# City of Joondalup

## City Water Plan 2012-2015




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# EXECUTIVE SUMMARY

The City of Joondalup recognises the importance of the sustainable use of water within its operations and facilities, and the need to promote water conservation and water efficiency within the community. Sustainable water management is an important issue for the City of Joondalup and the need to balance provision of water services for the community with the protection of water resources is becoming even more vital in a drying climate.

As a Local Government, the City relies heavily on both scheme and groundwater resources. Scheme water is used within the City's buildings and facilities whilst groundwater is utilised for the irrigation of parks and reserves managed by the City.

The City of Joondalup has demonstrated a commitment to sustainable water management by joining the ICLEI- Local Governments for Sustainability, Water Campaign Program in 2008. In 2010 the City joined the Waterwise Council Program to further increase the capacity of the City to use and manage water resources in a more efficient way.

The City Water Plan 2012-2015 has been developed to provide strategic direction for the delivery of water conservation and water quality improvement initiatives within the City. The Plan presents key projects to be implemented, in a staged approach, between 2012 and 2015. Projects aim to improve water management practices through education and awareness-raising within the City and the community; introduction of water efficient devices within City buildings; implementation of water efficient practices in open space management; and the development and implementation of policies and guidelines that support water conservation and water quality improvement.

Implementation of the City Water Plan goes beyond regulatory requirements for water management and demonstrates the City's commitment and proactive approach to holistic water management.

# PART 1 – INTRODUCTION

## 1.0 Purpose

The City Water Plan 2012 – 2015 (City Water Plan) provides a coordinated approach for the City to sustainably manage water resources within City operations and the community. The Plan identifies the main water related issues impacting the City and sets objectives for scheme and groundwater water conservation ~~and~~ water quality and quantity improvement.

The implementation of the City Water Plan approach will allow the City to demonstrate leadership in meeting its water conservation and water quality ~~improvement~~ management targets and create community awareness regarding the need to manage water resources for the future.

## 1.1 Structure of the Plan

The City Water Plan will utilise a project based implementation framework and includes the development of specific water related projects that will be implemented over the life of the Plan to achieve its stated objectives.

The Project Based Framework addresses both water conservation and water quality within City operations and the community sector. Part 1 of the City Water Plan provides context to the water management issues facing the City, including future threats and impacts.

Part 2 is an overview of water consumption by the City and the community and details operational barriers to water management and the City's strategic water management targets.

Part 3 of the City Water Plan includes key projects that will be implemented over the life of the Water Plan to achieve the City's water conservation and water quality improvement targets within the following areas:

- Water Monitoring and Reporting.
- Built Environment.
- Management of Natural Areas and Public Open Space.
- Water Sensitive Urban Design.
- Contracts and Purchasing.
- Staff Education and Participation.
- Community Education and Participation.
- Partnerships and Policy.

The City Water Plan will be continually monitored and reviewed on an annual basis, against a set of indicators for water conservation and water quality improvement. This will assist the City to track progress towards the water management targets.

## 1.2 Targets

The aim of the City Water Plan is to ensure the City manages water resources, for both water quantity and water quality, in an ecologically sustainable way. This will be achieved through City operations and policies, and through interaction with the community, to achieve the following targets:

- Reduce corporate groundwater use by 10 per cent per capita below 2010/11 consumption by 2014/15.
- Reduce corporate scheme water use by 5 per cent per capita below 2010/11 consumption by 2014/15.
- Reduce community scheme water use by 5 per cent per capita below 2010/11 consumption by 2014/15.
- Implement water quality improvement projects through best practice City operations, procedures and policy in at least three Water Management Areas per year by 2014/15.
- Implement water quality improvement projects that encourage community responsibility and promote partnerships for water quality improvement in at least two Water Management Areas per year by 2014/15.

# 2.0 Background

Western Australian local governments are estimated to use three per cent of the State's water budget through irrigation of public open space[1]. Irrigation is the highest water use category for the City and accounts for over 98 per cent of the total water use.

The need to balance the provision of services for the community with the protection of water resources is an increasing challenge for the City. However, as a water user, facility manager, land-use planning authority and community educator, the City is well placed to demonstrate leadership and contribute to sustainable water management.

The City has also recognised the need to minimise impacts to local water bodies and to create awareness in the community of local water quality and quantity management issues.

## 2.1 Water Management in the City of Joondalup

The City has demonstrated its ongoing commitment to sustainable water management through the delivery of projects, programs and strategies that aim to improve water efficiency and water quality. Nestled between the Indian Ocean in the west and Yellagonga Regional Park in the east, the City is also situated on the Gnangara Mound, a resource that is currently under increasing pressure from extraction and the impacts of climate change. The City has demonstrated its ongoing commitment to balancing its own use of water resources and encouraging the community to do the same.

[1]Department of Water. (n.d). *Water Reform made simple*. [Fact Sheet]. Retrieved from http://www.water.wa.gov.au/PublicationStore/first/76923.pdf

### 2.1.1 Water Demand and Population

The City of Joondalup encompasses an area of 97 square kilometres comprising of an urban centre surrounded by residential, commercial and retail land uses. The City contains a diverse number of natural assets which includes 17 kilometres of coastline, a chain of wetlands and a variety of bushland ecosystems.

The City's population has increased by five per cent in the past ten years. The growing population has increased demand for services and facilities within the City. With an expected increase in population across the Perth-Peel Region from 1.65 million to 2.2 million by 2031[2], demand for water resources is set to increase considerably. As water availability decreases and demand increases it is essential that the City takes steps to use water resources in a responsible manner while delivering services and facilities for the community.

### 2.1.2 Water Campaign

The Water Campaign™ is an international freshwater management program that aims to build the capacity of local government to reduce water consumption and improve local water quality. The Program is run by the International Council for Local Environmental Initiatives (ICLEI) and provides direct assistance to local governments to identify, manage and report on the management of water resources and implement actions to improve holistic water management.

The City has been a participant of the ICLEI Water Campaign™ since 2007 and has completed all five milestones of the Program in the corporate and community sector. The City Water Plan replaces the ICLEI Water Campaign as the City's major strategic commitment to sustainable water management.

### 2.1.3 Water Conservation Plan

The development of Water Conservation Plans is a licensing requirement for Local Governments extracting groundwater. The aim of Water Conservation Plans is to encourage Local Governments to manage water allocations effectively and implement strategies to conserve groundwater, while retaining quality public open spaces for the community. The City has three groundwater licences, issued by the Department of Water, for an allocation of 7,500 kilolitres per hectare.

The objectives of the City's Water Conservation Plan 2009-2010 have been incorporated into the City Water Plan 2012-2015. The development of this Water Plan meets the intent of the Department of Water *Operational Policy on Water Conservation/Efficiency plans*[3] and will take the place of future Water Conservation Plans. The Department of Water was consulted during the development of the Water Plan.

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[2] Department of Planning & Western Australian Planning Commission. (2010). *Directions 2031 and Beyond: Metropolitan planning beyond the horizon*. Retrieved from the Department of Planning website http://www.planning.wa.gov.au/dop_pub_pdf/plan_directions2031_part1.pdf

[3] Department of Water. (2009a). *Operational policy no 1.02 Policy on water conservation/efficiency plans*. Retrieved from: http://www.water.wa.gov.au/PublicationStore/first/92867.pdf

### 2.1.4 Water ResSources

The City relies on both scheme and groundwater resources. Scheme water is used within community buildings and facilities and administrative buildings. Groundwater is used to irrigate the City's parks and open spaces. Both scheme and groundwater resources are under pressure from a drying climate and are both sourced from the Gnangara Groundwater System. The use of alternative water sources, to substitute scheme and groundwater, will be investigated by the City as it adapts to a drying climate. Maintaining water quality is also important as wetlands provide important local amenity and ecological values.

#### *2.1.4.1 Scheme Water*

All sScheme water used ~~by~~ in the City ~~and the community~~ is sourced from the superficial aquifer of the Gnangara Groundwater System. ~~via the Integrated Water Supply Scheme (IWSS). The IWSS consists of three sources: dams (surface water), groundwater (Gnangara and Jandakot aquifers) and desalination (sea water). Currently, 35 – 50 per cent of water sourced for the IWSS is from groundwater.~~ A significant area of the City is defined as a Priority 3 Drinking Water Source Area because groundwater extracted from this area is used to supply public drinking water through the Integrated Water Supply Scheme (IWSS). The IWSS consists of three sources: dams (surface water), groundwater (Gnangara and Jandakot aquifers) and desalination (sea water). Currently, 35 – 50 per cent of water sourced for the IWSS is from groundwater.

#### *2.1.4.2 Groundwater*

The City uses groundwater from superficial (shallow) aquifers in the Gnangara Groundwater System to irrigate public open space. The *Draft Gnangara Sustainability Strategy*[4] noted that due to water table decline in the superficial aquifer, a number of wetlands would have to be managed for a transition to terrestrial ecosystems. Some high value groundwater-dependent ecosystems are now also being managed artificially through the pumping and transfer of water. Groundwater is extracted from the system for public water supply, agriculture, industry, public open space irrigation and domestic irrigation.

#### *2.1.4.3 Wastewater*

The majority of wastewater produced in the City of Joondalup is treated at Beenyup Wastewater Treatment Plant, from which 45 gigalitres of treated wastewater is pumped to the ocean annually. The Water Corporation is undertaking a Groundwater Replenishment Trial at the plant, with the aim of recharging the Leederville Aquifer with drinking-water-quality recycled water, to be used as a potential future public water supply source. As of October 2011, 0.998 gigalitres of recycled water had been recharged as part of the Trial.

