 1914 (WA) by the Department of Water;
- To conform to legislation/ regulation in relation to groundwater use/ bore use for Local Government;
- To implement hydrozoning of irrigated reserves on a staged bases commencing with water delivery efficiency studies in each reticulated reserve; and
- To maintain existing reticulation systems in good working order to minimise water wastage and maximise water delivery to target areas.

4.3 Water Efficiency and Environmental Considerations

Since 1995 the Shire has progressively replaced all mobile water cannons with in ground reticulation systems that allowed accurate testing of the systems to prioritise resources towards implementation of the most efficient reticulation system (Shire of Kalamunda, 2005).

As funding becomes available the Shire of Kalamunda implements hydrozoning principles throughout its areas of POS, demonstrating leadership in efficient water use and minimum wastage of water.

Hydrozoning is an important tool to promote water conservation and irrigation efficiency ensuring that groundwater allocation targets are met. Table 3 presents the Shire's current hydrozoning status for each licence.

Table 3: The Shire of Kalamunda's Hydrozoning Information for each Licence in 2007/08.

License number	Groundwater resource	Number of sites	Number of parks currently hydrozoned	Irrigated area (ha)	Current hydrozoned area (ha)
156453	Leederville aquifer	1	1	5.6	5.60
158077	Superficial aquifer	33	7	79.5	8.09
162948	Superficial aquifer	1		0.7	
165529	Superficial aquifer	1	1	1.0	1.00

(Data Source: Shire of Kalamunda, 2008)

Minimisation of water loss from wind disturbance is a major feature of watering system operation in the Shire of Kalamunda therefore the Shire's irrigation crew developed schedules to allow for the impacts of easterly winds on watering patterns (Shire of Kalamunda, 2005).

Lysimeters are another tool the Shire uses to obtain a regular set of data to determine efficiency of the system and to ensure that delivered water at reserves does not leach past grass root zones at unacceptable rate. The Shire's Irrigation Crew also takes in to consideration the Bureau of Meteorology's evaporation rates to ascertain water delivery rates on grassed reserves (Shire of Kalamunda, 2005).

The Shire of Kalamunda undertakes regular soil and grass leaf testing at each sporting use reserve to monitor fertiliser leachate levels to ensure sustainable application of fertilisers on Shire's reserves. The Shire's Environmental Services in partnership with other stakeholders undertake monitoring of the areas adjoining developed reserves where water is extracted to record any unusual vegetation deaths due to water stress. Annually a sample of water taken from each production bore is analysed by National Association of Testing Authorities (NATA) accredited laboratory to determine various chemical indicators and usability for irrigation (Shire of Kalamunda, 2005).

4.4 Corporate Groundwater Conservation Strategies

As part of the Water Conservation Plan the Shire of Kalamunda has identified a number of strategies that will be undertaken to achieve the groundwater conservation objectives outlined above. These strategies include:

- To continue measuring and recording water use and amount of irrigated area to accurately determine water use;

- To undertake progressive incorporation of hydrozoning across irrigated playing fields and public open space;
- To improve the water delivery systems;
- To increase the performance of irrigation systems;
- To implement improved irrigation scheduling practices;
- To maintain irrigation systems at optimum performance;
- To monitor the impact of groundwater abstraction on environment;
- To investigate the storage and use of alternative water sources such as recycled water and stormwater;
- To develop and implement turf maintenance programs that lead to water savings; and
- To communicate the outcomes of the WCP to the community.

The Shire of Kalamunda has also proposed a number of groundwater conservation actions to support WCP strategies and address water management issues within corporate sector of the Shire. These actions are incorporated in the Water Action Plan Table of this report (Section 6 - 'Water Action Plan').

5 Actions and Policies Implemented since the Base Year

The Shire of Kalamunda currently has a number of strategies and policies in place regarding water quality and conservation management. Table 4 encompasses a full list of water management practices that have been implemented since base year. *Note: Base year for the community and corporate water conservation goal is 2002/03 (the most recent inventory year). The base year for the corporate and community water quality goals is 2004/05 (the year of joining the Water Campaign™).*

Table 4: Water Management Strategies Implemented since the Base Year.

Inventory Type	Water Quality Areas	Implemented Action
Corporate Water Conservation	**Water efficient devices/ appliances**	• Installation of dual flush toilet cisterns throughout administration office and some community buildings and public amenities;
	Waterless appliances	• Installation of waterless urinals at Ray Owen Sports Centre, Hartfield Park Recreation Centre, administration building and Kalamunda library.
	Swimming Pool	• Undertaking a feasibility study to determine viability of the Shire's Wet and Wild Aquatic Centre; and • Allocating some funding towards the Aquatic Centre maintenance and upgrading.
	Wastewater/ stormwater/ greywater reuse	• Implementation of the Housing in Environmentally Sensitive Areas Policy with a focus on storm water harvesting and reuse;

	Irrigation practices	• Implementation of the water wise landscaping in the vicinity of the Shire's administration office to reduce by 80% water use for irrigation purposes (2007); • Undertaking water conservation procedures through increasing the capacity of the Glen Road reserve dam to reduce reliance on scheme water on Ray Owen Reserve (2006); • Upgrading of the bore on MacKenzie Reserve (2006); • Installation of waterwise in ground reticulation system at Ledger Road Reserve in Gooseberry Hill and Davies Park in Maida Vale (2005); • Implementation of the Shire's tree planting program; • Installation of lysimeters as part of irrigation monitoring system; • Creating passive reserves and landscaped areas with waterwise plant species that have a low water requirement; • Replacing areas of irrigated grass with indigenous plants with low water requirements and drought tolerant plant species where practical; • Use of wetting agents and soil conditioner when establishing new plants; • Establishing plants together which have similar water requirements; • Use of mulch; • Using less water for well established indigenous plants and trees; • Planting of street trees in water absorbent material that assists with water retention; and • Replacement of overhead sprays in garden beds with subsurface drippers to increase water efficiency.
Corporate Water Quality	**Sediment and erosion control**	• Undertaking revegetation activities in the area of public open space known as Woodlupine Living Stream to improve water quality through the installation of sediment control and nutrient stripping devices (2006); • Undertaking erosion control and creek restoration program with assistance from volunteers, to restore natural alignment of Nestle Brae and Booralie reserve creeks (2005); • Participation in 'Perth Biodiversity Project' (since August 2004) to address erosion, sedimentation and eutrophication issues; • Undertaking construction of sediments traps as part of upgrading of POS; and • Providing ongoing maintenance of watercourses in new subdivisions.

	Herbicide, pesticide and fertiliser use	• Undertaking a review of herbicide and fertiliser use within the Shire's operations; • Undertaking a regular soil and grass leaf testing at each reserve to monitor fertiliser leachate levels to ensure sustainable application of fertilisers on Shire's reserves; • Application of phosphate free fertilisers to minimise damage to receiving environment; and • Avoiding application of fertilisers on established gardens and passive open space areas.
	Gross litter control	• Installation of Gross Pollutant Traps (eg 6 Gross Pollutant Traps were installed in 2005/06 and ECOLITE Drainage Treatment Systems were installed in December 2004); • Undertaking street litter bin maintenance and community education in the area of minimisation of gross litter generation; and • Undertaking a review of current street sweeping program and implementation of best management practices in street sweeping.
	Acid sulphate soil management	• Requiring sub-division developers to provide management plans in relation to acid sulphate soils; and • Participation in 'Perth Biodiversity Project' (since August 2004) to deal with salinity issues and to reduce groundwater recharge in the areas affected by salinity.

	Nutrients	• Sustainable maintenance and restoration of local creeks, wetlands, stormwater drains bushlands, and other passive open space reserves with native plant species; • Development and implementation of the Local Biodiversity Strategy (2008); • Progressing through the 'Perth Biodiversity Project' milestone framework with a focus to reduce nutrient discharge into waterways, pollutant breakdown and absorption; • Implementation of Woodlupine Living Stream Project in Wattle Grove (2006); • Maintaining best management practices in turf fertiliser application; • Implementation of the monitoring program for water and nutrient use in major parks and reserves; • Installation of lysimeters to measure level of nutrients, pH and salinity; • Implementation of biannual water quality monitoring of watercourses with support through EMRC; • Supporting volunteer groups to manage wetlands and waterways in their local neighbourhood; • Development and implementation of the Tree and Endemic Vegetation Preservation Policy (2008); • Implementation of the Wildlife Corridor Strategy (1998); • Implementation of the Waterway Rehabilitation; and • Implementation of the Weed Control Strategy (2002).
	Groundwater contamination management	• Implementation of a chemical spill emergency response procedures focusing on containment in case of chemical spills; • Implementation of ongoing maintenance of petrol/ oil trap that was installed in Shire's operation facilities to remove oil based substances from wastewater; • Conduction of a regular groundwater testing on two former landfill sites; • Upgrading of the Shire's toxic and hazardous substances storage facilities in line with best practice; and • Undertaking ongoing maintenance of the oil collection facility at the Shire's waste management facility for community use.

Community Water Conservation	**Water efficient devices/ appliances**	• Encouraging the use of water efficient appliances through implementation of 5 Star Plus Building Standards; • Implementation of planning and building controls that support the use of waterless and water efficient appliances; • Promotion of the State Government's Waterwise Rebates to the residential sector; • Promotion of dual flash toilets installation in non residential sector; and • Promotion of the Water Sensitive Urban Design principles in residential and non residential sectors; and • Support and delivering of a community education program encouraging the use of water efficient appliances by the local community through Living Smart program.
	Waterless Appliances	• Support and delivering of a community education program encouraging the use of waterless appliances by the local community through Living Smart program.
	Wastewater/ stormwater/ greywater reuse	• Promotion of greywater systems for external use in residential properties as governed by the Department of Health; and • Promotion of the State Government's Waterwise Rebates to the residential sector, with a focus on greywater reuse technologies.
	Irrigation practices	• Implementation of the 'Plants to Residents' scheme; • Supporting the uptake of water efficient garden and/or landscape practices by the community through professional consultation by parks staff members; • Undertaking native tree planting campaign through implementation of the 'Commemorative Tree Planting' for residents; • Provision of free mulch to local residents to reduce water consumption and suppress weed growth in private gardens; • Implementation of the 'Dams on Water Courses' policy to inform land owners of their legal restrictions on the use of water. • Encouraging local community to plant waterwise gardens using native plant species through hosting a range of community education workshops; • Promotion of the Water Sensitive Urban Design principles in the residential sector; • Promotion and support of rainwater tank installation in residential and non residential sectors and; and • Promotion of the State Government's Waterwise Rebates to the residential sector with a focus on water conservation through water wise irrigation practices.
Community Water Quality	**Sediment and erosion control**	• Delivering a sediment and erosion control community education campaign via Bush Skills for Hills program; and • Implementation of a policy/ planning control which supports the retention or enhancement of remnant vegetation on private land with its main purpose being for sediment and erosion control.

	Herbicide, pesticide and fertiliser use	• Hosting 'Great Gardens' workshops to encourage establishment of native gardens with minimal requirement for fertilisers; and • Undertaking community education campaign through range of bush skills workshops with a focus on the ways to minimise the use of herbicide through mulch application to suppress weed growth.
	Gross litter control	• Immediate removal of dumped rubbish from public land and attempt to identify people involved; • Participation in 'Illegal Dumping Program' to target 'fly tipping' hot spots within the district; and • Implementation of the waste recycling scheme and bulk kerbside collection services.
	Acid sulphate soil management	• Consideration of the risk exposure to acid sulphate soils as part of every development application.
	Nutrients	• Support and facilitation of various Friends Groups to ensure community engagement in bushland revegetation and restoration projects primarily focusing on water quality improvement; • Holding community planting days to demonstrate the benefits of using native species for water quality improvement and biodiversity enhancement purposes; • Incorporating Water Sensitive Urban Design principles and best management practice initiatives into developments, and placing surface and groundwater conditions on development applications; • Installation of local law signage at public open spaces on the collection and appropriate disposal of dog faeces; • Installation of bins for dog faeces collection at public open space where dog exercise is approved by the Shire; and • Implementation of a community education program focusing on ways to reduce nutrient load in receiving environment through encouraging residents to collect and compost their green waste.
	Groundwater contamination management	• Implementation of a community education campaign focusing on the safe disposal of hazardous waste including motor oils, backyard chemicals, paint and car batteries.

6 Water Action Plan

6.1 Water Action Plan Outline

The Shire's Water Team in partnership with EMRC staff have produced the 'Water Action Plan' (WAP) to achieve the Water Campaign™ goals and to support groundwater conservation objectives and strategies outlined in the 'Water Conservation Plan' (2008). The actions contained in the WAP have the potential to result in significant cost savings and other benefits to the Shire including better water quality and improved water conservation. The WAP is designed as an organic document that has the ability to change to take advantage of new opportunities and adapt priorities to reflect the Shire of Kalamunda's water management needs.

The 'Water Action Plan' is based on ICLEI's Water Action Cards Template and presents corporate and community key initiatives that are supported by suggested water management actions for implementation.

It is important to note that actions are to be implemented over a five year time period. Suggested priority, budget and responsibility for the implementation of actions have been included in this report to give the Shire an indication of future year's activities and financial plans for the Water Campaign ™ at the Shire. Each action has been given a suggested priority based on the following:

- The estimated water conservation and quality benefit associated with the action;
- The costs associated with the implementation of the action; and
- The social, economic and environmental value to the region.

It is recommended that high priority actions be implemented within the next two years and medium priority actions in the next five years. Some actions are currently being implemented and are denoted as 'Standard Practice' this does not mean however that these actions should be overlooked, rather, they should be continued to be implemented with the continued amount of energy and resources. Some medium priority actions may be implemented sooner if opportunities for grants and sponsorship arise. In relation to the Shire's financial plan each action has been given a suggested budget based on:

- If the action is standard practice it is subject to normal budget expenditure;
- If the action relates to officer time it is subject to costs in kind; and
- If the action is not currently part of the Shire's standard practice it will be subject to funding.

To ensure that actions within the WAP are put into operation by the appropriate Shire officers a suggested delegation of responsibility for each action has been assigned to the appropriate business unit. Considerable consultation with officers identified as being responsible for action implementation has occurred, specifically regarding the action and priority. These actions were discussed and amended to reflect water conservation and water quality needs within both community and corporate sectors.

Implementation of the 'Water Action Plan' will support and enhance the profile of the 'Strategic Plan (2009-2014)'. The WAP will also reflect various actions in the 'Water Conservation Plan' (2008).

The implementation of the 'Water Action Plan' has great potential to provide the following benefits:

<u>Economic</u>

- Increase in financial savings associated with the implementation of water conservation measures;

- Reduction of scheme/groundwater consumption through an alternative water supply use such as stormwater, greywater and treated wastewater;
- Water savings through the implementation of best practice water management including sustainable use of groundwater and scheme water management;
- Establishment of environmental indicators through water consumption and water quality analysis to measure and compare the success of programs;
- Assisting community members to reduce their water use accruing financial savings;
- Improvements in the local economy through the development of new markets in areas such as water efficient devices, irrigation and landscape services; and
- Creation of local job opportunities through implementation of measures in the plan.

Social

- Improvement of community relations and fostering a greater sense of community through development of partnerships with the commercial residential and industrial sectors of the community; and
- Establishment of a local leadership in the area of the water resource management.

Environmental

- Contribution to the sustainable management of our water resources;
- Improvements in water quality through the implementation of initiatives such as erosion and sediment control, reduced use of chemicals and the containment and appropriate disposal of gross litter etc.

6.2 Water Action Plan Table

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Data Management	**Aim**	**To allow the ongoing improvement of data collected for the Water Campaign™ inventory and therefore allow the selection of targeted and effective actions.**					
	DM-1a	Conduct water consumption inventory within corporate sector. Where detailed information on the corporate consumption was not available in Milestone 1 data, investigate other sources of information and incorporate this into inventory process.	Data Management	High	Subject to costs in kind	Building Maintenance	This action is ongoing.
	DM-1b	Identify and investigate high consuming sites with multiple uses. Install sub meters where appropriate and develop a process for recording this information in the Shire's inventory.	Data Management	High	Subject to funding	Building Maintenance; Parks and Reserves	This action is ongoing.
	DM-1c	Modify existing internal data/asset management systems to include data required for the Water Campaign™ inventory.	Data Management	Medium	Subject to costs in kind	Building Maintenance	
	DM-1d	In some cases, Council may use water which comes from a source that is not metered. This includes use of groundwater, stormwater, wastewater, greywater, rainwater etc. To gain a holistic understanding of Shire's water use, install meters, or use other methods to measure this use. In conjunction with Water Campaign™ Support Officers either from ICLEI and / or EMRC develop a process for integrating this data into the Shire's Water Campaign™ inventory.	Data Management	High	Subject to funding	Building Maintenance; Parks and Reserves	This action is ongoing.
	DM-1e	In some cases, the amount of water that can be taken sustainably from a water source may not be known (eg surface water, groundwater, stormwater etc). Where this information is not available, work with appropriate stakeholders to determine the sustainability of these sources.	Research/ Scoping Study Data Management	Medium	Subject to funding	Building Maintenance; Parks and Reserves	This action is ongoing.