#### *2.1.4.4 Stormwater*

The City manages stormwater through its drainage network. Stormwater systems traditionally collected and conveyed stormwater to water bodies, including to groundwater, without any treatment. The City has incorporated the principles of water sensitive urban design into stormwater management to protect local waterways from contaminants and other pollutants.

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[4] Gnangara Coordinating Committee. (2009). *Gnangara Sustainability Strategy (draft for public comment)*. Perth, Australia: Government of Western Australia.

The City also recharges the superficial aquifer by directing stormwater to infiltration basins. This system is not officially recognised as 'managed aquifer recharge' ~~by the~~ in the Department of Water's *Operational Policy 1.01 Managed Aquifer Recharge in Western Australia*, and therefore does not contribute to the City's groundwater allocation.

#### *2.1.4.5 Surface Water*

The interface between surface water, including coastal waters, and groundwater in the City means that water quality management is an important issue for all landholders and visitors to the City. The City impacts water quality through its drainage network, maintenance works (including street sweeping), and management of waterways, public open space and natural areas. The community impacts water quality through its application of fertilisers and other chemicals, waste management, vehicle use and interaction with waterways. Industrial areas also have a significant impact, particularly when they are un-sewered or have inappropriate wash-down or maintenance procedures. The City manages a number of constructed wetlands and has shared management responsibilities for wetlands in Yellagonga Regional Park.

### 2.1.5 Total Water Cycle

Consideration of the total water cycle is critical to achieving sustainable water management in the City. The availability of groundwater, coupled with sandy soils, means that groundwater and surface water resources are closely interconnected. Approaches to water management therefore need to acknowledge the interconnectedness between all water resources in the City, and the ~~interconnectedness~~ relationship between water resources and land use impacts.

Holistic water management recognises that water resources, whether used for irrigation, drinking water or to support ecological communities in wetlands, are all connected and need to be managed accordingly. City operations and community activities have the potential to impact water resources through both natural and constructed hydrological systems. As water moves through these systems, it is important that both water quality and water quantity is managed to maintain the water balance and protect water resources.

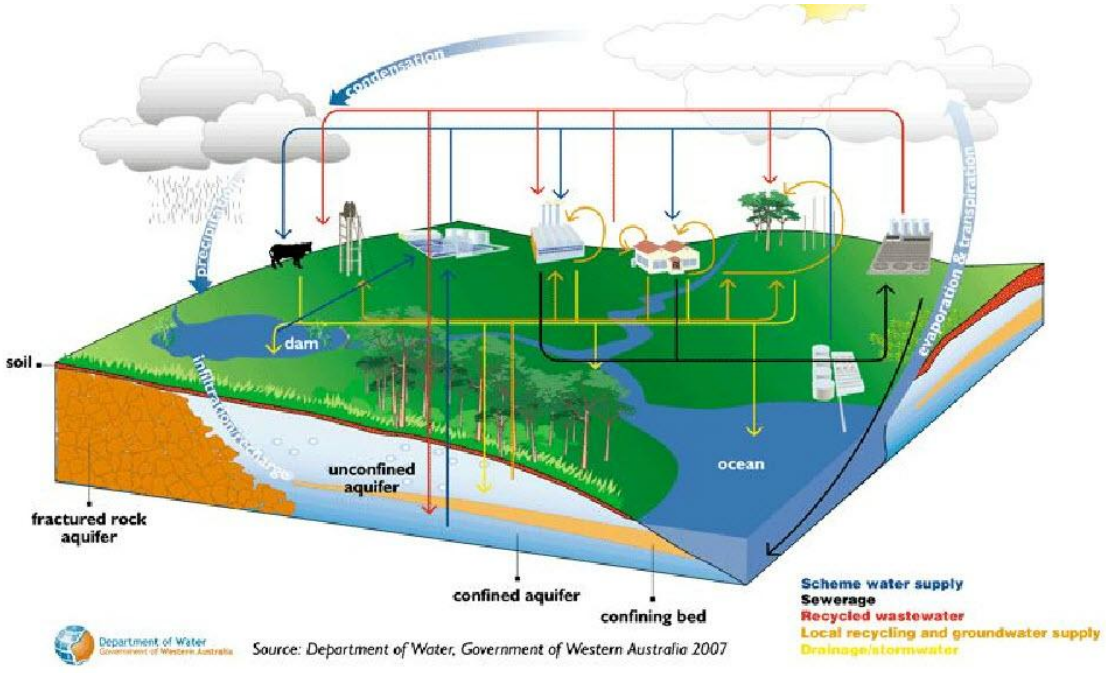


**Figure 1: Managed Water Cycle in Western Australia (*courtesy of Department of Water*)**

### 2.1.6 Climate Change

The City of Joondalup is located in the Southwest of Western Australia, an area that will be impacted considerably by the effects of climate change. The drying climate will reduce the availability of water resources across the region. The City is facing a future with less water, increased evaporation rates and more hot days.

Adaptation to the drying climate is critical, particularly as the impacts of climate change are already being experienced. Rainfall in the Perth-Peel region has decreased by over 10 per cent since the 1970s and much of this region, and the Southwest, experienced its driest year on record in 2010/11. Figure 1, below shows the variable rainfall pattern for this period across the state.

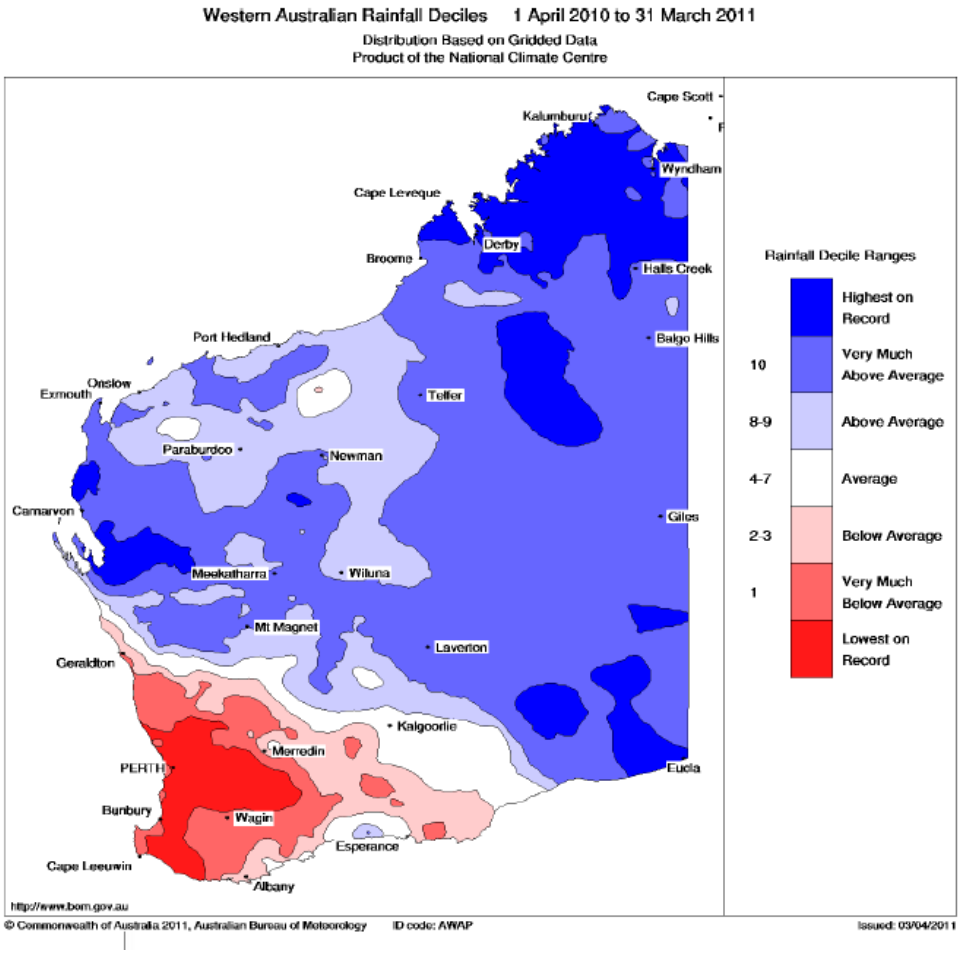


**Figure 2: Western Australian Rainfall Deciles 1 April 2010 to 31 March 2011**

Rainfall decline in the Southwest has reduced stream flow to surface water bodies and dams by 70 per cent[5]. Dams were once relied upon for the majority of the region's drinking water. Reduced stream flow has also dramatically reduced recharge to groundwater aquifers. Water levels in the Gnangara Groundwater System, where competition and demand for water resources is also high, have been declining dramatically, and were the lowest on record before the winter rainfall of 2011.

[5] Water Corporation. (2008). *Water Forever Sustainability Assessment*. Retrieved from http://www.thinking50.com.au/files/Water_Forever_-_Sustainability_Assessment_Report_(Low_Res)2.pdf

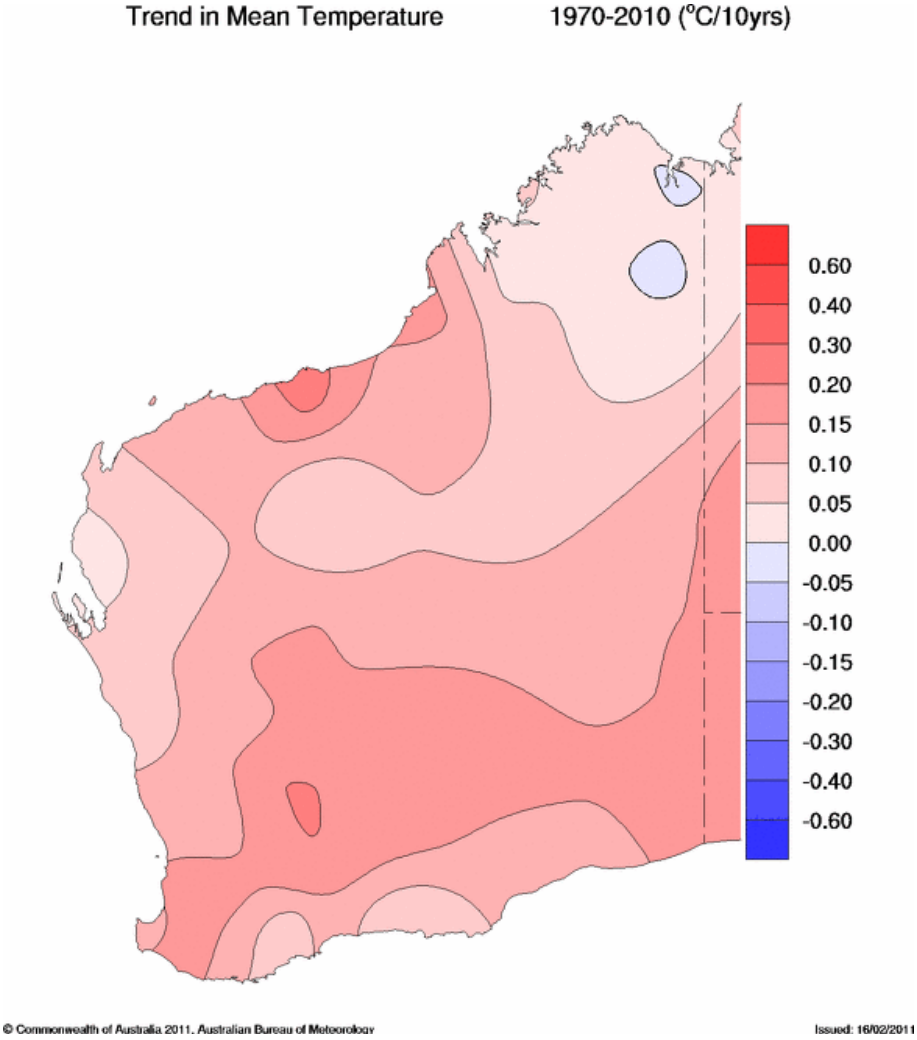


**Figure 3: Trend in WA mean temperature 1970 – 2010**

Climate change is likely to increase temperatures and the number of days over 30 degrees in the Southwest, and will subsequently increase evaporation rates from surface water bodies and soil. By 2030, the annual average number of days over 35°C in Perth could grow from the current 27 to 29-38 days[6]. More extreme weather events are also predicted, including more frequent and severe droughts. The City's future management of water resources will need to be considered in the context of a changing climate.

[6] South Western Australia (Climate Change). [n.d.]. Retrieved from the WALGA website: http://www.walgaclimatechange.com.au/south-western-australia.htm

# 3.0 Strategic Context

A decline in water availability has prompted action at the national, state and local level. Water management has shifted from purely an operational issue for water service providers and water managers to one that is now embedded in strategic policy for all spheres of government.

The decline in the availability of water sources has lead to the introduction of strong national and state legislation, regulation and restrictions. The key strategic documents and initiatives undertaken to improve water management across government are outlined below.

## 3.1 Local

The City's Strategic Plan 2008 - 2011 provides direction for the management and protection of the natural environment, including water. The natural environment is a key focus area of the Plan and aims to achieve the following outcomes:

- The City's natural environmental assets are preserved for future generations.
- The City establishes new, or maintains existing networks and partnerships in relation to the preservation of its natural environmental assets.

*Note:* The City is currently developing the Strategic Community Plan 2012 – 2022. Key Focus Areas and Outcomes will be reviewed as part of the process.

The City has also developed environmental plans and strategies, as outlined in Figure 3, to improve its environmental performance. A number of these target sustainable water management, including:

- *Landscape Master Plan 2009 – 2019*
- *Yellagonga Integrated Catchment Management Plan 2009 - 2014*
- *Environment Plan 2008 – 2011 (Under review)*

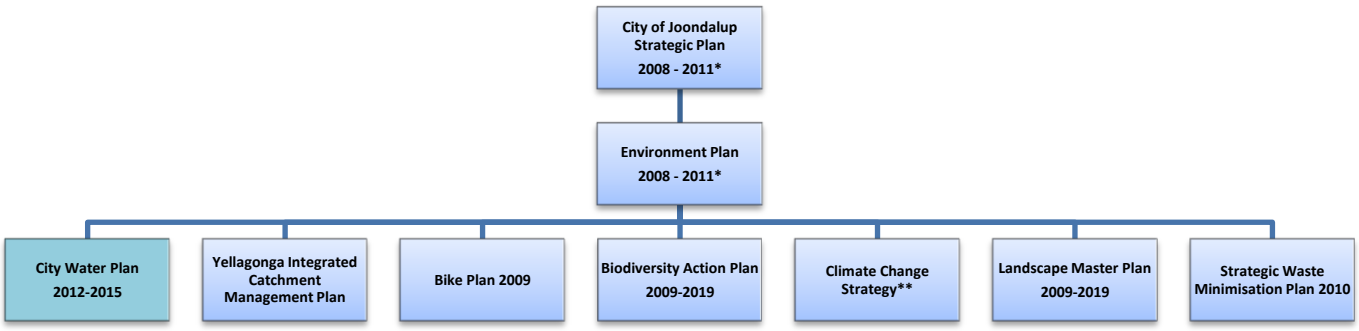


**Figure 4: Strategic Environmental Framework**

** Under review*

*** Currently in development*

## 3.2 State

Western Australia has implemented a range of initiatives to deal with water availability and water use across the State. Water restrictions were first introduced in the 1970s and were again implemented in 2001. Since 2001, many successful community education campaigns have been run by both State and Local Government. The State's major water utility, the Water Corporation, has recognised the water supply challenge for the State and need for adaptation. Two desalination plants have been built that now provide 30 per cent of water supplied to the Integrated Water Supply Scheme.

The Government of Western Australia has implemented a number of plans and strategies to improve water management. These include:

- *Water Forever: Towards Climate Resilience, 2009.*
- *Better Urban Water Management, 2008.*
- *State Water Plan, 2007.*
- *State Water Strategy, 2003.*
- *State Planning Policy 2.9: Water Resources.*
- *Stormwater Management Manual.*

### 3.2.1 Legislative Water Reform

The State Government, through the Department of Water, is currently undertaking extensive legislative water reform. The objectives of this reform are to:

- Implement the Water Reform Program and the National Water Initiative in Western Australia;
- Modernise and consolidate water resource management and water service delivery legislation; and
- Optimise operational efficiency and streamline processes where possible.

The outcome of this process will be the development of a *Water Services Act*, a *Water Resources Management Act* and the *Water Corporations Act* (following amendments to the *Water Corporation Act*).

### 3.2.2 Regulation

The Western Australian State Government has introduced a number of measures in recent years to ensure that Local Government takes action to reduce water consumption. Measures include regulation, capacity building programs and education initiatives. Local government is subject to daytime and winter sprinkler bans, and monitoring of groundwater use. All Perth Metropolitan local governments are also required to develop Water Conservation Plans for groundwater licences. Local governments with licences for extracting large amounts of groundwater are also required to develop Operating Strategies.

## 3.3 National

The National Water Initiative (NWI) was developed in 2004 as the blueprint for national water reform in Australia. It is a shared government commitment to increase water efficiency for the benefit of the Australian people, economy and the environment[7]. The NWI has contributed to the water reform agenda in Western Australia through the following:

- Intergovernmental Agreement on a National Water Initiative - signed by COAG 25 June 2004.
- Western Australia became a signatory in April 2006.
- Western Australia NWI Implementation Plan developed in 2007 and includes:
    - Improved water management planning;
    - Review of water access processes; and
    - Legislative water reform.

## 3.4 Achievements

In 2007, the City demonstrated its commitment to sustainable water management by joining the ICLEI- Local Governments for Sustainability Water Campaign™ Program. Since that time, the City has completed all five milestones of the Milestone Framework in the corporate and community sector.

In 2010, the City became an accredited Waterwise Council under the Waterwise Council Program. The City received the Waterwise Council category award at the 2011 WA Water Awards for its contribution towards sustainable water management.

In 2011, the City was named the most liveable city at the International Awards for Liveable Communities (LivCom), winning the category for cities with populations of between 150,001 and 400,000. Environmental performance and management of natural resources is a key component in the United Nations Environment Program (UNEP) endorsed awards.