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	DM-1f	At Milestone 4 Council is required to calculate the savings resulting from the actions they have implemented. Where data for calculating savings resulting from implemented actions is not easily available, implement systems to record, or estimate water saved through these actions.	Data Management	Medium	Subject to costs in kind	Building Maintenance; Parks and Reserves	
Avoid	**Aim**	**To reduce water consumption through avoiding water use where waterless options exist.**					
Irrigation practices	**IP-1a**	Conduct a staged review of the Shire's POS to determine use by the community and investigate possible water conservation opportunities (see IP-2a).	Research/ Scoping Study Data Management	High	Subject to funding	Parks and Reserves; Community Development	
	IP-2	**Implement actions to avoid water use in new and existing open spaces.**					
	IP-2a	In consultation with Council and the community consider the browning off / revegetation of POS in accordance with the results of the review conducted as part of action IP-1a above.	Implementation	High	Subject to costs in kind	Parks and Reserves	
	IP-2b	Install/ retrofit open space areas with waterless / water efficient garden and landscape designs.	Implementation	High	Subject to funding	Parks and Reserves	This action is ongoing.
	IP-3a	Develop a range of maintenance procedures appropriate to the implemented actions.	Maintenance	High	Subject to costs in kind	Parks and Reserves	
	IP-3b	Conduct training for relevant staff to ensure that they understand how to implement the above actions and maintenance procedures.	Maintenance	High	Subject to funding	Parks and Reserves	
Waterless Appliances	**WA-1**	Utilise the water consumption inventory and investigate high consuming sites to determine which waterless appliances will be the most effective.	Data Management	High	Subject to costs in kind	Building and Reserves	
	WA-2	Develop a policy which requires all upgraded Shire's amenities to include waterless devices, where practical.	Policy	High	Subject to costs in kind	Planning and Development Services; Building	

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
						Maintenance	
	WA-3	Conduct a scoping study in conjunction with appropriate stakeholders in order to determine the feasibility of installation/ retrofitting of various waterless appliances in the Shire's buildings and public amenities.	Research/ Scoping/ Feasibility Study	High	Subject to funding	Building Maintenance	
		In accordance with scoping study results install and/ or retrofit waterless appliances.					
	WA-3a	Install / retrofit waterless urinals into existing Shire managed buildings, where ever the technology is deemed appropriate.	Implementation	High	Subject to funding	Building Maintenance	This action is ongoing.
	WA-3a	I Install / retrofit waterless urinals in all new managed Shire buildings, wherever the technology is deemed appropriate.	Implementation	High	Subject to funding	Building Maintenance	This action is ongoing.
	WA-3b	Install composting toilets into the Shire managed public amenities, where practical.	Implementation	High	Subject to funding	Health Services; Building Maintenance	
	WA-4a	Develop a range of maintenance procedures appropriate to the implemented actions.	Maintenance	High	Subject to funding	Building Maintenance	
	WA-4b	Conduct training for relevant staff to ensure that they understand how to implement the above actions and undertake routine maintenance procedures.	Maintenance	High	Subject to costs in kind	Building Maintenance	
Council Decision Making	**CDM-1**	Investigate the feasibility of developing an internal policy which ensures avoiding unnecessary water use at any new or upgraded facilities through appropriate control mechanisms	Policy	Low	Subject to costs in kind	Planning and Development Services; Building Maintenance	
	CDM-2	Establish procedures to ensure the ongoing policy implementation.	Implementation	Low	Subject to costs in kind	Building Maintenance	
	CDM-3	Collect information on policy effectiveness.	Benefit Reporting	Low	Subject to costs in kind	Planning and Development Services; Building Maintenance	

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Reduce	**Aim**	**To reduce the amount of potable/ groundwater used through water conservation, efficiency and stormwater/rainwater harvesting.**					
Irrigation Practices	**IP-1b**	Develop an appropriate irrigation monitoring system to track consumption and quality of irrigation water over time.	Data Management	High	Subject to costs in kind	Parks and Reserves	This action is ongoing.
	IP-1c	Conduct an audit of each reticulation system to determine the efficiency of the irrigation practice in the Shire.	Data Management	High	Subject to costs in kind	Parks and Reserves	This action is ongoing.
	IP-2	Develop a policy which facilitates all new or upgraded open space areas to be landscaped according to water conservation principles.	Policy	High	Subject to costs in kind	Parks and Reserves	
	IP-3	**Implement water conservation actions in new and existing open spaces.**					
	IP-3a	Install irrigation systems which allow areas to be irrigated based on the actual requirements of the grassed area (eg installation of moisture sensitive reticulation system to irrigate parks and gardens).	Data Management/ Implementation	High	Subject to funding	Parks and Reserves	This action has commenced.
	IP-3b	Progressively upgrade any substandard irrigation systems in accordance with the results of the irrigation system audit in the action IP-1c above.	Implementation	High	Subject to funding	Parks and Reserves	This action is ongoing.
	IP-3d	Amend soil to reduce water consumption (eg use wetting agents in soil media plant stock to control the release of moisture).	Implementation	High	Subject to normal budget expenditure	Parks and Reserves	This action is ongoing.
	IP-3f	Locate plants together that have similar water requirements.	Implementation	High	Subject to normal budget expenditure	Parks and Reserves	This action is ongoing.
	IP-3g	Select and plant native plants in new and upgraded landscaping, where practical.	Implementation	High	Subject to normal budget expenditure	Parks and Reserves; Environmental Services	This action is ongoing.

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	SH-3b	Investigate the construction of stormwater detention systems and/ or aquifer storage recovery schemes in new or upgraded reserves for use in irrigation practices.	Implementation	Medium	Subject to funding	Engineering Services; Parks and Reserves	
	IP-3h	Use mulch in planting beds and street trees to maintain moisture.	Implementation	High	Subject to normal budget expenditure	Parks and Reserves; Environmental Services	This action is ongoing.
	IP-3i	Select drought tolerant grass species for turf upgrade and new site establishment.	Implementation	High	Subject to normal budget expenditure	Parks and Reserves	This action is ongoing.
	IP-3j	Develop a list of plants (waterwise/ native) suitable for landscaping around the Shire for use by the Operations teams.	Implementation	High	Subject to costs in kind	Parks and Reserves; Environmental Services	This action has commenced.
	IP-3k	Install meters on all Shire's bores to ensure sustainable groundwater extraction.	Implementation	High	Subject to funding	Parks and Reserves	This action has commenced.
	IP-3l	Undertake groundwater feasibility investigation for the sustainable extraction limits and desired water quality.	Implementation	High	Subject to costs in kind	Parks and Reserves	
	IP-4a	Develop an irrigation leak detection system.	Maintenance	High	Subject to costs in kind	Parks and Reserves	
	IP-4c	Develop and implement appropriate maintenance regimes for each action implemented.	Maintenance	High	Subject to costs in kind	Parks and Reserves	
	IP-5	Conduct training for relevant staff to ensure that they understand how to implement the above actions and maintenance procedures.	Staff Training	High	Subject to costs in kind	Parks and Reserves	

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Water Efficient Appliances	**WEA-1**	Utilise the water consumption inventory and investigate high consuming sites to determine which water conservation measures will be the most effective.	Data Management	High	Subject to normal budget expenditure	Building Maintenance	This action is ongoing.
	WEA-2a	Develop policy/ guidelines which require Shire's contractors to comply with water conservation practices.	Policy	High	Subject to costs in kind	Building Maintenance; Parks and Reserves	
	WEA-2b	Develop policy/ guidelines which require all upgraded Shire's amenities to include water conservation devices and water efficient appliances.	Policy	High	Subject to costs in kind	Planning and Development Services; Building Maintenance	
	WEA-3	Conduct a scoping study in conjunction with appropriate stakeholders in order to determine the feasibility of installation/ retrofitting of various water efficient appliances in the Shire's buildings and public amenities.	Research/ Scoping/ Feasibility Study	High	Subject to costs in kind	Building Maintenance	
		In accordance with scoping study results install and/ or retrofit water efficient appliances.					
	WEA-3a	Install/ retrofit dual flush toilets in the Shire's buildings and public amenities where practical.	Implementation	High	Subject to funding	Building Maintenance	This action is ongoing.
	WEA-3b	Install/ retrofit water efficient shower roses in the Shire's buildings and public amenities.	Implementation	High	Subject to funding	Building Maintenance	This action has commenced.
	WEA-3c	Install/ retrofit flow control valves in all taps in the Shire's buildings and public amenities.	Implementation	High	Subject to funding	Building Maintenance	This action has commenced.
	WEA-3d	Install/ retrofit spring loaded taps in the Shire's buildings and public amenities.	Implementation	High	Subject to funding	Building Maintenance	This action has commenced.
	WEA-3e	Install rainwater tanks to supplement mains water use in the Shire's buildings/ public amenities.	Implementation	Low	Subject to funding	Building Maintenance; Parks and Reserves	

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	WEA-3f	Install water efficient washing machines in the Shire owned and leased buildings.	Implementation	Medium	Subject to funding	Building Maintenance	
	WEA-4	Conduct an internal water management education campaign to raise awareness and educate staff in the importance of saving water and the best ways to use the water efficient appliances.	Staff Education	Medium	Subject to costs in kind	Building Maintenance; Environmental Services	
	WEA-5a	Develop maintenance and leak detection system for the Shire's amenities.	Maintenance	Low	Subject to costs in kind	Building Maintenance	This action is ongoing.
	WEA-5b	Develop procedures for dealing with leaks quickly.	Maintenance	Medium	Subject to costs in kind	Building Maintenance	This action is ongoing.
Recycle	**Aim**	**To treat and utilise low quality water produced from one application to be used in another application.**					
Swimming Pool Water	**SPW-1**	Conduct a scoping study in conjunction with appropriate stakeholders in order to determine the feasibility of recycling (capture, treatment and reuse) water emptied from the Shire's swimming pools.	Research/ Scoping/ Feasibility Study	Low	Subject to funding	Community Development; Health Services	
	SPW-2a	In conjunction with appropriate stakeholders develop and implement a monitoring program to ensure the pool water reuse will not have an adverse impact on local environmental systems or public health.	Data Management	Low	Subject to costs in kind	Community Development; Health Services	
	SPW-3	Develop a policy that addresses how the Shire's swimming pool backwash and potential wastewater from maintenance activities will be reused.	Policy	Low	Subject to costs in kind	Community Development; Health Services; Building Maintenance	
	SPW-4	**In accordance with the scoping study utilise treated pool water for various purposes.**					
	SPW-4b	Investigate the feasibility of installing alternate wastewater system(s) to capture, treat and reuse the Shire's swimming pool backwash for alternative uses.	Feasibility Study	Low	Subject to funding	Community Development; Health Services; Building Maintenance	

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	SPW-5	Develop and implement appropriate maintenance regimes for each action implemented.	Maintenance	Low	Subject to costs in kind	Community Development; Health Services; Building Maintenance	
	SPW-6	Conduct training for relevant staff to ensure that they understand how to implement the above actions and maintenance procedures.	Staff Training	Low	Subject to costs in kind	Community Development; Health Services; Building Maintenance	
Treated Wastewater and Greywater	**TWR-2a**	In conjunction with appropriate stakeholders develop and implement a monitoring program to ensure the use of treated wastewater will not have an adverse impact on local environmental systems or public health.	Data Management	Medium	Subject to funding	Community Development; Health Services; Building Maintenance; Parks and Reserves	
	TWR-2c	Inform community about waste water reuse.	Community Education	Low	Subject to costs in kind	Environmental Services	
	TWR-3	Develop/ adopt and implement a policy which ensures the use of cleaning products with low salt concentrations in the Shire's operations.	Policy	Low	Subject to funding	Building Maintenance	
	TWR-4	**In accordance with scoping study results utilise treated wastewater to substitute potable or groundwater supplies.**					
	TWR-4a	Investigate installation of greywater systems for toilet flushing in all Shire owned buildings.	Implementation/ Research/ Scoping/ Feasibility Study	Low	Subject to funding	Health Services; Building Maintenance	
	TWR-4b	Investigate the feasibility of utilising treated wastewater (greywater or stormwater) for washing down fleet vehicles and machinery, subject to suitable supply and availability of appropriate waster waste.	Implementation	Low	Subject to funding	Health Services; Building Maintenance	

CORPORATE WATER CONSERVATION ACTIONS							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	TWR-4c	Investigate utilisation of greywater for irrigation in the Shire's parks and gardens (eg greywater systems for sub-surface irrigation), subject to requirements imposed relevant state and federal legislation.	Implementation/ Research/ Scoping/ Feasibility Study	Medium	Subject to funding	Health Services; Parks and Reserves	
	TWR-5	Develop and implement appropriate maintenance regimes for each action implemented.	Maintenance	Low	Subject to costs in kind	Community Development; Building Maintenance; Parks and Reserves	
	TWR-6	Conduct training for relevant staff to ensure that they understand how to implement the above actions and maintenance procedures.	Staff Training	Low	Subject to costs in kind	Building Maintenance; Parks and Reserves	

COMMUNITY WATER CONSERVATION							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Data Management	**Aim**	**To allow the ongoing improvement of data collected for the Water Campaign™ inventory and therefore allow the selection of targeted and effective actions.**					
	DM-1a	Conduct a water consumption inventory within community sector. Where detailed information on the community's consumption was not available for completion of Milestone 1, investigate other sources for obtaining this information and incorporate into the inventory process.	Data Management	High	Subject to costs in kind	Building Maintenance	This action is ongoing.
	DM-1b	Where data for reporting savings for each action is not easily available, implement systems to record water saved through the implemented actions (for use at Milestone 4).	Data Management	High	Subject to costs in kind	Building Maintenance	
Avoid/ Reduce	**Aim**	**To reduce water consumption through avoiding water use where waterless options exist or to reduce the amount of potable/ groundwater used through water conservation, efficiency and stormwater/ rainwater harvesting.**					
Irrigation Practices	**IP-1**	Support the uptake of water efficient garden and/ or landscape assessments by the residential and non-residential community.	Data Management	High	Subject to funding	Parks and Reserves	This action is ongoing.
	IP-2	Develop and implement planning and building controls that ensure developers install irrigation equipment that is compatible with the Shire's requirements and guidelines.	Data Management/ Implementation	High	Subject to costs in kind	Parks and Reserves; Planning and Development Services.	
	IP-2	**Support the implementation of waterless landscaping techniques and water efficient irrigation practices throughout the Shire's residential and non-residential community sectors.**					
	IP-2a	Encourage the development and implementation of planning and building control mechanisms that support the use of waterless and water efficient landscaping techniques by builders / developers.	Implementation	High	Subject to costs in kind	Building Services; Planning and Development Services; Parks and Reserves;	

COMMUNITY WATER CONSERVATION							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	IP-2b	In conjunction with the appropriate stakeholders support the delivery to local residents of a range of community workshops that actively support the uptake of waterless and water efficient landscaping techniques.	Implementation	Medium/ High	Subject to costs in kind/ Subject to funding	Parks and Reserves; Environmental Services	This action is ongoing.
	IP-2c	Continue implementation of Plants to Residents program to encourage local residents to reduce water consumption for irrigation practices through planting low water demand plants.	Implementation	High	Subject to normal budget expenditure	Parks and Reserves; Environmental Services	This action is ongoing.
	IP-2d	Develop and implement planning and building controls that support the installation of irrigation equipment that is compatible with best practice.	Implementation	High	Subject to funding	Planning and Development Services; Parks and Reserves	
	IP-3c	In partnership with Water Corporation encourage promotion of water efficient irrigation practices.	Implementation	High	Subject to costs in kind	Parks and Reserves; Environmental Services	
	IP-3a	Provide ongoing support for implemented actions by the community.	Maintenance	Medium	Subject to costs in kind	Environmental Services; Community Development	
Waterless/ Water Efficient Appliances	**WWEA-1**	Support the uptake of water audits by the residential and non-residential community to ensure targeted and effective actions.	Data Management	High	Subject to costs in kind	Building Maintenance; Environmental Services	
	WWEA-2	**Support the installation/ retrofitting of waterless and water efficient appliances throughout the Shire's residential and non-residential community sectors.**					
	WWEA-2a	Develop and implement planning and building controls that support the use of waterless and water efficient appliances and develop processes to ensure their ongoing implementation.	Implementation	High	Subject to costs in kind	Building Maintenance; Planning and Development Services.	This action has commenced through implementation of '5 Star Plus New Standard in Sustainable Housing'.

COMMUNITY WATER CONSERVATION							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	WWEA-2b	In conjunction with the appropriate stakeholders support the delivery of a community education program encouraging the use of waterless and water efficient appliances.	Implementation	Low/ Medium	Subject to costs in kind	Environmental Services	
	WWEA-2c	In conjunction with the appropriate stakeholders work with specific sectors of the community to support water conservation.	Implementation	Medium	Subject to costs in kind	Building Maintenance; Environmental Services; Community Development	
	WWEA-2d	Develop and promote the planning and building controls that support the installation of rainwater tanks, where practical.	Implementation	Low	Subject to costs in kind	Building Services	This action has commenced through implementation of '5 Star Plus New Standard in Sustainable Housing'.
	WWEA-2e	In partnership with Water Corporation encourage promotion of installation / retrofitting of water efficient technologies.	Implementation	High	Subject to costs in kind	Environmental Services	
	WWEA-3	Support the appropriate maintenance of the implemented actions by the community.	Maintenance	Medium/ High	Subject to costs in kind	Building Maintenance; Community Services; Environmental Services	
Recycle	**Aim**	**To treat and utilise low quality water produced from one application to be used in another application.**					
Treated Wastewater and Greywater	**TWR-2**	In conjunction with the appropriate stakeholders continue the implementation of a monitoring program to ensure that the use of approved waste treatment systems do not have an adverse impact on local environmental systems or public health.	Data Management	High	Subject to funding	Health Services	This action is ongoing.