[7] Overview (National Water Initiative). [n.d.]. Retrieved from the National Water Commission Web site: http://www.nwc.gov.au/www/html/117-national-water-initiative.asp

# PART 2 - CITY OF JOONDALUP WATER PROFILE

## 4.0 Water Consumption

In order to track the City's performance, water consumption is continually monitored. Scheme water use by the City and the community is measured on a regular basis. The City utilises the services of Planet Footprint to monitor its scheme water use, as well as other utilities. Community scheme water data is sourced from the Water Corporation. The City has been manually monitoring its groundwater use by means of water meters since 2007; however, groundwater usage data is not available for the community sector.

## 4.1 Groundwater

The City of Joondalup is located on the Gnangara Groundwater System, comprising four main aquifers: superficial (shallow, unconfined), Mirrabooka (deeper, semi-confined), Leederville (deep, mostly confined) and the Yarragadee (deep, mostly confined). The Gnangara Mound refers to the Superficial aquifer where the water table creates a mound shape[8].

Groundwater levels in the superficial aquifer have been declining over recent years; however, the high rainfall experienced in the winter of 2011 has increased water levels above what they were at the same time in 2010.

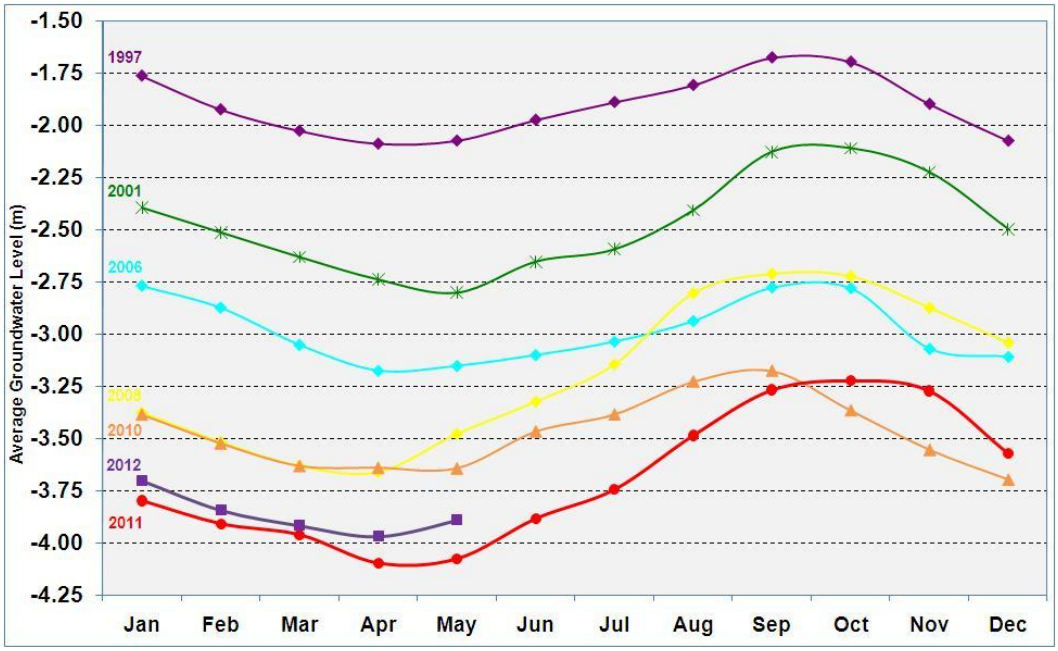


**Figure 5: Average groundwater level in the Gnangara Mound *(courtesy of Department of Water)***

[8] Gnangara Groundwater System. [n.d.]. Retrieved from the Department of Water Web site: http://www.water.wa.gov.au/Understanding+water/Groundwater/Gnangara+Mound/default.aspx

### 4.1.1 City of Joondalup Groundwater Use

Groundwater accounts for over 98 per cent of the City of Joondalup's corporate water use. The City has three groundwater licenses (GWL 155515, GWL 155582 and GWL 155510) for irrigating public open space. The GWLs cover two groundwater subareas: Whitfords and Quinns. GWL 155510 is in the Quinns subarea, which is located north of Burns Beach Road and consists of newer parks and sporting fields. The remaining two GWLs cover the Whitfords subarea, from Beach Road to Burns Beach Road. This area consists predominantly of established parks and sporting ovals with older infrastructure and design elements. The licence areas for the City's GWLs are displayed in Figure 5.

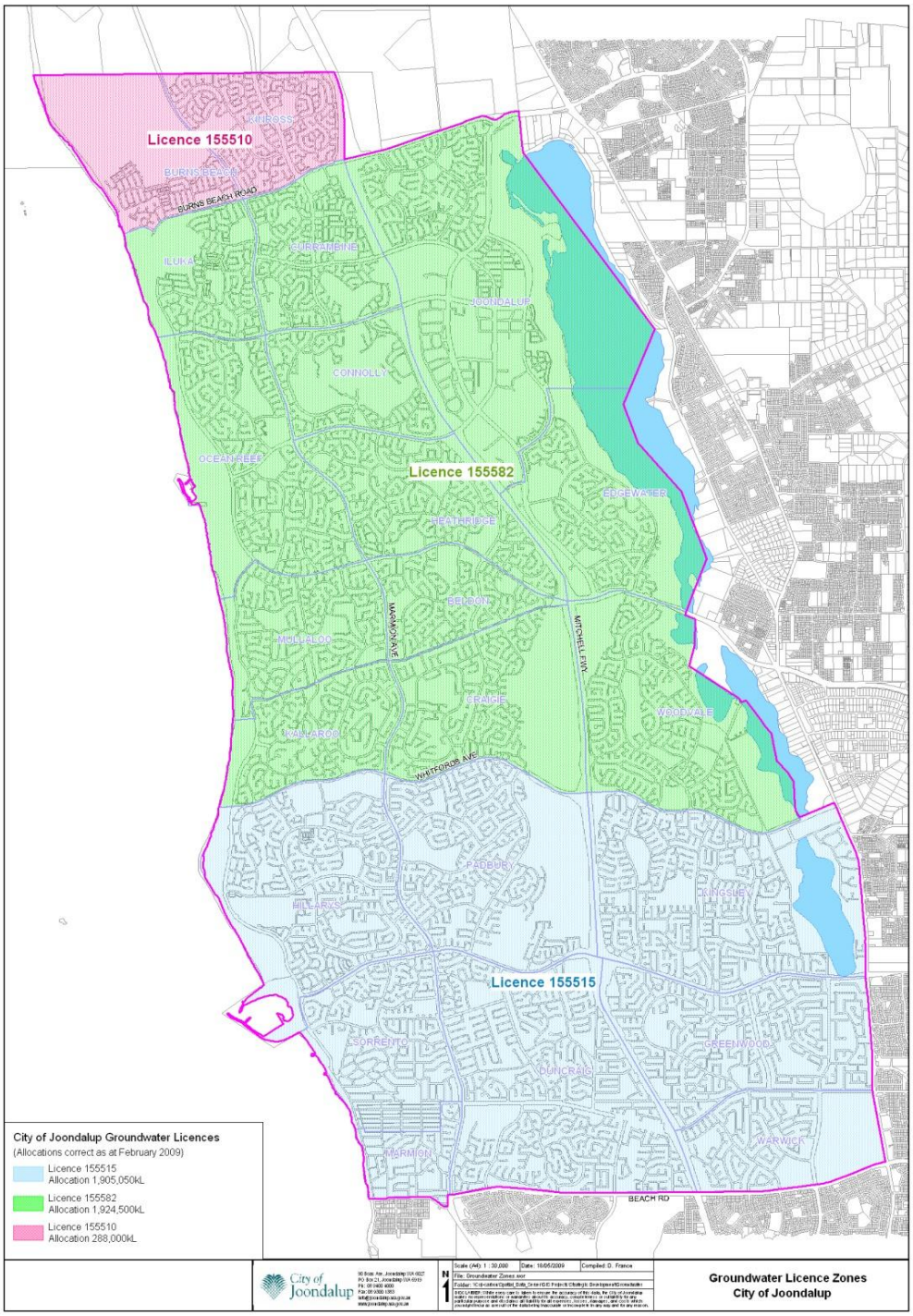


**Figure 6: Groundwater Licence Zones - City of Joondalup**

The City recently amended its licence conditions and now provides extraction data for each groundwater subarea. Previously the City reported on extraction data for each groundwater licence. Groundwater subareas represent separate aquifers and are used to determine license allocations. Management within a groundwater subarea allows for more flexibility to reduce or increase water use when needed and provides for holistic, sustainable management of groundwater resources.

Groundwater consumption data has been collected since 2007/08; however, meters were not installed on all bores until 2008/09. Estimates were therefore used to determine the baseline groundwater consumption for 2007/08, as this was chosen as the baseline year for the City's ICLEI Water Campaign™ and for the Water Conservation Plan goals. Groundwater data from 2008/09 onwards has been displayed in Figure 6, below, because it provides greater accuracy.

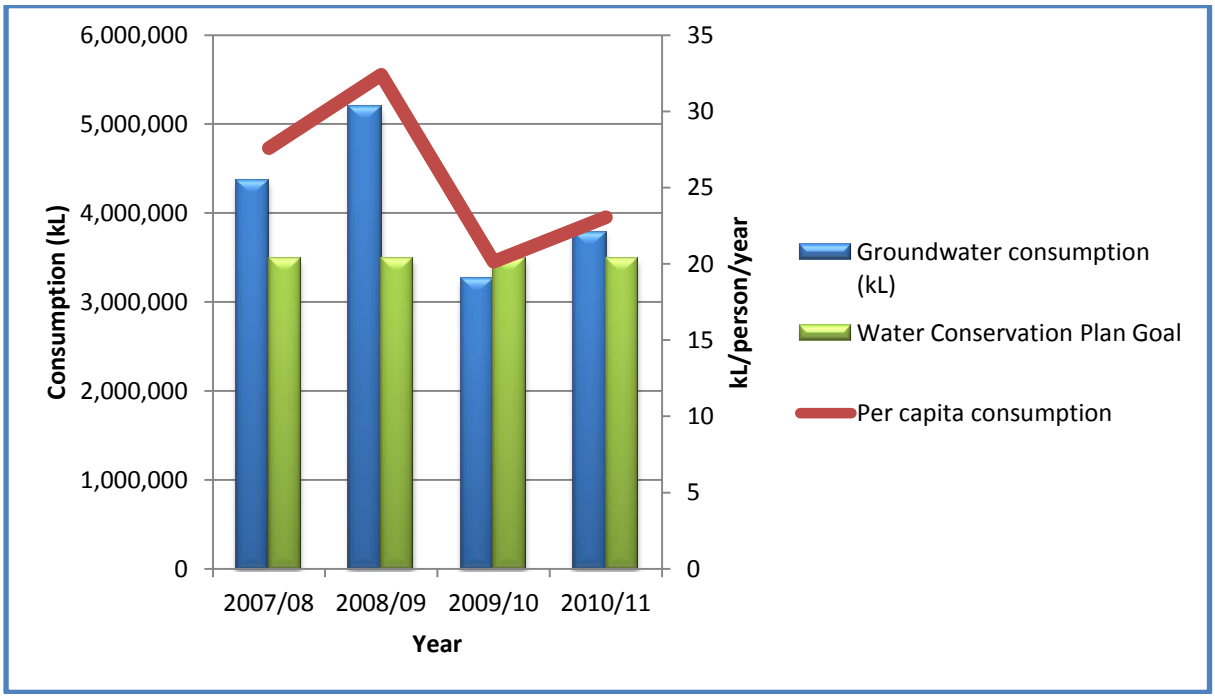


**Figure 7: Groundwater consumption 2008/09 – 2010/11**

Groundwater use was highest in 2008/09, coinciding with the implementation of meter readings for all City bores. Low rainfall was also experienced in the winter of 2008/09. Since 2008/09, groundwater use has reduced significantly at an average rate of 1,671,389 kilolitres per year.

The increase in groundwater consumption in 2010/11 can be attributed to Perth experiencing one of the driest years on record. Groundwater consumption in 2010/11 was 27 per cent less than 2008/09 consumption and 29 per cent less per capita.

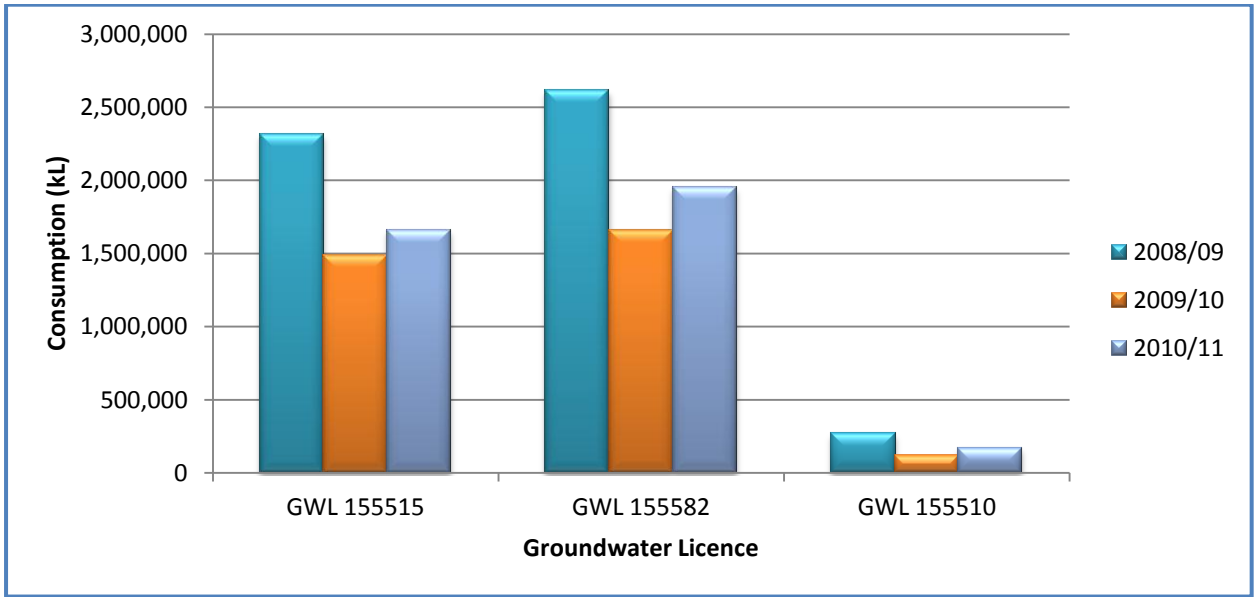


**Figure 8: Groundwater use for each licence 2008/09 to 2010/11**

Figure 7 demonstrates that the trends in groundwater consumption are relatively consistent across the three groundwater licences.

| Groundwater Sub-Area | Whitfords | Quinns |
|---|---|---|
| Water use (kL/yr) | 3,617,412 | 174,277 |
| Allocation (kL/yr) | 3,829,550 | 280,000 |
| Over/under % (amount) | -6% | -38% |
| Irrigated area (ha) | 561.59 | 24 |
| Average water use/ha irrigated (kL/ha/yr) | 6429.5 | 7261 |
| # bores | 187 | 10 |
| # irrigated parks & reserves | 228 | 15 |

**Figure 9: Groundwater use for groundwater subareas 2010/11**

The City is moving towards a reporting regime based on groundwater subareas, rather than groundwater licenses, as detailed in Figure 8. The Whitfords subarea is an amalgamation of GWL 155515 and GWL 155582. The Quinns subarea is GWL 155510.

### 4.1.2 Community Groundwater Use

There is no measured data on community groundwater consumption. It is estimated that there are 150,000 garden bores in the Perth Metropolitan Area[9]. Recent campaigns encouraging the use of garden bores to reduce demand for scheme water, along with increased land development, are increasing the number of bores in Perth.

The Department of Water developed the Groundwater Atlas to map areas that are suitable for garden bores. Where an area is deemed unsuitable, this can be due to water quality concerns or potential impacts to waterways, groundwater dependent ecosystems or acid sulphate soils. Garden bores are encouraged by the State Government because they can reduce demand on scheme water resources.

## 4.2 Scheme Water

All scheme water supplied to the City of Joondalup via the Integrated Water Supply Scheme is from groundwater. This is treated at local groundwater treatment plants to drinking water quality. The residential sector accounts for 71 per cent of water consumption, 39 per cent of which is used for irrigation[10].

### 4.2.1 Corporate Scheme Water use

The City uses scheme water in its community facilities, recreation centres, libraries and civic centres. Since joining the ICLEI Water Campaign™ in 2007, the City has made a concerted effort to reduce scheme water use. Corporate water consumption has reduced by 5 per cent since 2007/08. Population growth and new facilities, however, could increase the City's overall scheme water use.

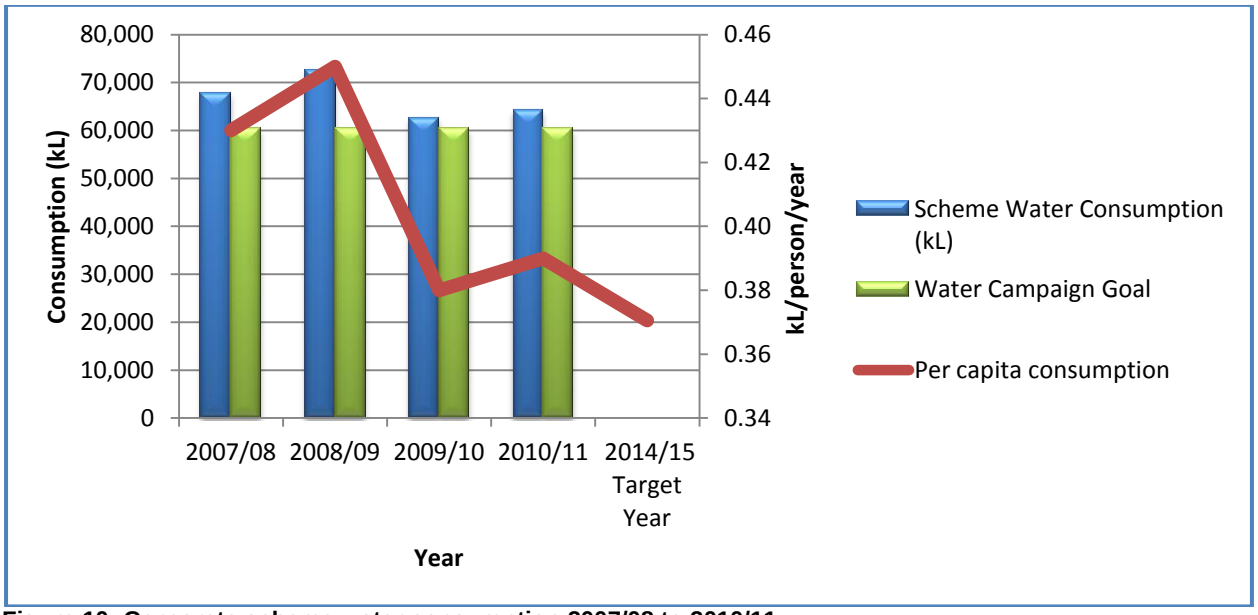


**Figure 10: Corporate scheme water consumption 2007/08 to 2010/11**

[9] Water Corporation. (2010a). *Garden Bores Information Sheet*. [Fact Sheet]. Retrieved from http://www.thinking50.com.au/go/publications/information-sheets

[10] Water Corporation. (2010b). *Perth Residential Water Use Study 2008/09*. Perth, Australia: Water Corporation.