COMMUNITY WATER CONSERVATION							
Water Saving Areas	**Ref #**	**Key Initiatives**	**Category**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	TWR-3a	Conduct community awareness raising sessions in order to ensure the acceptance of wastewater reuse in the local government area.	Community Education	Low	Subject to costs in kind	Environmental Services	
	TWR-3b	Promote the uptake of cleaning products with low salt concentrations within the community (To support increased availability of recycled water).	Community Education	Medium	Subject to costs in kind	Environmental Services	
	TWR-4	**Utilise treated wastewater to substitute potable or groundwater supplies.**					
	TWR-5a	Encourage the development and implementation of planning and building controls mechanisms that support the installation of greywater reuse systems by the local community within the Shire's residential and non-residential sectors, subject to requirements imposed relevant state and federal legislation.	Implementation	Medium	Subject to costs in kind	Planning and Development Services; Health Services	This action has commenced through implementation of '5 Star Plus New Standard in Sustainable Housing'.
	TWR-5c	In partnership with Water Corporation encourage promotion of greywater re- use systems.	Implementation	High	Subject to costs in kind	Environmental Services	
	TWR-6	Support the appropriate maintenance of the implemented actions by the community.	Maintenance	Medium	Subject to costs in kind	Community Development; Environmental Services	

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Aim	**These actions are designed to minimise the generation and export of silts and sediments off site during the Shire construction activities.**							
Sediment and Erosion Control	**SEC-1**	Adopt erosion and sediment control policy/ guidelines for all works undertaken by the Shire.	Policy	10	High	Subject to costs in kind	Engineering Services; Planning and Development Services;	
	SEC-3	Develop and implement a maintenance schedule to ensure the ongoing implementation of the policy.	Maintenance		Low	Subject to costs in kind	Planning and Development Services;	
	SEC-4	Conduct training for staff to ensure effective implementation of the above maintenance regimes.	Staff Training		High	Subject to costs in kind	Planning and Development Services;	
Aim	**These actions are designed to minimise the environmental impacts of excessive use of herbicides and pesticides on receiving environments.**							
Herbicide, Pesticide and Fertiliser Use	**HP-1**	Conduct an assessment of the Shire's herbicide, pesticide and fertiliser use to identify any related water quality problems and potential areas for improvement.	Research/ Scoping/ Feasibility Study		High	Subject to costs in kind	Parks and Reserves ; Environmental Services; EHCMP	This action is ongoing.
	HP-5	Continue providing training to relevant staff members to ensure sustainable herbicide and pesticide use.	Staff training		High	Subject to normal budget expenditure	Parks and Reserves; Environmental Services	This action is ongoing.
	HP-6	Assess herbicide use, volumes and method of application at set intervals (eg three times per year).	Benefit Reporting	5	Low	Subject to costs in kind	Parks and Reserves; Environmental Services	

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Aim	**These actions are designed to minimise exposure of potential acid sulphate prone soils to air and therefore reduce acidification of soils, damage to constructed assets and impact upon receiving environments.**							
Potential Acid Sulphate Soil Management	**PASS-1**	Map the extent of potential acid sulphate soils within the Shire's area.	Monitoring and Data Management	5	Low	Subject to costs in kind	Environmental Services	This action is ongoing.
	PASS-3	Continue providing advice to the Shire's contractors on acid sulphate soil status within the Shire's managed areas through existing guidelines.	Policy	10	Medium	Subject to costs in kind	Environmental Services	This action is ongoing.
	PASS-4	Carry out ongoing enforcement of acid sulphate soil management guidelines.	Implementation		Low	Subject to costs in kind	Environmental Services	This action is ongoing.
	PASS-5	Develop and implement a maintenance schedule to ensure the ongoing implementation of the acid sulphate soil guidelines.	Maintenance		Low	Subject to costs in kind	Environmental Services	
	PASS-6	Conduct training for relevant staff to ensure effective implementation of the above maintenance regimes.	Staff Training		Medium	Subject to normal budget expenditure	Environmental Services	
Aim	**These actions are designed to minimise the export of gross pollutants to receiving environments.**							
Gross Litter Control	**GLT-1**	Conduct a litter audit for the Shire's managed areas (eg collect and collate data on the quantity and type of litter trapped for use in education and awareness raising programs).	Monitoring and Data Management	5	Medium	Subject to costs in kind	Ranger Services; Engineering Services	This action has commenced.
	GLT-2	**Gross litter management actions.**						

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	GLT-2b	Review current street sweeping programs and implement best management practices in street sweeping.	Implementation	5	Low	Subject to normal budget expenditure	Engineering Services	This action is ongoing.
	GLT-2c	Respond to litter audit results by the appropriate selection and installation of litter trapping devices in stormwater drains.	Implementation	5	Medium	Subject to funding	Engineering Services	
	GLT-2d	Provide a level of maintenance to street litter bins that prevents overflow into nearby drains.	Implementation	5	Medium	Subject to normal budget expenditure	Health Services; Ranger Services	This action is ongoing.
	GLT-2e	Introduce various recycling options in the Shire's operations including depot and administration office.	Implementation	5	Medium	Subject to normal budget expenditure	Health Services	This action is ongoing.
	GLT-2f	Utilise litter audit results and remove unnecessary rubbish bins in parks and install education signage.	Implementation	5	Low	Subject to funding	Health Services	
	GLT-3	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	Medium	Subject to costs in kind	Engineering Services; Ranger Services	
Aim	**These actions are designed to assist in developing a better understanding and ensure prompt action to minimise the environmental impacts of excessive nutrient loads to receiving environments.**							
Nutrients								
	WWT-2	**Wastewater treatment actions.**						

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Wastewater Treatment	**WWT-2a**	Identify and manage leachate from disused landfill sites to prevent contamination of surrounding soil and water bodies.	Implementation	5	High	Subject to funding	Health Services	This action is ongoing.
	WWT-2b	Implement a program that will see all Shire's properties connected to sewer or the effective containment of septic system by target year (where practical).	Implementation	5	Low	Subject to funding	Health Services; Building Maintenance	
	WWT-3	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	Low	Subject to costs in kind	Building Maintenance	
	WWT-4	Conduct training for relevant staff to ensure effective implementation of the above maintenance regimes.	Staff training		Low	Subject to costs in kind	Building Maintenance	
Water Sensitive Urban Design	**WSUD-1**	Conduct a feasibility study to determine whether the Shire's land and drainage features are able to incorporate WSUD features.	Research/ Scoping/ Feasibility study		High	Subject to costs in kind	Engineering Services; Planning and Development Services	
	WSUD-2	Adopt an internal WSUD policy/ guidelines.	Policy	5	High	Subject to costs in kind	Engineering Services; Planning and Development Services.;	
	WSUD-3	Conduct training for engineers and town planners in WSUD modelling and engineering practices.	Staff Training	5	High	Subject to costs in kind	Engineering Services; Planning and Development Services;	
	WSUD-4	**WSUD features.**						

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	WSUD-4a	Construct a wetland for water quality improvement in line with best management practices.	Implementation	5	Low	Subject to costs in kind	Environmental Services; Parks and Reserves	This action is ongoing.
	WSUD-4c	Install bioretention lining in drainage channels	Implementation	5	Low	Subject to funding	Engineering Services; Environmental Services	
	WSUD-4d	Transform a drainage channel or creek to a living stream.	Implementation	5	Medium	Subject to funding	Engineering Services; Planning and Development Services;	This action is in progress.
	WSUD-4e	Install broken or flush kerbing where it is practical.	Implementation	5	Low	Subject to funding	Engineering Services	
	WSUD-4f	Use appropriate native landscaping on the Shire's managed land.	Implementation	5	High	Subject to costs in kind	Environmental Services; Parks and Reserves	This action is ongoing.
	WSUD-5	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	High	Subject to costs in kind	Engineering Services; Planning and Development Services;	
	WSUD-6	Conduct training for relevant maintenance staff to ensure effective implementation of the above maintenance regimes.	Staff Training		High	Subject to costs in kind	Engineering Services; Planning and Development Services	This action is ongoing.
	WSUD-7	Assess the nutrient export reduction as a result of the above.	Benefit Reporting	5	Medium	Subject to funding	Environmental Services; EHCMP	

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Other Nutrient Actions	**N-1**	Assess the impact the Shire's activities have on the nutrient load to local water bodies including the nutrient export from; fertiliser application, dog faeces, deciduous street trees, mulch piles, nursery operations and lawn mowing operations.	Research/ Scoping/ Feasibility Study		Low	Subject to funding	Environmental Services; Ranger Services	
	N-2	Conduct an ongoing water quality monitoring program to assess the level of nutrient enrichment occurring in local water bodies (in conjunction with stakeholders).	Monitoring and Data Management	5	High	Subject to normal budget expenditure	Environmental Services; EHCMP	This action is ongoing.
	N-3	**Other nutrient actions.**						
	N-3a	Encourage the development and implementation of a streetscape/ planning policy that supports reduction of the environmental impacts of excessive nutrient loads to receiving environments.	Implementation	5	High	Subject to costs in kind	Environmental Services; Parks and Reserves	
	N-3b	Where possible remove organic material generated from the Shire operations.	Implementation	5	High	Subject to costs in kind	Environmental Services; Parks and Reserves	This action is ongoing.
	N-3c	Contain mulch and soil stockpiles within appropriate physical barriers.	Implementation	5	High	Subject to funding	Parks and Reserves	
	N-3d	Implement best management practice techniques in regard to fertiliser application.	Implementation	5	High	Subject to normal budget expenditure	Parks and Reserves; Environmental Services	This action is ongoing.
	N-3e	Develop and implement a local policy which supports retention of native vegetation and vegetation links.	Implementation	5	High	Subject to costs in kind	Planning and Development Services	

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	N-4	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	High	Subject to costs in kind	Environmental Services; Parks and Reserves; Ranger Services	
	N-5	Conduct training for relevant staff to ensure effective implementation of the above maintenance regimes.	Staff Training		High	Subject to costs in kind	Planning and Development Services	
	N-6	Assess the nutrient export reduction as a result of the above.	Benefit Reporting	5	Low	Subject to costs in kind	Environmental Services; EHCMP	
Aim	**These actions are designed to minimise the environmental impacts of the aquatic centre discharges and to examine opportunities to optimise this resource.**							
Shire's Swimming Pool	**CSP-2**	Investigate possibility of using pool backwash for toilet flushing to minimise sewer discharge (eg capture, treat and reuse swimming pool's water).	Implementation	10	Low	Subject to funding	Building Maintenance	
	CSP-3	Develop and implement an ongoing maintenance schedule appropriate to action CSP-2.	Maintenance		Low	Subject to funding	Building Maintenance	
Aim	**These actions are designed to reduce and mitigate the impacts of groundwater contamination.**							
Groundwater Contamination Management	**GWC-1**	Consider identifying all potential point sources for groundwater contamination and/ or the extent of existing groundwater contamination.	Research/ Scoping/ Feasibility Study		High	Subject to funding	Environmental Services; EHCMP	This action is ongoing.

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	GWC-2	Conduct an ongoing groundwater contamination monitoring program (in conjunction with stakeholders).	Monitoring and Data Management	5	Medium	Subject to funding	Environmental Services; EHCMP	This action is ongoing.
	GWC-3	**Groundwater contamination management actions.**						
	GWC-3b	Continue maintenance of petrol/ oil trap that was installed in the Shire's depot workshop to remove oil based substances from wastewater.	Implementation	5	High	Subject to funding	Health Services	This action is ongoing.
	GWC-3c	Assess and Upgrade the Shire's toxic and hazardous substances storage facilities to comply with appropriate codes, if required.	Implementation	5	Low	Subject to funding	Health Services	This action is ongoing.
	GWC -3d	Continue the maintenance requirements for oil collection facility at the Shire's waste management facility.	Implementation	5	High	Subject to normal budget expenditure	Health Services	This action is ongoing.
Aim	**These actions are designed to reduce water recharge to the groundwater table in areas affected by salinity.**							
Salinity	**S-1**	Conduct an assessment of the salinity risk to the Shire's owned and managed land.	Research/ Scoping/ Feasibility Study		Low	Subject to costs in kind	Environmental Services	
	S-2	Undertake the groundwater salinity monitoring program (in conjunction with stakeholders).	Monitoring and Data Management	5	Low	Subject to normal budget expenditure	Environmental Services; Parks and Reserves	
	S-3	**Salinity management actions.**						

CORPORATE WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	S-3a	Partner with the local groups to assist in catchment re-vegetating areas of land to reduce recharge.	Implementation	5	Low	Subject to costs in kind	Environmental Services; EHCMP	
	S-3b	Ensure compliance with bore licence conditions for groundwater use. Develop water efficiency strategies for high use localities.	Implementation	5	High	Subject to costs in kind	Parks and Reserves; Ranger Services	
	S-3c	Develop/ adopt and implement a policy or planning control which supports the retention or enhancement of remnant vegetation on public land.	Implementation	5	Low	Subject to costs in kind	Planning and Development Services	
	S-4	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	Low	Subject to costs in kind	Planning and Development Services; Parks and Reserves	
	S-5	Conduct training for relevant staff to ensure effective implementation of the above maintenance regimes.	Staff Training		Low	Subject to costs in kind	Planning and Development Services; Parks and Reserves	This action is ongoing.

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
Aim	**These actions are designed to minimise the generation and export of silts and sediments off site during community construction activities.**							
Sediment and Erosion Control	**SEC-1**	Adopt erosion and sediment control policy/ guidelines/ planning control based on best management practices for community construction activities.	Policy	15	High	Subject to costs in kind	Engineering Services; Planning and Development Services;	
	SEC-2	Conduct training/ staff development to assist contract managers and staff in the enforcement of the erosion and sediment policy/ guidelines.	Staff Training/ Awareness Raising		Low	Subject to costs in kind	Engineering Services; Planning and Development Services	
	SEC-3	Ensure that the plan/ policy/ guidelines/ local laws are adhered to.	Implementation		Low	Subject to costs in kind	Engineering Services; Planning and Development Services.	
	SEC-5	Deliver a sediment and erosion control community education campaign (in conjunction with stakeholders).	Community Education	5	High	Subject to costs in kind	Environmental Services; EHCMP	This action is ongoing.
	SEC-6	Assess the effectiveness of the community education program.	Benefit Reporting		High	Subject to costs in kind	Environmental Services	
Aim	**These actions are designed to minimise the environmental impacts of excessive use of herbicides and pesticides on receiving environments.**							
Herbicide, Pesticide and Fertiliser Use	**HP-1**	Assess the extent of herbicide, pesticide and fertiliser use and related water quality problems within identified priority catchments.	Research/ Scoping/ Feasibility Study	5	Low	Subject to costs in kind	Environmental Services; EHCMP	

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	HP-2	Implement a herbicide, pesticide and fertiliser use community education campaign (in conjunction with stakeholders).	Community Education		Medium	Subject to costs in kind	Community Development; Environmental Services	This action is ongoing.
	HP-3	Assess the effectiveness of the community education program.	Benefit Reporting		Medium	Subject to costs in kind	Community Development; Environmental Services	
Aim	**These actions are designed to minimise exposure of Potential Acid Sulphate Prone Soils to air and therefore reduce acidification of soils, damage to constructed assets and impacts on receiving environments.**							
Potential Acid Sulphate Soil Management	**PASS-1**	Continue updating the extent of potential acid sulphate soils when new information becomes available.	Monitoring and Data Management	5	High	Subject to costs in kind	Environmental Services	
	PASS-2	Carry out the ongoing potential acid sulphate soil monitoring actions	Monitoring and Data Management	5	Low	Subject to costs in kind	Environmental Services	
	PASS-3	Incorporate an assessment of potential acid sulphate soil into local policy/ guideline	Policy	10	High	Subject to costs in kind	Planning and Development Services	
	PASS-4	Carry out ongoing enforcement of the potential acid sulphate soil policy/ guidelines.	Implementation		Low	Subject to costs in kind	Planning and Development Services	
	PASS-5	Develop and implement an ongoing maintenance schedule appropriate to the above guidelines.	Maintenance		High	Subject to costs in kind	Planning and Development Services	
	PASS-6	Conduct training for relevant staff to ensure effective implementation of the above policy.	Staff Training		High	Subject to costs in kind	Environmental Services	

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	PASS-7	Implement a potential acid sulphate soil community education campaign, if required.	Community Education	5	Low	Subject to costs in kind	Environmental Services	
	PASS-8	Assess the effectiveness of the community education program.	Benefit Reporting		Medium	Subject to costs in kind	Environmental Services	
Aim	**These actions are designed to minimise the export of gross pollutants to receiving environments.**							
Gross Litter Control	**GLT-1**	Conduct a community litter audit.	Monitoring and Data Management	5	Low	Subject to funding	Engineering Services	
	GLT-2	**Gross litter management actions.**						
	GLT-2a	Remove dumped rubbish immediately from public land and attempt to identify persons involved.	Implementation	5	High	Subject to normal budget expenditure	Ranger Services; Health Services	This action is ongoing.
	GLT-2b	Develop a cigarette butt education program to work with selected businesses at designated smoking areas.	Implementation	5	Low	Subject to funding	Ranger Services	This action has commenced.
	GLT-2c	Continue participation in 'Illegal Dumping Program' to target 'fly tipping' hot spots.	Implementation	5	High	Subject to costs in kind	Health Services; Environmental Services	This action is ongoing.
	GLT-2d	Continue delivering recycling services to ratepayers.	Implementation	5	High	Subject to costs in kind	Health Services	This action is ongoing.
	GLT-2e	Continue providing Waste and Recycling Guide to local residents.	Implementation	5	High	Subject to normal budget expenditure	Health Services; Environmental Services	This action is ongoing.