Figure 9 displays the City's scheme water consumption from 2007/08 to 2010/11. The City has reduced its scheme water use, however, this has not been a consistent decline since 2007/08. Scheme water use per capita has reduced by 9 per cent since 2007/08. The increase in scheme water use in 2008/09 could have been due to the low rainfall experienced in that year.
The water use trends for both groundwater and scheme water are very similar, indicating that climate may affect both indoor and outdoor corporate water consumption.

### 4.2.2 Community Scheme Water Use

Scheme water use in the community has reduced by over 5 per cent since 2007/08. The City's Water Campaign™ community water use reduction goal of 5 per cent below 2007/08 by 2015 was achieved in 2010/11.

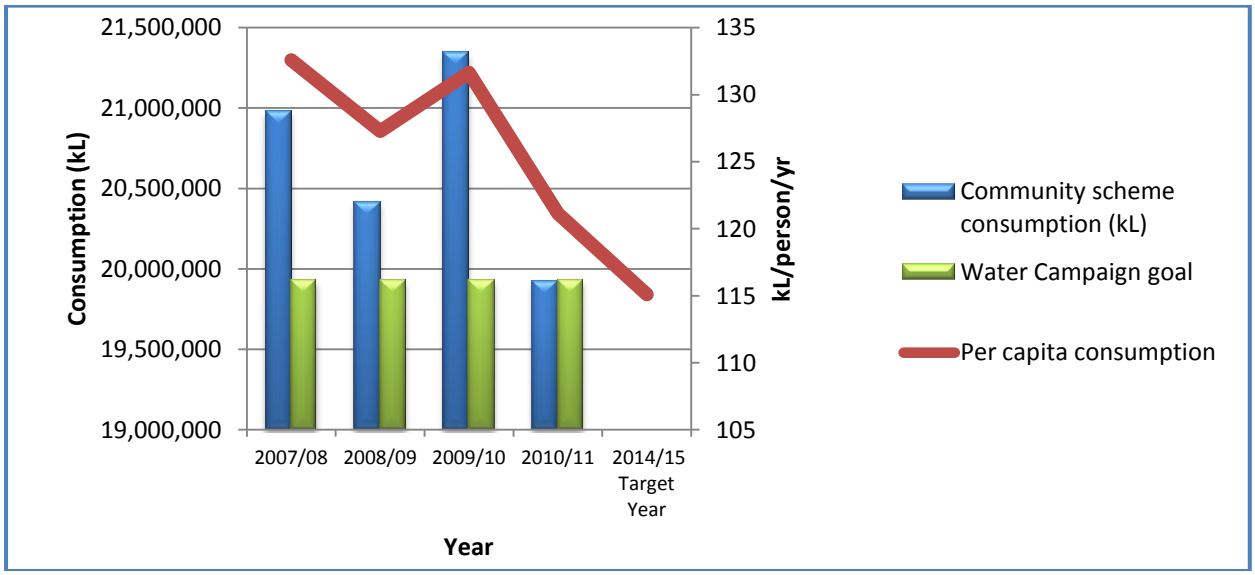


**Figure 11: Community scheme water consumption 2007/08 to 2010/11**

Figure 10 shows the water consumption trend for total scheme water use. This consumption includes residential, commercial and trade scheme water use. Water use has reduced at an average rate of 2 per cent below 2007/08 consumption. In 2009/10, consumption increased by 1.7 per cent compared to the previous year. Climate may have been a factor as 2010 was a record dry year in Perth. City corporate water was its lowest in 2009/10 compared to other years.

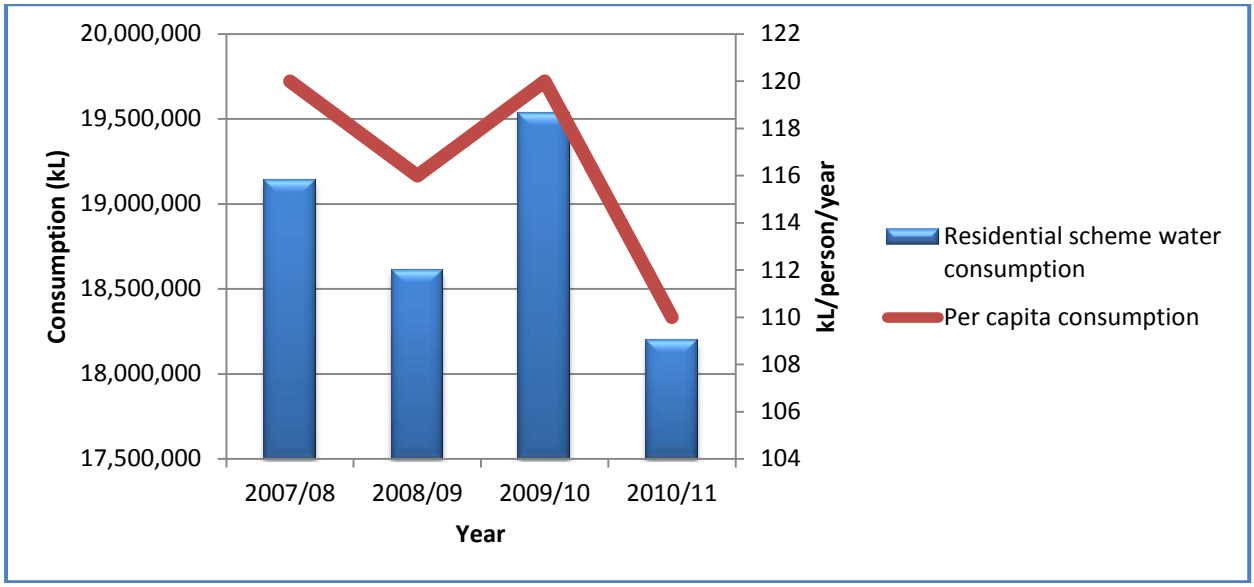


**Figure 12: Residential scheme water consumption 2007/08 to 2010/11**

Residential water consumption contributes to 91 per cent of the total community water use. Residential water use increased considerably in 2009/10 but reduced the following year. Water use has reduced by 5 per cent since 2007/08 and per capita water use has reduced by over 8 per cent.

The average water consumption for the Perth Metropolitan Area is 106 kilolitres per capita[11]. In 2010/11, the City of Joondalup community had a per capita consumption of 110 kilolitres per capita, just over 3 per cent above the average. The *State Water Plan 2007* set a goal of 100kL per capita.

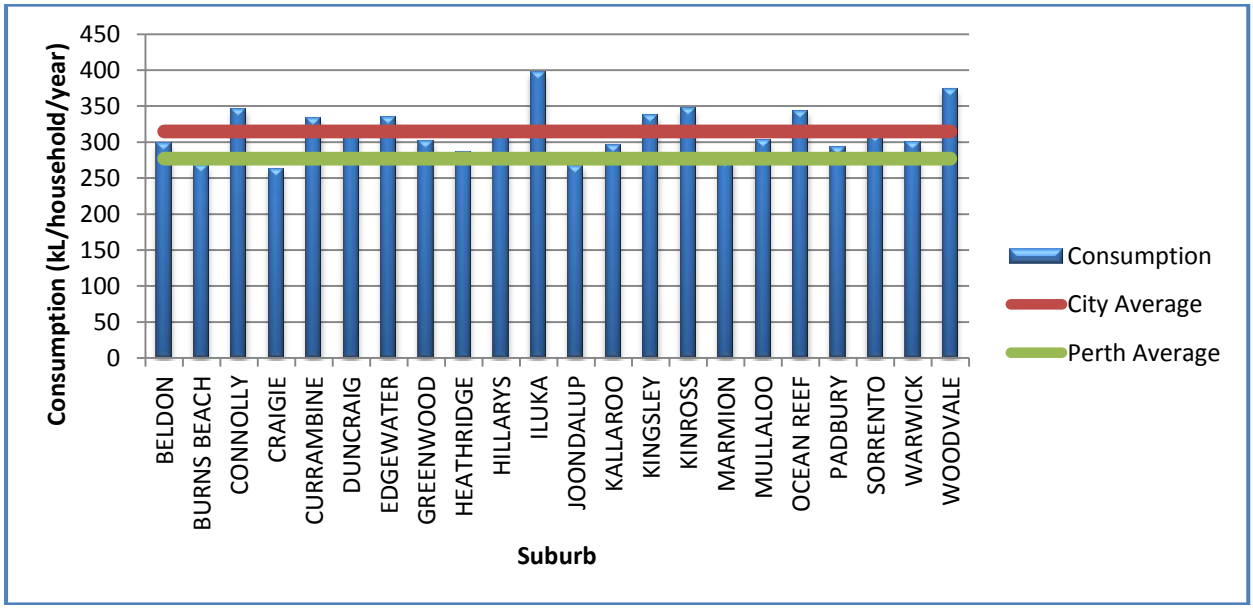


**Figure 13: Household scheme water consumption by suburb for 2010/11**

[11] Water Corporation. (2010b). *Perth Residential Water Use Study 2008/09*. Perth, Australia: Water Corporation.

The average consumption per household is 314.62 kilolitres per year. Iluka had the highest annual consumption per unit of 397 kilolitres, followed by Woodvale and Connolly. Suburbs with a greater number of high density residential dwellings recorded less water use per unit. Analysis of residential water consumption by suburb assists the City to run targeted campaigns for water conservation.

The average household scheme water consumption for Perth is 277 kilolitres per year. The suburbs of Burns Beach, Craigie, Joondalup and Marmion were below this average in 2010/11.

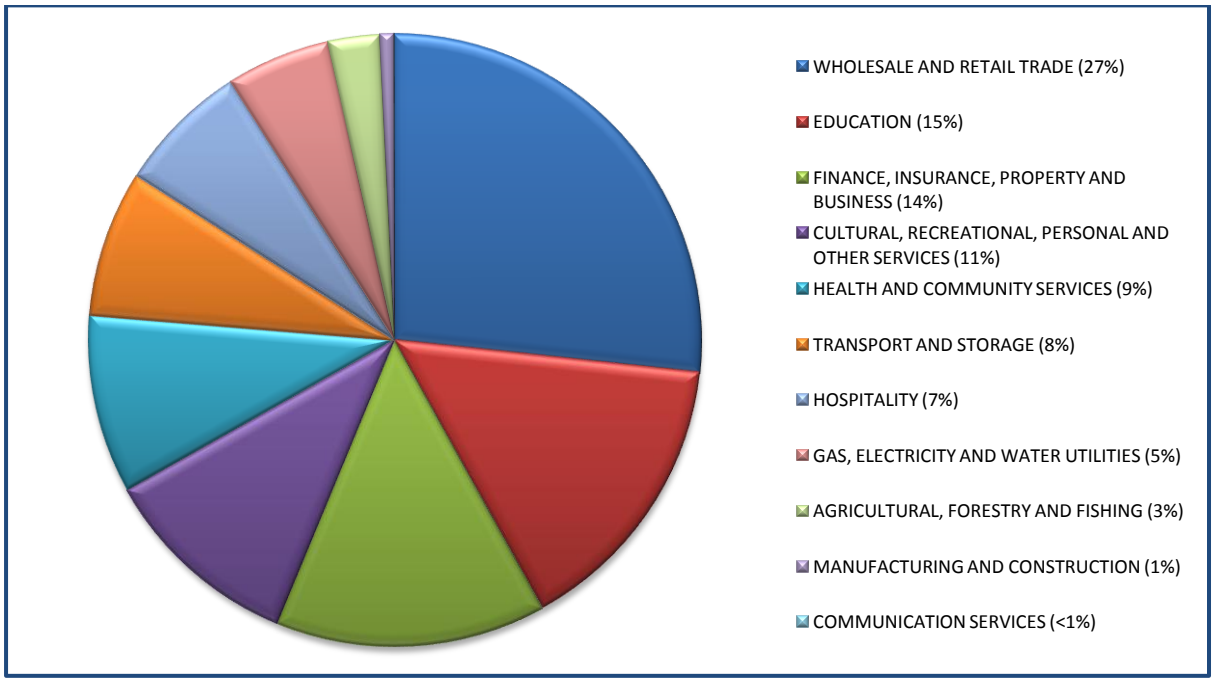


**Figure 14: Non-residential community water use breakdown for 2010/11**

The wholesale and retail trade category is the highest non-residential category water user. Education and the finance sector are also significant contributors to community water use. This type of comparison can assist the City to target its water conservation programs in specific sectors of the community.

# 5.0 Water Quality/Quantity Management

## 5.1 Water quality

Water quality is monitored at Yellagonga Regional Park as part of the Yellagonga Monitoring and Mapping Project within the *Yellagonga Integrated Catchment Management Plan 2009 - 2014.* Groundwater quality monitoring is undertaken at various locations as the City works towards developing a more comprehensive data set for water quality to provide for improved monitoring of groundwater and surface water quality. The scope and costs associated with groundwater and surface water quality monitoring inhibit the City from developing a complete data set. The Department of Water also has a number of groundwater monitoring bores in Yellagonga Regional Park; however thise data set is also incomplete.

Water quality monitoring at coastal sites ~~is conducted~~, undertaken with the primary purpose of ~~ily to~~ protecting public health, indicates that contaminates and nutrients are present in marine waters. Contaminants reach the coast through existing stormwater systems that discharge into coastal areas, and through sub-marine discharges from groundwater, and can have a significant impact on marine/coastal water quality

### 5.2 Water quantity

In addition to water quality management, there is also the need to manage water quantity throughout the City to respond to the drying climate. Wetlands, groundwater and drinking water resources are impacted by reduced rainfall and anthropological uses of water resources. Water quantity management is critical to ensuring that water is available to support wetlands and other groundwater dependent ecosystems, and also to provide water for irrigation and drinking water purposes.

### 5.3 Stormwater management

The City has developed a formal approach to the management of new and existing stormwater infrastructure through the *Drainage Asset Management Plan 2011-2031*. The levels of service for the provision of stormwater infrastructure are based primarily on flooding response, environmental impact, asset condition, capacity, safety, cleanliness and asset condition.

The City's stormwater network consists of 750 kilometres of pipeline, 3381 side entry gullies, 584 outfalls, 161 sumps, 58 leach drains, 36 soak wells, 25 gross pollutant traps (GPTs) and 18 bubble-up pits. The City traditionally managed the drainage network to prevent flooding, however, is now more cognisant of the need to manage water quality and water quantity impacts, as part of a holistic approach. Stormwater in the City is discharged via ocean, wetland and sump outfalls, and recharged to groundwater resources via infiltration through soakwells and drainage sumps.

The City recently assessed stormwater asset condition and developed a program for maintenance, renewals and new works. Renewal programs provide an opportunity for the City to improve the environmental performance of stormwater management systems, and to reduce potential water quality and water quantity impacts to the local environment. To this end, the City has retrofitted five sumps to reduce environmental impacts. New and renewal projects also provide an opportunity for the City to upgrade stormwater assets to manage increased, and more intense, storm events, as expected under climate change scenarios.

## 6.0 Water Management Targets

The Water Management Targets for the City were developed following a review of the Water Campaign and Water Conservation Plan goals. The proposed new targets were developed in consideration of the City's achievements since joining the ICLEI Water Campaign in 2007 and to promote continuous improvement in water management.

The review of the Water Management Targets enables the City to set a target year that is consistent for groundwater and scheme water use. Groundwater and scheme water have also been separated into two targets as they are managed separately by the City. Per capita,

rather than total, water use reductions have been proposed to account for new facilities and services for a growing population.

The new baseline year, 2010/11, has been selected as it is the most recent water consumption data year. The proposed target year is 2014/15, as this is the final year of project implementation in the City Water Plan.

- **Corporate Groundwater Consumption**

Reduce corporate groundwater use by 10 per cent per capita below 2010/11 consumption by 2014/15.

The City's groundwater consumption in 2010/11 was 23.06 kL per capita. The City will need to reduce groundwater use to 20.75 kL per capita in 2014/15 in order to meet this target.

- **Corporate Scheme water Consumption**

Reduce corporate scheme water use by 5 per cent per capita below 2010/11 consumption by 2014/15.

The City's corporate scheme water consumption in 2010/11 was 0.39 kL per capita. The City will need to reduce corporate scheme water use to 0.37 in 2014/15 in order to meet this target.

- **Community Scheme water Consumption**

Reduce community scheme water use by 5 per cent per capita below 2010/11 consumption by 2014/15.

Community scheme water consumption in 2010/11 was 121.15 kL per capita. The City will need to work with the community to reduce scheme water use to 115.09 kL per capita in 2014/15 in order to meet this target.

- **Corporate Water Quality Management**

Implement water quality improvement projects through best practice City operations, procedures and policy in at least three Water Management Areas per year by 2014/15.

- **Community Water Quality Management**

Implement water quality improvement projects that encourage community responsibility and promote partnerships for water quality improvement in at least two Water Management Areas per year by 2014/15.

## 7.0 Key issues and opportunities

A number of water management issues have been identified as priorities for the City. These range from resource condition to operational barriers to sustainable water management.