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	GLT-2f	Provide bulk kerbside collection services to local residents that include green waste and bulk rubbish collection.	Implementation	5	High	Subject to funding	Health Services	This action is ongoing.
	GLT-3	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	High	Subject to costs in kind	Ranger Services; Health Services; Environmental Services	
Aim	**These actions are designed to assist in developing a better understanding of and minimise the environmental impacts of excessive nutrient loads to receiving environments.**							
Nutrients								
Wastewater Treatment	**WWT-2**	**Wastewater treatment actions.**						
	WWT-2d	In the areas where leach drain are sited, promote the benefits of wastewater treatment technologies that treat wastewater to a higher level than conventional septics.	Implementation	5	High	Subject to costs in kind	Health Services	
	WWT-2e	Continue support of DOH Law that supports the use of residential and commercial generated greywater.	Implementation	5	High	Subject to costs in kind	Health Services	This action is ongoing.
Water Sensitive Urban Design	**WSUD-1**	Encourage the development of a WSUD planning policy.	Policy	5	High	Subject to costs in kind	Engineering Services; Planning and Development Services;	
	WSUD-3	Ensure the Shire's planners and engineers have appropriate training in WSUD modelling and engineering practices.	Staff training	5	High	Subject to funding	Engineering Services; Planning and Development Services	

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	WSUD-4	Require developers to provide an appropriate maintenance regime associated with each WSUD feature	Maintenance	5	Low	Subject to costs in kind	Engineering Services	
	WSUD-5	Develop/ adopt and promote WSUD information pack to assist local community members easily identify the features and benefits of WSUD.	Implementation	5	High	Subject to costs in kind	Engineering Services; Planning and Development Services	
Other Nutrient Actions	**N-1**	Assess the impact community activities have on the nutrient load to local water bodies.	Research/ Scoping/ Feasibility Study		Low	Subject to funding	Environmental Services; Parks and Reserves	
	N-2	Carry out ongoing water quality monitoring program to assess the level of nutrients occurring in local water bodies (in conjunction with stakeholders).	Monitoring and Data Management	5	High	Subject to costs in kind	Environmental Services, EHCMP	This action is ongoing.
	N-3	**Other nutrient actions.**						
	N-3a	Continue implementation of 'Plants to Residents' Program to encourage the planting of species that require minimal fertiliser and water.	Implementation	5	High	Subject to normal budget expenditure	Environmental Services	This action is ongoing.
	N-3b	Support alternate gardening groups or Officers from Operations to run sessions for the community on ways to minimise fertiliser use in private gardens.	Implementation	5	High	Subject to costs in kind	Environmental Services	This action is ongoing.

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	N-3c	Provide community education sessions that promote sustainable gardening practices and bush block management.	Implementation	5	High	Subject to costs in kind	Environmental Services	This action is ongoing.
	N-3d	Develop a local planning policy to support the retention of native vegetation or bush land areas.	Implementation	5	High	Subject to costs in kind	Planning and Development Services	This action is in progress.
	N-3e	Continue to install signs at public open spaces on the collection and appropriate disposal of dog faeces.	Implementation	5	Low	Subject to funding	Ranger Services	This action is ongoing.
	N-3f	Continue installation of doggy bag units throughout public open space, where required.	Implementation	5	Low	Subject to normal budget expenditure	Health Services; Ranger Services	This action is ongoing.
	N-3g	Provide green waste collection to residents and distribute educational leaflet before pickup.	Implementation	5	High	Subject to funding	Health Services	This action is ongoing.
	N-3h	Encourage community to compost green waste.	Implementation	5	High	Subject to costs in kind	Environmental Services	This action is ongoing.
	N-3i	Encourage community to contain mulch and soil stockpiles within suitable locations.	Implementation	5	Medium	Subject to costs in kind	Environmental Services	This action is ongoing.

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	N-4	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	Medium	Subject to costs in kind	Ranger Services; Environmental Services	
	N-5	Conduct training for relevant staff to ensure effective implementation of the above maintenance regimes.	Staff Training		High	Subject to costs in kind	Ranger Services	This action is ongoing.
Aim	**These actions are designed to reduce and mitigate the impacts of groundwater contamination.**							
Groundwater Contamination	**GWC-3**	**Groundwater contamination management actions.**						
	GWC-3b	Implement an educational campaign to encourage community members to dispose backyard chemicals appropriately.	Implementation	5	High	Subject to normal budget expenditure	Health Services	This action is ongoing.
	GWC-3c	Develop and implement an educational campaign to encourage community members to dispose oil substances appropriately.	Implementation	5	High	Subject to normal budget expenditure	Health Services	This action is ongoing.
Aim	**These actions are designed to reduce water recharge to the groundwater table in areas affected by salinity.**							
Salinity	**S-1**	Assess the salinity risk throughout the Shire's managed area.	Research/ Scoping/ Feasibility Study		High	Subject to costs in kind	Environmental Services	
	S-2	Undertake a groundwater salinity monitoring program (in conjunction with stakeholders	Monitoring and Data Management	5	Low	Subject to costs in kind	Environmental Services	
	S-3	**Salinity management actions.**						

COMMUNITY WATER QUALITY								
Water Quality Areas	**#**	**Key Initiatives**	**Category**	**Points**	**Priority** *High Medium Low*	**Proposed Budget**	**Responsible Department**	**Action Status**
	S-3a	Continue partnership with EHCMP to revegetate areas of land to reduce recharge.	Implementation	5	Low	Subject to normal budget expenditure	Environmental Services; EHCMP	This action is ongoing.
	S-3b	Implement water conservation and recharge reduction measures.	Implementation	5	Low	Subject to costs in kind	Environmental Services; EHCMP	
	S-3c	Develop a local planning policy to support the retention of native vegetation or bush land in designated areas.	Implementation	5	Medium	Subject to costs in kind	Environmental Services	
	S-3d	Subsidise or provide free local native species to the community for the purpose of reducing recharge.	Implementation	5	Low	Subject to normal budget expenditure	Environmental Services;	This action is ongoing.
	S-4	Develop and implement an ongoing maintenance schedule appropriate to each action implemented.	Maintenance	5	Medium	Subject to costs in kind	Environmental Services	
	S-5	Conduct training for relevant staff to ensure effective implementation of the above maintenance regimes.	Staff Training		Medium	Subject to costs in kind	Environmental Services	

7 Commitment to Monitoring and Review Process

The Water Action Plan is intended to be used as a 'living' document that can be altered according to the Shire of Kalamunda's needs. A commitment to a monitoring and review process is essential so that the WAP remains current to the Shire's needs and does not become an unused or out of date document. A review of the WAP would allow the incorporation of new technologies and initiatives and ensure that actions remain appropriate and that priority actions are implemented.

It is suggested that a minor annual review of the WAP be completed by February each year to determine the progress toward reaching the target goals and also to incorporate any changes that may need to be included in preparation for budget. The budget requirements will be assessed on an annual basis. The water savings resulting from the water saving initiatives could be reinvested to fund remaining WAP actions through the creation of a Revolving Water Fund (RWF).

The review process to be conducted by the Water Team, with the project deliverables presented to the other relevant staff members for their consideration. Any formal changes resulting from the monitoring and review process will need to be authorised by Council and documented in a brief annual status report.

This review, in conjunction with the annual budget review, will form part of a larger triennial report for the Water Campaign™ and will detail the progress of the program, the amount of saved water and the associated financial costs and savings.

Groundwater use in the Shire's operations for irrigation purposes is a common practice. Therefore the Water Conservation Plan's corporate groundwater consumption data will be used as a one of the major tools in the WAP review process in relation to the corporate conservation actions. Though bore water extraction was not included in the Water Campaign™ Milestone 1 inventory, the Shire intends to incorporate the groundwater component into the inventory once all Shire's bores are equipped with meters.

8 Water Action Plan Adopted for Implementation by the Shire

The Shire of Kalamunda has been committed to the Water Campaign™ and to progressing through the five Milestone framework through a Council resolution since October 2004.

The adoption of this Water Action Plan establishes the Shire's political ownership to progress its commitment to the Water Campaign™ through addressing actions identified in the Water Action Plan Table.

The Council endorsement of this report will enable the Shire to progress successfully through the Water Campaign™ and achieve concurrently Milestone 2 and 3. The implementation of water management actions outlined in this document will take the Shire to Milestone 4 in the Water Campaign™ program. ICLEI and EMRC Water Campaign™ support officers will assist the Shire at this stage with Milestone 4 verification process that will quantify the water consumption reductions and water quality improvements achieved from projects implemented.

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Glossary

Acronym list

CCP	Cities for Climate Protection® Program
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	Department of Environment and Conservation
EMRC	Eastern Metropolitan Regional Council
EPA	Environmental Protection Authority
GPT	Gross Pollutant Trap
ICLEI	International Council for Local Environmental Initiatives
IWSS	Integrated Water Supply Scheme of the Water Corporation
NRM	Natural Resource Management
POS	Public Open Space
SRT	Swan River Trust
WCP	Water Conservation Plan
WAP	Water Action Plan
WSUD	Water Sensitive Urban Design

Definition of Terms

Algal bloom: sudden, massive growths of microscopic and macroscopic plant life, such as green or blue green algae, which develop in lakes and reservoirs, which can affect water quality adversely and indicate potentially hazardous changes in local water chemistry.

Aquifer: geological formation or a group of formations able to receive, store and transmit significant quantities of water.

Catchment: the land area drained by a river and its tributaries.

Climate: the long-term average weather of a region including typical weather patterns, the frequency and intensity of storms, cold spells, and heat waves. Climate is not the same as weather.

Composting: the activity of breaking down plant and animal material using microorganisms under aerobic conditions. For successful composting there must be sufficient water and air to allow the microorganisms to break down the material, and the compost should reach and maintain a warm temperature.

Contaminants: any substances in a material which makes it impure.

'Dry park' concepts: open space area utilised as parks that are not irrigated.

Ecosystem: a community of organisms and its physical environment.

Enhanced greenhouse effect: the increase in the natural greenhouse effect resulting from increases in atmospheric concentrations of GHGs due to emissions from human activities.

Evaporation: the process by which a liquid becomes a gas.

Evapotranspiration: the combined processes of evaporation and transpiration. It can be defined as the sum of water used by vegetation and water lost by evaporation.

Fertiliser: substances added to the soil (in granules or liquid form) containing one or more recognized plant nutrients, such as nitrogen, potassium and phosphorus (called an 'NPK'

mixture). Fertilisers, which can be either organic or inorganic in nature are really plant foods, and are added to the soil to improve the quality or quantity of plant growth.

Gardens - Planter Boxes sector: ICLEI's category (facility type) that refers to small garden beds and planter boxes. Larger gardens that are associated with parklands are classified as open space.

Greenhouse effect: natural and anthropogenic gases in the atmosphere that absorb and emit infrared or heat radiation, causing the greenhouse effect.

Greywater: domestic wastewater composed of wash water from kitchen, bathroom, and laundry sinks, tubs, and washers

Gross pollutant trap: a physical structure that prohibits large pollutants from entering water sources by trapping coarse pollutants in stormwater - notably litter and coarse sediments.

Groundwater extraction: the process, deliberate or inadvertent, of extracting ground water from a source at a rate so in excess of the replenishment that the ground water level declines persistently, threatening exhaustion of the supply or at least a decline of pumping levels to uneconomic depths.

Groundwater: water beneath the earth's surface that fills pores between materials such as sand, soil or gravel.

Groundwater level: the water found below the watertable. This level of groundwater in an unconfined aquifer below which the porous medium is saturated.

Herbicide: a herbicide is a type of chemical applied to eradicate certain types of unwanted vegetation, such as weeds.

High Density: a duplex or above (i.e. a property with two or more dwellings).

Hydrozoning: a landscape practice that groups plants with similar water requirements together in an effort to conserve water. It is also a design practice in irrigation in an effort to improve watering efficiency. The system is designed so that plants with similar watering requirements are watered together and treated differently from plants with different requirements.

ICLEI's facility types: system used by ICLEI to sort corporate scheme water accounts by the facility type. Where the water meeter services two different activities or sectors the approach is to allocate all the consumption to the sector that is likely to be using the most of scheme. There are 17 Water Campaign™ facility types (see appendix 2).

Low Density: single dwelling properties.

Lysimeter: a measuring device which can be used to measure the amount of actual evapotranspiration which is released by plants. By recording the amount of precipitation that an area receives and the amount lost through the soil, the amount of water lost to evapotranspiration can be calculated.

Natural environment: the natural environment, commonly referred to simply as the environment, is a terminology that comprises all living and non-living things that occur naturally on Earth or some part of it (e.g. the natural environment in a country). The natural environment is contrasted with the built environment, which comprises the areas and components that are strongly influenced by man.

Natural Resource Management: the management of the natural resource base (land, soil, water, vegetation) in a manner that maintains and/or safeguards its value for future generations.

Nutrients: chemicals that are needed by plants and animals for growth (eg nitrogen, phosphorus). In water resources, if other physical and chemical conditions are optimal, excessive amounts of nutrients can lead to degradation of water quality by promoting excessive growth, accumulation, and subsequent decay of plants, especially algae. Some nutrients can be toxic to animals at high concentrations.

Open space: vacant land and land occupied by roundabouts, nature strips, median strips and cemeteries is regarded as open space in accordance with Water Campaign™ facility type classification by ICLEI (see appendix 2).

Passive reserves: passive parks and reserves are public open space and as such are under the care, control and management of the local government authority.

Pesticide: substances intended to repel, kill, or control any species designated a 'pest' including weeds, insects, rodents, fungi, bacteria, or other organisms. The family of pesticides includes herbicides, insecticides, rodenticides, fungicides, and bactericides.

Potable water: raw or treated water that is considered safe to drink.

Precipitation: water that falls to the earth in the form of rain, snow, hail, or sleet.

Rainwater tank: a rainwater tank is a water tank which is used to collect and store rainwater runoff, typically from rooftops.

Recharge zone: areas where water filters down into the groundwater system. The amount of water infiltrating into a given aquifer over a given period of time is normally expressed as mm/year.

Receiving waters: a river, lake, ocean, stream or other watercourse into which runoff, wastewater or treated effluent is discharged.

Remnant bushland: any native vegetation that is not regrowth *(Note: The term 'regrowth' has specific meanings that are shown within the Native Vegetation Act 2003).*

Riparian environment: any land that adjoins directly influences or is influenced by a body of water. However, there is no rule of nature that defines the 'width' of riparian land: the width of interest of concern is largely determined by the management objectives.

Riparian vegetation: any vegetation on land that adjoins directly influences or is influenced by a body of water.

River systems: all of the streams and channels draining a river basin.

Runoff: water that is not absorbed by soil but rather drains off the land into bodies of water, either via surface or subsurface flows.

Stormwater: runoff from urban or intensively developed areas. Stormwater can be comprised of rainwater plus anything the rain carries along with it (eg oils). Stormwater should be considered a valuable resource. Stormwater re-use leads to water savings and reduced environmental impact.

Stormwater infiltration: a designated depressed area where infiltration of run off occurs through the movement of water from the surface down into the soil before moving down to the aquifers, or out to rivers.

Sustainability: managing our natural resources in a way that maintains their environmental, economic, social and cultural values so they continue to be available in the long term.

Sustainable living initiatives: a set of green, more environmentally sensitive designs and actions that provide economic, social and environmental benefits in the long term, having regard to the living and future generations.

The water cycle: the continuous process of water movement near the earth's surface. The cycle experienced by water in its travel from the ocean, through evapo-transpiration and precipitation, infiltration, runoff, and return to the ocean.

Transpiration: the conversion of water to water vapour through plant tissue.

Urbanised environment: the high scale alteration of the natural environment by humans to create human communities for living, work, and play. Such alterations include clearing of land for infrastructure, roads and drainage system.

Watertable: the depth or level below which the ground is saturated with water.

Wastewater: the spent or used water from a community. It comes from domestic, commercial and industrial sources.

Water Campaign™: an international program that assists local government to improve water management through reduced consumption and water quality improvement. In Australia the Program is delivered by the International Council for Local Environmental Initiatives (ICLEI).

Water drainage lines: a line that a body of water flows through. Commonly part of a drainage system

Waterless appliances: devices that function that do not require the use of water.

Water Sensitive Urban Design: a best practice approach to urban stormwater management that provides for the sustainable management and improvement of water quality entering waterways from urban regions; opportunities for stormwater and greywater harvesting and reuse; and innovative reductions in potable water demand.

Waterwise plant species: are plants that do not require much water to survive and are more adapted to withstand the dry climates typical of Australia.

Appendix

Appendix 1 – Shire of Kalamunda's Corporate Scheme Water Consumption Data

Table 1: Shire of Kalamunda's Annual Corporate Scheme Water Consumption (kL) and Cost per Inventory Year by the Water Campaign™ Facility Type (Milestone 1 Data)

Water Campaign™ facility type	1999/00		2000/01		2001/02		2002/03	
	Consumption (kL)	Cost ($)	Consumption (kL)	Cost ($)	Consumption (kL)	Cost ($)	Consumption (kL)	Cost ($)
Administration Buildings	5,003.00	$2,846.00	7,716.00	$5,710.00	4,917.00	$2,898.00	3,126.00	$1,864.00
Child Care Centres	2,287.00	$1,024.00	4,140.00	$2,143.00	4,286.00	$2,264.00	3,078.00	$1,769.00
Community and Function Centres	10,974.00	$4,996.00	10,616.00	$5,010.00	7,719.00	$3,229.00	8,314.00	$4,274.00
Cultural Buildings	1,918.00	$867.00	2,447.00	$1,195.00	3,075.00	$1,642.00	1,509.00	$810.00
Depots	1,232.00	$627.00	1,487.00	$799.00	1,069.00	$550.00	868	$447.00
Facilities Toilets	7,507.00	$3,923.00	8,546.00	$4,614.00	7,352.00	$3,986.00	7,344.00	$8,374.00
Gardens and Planter Boxes	0	$0.00	0	$0.00	36	$0.00	39	$14.00
Miscellaneous	784	$100.00	918	$88.00	819	$44.00	3,117.00	$5,855.00
Open Space	44,154.00	$28,081.00	46,231.00	$27,520.00	24,795.00	$13,745.00	18,546.00	$11,772.00
Playing Fields	4,059.00	$2,386.00	4,087.00	$2,460.00	5,330.00	$3,328.00	2,965.00	$1,950.00
Recreation Centres	1,960.00	$875.00	4,307.00	$2,677.00	1,761.00	$847.00	1,203.00	$493.00
Residences	1,488.00	$862.00	678	$130.00	982	$367.00	791	$390.00
Swimming Pools	25,434.00	$17,331.00	23,901.00	$16,657.00	22,310.00	$15,925.00	23,874.00	$17,502.00
Total	**106,800.00**	**$63,918.00**	**115,074.00**	**$69,003.00**	**84,451.00**	**$48,825.00**	**74,774.00**	**$55,514.00**

(Data Source: Water Corporation, 2004)

Table 2: Summary of the Shire of Kalamunda's Corporate Scheme Water Consumption (kL) Inventory Data by the Water Campaign™ Facility Type from 1999/00 to 2002/03 (Milestone 1 Data)

Account number	Property common name	Property address	Water Campaign™ facility type	Annual scheme water consumption (kL)			
				1999/00	2000/01	2001/02	2002/03
9004857125	Community Offices/Kalamunda Police Station	31 CANNING RD WALLISTON LOT 56 RES 9050	Administration Buildings	840.00	1,943.00	1,865.00	1,224.00
9004852439	Council Administration Building	2 RAILWAY RD KALAMUNDA LOT RES 36023	Administration Buildings	4,163.00	5,773.00	3,052.00	1,902.00
9004748367	Forrestfield Child Care Centre	35 EDINBURGH RD FORRESTFIELD LOT 109	Child Care Centres	87.00	20.00	27.00	79.00
9004885900	Lesmurdie Pre-School	7 SANDERSON RD LESMURDIE LOT RES 30308	Child Care Centres	93.00	69.00	131.00	108.00
9004769168	Maida Vale Pre-School	36 CASUARINA RD MAIDA VALE LOT RES 33262	Child Care Centres	1,631.00	1,154.00	785.00	313.00
9004728008	Peter Anderton Lodge - Adult Daycare	R19500 ANDERSON RD FORRESTFIELD LOT RESERVE 19500	Child Care Centres	15.00	2,351.00	2,584.00	2,034.00
9004871381	Walliston Pre-School	12 GROVE RD WALLISTON LOT RES 32344	Child Care Centres	461.00	546.00	759.00	544.00
9004727996	Anderson Road Community Centre	24 ANDERSON RD FORRESTFIELD LOT RESERVE 19500	Community and Function Centres	551.00	1,057.00	443.00	720.00
9004899130	Carmel Hall	152 CARMEL RD CARMEL LOT 23	Community and Function Centres	105.00	173.00	33.00	33.00
9004850070	Central Hall (KADS)	6 CENTRAL RD KALAMUNDA LOT 3669 RES 41794	Community and Function Centres	2,874.00	3,247.00	2,209.00	1,872.00
9004778523	Cyril Road Hill	58 CYRIL RD HIGH WYCOMBE LOT RES 36298	Community and Function Centres	149.00	89.00	387.00	276.00
9004780148	Foothills Learning Centre	15 EDNEY RD HIGH WYCOMBE LOT 726	Community and Function Centres	506.00	388.00	404.00	427.00
9004728016	Forrestfield Hall	6 ANDERSON RD FORRESTFIELD LOT 1449	Community and Function Centres	26.00	16.00	19.00	25.00
9004825211	Gooseberry Hill Hall	42 LEDGER RD GOOSEBERRY HILL LOT RES 27154	Community and Function Centres	1,005.00	80.00	144.00	434.00
9004718977	Hartfield Park Recreation Centre	L 106 HALE RD FORRESTFIELD LOT PT 106	Community and Function Centres	1,178.00	1,063.00	822.00	644.00
9004849520	Headingly Road House	11 HEADINGLY RD KALAMUNDA	Community and	65.00	69.00	90.00	4.00

Account number	Property common name	Property address	Water Campaign™ facility type	Annual scheme water consumption (kL)			
				1999/00	2000/01	2001/02	2002/03
		LOT 8	Function Centres				
9004775082	High Wycombe Community and Recreation Centre	194 NEWBURN RD HIGH WYCOMBE LOT 11891 RES 34946	Community and Function Centres	440.00	269.00	215.00	667.00
9004856042	Kalamunda Performing Arts and Agriculture Centre	48 CANNING RD KALAMUNDA LOT RES 5530	Community and Function Centres	629.00	696.00	477.00	369.00
9004856034	Lapidary Club Hall	3 RECREATION RD KALAMUNDA LOT 4752 RES 2935	Community and Function Centres	1,365.00	1,351.00	747.00	973.00
9004875550	Lesmurdie Scouts and Clubs Hall	22 FALLS RD LESMURDIE LOT RESERVE 23383	Community and Function Centres	131.00	200.00	177.00	134.00
9004835516	Pat Moran Pavilion and Change rooms	3 RECREATION RD KALAMUNDA LOT 4752 RES 2935	Community and Function Centres	602.00	867.00	899.00	730.00
9004850089	Town Square Hall	4 CENTRAL RD KALAMUNDA LOT 3669 RES 41794	Community and Function Centres	1,124.00	978.00	575.00	746.00
9004857133	Toy Library	33 CANNING RD KALAMUNDA LOT 57	Community and Function Centres	18.00	20.00	34.00	33.00
9004897530	Walliston Hall	10 BORONIA RD WALLISTON LOT RESERVE 17086	Community and Function Centres	206.00	53.00	44.00	227.00
9004734352	Forrestfield Library	3 SALIX WY FORRESTFIELD LOT 201	Cultural Buildings	126.00	185.00	135.00	124.00
9004775576	High Wycombe Library	15 MARKHAM RD HIGH WYCOMBE LOT RESERVE 36299	Cultural Buildings	35.00	36.00	41.00	34.00
9004852367	History Village	56 RAILWAY RD KALAMUNDA LOT 620 RES 32001	Cultural Buildings	119.00	105.00	126.00	164.00
9004852340	Kalamunda Library	50 RAILWAY RD KALAMUNDA LOT RES 24956	Cultural Buildings	1,621.00	2,104.00	2,740.00	1,183.00
9004842812	Stirk Cottage	18 KALAMUNDA RD KALAMUNDA	Cultural Buildings	17.00	17.00	33.00	4.00
9004895447	Depot Buildings	10 RAYMOND RD WALLISTON LOT RES 25766	Depots	1,232.00	1,487.00	1,069.00	868.00
9004901982	Bartons Mill Chapel Toilets	251 PICKERING BROOK RD PICKERING BROOK LOT RES 18809	Facilities and Toilets	8.00	71.00	43.00	7.00
9004790653	Flemming Reserve Public Toilets	111 UPTON RD HIGH WYCOMBE LOT R 39218	Facilities and Toilets	1,839.00	2,589.00	1,584.00	1,358.00
9004710318	Hartfield Park Change rooms	R17098 HALE RD FORRESTFIELD LOT RES 17098	Facilities and Toilets	369.00	288.00	238.00	115.00

Account number	Property common name	Property address	Water Campaign™ facility type	Annual scheme water consumption (kL)			
				1999/00	2000/01	2001/02	2002/03
9004836551	Hedley Jorgensen Park Pavilion - amenities	19 CRESCENT RD KALAMUNDA LOT 58	Facilities and Toilets	405.00	339.00	770.00	607.00
9004769811	Maida Vale Reserve – amenities (Norm Sadler Pavilion facilities)	154 MIDLAND RD MAIDA VALE LOT 11583 RES 14088	Facilities and Toilets	61.00	72.00	84.00	52.00
9004879025	Palm Terrace Public Toilets	90 PALM TCE FORRESTFIELD LOT 140	Facilities and Toilets	3,637.00	4,703.00	3,882.00	3,592.00
9008898768	Pioneer Park Pavilion and Change rooms	R41156 DAWSON AV FORRESTFIELD LOT R 41156	Facilities and Toilets	1,183.00	472.00	748.00	1,612.00
9004717800	Pioneer Park Toilets	120 DAWSON AV FORRESTFIELD LOT RES 41156	Facilities and Toilets	5.00	12.00	3.00	1.00
9011166453	Roundabout - Garden	GOOSEBERRY HILL RD GOOSEBERRY HILL LOT VERGE	Gardens and Planter Boxes	0.00	0.00	36.00	39.00
9004750117	Lincoln Road Reserve BBQ - Garden	LINCOLN RD FORRESTFIELD LOT RD RES CNR CUMBERLAN	Gardens-Planter Boxes	0.00	0.00	0.00	0.00
9004895834	Animal Pound	L 153 CALADENIA RD WALLISTON LOT 153	Miscellaneous	54.00	40.00	38.00	44.00
9004777360	Drinking tap	R39496 KIANDRA WY HIGH WYCOMBE LOT R34946 (SCOTT RESVE)	Miscellaneous	302.00	228.00	219.00	37.00
9004895455	Fire Station - Volunteer Bush Fire Brigade and SES	R25766 RAYMOND RD WALLISTON LOT RES 25766	Miscellaneous	322.00	305.00	259.00	293.00
9004849504	Standpipe A	L 6 HEADINGLY RD KALAMUNDA LOT 6	Miscellaneous	74.00	298.00	273.00	728.00
9012388517	Standpipe B	STANDPIPE HIRE	Miscellaneous	0.00	0.00	0.00	1,982.00
9004899923	Transfer Station	155 LAWNBROOK RD BICKLEY LOT 5	Miscellaneous	32.00	47.00	30.00	33.00
9004900568	Bickley Recreational Ground	R37174 LAWNBROOK RD BICKLEY LOT RESERVE 37174	Open Space	77.00	48.00	50.00	56.00
9004896167	Bill Shaw Reserve	302 CANNING RD WALLISTON LOT 2570 RES 32507	Open Space	0.00	0.00	0.00	544.00
9004899288	Carmel Road Park	121 CARMEL RD CARMEL LOT RES 15470	Open Space	0.00	1.00	1.00	0.00
9004714001	Citrine Gardens	L 151 CITRINE GDNS FORRESTFIELD LOT 151	Open Space	1,714.00	1,742.00	387.00	0.00

Account number	Property common name	Property address	Water Campaign™ facility type	Annual scheme water consumption (kL)			
				1999/00	2000/01	2001/02	2002/03
9004748244	Conaught Reserve	35 HAREWOOD ST FORRESTFIELD LOT RES 28447	Open Space	0.00	0.00	2.00	0.00
9004718635	Dawson Reserve	R32912 DAWSON AV FORRESTFIELD LOT RESERVE 32912	Open Space	0.00	0.00	0.00	0.00
9004801148	Emm's Reserve (Playground)	13 WITTENOOM RD HIGH WYCOMBE LOT RES 27815	Open Space	918.00	1,505.00	495.00	72.00
9004891358	Falls Farm	41 CAGNEY WY LESMURDIE LOT RESERVE 39706	Open Space	286.00	240.00	550.00	314.00
9008875742	Flora Terrace Reserve	R29757 WALYUNGA ST LESMURDIE LOT 2187 RES 29757	Open Space	3,043.00	4,315.00	2,385.00	1,290.00
9004710852	Hartfield Park A	199 HALE RD FORRESTFIELD LOT RES 17098	Open Space	2,495.00	3,225.00	1,726.00	1,203.00
9004710297	Hartfield Park B	R17098 HALE RD FORRESTFIELD LOT RES 17098	Open Space	1,011.00	1,347.00	644.00	571.00
9004882777	Kershaw Reserve	R26754 KERSHAW AV LESMURDIE LOT 597 RES 26754	Open Space	127.00	278.00	359.00	15.00
9004848317	Kostera Oval	3 RECREATION RD KALAMUNDA LOT 4752 RES 2935	Open Space	12,427.00	9,156.00	9,810.00	5,469.00
9004769803	Maida Vale Recreation Reserve	20 RIDGE HILL RD MAIDA VALE LOT RESERVE 14088	Open Space	1,420.00	1,816.00	1,640.00	984.00
9004885361	Pagotto Reserve	R26531 WATERLOO CR LESMURDIE LOT 1890 RES 26531	Open Space	0.00	0.00	0.00	0.00
9004876844	Percy Seation Park	11 KAOLUNGA WY LESMURDIE LOT RES 31137	Open Space	0.00	1.00	0.00	0.00
9004818249	Playground	16 FAYE CR GOOSEBERRY HILL LOT RES 33235	Open Space	42.00	0.00	0.00	0.00
9004778945	Progress Park	67 BANDALONG WY HIGH WYCOMBE LOT RES 30540	Open Space	0.00	0.00	0.00	0.00
9004759680	Quarry A (old tip)	101 BRAE RD HIGH WYCOMBE LOT 13	Open Space	0.00	0.00	0.00	0.00
9004759699	Quarry B (old tip)	65 BRAND RD HIGH WYCOMBE LOT 14	Open Space	0.00	0.00	0.00	0.00
9004763145	Rangeview Park	32 SWAN RD HIGH WYCOMBE LOT 28	Open Space	145.00	158.00	111.00	39.00
9004886006	Ray Owen Reserve	R26127 SANDERSON RD LESMURDIE LOT RESERVE 26127	Open Space	17,309.00	19,144.00	813.00	0.00

Account number	Property common name	Property address	Water Campaign™ facility type	Annual scheme water consumption (kL)			
				1999/00	2000/01	2001/02	2002/03
9004792608	Robert Hewson Park	31 MURRAY DR HIGH WYCOMBE LOT RES 36478	Open Space	46.00	44.00	0.00	0.00
9004853757	Roundabout A	60 DIXON RD KALAMUNDA LOT RES 25574	Open Space	242.00	171.00	163.00	107.00
9011207139	Roundabout B	KALAMUNDA RD HIGH WYCOMBE LOT 1170	Open Space	0.00	0.00	1,118.00	1,440.00
9011426569	Roundabout C	HAWTIN RD FORRESTFIELD	Open Space	0.00	0.00	137.00	27.00
9004760788	Scott Reserve	200 NEWBURN RD HIGH WYCOMBE LOT R34946	Open Space	1,840.00	1,950.00	2,194.00	2,445.00
9004842847	Stirk Park	18 ELIZABETH ST KALAMUNDA LOT 1	Open Space	1,012.00	1,090.00	1,648.00	1,143.00
9004878532	Vacant Land	25 LEWIS RD WATTLE GROVE LOT 7	Open Space	0.00	0.00	0.00	0.00
9004800479	Viv Robinson Park	L 115 JOUDAH CT HIGH WYCOMBE LOT 115	Open Space	0.00	0.00	562.00	2,827.00
9004870506	Ray Owen Reserve	96 GROVE RD LESMURDIE LOT RESERVE 26127	Playing Fields	4,059.00	4,087.00	5,330.00	2,965.00
9004897610	CLUB	155 LAWNBROOK RD BICKLEY LOT 5	Recreation Centres	109.00	2,436.00	10.00	59.00
9004710879	Hartfield Park Club	R17098 HARTFIELD RD FORRESTFIELD LOT RESERVE 17098	Recreation Centres	759.00	878.00	493.00	446.00
9004832171	Kalamunda Roller Rink	38 COLLINS RD KALAMUNDA LOT 435 RES 26843	Recreation Centres	835.00	430.00	784.00	232.00
9004852420	Kalamunda Tennis Club	22 RAILWAY RD KALAMUNDA LOT RES 28545	Recreation Centres	257.00	563.00	474.00	466.00
9004832155	Administration House - Caretakers Quarters	36 COLLINS RD KALAMUNDA LOT 435 RES 26843	Residences	178.00	150.00	111.00	81.00
9004849280	Headingly Hill House	8 LINDSAY ST KALAMUNDA LOT 42	Residences	83.00	67.00	63.00	102.00
9004878524	Lewis Road House	21 LEWIS RD WATTLE GROVE LOT 8	Residences	128.00	207.00	143.00	174.00
9004878540	Wattle Grove Centre	29 LEWIS RD WATTLE GROVE LOT PT 6	Residences	1,099.00	254.00	665.00	434.00
9004832163	Kalamunda Wet and Wild	R26843 COLLINS RD KALAMUNDA LOT 435 RES 26843	Swimming Pools	25,434.00	23,901.00	22,310.00	23,874.00
		Total Annual Consumption (kL)		**106,800.00**	**115,074.00**	**84,451.00**	**74,774.00**

(Data Source: Water Corporation, 2004)

Table 3: Scheme Water Consumption (kL) Reduction Trends within Corporate Sector of the Shire of Kalamunda against Base Year 2002/03

Inventory year	Water consumption (kL)	Water savings (kL)	% Decrease against the base year (2002/03)	Data source
2002/03	74,774	0	100%	Milestone 1 Data obtained from Water Corporation in 2004
2003/04	76,974	-2,200	3%	Milestone 3 Data obtained from Water Corporation in September 2008
2004/05	74,360	414	-1%	Milestone 3 Data obtained from Water Corporation in September 2008
2005/06	73,775	999	-1%	Milestone 3 Data obtained from Water Corporation in September 2008
2006/07	69,680	5,094	-7%	Milestone 3 Data obtained from Water Corporation in September 2008
2007/08	85,039	-10,265	14%	Milestone 3 Data obtained from Water Corporation in September 2008
2008/09	70,000	4,774	-6%	Projected Data
2009/10	66,000	8,774	-12%	Projected Data
2010/11	63,000	11,774	-16%	Projected Data
2011/12	59,819	14,955	-20%	Projected Data

(Data Source: Water Corporation, 2004 and Water Corporation, 2008)
Note: Figures in red are projected levels in scheme water consumption.

Appendix 2 – Water Campaign™ Facility Type and Description

The Shire of Kalamunda, as part of the Milestone 1 requirements investigated its corporate scheme water accounts and classified them by the Water Campaign™ facility type categories in accordance with the actual use of the water from investigated accounts. At Milestone 1 the Shire has identified only 13 out of 17 facility types within the corporate sector due to not being able to allocate any scheme water accounts to the facility types such as 'Market Buildings', 'Nurseries', 'Shops and Shopping Centres' and 'Standpipes/ Metered Hydrants'. The following table presents 17 Water Campaign™ facility types and a brief description of each facility type**.**

Table 4: Water Campaign™ Facility Type List and Description

Facility Type	Description
1. Administration Buildings	*Administration Buildings* should be used for standard office buildings such as those used by the planning, infrastructure, corporate services or environmental health departments. Some town halls will sit within this category if the account includes an administration area, which is believed to be responsible for a majority of the water consumption. If this is not the case, town halls are to be categorised as *Function/Community Centres*.
2. Child Care Centres	Any centre, which has as its primary function the care of children, except for maternal health centres is a *Child Care Centre*. Maternal health centres are to be categorised as Function/Community Centres.
3. Cultural Buildings	Accounts associated to art and/or craft galleries, exhibition halls and libraries are *Cultural Buildings*.
4. Depots	*Depots* can be high consumers of water, usually for washing down garbage collection vehicles or other equipment servicing functions.
5. Facilities and Toilets	*Facilities and Toilets* operated by council are typically public-access sites in parks or along the foreshore. Facilities include showers **and** areas used for washing down boats.
6. Function and Community Centres	This category is relevant to accounts servicing buildings utilised for community activities such as: - Civic centres - Maternal health centres - Basic mixed-use halls, such as those comprising of simple open indoor areas with minimal facilities ie: girl guide/scout halls. Town halls naturally sit within this category if their associated account is expressly used for function/community activities OR if a majority of their accounts water consumption can be attributed to this type of use rather than administration activities. The function area of a town hall is likely to comprise the hall space itself, reception and ancillary rooms.

7. Gardens and Planter Boxes	This category refers to small garden beds and planter boxes. Larger gardens that are associated with parklands are classified as open space.
8. Market Buildings	Some councils own market sites that have permanent buildings and offices. These sites typically have high water consumption, mainly for cleaning but also ice making. Cattle/Sale yards should be categorised under this facility type. **If the site is merely an open space used occasionally for a weekend market, water use should be allocated to the *Open Space* category.**
9. Miscellaneous	*Miscellaneous* should **only be used for accounts, which cannot be classified into one of the other facility types.** *Miscellaneous* includes but is not limited to: - Un-metered accounts that require an estimate of water consumption volume - Accounts listed as 'closed roads', 'occupied land' or 'railway land' - Public drinking fountains - Decorative water features not associated to another major water using account - Taps located in car parks - Play grounds; and - Caravan parks
10. Nurseries	Councils frequently operate a *Nursery* for the production of seedlings and street trees for use within the municipality.
11. Open Space	Roundabouts, nature strips, median strips and cemeteries should be regarded as *Open Space*, unless there is also a *Garden* that is likely to be using the majority of the water. In cases where there is a combination of *Garden beds* and *Open Space* (surrounding lawn) serviced from the one meter, advice should be sought from operational staff regarding which area is responsible for the majority of water consumption.
12. Playing Fields	This sector should be used for accounts dedicated to organised sporting activities such as football or soccer fields, tennis or golf courses and other sporting fields. If separately metered, consumption by a clubhouse of other facility should be entered in *Recreation Centres*.
13. Recreation Centres	*Recreation Centres* are sites dedicated to indoor recreation such as gymnasiums, netball courts, etc. These are more likely to have facilities such as showers or saunas. This sector refers to **indoor** recreation centres only.

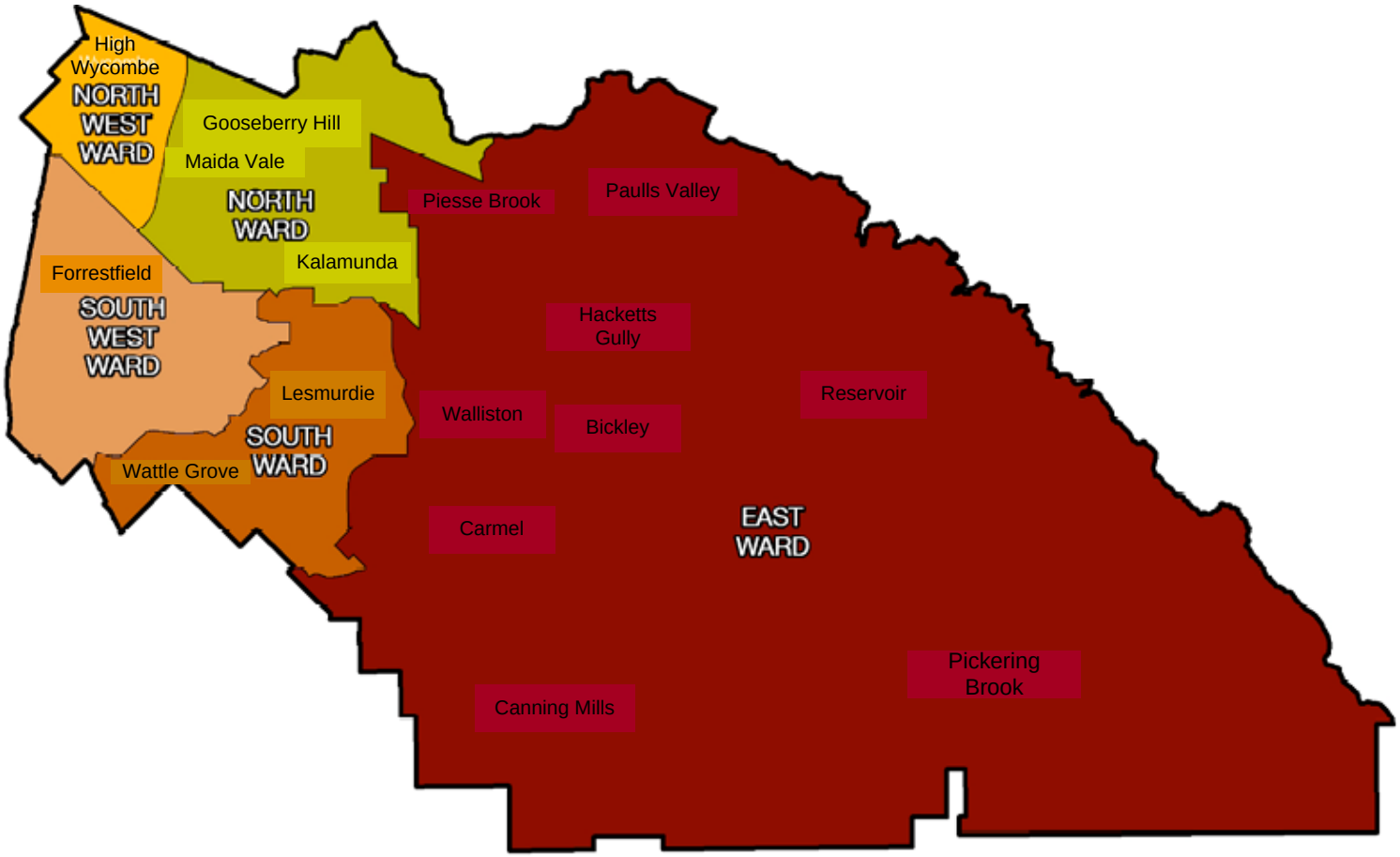
14. Residences	Some councils own private *residences* and let these properties. These may range from flats to houses to aged care facilities. Include these in council's inventory where a lease is regularly renewed, maintenance/renovation is undertaken and/or planned to be undertaken by council.
15. Shops and Shopping Centres	Occasionally a council will own *Shops* or a *Shopping Centre*. These accounts can be distinguished from a *Market Building* account by considering the operating hours. A Shop/*Shopping Centre* is open for normal trading hours whereas a market is often only open for a few days a week.
16. Standpipes / Metered Hydrants	Standpipes, such as the tall vertical pipes used to fill water trucks in rural areas should be categorised under this facility type. Metered water hydrants, such as those provided to tap the water supply to assist in extinguishing a fire, should be categorised under this facility type.
17. Swimming Pools	The *Swimming Pools* category should be used for both indoor and outdoor pools.

(Source: ICLEI Oceania, 2007)

Appendix 3 – The Shire of Kalamunda Suburb Boundary Map

The Shire of Kalamunda is located in Perth's south-eastern suburbs, about 24 kilometers from the Perth CBD. The Shire of Kalamunda is bounded by the City of Swan in the north, the Shire of Mundaring in the east, the Cities of Armadale and Gosnells in the south and the Cities of Canning and Belmont in the west.
The Shire of Kalamunda includes the suburbs and localities of Bickley, Canning Mills, Carmel, Forrestfield, Gooseberry Hill, Hacketts Gully, High Wycombe, Kalamunda, Kewdale (part), Lesmurdie, Maida Vale, Paulls Valley, Perth Airport (small part), Pickering Brook, Piesse Brook, Reservoir, Walliston and Wattle Grove (Profile Id, 2008).

Map of the Shire of Kalamunda



(Source: Shire of Kalamunda, 2007)

Appendix 4 – Shire of Kalamunda Community Scheme Water Consumption Data

The following data has been sourced from the Water Corporation as part of Milestone 1 inventory and shows an estimate of the Shire of Kalamunda's community water consumption within the residential sector. The following data allows identification of high consumers and targets actions toward these consumers.
Note: Suburbs such as Paulls Valley and Canning Mills are not on a scheme water supply.

Table 5: Shire of Kalamunda's Residential Scheme Water Consumption (kL) by Suburb from 2000/01 to 2002/03 (Milestone 1 Data)

Suburb	ICLEI ANZIC category	Accounts as at November 2003	Units as at November 2003	Annual scheme water consumption (kL)		
				2000/01	2001/02	2002/03
BICKLEY	HIGH DENSITY RESIDENTIAL	0	0	0	0	0
CARMEL	HIGH DENSITY RESIDENTIAL	1	1	433	310	291
CLOVERDALE	HIGH DENSITY RESIDENTIAL	0	0	0	0	0
FORRESTFIELD	HIGH DENSITY RESIDENTIAL	11	11	4,306	4,598	3,636
GOOSEBERRY HILL	HIGH DENSITY RESIDENTIAL	4	4	3,106	2,782	1,111
HACKETTS GULLY	HIGH DENSITY RESIDENTIAL	0	0	0	0	0
HIGH WYCOMBE	HIGH DENSITY RESIDENTIAL	7	7	1,535	1,446	1,508
KALAMUNDA	HIGH DENSITY RESIDENTIAL	27	47	12,410	11,978	11,284
LESMURDIE	HIGH DENSITY RESIDENTIAL	14	14	6,153	6,186	5,402
MAIDA VALE	HIGH DENSITY RESIDENTIAL	6	6	2,983	2,684	2,218
PICKERING BROOK	HIGH DENSITY RESIDENTIAL	0	0	0	0	0
PIESSE BROOK	HIGH DENSITY RESIDENTIAL	0	0	0	0	0
WALLISTON	HIGH DENSITY RESIDENTIAL	3	4	1,443	1,113	1,372
WATTLE GROVE	HIGH DENSITY RESIDENTIAL	1	1	384	490	600
HIGH DENSITY RESIDENTIAL Total		**74**	**95**	**32,753**	**31,587**	**27,422**
BICKLEY	LOW DENSITY RESIDENTIAL	170	172	78,777	73,738	61,981
CARMEL	LOW DENSITY RESIDENTIAL	183	183	84,262	73,334	62,568
FORRESTFIELD	LOW DENSITY RESIDENTIAL	4,174	4,227	1,538,512	1,223,686	1,234,103
GOOSEBERRY HILL	LOW DENSITY RESIDENTIAL	1,294	1,328	682,938	653,834	524,134
HACKETTS GULLY	LOW DENSITY RESIDENTIAL	3	4	2,350	1,700	2,039
HIGH WYCOMBE	LOW DENSITY RESIDENTIAL	3,560	3,569	1,082,872	992,893	941,152
KALAMUNDA	LOW DENSITY RESIDENTIAL	2,654	2,764	1,050,703	1,047,445	859,764
LESMURDIE	LOW DENSITY RESIDENTIAL	2,690	2,690	1,195,487	1,138,774	949,684
MAIDA VALE	LOW DENSITY RESIDENTIAL	1,397	1,397	536,484	497,341	483,788

Suburb	ICLEI ANZIC category	Accounts as at November 2003	Units as at November 2003	Annual scheme water consumption (kL)		
				2000/01	2001/02	2002/03
PICKERING BROOK	LOW DENSITY RESIDENTIAL	105	106	39,721	36,595	34,740
PIESSE BROOK	LOW DENSITY RESIDENTIAL	32	33	15,151	16,796	12,248
WALLISTON	LOW DENSITY RESIDENTIAL	343	343	115,262	112,391	93,619
WATTLE GROVE	LOW DENSITY RESIDENTIAL	473	476	164,732	155,673	159,156
LOW DENSITY RESIDENTIAL Total		**17,078**	**17,292**	**6,587,251**	**6,024,200**	**5,418,976**
RESIDENTIAL Total		**17,152**	**17,387**	**6,620,004**	**6,055,787**	**5,446,398**

(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Note: This report is derived from the Water Corporation Mapping and Billing Systems and allows metered properties to be identified by the reporting boundary of Local Government Authority for Milestone 1 inventory. Number of water accounts and units (number of flats and houses) listed in Table 5 is for the year 2002/03. The number of flats and houses is not available for the years prior to 2002/03. Please note that in high growth suburbs number of properties may change significantly over the years provided in this set of data. Please consider this when interpreting Milestone 1 inventory data. Number of properties is actually number of accounts. Therefore consumption per property figures may be inaccurate where a number of properties have been grouped under one account. This is most often the case with residential flats, where body corporate flats are billed under one account. This may result in consumption per property figures being much larger for flats than houses. This is unlikely to be correct in most cases as houses with gardens generally consume more water per property than flats. Consumption per property figures should therefore be used with caution.

Tables 6, 6a and 7 include Milestone 1 and Milestone 3 inventory data sets that have been sourced from the Water Corporation and show an estimate of the Kalamunda's residential scheme water consumption per property. These data sets allow identification of high consumers and target actions toward these consumers.

Table 6: Scheme Water Consumption (kL) per Property in the Residential Sector of the Shire of Kalamunda from 2000/01 (Milestone 1 Data)

ICLEI ANZIC category	Units as at November 2003	Annual scheme water consumption (kL)		
		2000/01	2001/02	2002/03
HIGH DENSITY RESIDENTIAL	95	32,753	31,587	27,422
LOW DENSITY RESIDENTIAL	17,292	6,587,251	6,024,200	5,418,976
Residential total	**17,387**	**6,620,004**	**6,055,787**	**5,446,398**
Total consumption per property		**381**	**348**	**313**

(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Note: Number of units (number of flats and houses) listed in Table 6 is for the year 2002/03. The number of properties is not available for the years prior to 2002/03. Please note that in high growth suburbs number of properties may change significantly over the years provided in this set of data. Please consider this when interpreting Milestone 1 inventory data. Number of properties is actually number of accounts. Therefore consumption per property figures may be inaccurate where a number of properties have been grouped under one account. This is most often the case with residential flats, where body corporate flats are billed under one account. This may result in consumption per property figures being much larger for flats than houses. This is unlikely to be correct in most cases as houses with gardens generally consume more water per property than flats. Consumption per property figures should therefore be used with caution.

Table 6a: Scheme Water Consumption (kL) per Property in the Residential Sector of the Shire of Kalamunda from 2003/04

ICLEI ANZIC category	Units as at November 2007	Annual scheme water consumption (kL)			
		2003/04	2004/05	2005/06	2006/07
HIGH DENSITY RESIDENTIAL	219	38,061	39,346	36,972	47,161
LOW DENSITY RESIDENTIAL	18,535	5,869,271	6,148,463	5,809,992	6,394,211
Residential total	**18,754**	**5,907,332**	**6,187,809**	**5,846,964**	**6,441,372**
Total consumption per property		**315**	**330**	**312**	**343**

(Data Source: Water Corporation, 2008 and ICLEI Oceania, 2008)

Note: Number of units (number of flats and houses) listed in Table 6a is for the year 2006/07. Please note that in high growth suburbs number of properties may change significantly over the years provided in this set of data. Please consider this when interpreting scheme water consumption inventory data. Number of properties is actually number of scheme water accounts. Therefore consumption per property figures may be inaccurate where a number of properties have been grouped under one account. This is most often the case with residential flats, where body corporate flats are billed under one account. This may result in consumption per property figures being much larger for flats than houses. This is unlikely to be correct in most cases as houses with gardens generally consume more water per property than flats. Consumption per property figures should therefore be used with caution.

Table 7: Average Annual Scheme Water Consumption (kL) in 2006/07 per Property within Residential Sector of the Shire of Kalamunda

Suburb	ICLEI ANZSIC category	Average annual consumption (kL) per property in 2006/07
BICKLEY	HIGH DENSITY RESIDENTIAL	304
CARMEL	HIGH DENSITY RESIDENTIAL	263
FORRESTFIELD	HIGH DENSITY RESIDENTIAL	244
GOOSEBERRY HILL	HIGH DENSITY RESIDENTIAL	424
HIGH WYCOMBE	HIGH DENSITY RESIDENTIAL	148
KALAMUNDA	HIGH DENSITY RESIDENTIAL	189
LESMURDIE	HIGH DENSITY RESIDENTIAL	439
MAIDA VALE	HIGH DENSITY RESIDENTIAL	224
WALLISTON	HIGH DENSITY RESIDENTIAL	341
WATTLE GROVE	HIGH DENSITY RESIDENTIAL	544
	HIGH DENSITY RESIDENTIAL Overall Consumption	**312**
BICKLEY	LOW DENSITY RESIDENTIAL	400
CARMEL	LOW DENSITY RESIDENTIAL	360
FORRESTFIELD	LOW DENSITY RESIDENTIAL	312
GOOSEBERRY HILL	LOW DENSITY RESIDENTIAL	455
HACKETTS GULLY	LOW DENSITY RESIDENTIAL	598
HIGH WYCOMBE	LOW DENSITY RESIDENTIAL	321
KALAMUNDA	LOW DENSITY RESIDENTIAL	322
LESMURDIE	LOW DENSITY RESIDENTIAL	373
MAIDA VALE	LOW DENSITY RESIDENTIAL	379
PICKERING BROOK	LOW DENSITY RESIDENTIAL	386
PIESSE BROOK	LOW DENSITY RESIDENTIAL	389
WALLISTON	LOW DENSITY RESIDENTIAL	285
WATTLE GROVE	LOW DENSITY RESIDENTIAL	378
	LOW DENSITY RESIDENTIAL Overall Consumption	**381**
	RESIDENTIAL Overall Annual Consumption	**343**
	Average Perth Metropolitan Area	**260 - 289**

(Data Source: Water Corporation 2008 and ICLEI Oceania 2008)

Note: Figures in blue indicate that average annual consumption per property is inline with the Perth Metro average water consumption.

Table 7a: Average Residential Consumption of Scheme Water in Perth Metropolitan Area

Average annual consumption	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Per household (kL/property)	289	260	285	277	268	282
Per resident (kL/person)	111	100	110	107	103	108

(Data Source: Department of Water 2009 and Economic Regulation Authority 2005)

The following data has been sourced from the Water Corporation and shows an estimate of the Shire's community water consumption within the non-residential sector. The following data allows identification of high consumers and targets actions toward these consumers.

Table 8: Shire of Kalamunda's Non-residential Scheme Water Consumption (kL) in 2000/01 (Milestone 1 Data)

Inventory year 2000/01

Water Campaign™ category **Industrial**	Number of properties	Consumption (kL)	Consumption/property (kL)
Agricultural, Forestry and Fishing	25	45,805	1,832
Mining	2	0	0
Manufacturing and Construction	42	392,562	9,347
Gas, Electricity and Water Utilities	2	3	2
Industrial total	**71**	**438,370**	**6,174**
Commercial	**Number of properties**	**Consumption (kL)**	**Consumption/property (kL)**
Wholesale and Retail Trade	76	67,258	885
Accommodation, Cafes and Restaurants	19	52,975	2,788
Communication Services	12	2,986	249
Transport and Storage	17	16,127	949
Finance, Insurance, Property and Business	96	57,230	596
Government Administration and Defence	1	40	40
Education	33	151,438	4,589
Health and Community Services	48	75,626	1,576
Cultural, Recreational and Personal Services	267	174,947	655
Other	1	5,194	5,194
Commercial total	**570**	**603,821**	**1,059**
Non-residential total	**641**	**1,042,191**	**1,626**

(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Note: At Milestone 1 the Water Corporation did not provide the number of properties for the years prior to 2002/03. Therefore the Table 8 includes number of properties based on 2002/03 figures. The number of properties is actually number of accounts. Therefore consumption per property figures may be inaccurate where a number of properties have been grouped under one account.

Table 9: Shire of Kalamunda's Non-residential Scheme Water Consumption (kL) in 2001/02 (Milestone 1 Data)

Inventory year 2001/02

Water Campaign™ category **Industrial**	Number of properties	Consumption (kL)	Consumption/property (kL)
Agricultural, Forestry and Fishing	25	30,749	1,230
Mining	2	0	0
Manufacturing and Construction	42	353,351	8,413
Gas, Electricity and Water Utilities	2	3	2
Industrial total	**71**	**384,103**	**5,410**
Commercial	**Number of properties**	**Consumption (kL)**	**Consumption/property (kL)**
Wholesale and Retail Trade	76	60,873	801
Accommodation, Cafes and Restaurants	19	57,017	3,001
Communication Services	12	4,112	343
Transport and Storage	17	18,352	1,080
Finance, Insurance, Property and Business	96	47,359	493
Government Administration and Defence	1	38	38
Education	33	139,432	4,225
Health and Community Services	48	75,207	1,567
Cultural, Recreational and Personal Services	267	137,798	516
Other	1	4,615	4,615
Commercial total	**570**	**544,803**	**956**
Non-residential total	**641**	**928,906**	**1,449**

(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Note: At Milestone 1 the Water Corporation did not provide the number of properties for the years prior to 2002/03. Therefore the Table 9 includes number of properties based on 2002/03 figures. The number of properties is actually number of accounts. Therefore consumption per property figures may be inaccurate where a number of properties have been grouped under one account.

Table10: Shire of Kalamunda's Non-residential Scheme Water Consumption (kL) in 2002/03 (Milestone 1 Data)

Inventory year 2002/03

Water Campaign™ category **Industrial**	Number of properties	Consumption (kL)	Consumption/property (kL)
Agricultural, Forestry and Fishing	25	21,767	871
Mining	2	0	0
Manufacturing and Construction	42	285,372	6,795
Gas, Electricity and Water Utilities	2	34	17
Industrial total	**71**	**307,173**	**4,326**
Commercial	**Number of properties**	**Consumption (kL)**	**Consumption/property (kL)**
Wholesale and Retail Trade	76	63,431	835
Accommodation, Cafes and Restaurants	19	68,764	3,619
Communication Services	12	2,715	226
Transport and Storage	17	14,250	838
Finance, Insurance, Property and Business	96	56,051	584
Government Administration and Defence	1	44	44
Education	33	117,908	3,573
Health and Community Services	48	77,885	1,623
Cultural, Recreational and Personal Services	267	124,073	465
Other	1	3,013	3,013
Commercial total	**570**	**528,134**	**927**
Non-residential total	**641**	**835,307**	**1,303**

(Data Source: Water Corporation, 2004 and ICLEI Oceania, 2004)

Note: At Milestone 1 the Water Corporation did not provide the number of properties for the years prior to 2002/03. Therefore the Table 10 includes number of properties based on 2002/03 figures. The number of properties is actually number of accounts. Therefore consumption per property figures may be inaccurate where a number of properties have been grouped under one account.

Table 11: Scheme Water Consumption Reduction Trends (per Household) within the Residential Sector of the Shire of Kalamunda against Base Year 2002/2003 (kL)

Inventory year	Total residential consumption (kL)	Annual consumption per property within the residential sector (kL)	Water savings per property (kL)	Water savings per property (%)	Data source
2000/01	6,620,004	381	-68	22	Milestone 1 Data obtained from Water Corporation in 2004
2001/02	6,055,787	348	-35	11	Milestone 1 Data obtained from Water Corporation in 2004
2002/03	5,446,398	313	0	0	Milestone 1 Data obtained from Water Corporation in 2004
2003/04	5,907,332	315	-2	1	Milestone 3 Data obtained from Water Corporation in October 2008
2004/05	6,187,809	330	-17	5	Milestone 3 Data obtained from Water Corporation in October 2008
2005/06	5,846,964	312	1	0	Milestone 3 Data obtained from Water Corporation in October 2008
2006/07	6,441,372	343	-30	10	Milestone 3 Data obtained from Water Corporation in October 2008
2007/08	5,283,006	313	0	0	Projected Data
2008/09	5,119,612	310	3	-1	Projected Data
2009/10	4,956,220	300	13	-4	Projected Data
2010/11	4,792,829	280	33	-11	Projected Data
2011/12	4,629,438	266	47	-15	Projected Data

(Data Source: Water Corporation, 2004 and Water Corporation, 2008)
Note: Figures in red are projected levels in scheme water consumption. *Row highlighted in yellow presents base year data.*

Scheme Water Consumption (kL) Reduction Trends within Community (Residential and Non-Residential) Sector of the Shire of Kalamunda against Base Year 2002/03 Levels

Inventory year	Residential consumption (kL)	Non-residential consumption (kL)	Scheme water consumption within the community sector (kL)	Water savings (kL)	Savings (%)	Data source
2000/01	6,620,004	1,042,191	7,662,195	-1,380,490	22	Milestone 1 Data obtained from Water Corporation in 2004
2001/02	6,055,787	928,906	6,984,693	-702,988	3	Milestone 1 Data obtained from Water Corporation in 2004
2002/03	5,446,398	835,307	6,281,705	0	0	Milestone 1 Data obtained from Water Corporation in 2004
2003/04	5,907,332	856,448	6,763,780	-482,075	8	Milestone 3 Data obtained from Water Corporation in October 2008
2004/05	6,187,809	877,870	7,065,679	-783,974	12	Milestone 3 Data obtained from Water Corporation in October 2008
2005/06	5,846,964	925,038	6,772,002	-490,297	8	Milestone 3 Data obtained from Water Corporation in October 2008
2006/07	6,441,372	1,044,188	7,485,560	-1,203,855	19	Milestone 3 Data obtained from Water Corporation in October 2008
2007/08	5,283,006	810,248	6,093,254	188,451	-3	Projected Data
2008/09	5,119,612	785,189	5,904,801	376,904	-6	Projected Data
2009/10	4,956,220	760,129	5,716,349	565,356	-9	Projected Data
2010/11	4,792,829	735,070	5,527,899	753,806	-12	Projected Data
2011/12	4,629,438	728,211	5,357,649	924,056	-15	Projected Data

(Data Source: Water Corporation, 2004 and Water Corporation, 2008)

Note: Figures in red are projected levels in scheme water consumption. Row highlighted in yellow presents base year data.

Appendix 5 - Corporate Water Quality Checklist

ICLEI's Water Campaign™ Corporate Checklist

Insert council name SHIRE OF KALAMUNDA

This checklist has been developed to identify gaps in councils current operations, which can affect the water quality of receiving waters.

Please click on the box and enter yes, no or N/A for each question in the checklist. There is room for comment at the end of each section or sometimes within it, should you wish to clarify any answers. Following completion could you please save and email to jnechwatal@iclei.org

Erosion and sediment control

Suspended solids are sediments (soil and other fine solid organic particles) suspended in water and often have other pollutants attached to them. A quantitative measure to determine the presence of suspended solids in the water column is to filter, dry and weigh the particles, however this requires a laboratory. A qualitative assessment of turbidity, which looks at the presence of fine particles, algae and detritus, can be undertaken using a tube or disc, requiring visual interpretation of the readings or a turbidity electrode. A turbidity electrode could also assist in the qualitative sampling of suspended solids. Suspended solids in urban stormwater are typically two to ten times greater than in undisturbed catchments. The particulate forms of phosphorus, nitrogen and toxicants such as heavy metals and pesticides can be attached to sediment particles. The combined use of the filtration method of suspended solids and the turbidity electrode will provide more accurate results.

Soil erosion also has the potential for downstream impacts on creeks, rivers, reservoirs, lakes, and estuarine and marine environments. Water-borne erosion increases the supply of sediment to rivers. High concentrations of suspended sediments in rivers can:

* reduce stream clarity;
* inhibit respiration and feeding of stream biota;
* diminish light needed for plant photosynthesis;
* require treatment of water for human use;
* smother the stream bed; and
* increase land flooding.

Increased supply of sand and gravel from gully and riverbank erosion has led to deposition of sand and gravel beds (*sand slugs*). Sand slugs smother aquatic habitat. They can prevent fish passage, fill pools and other refugia and are unstable substrates for river bed life.

It is estimated that Gully, riverbank and sheetwash erosion deliver over 120 million tonnes of sediment to streams each year (ANRA, website).

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Activities, which can lead to erosion and sediment laden runoff, include:

- Road and footpath upgrade and maintenance for both sealed and unsealed surfaces
- Upgrade and maintenance of impervious and pervious surfaces in open space areas
- Building upgrade
- Drainage works
- Landscape works
- Nursery operations

	Yes,	No or	N/A
1. Does your Council have responsibility to enforce or develop a local law, code or policy, which prevents sediment-laden runoff from leaving construction sites? If so,	☒	☐	☐
2. Is this currently being undertaken as standard procedure?	☐	☒	☐
3. Does your Council have erosion and sediment control guidelines that are suitable for use during construction activities?	☐	☒	☐
4. Has your Council integrated these guidelines with their own work and staff functions?	☐	☒	☐
5. Does your Council have an officer responsible to oversee issues of erosion and sediment control?	☐	☒	☐
6. Does your Council tenders for construction activities have a clause, which incorporates the need to prepare an erosion and sediment control plan to be approved by council?	☐	☒	☐
7. Does your Council operations follow a procedure that prevents sediment-laden runoff or gravel leaving the work site?	☐	☒	☐
8. Does your nursery operations take measures to reduce sediment runoff from soil stockpiles through appropriate containment measures?	☐	☒	☐
9. Does your Council have a drainage or stormwater strategy? If so,	☒	☐	☐
10. Does the strategy cover potential for on site detention systems?	☒	☐	☐
11. Does your council have a policy or planning control in place, which supports the retention or enhancement of remnant vegetation on public land, with its main purpose being for sediment and erosion control?	☐	☒	☐

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Comments

References

Allison, R, Chiew, F, and McMahon, T. (1997) Stormwater Gross Pollutants – Industry Report. Co-operative Research Centre for Catchment Hydrology.
Australian National Resource Atlas (www.nlwra.gov.au/atlas).

Gross litter and pollution management

Gross litter is generally considered to be manufactured material of varying sizes ranging from polymer beads and cigarette butts to tyres and furniture. Gross litter entering the watercourse via the drainage system or dumping of rubbish can reduce the aesthetics of a water body and injure aquatic vertebrates through entrapment.

In the urban areas gross litter can be responsible for contributing between 20-40 kilograms (dry mass) per hectare per year of gross pollutants to stormwater (Allison, et. al 1997).

Chemical and toxicant pollutants entering water bodies are derived from industrial processes and vehicle emissions. Pollutants are generally seen in the context of undesirable elements, which can impact upon the beneficial uses of the receiving waters. Due to the range of these pollutants this checklist is particularly concerned with the identification of heavy metals, oils and grease. A useful website for information on pollutants is the US EPA website. http://www.epa.gov/ebtpages/pollutants.html

Activities that can contribute towards water pollution include:

- Collection and transfer of recycle material from private properties.
- Litter generated at building sites.
- Street cleaning operations.
- Location and effectiveness of litter bins in public places.
- Management of litter at waste transfer stations.
- Management of car parks, wash down and mechanical bays.

	Yes	No	N/A
12. Does your Council evaluate the effectiveness of council recycling services in preventing litter overflow?	☐	☒	☐
13. Does your Council have any programs, which identifies hot spot areas of litter generation ie, shopping centres, school routes, public transport centres?	☒	☐	☐

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14. Does your Council install gross litter trapping measures appropriate for the site?	☒	☐	☐
15. Does your Council have a program, which annually reviews the effectiveness of the litter trapping devices?	☐	☒	☐
16. Does your Council have a local law in place, which requires building sites to install receptacles for containment of building rubbish?	☒	☐	☐
17. Does your Council review the location and effectiveness of litter bins in public places?	☒	☐	☐
18. Is data collated on quantity and type of gross litter trapped?	☒	☐	☐
19. Is the data collated utilised in the development of Council education campaigns?	☐	☒	☐
20. Does your Council evaluate the effectiveness of street cleaning operations in preventing litter entering the stormwater system and make adjustments as necessary?	☒	☐	☐
21. Does your Council manage a waste transfer station? If so,	☒	☐	☐
22. Does your Council take measures to contain the waste during transfer modes?	☒	☐	☐
23. Does your Council have installed triple interceptor pits or similar for the collection of chemical and toxicant pollutants? If so,	☒	☐	☐
24. Does your Council have an EPA license to discharge to sewer?	☐	☐	☒
25. Does your Council have in place an action plan focusing on containment in the case of chemical spills?	☒	☐	☐

Comments

Herbicide and pesticide management

Herbicides and pesticides are used to control a variety of weeds and pest animals largely in the management of open space and tree care on council land. Some herbicides can enter freshwater resources either through seepage into ground water or overland runoff into watercourses.

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Excess use or poor management of herbicides and pesticides can have a toxic effect on receiving waters affecting non-target species.

Activities that can lead to a significant impact on receiving waters include:

- Management of weeds on council land and laneways managed by Council.
- Management of insect pests in terrestrial vegetation.
- Implementation of weed control measures through the use of herbicide.
- Management of nursery stock.

	Yes	No	N/A
26. Does your Council review its use of herbicides and pesticides and their potential impact on non-target species?	☒	☐	☐
27. Does your Council use steam application on target weeds to minimise herbicide use?	☐	☒	☐
28. Does your Council use mulch to suppress weed growth and maintain soil moisture?	☒	☐	☐
29. Does your Council use biological control techniques for pests instead of pesticides where available?	☒	☐	☐
30. Does your Council use fertilisers in open space management? If so,	☐	☒	☐
31. Does your Council review its policy on the need to use fertilisers in the face of technological advances in soil treatment and plant selection?	☐	☐	☒

Comments

Nutrient management

Nutrients are naturally derived from the breakdown of organic material. However, artificially increased loads of nutrients can lead to excessive plant growth in water bodies. The decomposition process can lead to an increase in biological oxygen demand, which deprives the water body of oxygen and reduces its suitability for freshwater vertebrates and invertebrates. Nutrients are also used contained in fertilisers where it is deemed desirable to improve the soil to support or enhance the growth of a desired crop. In the open space context this can include management of grass areas, growing of nursery stock and maintenance of flower beds.

Activities that can lead to an increase in nutrients from vegetative material include:

- Mowing of open space.
- Mowing of road median strips.
- Accumulation of street tree litter.

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- Stockpiling of mulch.
- Applying nutrients to nursery stock.

	Yes	No	N/A
32. Does your Councils grass cutting operations / patterns prevent dispersal into drainage lines?	☒	☐	☐
33. Does your Council remove tree waste from road verges during street cleaning operations and tree care works?	☒	☐	☐
34. Does your Council contain mulch stockpiles through appropriate containment measures?	☒	☐	☐
35. Does your Council work within local waterways by the cutting of aquatic rushes? If so,	☒	☐	☐
36. Is the green waste removed from the site immediately to prevent re-entry into the waterway?	☒	☐	☐
37. Does your Council use additional nutrients in the management of nursery stock or vegetation management?	☐	☒	☐

Comments

Council Swimming Pools

Swimming pools not only consume water but may also be discharging chemical laden water to receiving waters. Depending on the treatment process of the waste water this may result in an unnatural balance of chemicals to the receiving waters.

An activity that can lead to a significant impact on receiving waters is:

- Poor management of council's public pools and their waste water discharge.

	Yes	No	N/A
38. Does your Council manage swimming pools in their local government area?	☐	☒	☐
39. Does your Council know how the wastewater is treated and managed? If so,	☒	☐	☐
40. Is your Council required to have an EPA licence to discharge wastewater?	☐	☐	☒

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41. Does your Council have a system in place, which reuses the water from the swimming pool?	☐	☐	☒

Comments

Wastewater treatment

For the purpose of this document wastewater will be deemed to be any water containing waste generated form sewerage treatment, agricultural or industrial processes and leachate from current and disused landfill sites. The wastewater generated from these activities will require EPA licensing or a trade waste agreement with an authorised agency.

Some councils may manage their own waste water treatment plant, with the legislation and management of the plant varying between States. The treatment of wastewater is receiving increased attention from EPA's and State agencies as the waste water has the potential to impact significantly on receiving waters through the discharge of nutrients and toxicants.

Current and disused landfills are often managed by councils as part of their waste disposal operations both for their own waste and the waste generated by their community. The management of landfills has changed significantly over the years with more stringent controls being placed on the managers, however, the generation of leachate from disused sites can remain a burden on councils for several decades. The lack of records, changes to staff and council boundaries can also exacerbate management problems.

Excess nutrients and pathogens derived from sewerage treatment can be detrimental to health and cause algal blooms, which if not managed may become toxic.

Activities that can lead to a significant impact on receiving surface and groundwater include:

- Management of council's wastewater treatment plant and their associated wastewater discharges.
- Management of pump out sewage services for residences (including boats)
- Poorly managed current and disused landfill sites failing to comply with EPA best practice standards.
- Leaching of pollutants including heavy metals into ground water or local waterways via overland flow.

	Yes,	No or	N/A
42. Does your Council manage any wastewater treatment plants? If so	☐	☒	☐

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43. What mechanisms does your Council have in place to monitor your trade waste or licence agreement? ***Comments***			
44. What does your Council test, to determine attainment of compliance? ***Comments***			
45. How does your Council rate with compliance? ***Comments***			
46. Does your Council annually review its management of wastewater issues to ensure that infiltration, exfiltration and wet weather overflow is not able to affect the water quality of receiving waters?	☐	☐	☒
47. Does your Council have the responsibility of pumping and disposal of sewage collected from residences? If so,	☐	☒	☐
48. Does your Council annually review this operation to ensure that procedures are in place to protect the natural environment from accidental spillage?	☐	☐	☒
49. Does your Council manage an operation, which supports the pump out of sewage from boats at mooring locations? If so	☐	☒	☐
50. Does your Council annually review this operation to ensure its effectiveness in preventing sewage discharges from boats?	☐	☐	☒
51. Is treated wastewater re-used for a beneficial purpose?	☒	☐	☐
52. Does your Council support the use of domestic generated grey water which, meet State health regulations?	☒	☐	☐
53. Does your Council have disused landfill sites? If so,	☒	☐	☐
54. Have investigations been undertaken to determine the presence of leachate?	☒	☐	☐

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55. Does your Council test for the presence of heavy metals (cadmium, arsenic and cobalt) in surrounding water bodies or ground water?	☒	☐	☐
56. Is your Council managing these sites as per licence or trade waste agreement requirements?	☒	☐	☐
57. Can the information your Council has gained through its management be utilised by other Councils, experiencing similar issues?	☒	☐	☐
58. Has your Council incorporated any innovative solutions to manage the leachate, which you are prepared to share with other councils?	☐	☐	☒
59. Does your Council have any active landfill sites it manages?	☐	☒	☐
60. Does your Council's landfill management currently comply with the conditions of its license or other approval?	☒	☐	☐

Comments

Groundwater Management

Groundwater allows people to live in places where surface water is scarce. In much of rural South Australia it the sole water supply for stock and domestic purposes. It provides water for irrigation and industry. Groundwater is also an important ecological resource. It helps keep our rivers and lakes full, and sustains a wealth of plants of animals. Some of our ecosystems are dependent on groundwater for their survival.

We can run out of groundwater if more water is withdrawn by pumping (discharge) than is fed by recharge from the surface. This is a problem considering that in many areas groundwater is being withdrawn in increasing quantities to meet growing demands and development pressures. These human demands compete with natural uses.

Unsustainable groundwater extraction won't only mean less water for human use; it will also have an impact on the environment. For example, plants in the riparian zone that grew because of the close proximity of the water table to the land surface may not survive as the depth to water increases. The environment for fish and other aquatic species also may be altered as the stream level drops or dries up altogether.

To manage groundwater resources effectively, we need to understand how these systems operate, monitor allocation and extraction, and establish a sustainable groundwater yield for each system.

Groundwater can also become polluted with salt. The most common cause of salinity is the replacement of perennial, deep-rooted native vegetation with crops and pastures used

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in agriculture. Because crops and pastures use less of the incoming rainfall this unused water either runs off into streams, rivers and lakes, or infiltrates beyond the root zone where it accumulates as groundwater. As the groundwater level rises, salts that have accumulated over thousands of years in the subsoil rise with it, degrading wetland habitats and water resources.

Yet another threat occurs in coastal regions, where freshwater aquifers can become 'polluted' with salt water. This happens when seawater seeps into the groundwater, often because there has been an excessive pumping of groundwater from a well that has been developed at the boundary of freshwater and saltwater.
http://www.clw.csiro.au/education/groundwater/groundwater.html

Activities that can influence groundwater resources include:

- Over extraction of groundwater.
- Net loss of native vegetation.
- Infiltration of pollutants contaminating groundwater from septic tanks and landfill, leakages from underground fuel tanks, soluble chemicals from industrial activities, detergents, and pesticides and fertilisers used in agriculture.
  http://www.clw.csiro.au/education/groundwater/groundwater.html

61. Does your Council support the dewatering of wetland sites to support the growth of residential areas? If so	☐	☐	☒
62. Does your Council consider and act to rectify the regional implications that dewatering can have on surrounding landuses?	☐	☐	☒
63. Does your Council have a policy or planning control in place, which supports the retention or enhancement of remnant vegetation on public land, with its main purpose controlling salinity in discharge areas?	☐	☒	☐
64. Does your Council use groundwater for council operations? If so	☒	☐	☐
65. Does your Council measure the quantity of groundwater extracted for council operations? If so,	☒	☐	☐
66. How is this achieved? ***Comments*** ***measuring sprinkler outputs and timing. Regular checks of bore outputs***			

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67. How is this information being used to ensure this is a sustainable level of extraction of groundwater resources? ***Comments*** ***liaising with water and rivers commission (DOE)***			
68. Does your Council measure the quality of groundwater extracted for council operations?	☒	☐	☐
69. Does your local government area contain Acid Sulphate Soils? If so	☐	☒	☐
70. What actions does your Council undertake to manage these soils to prevent acidification of groundwater resources and surface water? ***Comments***			

Comments

In order to set a qualitative water quality goal for Milestone 2 could you please identify the three sectors (from the above) which your Council needs to address as priority areas.
1. Guidelines to determine in which cases an erosion/sediment/water quality control plan should be submitted by applicant
2. Guidelines to determine in which cases a surface and ground water quality (hydrology) control plan should be submitted by applican
3. etention of native vegetation and vegetation links
To be authorised by Council Chief Executive Officer / General Manager as a true and correct representation of councils operations.

Insert name David E Vaughan.

Electronic Signature 

Date sent 13/5/05

Please save the document and email to Janine Nechwatal jnechwatal@iclei.org

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Appendix 6 - Community Water Quality Checklist

ICLEI's Water Campaign™ Community Checklist

Insert Council name here SHIRE OF KALAMUNDA

The following checklist has been developed to identify issues affecting water quality and management opportunities, and how council can influence the community to reduce the impact on receiving waters.

Please click on the link and enter yes, no or N/A for each question, save the document and **email to jnechwatal@iclei.org**

Erosion and sediment control

Community activities which can lead to erosion and sediment laden runoff include:

- Construction works
- Drainage works
- Landscape works
- Nursery operations
- Agricultural production

	Yes	No	N/A
1. Does your Council control construction activities through a local law, code or policy, which prevents sediment-laden runoff from leaving the site?	☒	☐	☐
2. Does your Council have erosion and sediment control guidelines that are suitable for use during construction activities? If so,	☐	☒	☐
3. Does this extend to private and commercial landscape activities?	☐	☒	☐
4. Does your Council have erosion and sediment control guidelines that are suitable for use during agricultural activities?	☐	☒	☐
5. Does your Council's statutory planning processes require applications to prepare an erosion and sediment control plan to be approved by council?	☐	☒	☐
6. Does your Council have a policy for private nursery operations to address sediment runoff from soil stockpiles through appropriate containment measures? If so	☐	☒	☐
7. How are these enforced?	☐	☐	☒
Comments			
8. Does your Council have a strategy that seeks to retain a certain percentage of permeable surfaces within your local government area?	☐	☒	☐

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9. Does your council have a policy or planning control in place, which supports the retention or enhancement of remnant vegetation on private land with its main purpose being for sediment and erosion control?	☒	☐	☐

Comments

Gross litter management

Community activities that can contribute towards Gross Litter pollution include:

- Overstocking or poor containment of recyclable material in supplied bins.
- Illegal disposal of household rubbish.

	Yes	No	N/A
10. Does your Council inform residents who are not using the recycling services correctly?	☒	☐	☐
11. Does your Council investigate dumped rubbish to find the likely culprits?	☒	☐	☐

Comments

Herbicide, pesticide and fertiliser use

Community activities that can lead to a significant impact on receiving waters include:

- Management of weeds on private land through the use of herbicide.
- Management of insect pests in crops, pasture and gardens.
- Improvement of garden areas with the use of fertilisers.
- Management of crops and pasture with the use of fertilisers.
- Management of nurseries with the use of herbicides, pesticides and fertilisers through all stages of production.

	Yes	No	N/A
12. Does your Council take measures to educate the community on ways to minimise the use of herbicide through mulching etc. to suppress weed growth?	☒	☐	☐
13. Does your Council take measures to educate the community on ways to minimise pesticide and fertiliser use on gardens?	☒	☐	☐
14. Does your Council provide advice to residents on techniques to control insect pests?	☒	☐	☐

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15. Does your Council take measures to educate primary producers and hobby farmers on ways to minimise pesticide and fertiliser use on crops and pastures?	☒	☐	☐
16. Does your Council take measures to educate primary producers and hobby farmers on ways to minimise herbicide use.	☒	☐	☐
17. Does your Council have a program in place that supports and encourages nursery practices, which focus on minimising herbicide, fertiliser and pesticide use?	☐	☒	☐
18. Does your Council promote the use of indigenous plants to your community, which use less water and fertiliser?	☒	☐	☐

Comments

Nutrients

Community activities that can lead to an increase in nutrients from land based activities include:

- Mowing of lawns and nature strips.
- Accumulation of street tree litter in drains
- Stockpiling of mulch on nature strips.
- Collection of green waste
- Distribution of dog faeces

	Yes	No	N/A
19. Does your Council have an education brochure or forum that encourages their community to collect and compost grass and tree litter via compost or recycling bins?	☒	☐	☐
20. Does your Council undertake or construct stormwater quality treatment measures for nutrient management?	☒	☐	☐
21. Does your Council take any action to reduce dog faeces in public places?	☒	☐	☐
22. Does your Council inform its community on methods to temporarily contain mulch?	☒	☐	☐

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Comments

Private Swimming Pools

Private swimming pools are a common theme in many household blocks in Australia. The pools not only use large amounts of water but they are also often maintained with doses of chemicals.

Community activities that can contribute towards the quality of receiving waters from swimming pools include:

- Poor or illegal management of pool water discharge.

	Yes	No	N/A
23. Does your council require a planning permit for the construction or erection of a swimming pool or pool fence? If so,	☒	☐	☐
24. Is it possible to include a permit condition that addresses environmentally responsible measures to discharge chemically treated water from the pool?	☒	☐	☐

Comments

Wastewater management

Whilst members of the community do not have direct responsibilty of wastewater treatment plants, they may be using greywater around the home or they may be on a septic system.

Community activities that can lead to an increase in nutrients and pathogens to receiving waters include:

- Poor management of septic systems.
- Poor management of greywater reuse.
- Infiltration of sewage into receiving waters.

	Yes	No	N/A
25. Does your Council have a policy on domestic and industrial connection to sewer where available and practical?	☒	☐	☐
26. Does your Council have a policy on the safe use of private greywater systems?	☒	☐	☐
27. Does your Council have or participate in any programs that monitor pathogens and nutrients in receiving waters?	☒	☐	☐
28. Does your Council encourage the use of greywater in irrigating private golf courses and nurseries?	☒	☐	☐

Comments

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Groundwater Management

The use of groundwater by members of the community is varied across Australia, with some regions actively promoting groundwater use to supplement water supplies derived from surface water supplies.

Activities that can influence groundwater quality and reliability of supply include:

- Non regulation of private bores.
- Large scale removal of native vegetation
- Leaching of nutrients and chemicals from land based practices

	Yes	No	N/A
29. Does your council have a policy or planning control in place, which supports the retention or enhancement of remnant vegetation on private land with its main purpose being controlling saline areas?	☐	☒	☐
30. Does your council have a policy or planning control in place, which supports the revegetation of saline areas that could affect groundwater quality?	☐	☒	☐
31. Does your council have a program in place, which promotes the registration of private bores for groundwater extraction? If so	☐	☒	☐
32. How is this implemented? ***Comments***			
33. Does your water board encourage this program? ***Comments***	☐	☐	☒
34. Does your council work with your water board to determine best management practices to address these issues? ***Comments***	☒	☐	☐

Comments

From the sectors considered above could you please identify three priority issues that your council considers requires immediate attention, which can lead to improvements in the receiving waters. **Please consider not only what practices are in place but also whether your council considers a review of current practices is desirable. The aim is to strive towards best practice management in areas, which can impact upon water quality.**

1.Groundwater and Surface water quality management (both gross pollutants and nurtient increases)

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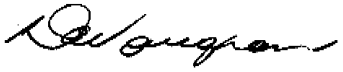
2. Sedimentation and erosion control (specifically in upper reaches of creekline systems)
3. Retention of native vegetation.

To be authorised by Council Chief Executive Officer / General Manager as a true and correct representation of Councils operations.

Insert name David E Vaughan

Electronic signature 

Date sent 13/5/05

Please then save the document and email to Janine Nechwatal jnechwatal@iclei.org

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