Key issues, as well as opportunities to address these issues, are detailed below. Issues and opportunities have been categorised into Water Management Areas to ensure they are addressed appropriately for holistic water management.

| Issue | Opportunity | Water Management Area(s) |
|---|---|---|
| Gaps in data for City scheme and groundwater consumption. | Improved data management to allow for accurate monitoring and measuring of water efficiency initiatives and anomalies. | Water Monitoring and Reporting |
| Monitoring and reporting systems for water consumption that are time consuming and prone to human error. | Use of technology to improve accuracy and staff efficiency in monitoring and reporting water consumption. | Water Monitoring and Reporting |
| Lack of accountability for variances in water use in City facilities. | Improved communication and reporting of water use anomalies in City facilities. | Water Monitoring and Reporting<br>Built Environment |
| Gaps in water quality monitoring data. | Improved, consistent and ongoing water quality data monitoring program. | Water Monitoring and Reporting<br>Partnerships and Policy |
| Financial constraints for infrastructure upgrades and building retrofits. | Upgrade and retrofit projects are integrated into existing works schedules.<br>Funding opportunities for retrofit projects. | Built Environment<br>Management of Natural Areas and Public Open Space<br>Water Sensitive Urban Design |
| Incomplete data within Asset Management systems for scheme and groundwater assets. | Improved asset management and record keeping systems that inform works maintenance schedules and capital works. | Management of Natural Areas and Public Open Space |

| Issue | Opportunity | Water Management Area(s) |
|---|---|---|
| Manual operation of irrigation systems. | Use of technology to increase staff efficiency and allow for greater, centralised control of irrigation systems. | Management of Natural Areas and Public Open Space |
| City operations may have negative impact on local water quality. | Consideration of water quality impacts in all City operations and decision-making. | Management of Natural Areas and Public Open Space<br>Water Sensitive Urban Design<br>Staff Education and Participation |
| Continuing water quality decline in parts of Yellagonga Regional Park. | Improved management of wetland areas and increased education to prevent further water quality decline. | Management of Natural Areas and Public Open Space<br>Staff Education and Participation<br>Community Education and Participation<br>Partnerships and Policy |
| Traditional stormwater conveyance systems which do not provide environmental and social benefits. | Incorporate principles of water sensitive urban design with City stormwater management. | Water Sensitive Urban Design |
| External contractors and suppliers that operate under different policies and procedures. | Integration of sustainable water management principles into City contracts and purchasing decisions. | Contracts and Purchasing |
| Community awareness of catchment issues and processes. | Increased community awareness of catchment issues to promote behaviour change. | Community Education and Participation |
| Community water consumption and behaviours. | Implementation of water efficiency measures in the wider community. | Community Education and Participation<br>Partnerships and Policy |
| Gaps in research for new water technologies. | Formation of partnerships for collaborative new water technology research projects. | Partnerships and Policy |
| Coordination and collaboration with stakeholders. | Collaboration with stakeholders to achieve local and regional sustainable water management. | Partnerships and Policy |

# PART 3 – CITY OF JOONDALUP WATER PLAN

## 8.0 Water Management Project Areas and Objectives

Water Management Areas have been developed to address key water issues and opportunities. Implementation of Projects within these key focus areas will ensure that a multi-pronged approach to holistic water management is adopted. Objectives to improve water conservation and water quality management in the City have been developed for each Water Management Area and are provided below.

| Water Management Area | Water Management Objective |
|---|---|
| Water Monitoring and Reporting | Collate and maintain accurate water consumption and water quality data that allows for consistent monitoring, review and reporting. |
| Built Environment | Create and maintain City assets that minimise the use of water and protect local water resources through appropriate design, construction and operation. |
| Management of Natural Areas and Public Open Space | Manage and protect local water resources through best practice management of the natural environment and public open space. |
| Water Sensitive Urban Design | Promote and implement stormwater management practices that improve local water quality and reduce water consumption. |
| Contracts and Purchasing | Minimise the consumption of, and impact to, water resources through the consideration of environmental criteria in City purchasing and tender decisions. |
| Staff Education and Participation | Improve the environmental performance of the organisation through the provision of information to staff regarding sustainable water management and water quality improvement. |
| Community Education and Participation | Provide opportunities for community education and participation in water efficiency and water quality improvement initiatives. |
| Partnerships and Policy | Develop partnerships with the State Government and external stakeholders to enhance water conservation and water quality improvement opportunities within the City. |

# 9.0 Project Descriptions

### WATER MANAGEMENT AREA: WATER MONITORING AND REPORTING

*Objective: Collate and maintain accurate water consumption and water quality data that allows for consistent monitoring, review and reporting.*

## Environmental Building Audits

**New Project**

**Project Description**
Environmental auditing involves the identification of assets and processes that contribute to inefficiencies in water use within facilities and operations. Audits also enable the identification of opportunities for improvements which can reduce water consumption.

The City will carry out Environmental Building Audits of key facilities that utilise scheme water in order to identify opportunities for upgrades or improvements in water efficiency. Physical audits of nominated facilities will be conducted.

Property scheme water usage data, provided by Planet Footprint, will be used to inform the Audits. A report will be developed that will include recommendations to improve water use within the facilities. Recommended works will be incorporated into future Capital Works Programs and Maintenance Schedules.

**Project Objectives**
- Identify where water efficiencies can be made through the auditing of scheme water infrastructure in City facilities.
- Prioritise upgrades, retrofits and replacements for the City's Capital Works Program and Maintenance Schedules.

**Deliverables**
- Development of an audit schedule for City buildings identifying those that can be audited by City staff and those that require the skills of an external consultant.
- Environmental Building Audit and Report outlining findings for City facilities including:
    - Craigie Leisure Centre
    - Joondalup Administration Building
    - Works Operations Centre.

**Approach**
The initial focus of the Project will be to conduct Audits at the City's highest water consumption buildings. Consultants will be engaged to undertake Water Audits for larger City facilities. Audits requiring less investigation may be conducted by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Asset Management

# Irrigation Infrastructure Audits

**New Project**

**Project Description**
Auditing of irrigation infrastructure will identify assets that contribute to water use inefficiency and allow for the prioritisation of asset upgrades and replacements to reduce water consumption.

The City will carry out an Audit of irrigation infrastructure to identify where upgrades and maintenance is required. The Audit will assess the condition of irrigation assets and will indentify where faulty or end-of-life infrastructure exists, as well as the efficiency of irrigation systems.

Research will also be undertaken to identify the latest water efficient technologies for irrigation infrastructure.

**Project Objectives**
- Increase the water efficiency of the City's irrigation infrastructure by identifying where improvements in technology can be made.

**Deliverables**
- Audit of the City's irrigation infrastructure including: lakes, liners, filters, bores, pumps and reticulation systems.
- Development of a Report detailing priority projects to improve water efficiency and ongoing maintenance schedules.
- Research and analysis into the latest water efficient technologies for irrigation infrastructure.

**Approach**
The auditing of irrigation infrastructure and development of priorities for the City's works and maintenance schedules will be implemented by the City of Joondalup.

**Timeframe for Implementation**
July 2013 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Operation Services

# Groundwater Monitoring and Data Management

**New Project**

**Project Description**
Consistent, automated and ongoing collection of groundwater consumption data will improve accuracy and allow for better informed irrigation scheduling and water efficiency outcomes within City parks.

This project will identify current technologies and software that could assist with water consumption data collection, entry and analysis. Specifically, technologies with automated meter reading will be researched. The City will investigate available centralised irrigation control systems and electronic metering systems, to inform effective decision making, and determine which system best meets the needs of the City.

An automated monitoring system will allow for more in-depth analysis of the City's groundwater use and significantly reduce officer time spent on collecting, analysing and reporting groundwater use data. An automated system will also reduce potential human error in recording meter readings.

**Project Objectives**
- Improve management of groundwater through informed decision-making based on accurate and reliable data.

**Deliverables**
- Investigation into the use of personal computing devices that digitally record meter readings and upload this information to a central database.
- Consultation with turf management agencies regarding fertiliser and water use, and implementation of ideas considered to be advantageous to the City's turf management program.
- Development of a Report into current technologies, including case studies from other turf management organisations and recommendations for improvements.

**Approach**
Research and implementation will be carried out by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Operation Services

# Soil Moisture Monitoring

**New Project**

**Project Description**
Soil moisture monitoring allows the identification of moisture levels in the soil profile and the scheduling of irrigation regimes according to turf requirements. It also allows the City to promote deep root growth without causing stress to turf roots.

Following a trial of ten soil moisture sensors (lisometers) in active sporting ovals in 2011, the City developed a Case Study to detail the benefits of the technology. Soil moisture meters monitor moisture at four depths in the soil profile. This data is then automatically sent to a website where it can be viewed and analysed by City staff to inform irrigation regimes.

Soil moisture sensors will be installed and monitored each year with the goal of expanding the soil moisture monitoring program to include all active and high profile parks in four years.

The City will use soil moisture data to develop irrigation schedules based on turf needs. The sensors indicate moisture levels after rainfall events, preventing over-watering, and allow the City to manage turf on minimal irrigation without causing stress. Soil moisture sensors are used in combination with weather forecasts, evaporation rates and soil types to ensure the City adopts a science based approach to irrigation scheduling.

**Project Objectives**
- Ensure the City adopts a science-based approach to irrigation scheduling to increase water use efficiency.

**Deliverables**
- The establishment of a program for the installation of ten soil moisture meters each year.
- Development of irrigation schedules with consideration of soil moisture levels and turf requirements.

**Approach**
Research and implementation will be carried out by the City of Joondalup.

**Timeframe for Implementation**
July 2013 – June 2015

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Operation Services

# Craigie Leisure Centre Automated Water Metering

**New Project**

**Project Description**
Craigie Leisure Centre is the City's flagship building for the demonstration of environmental initiatives. This building will continue to develop as the City's leading water conservation and efficiency site as it is a high water using building, has high patronage and is a prominent facility used to promote City projects. An electronic meter installed at Craigie Leisure Centre (CLC) will ensure the continual and reliable collection of water consumption data.

The installation of an automated, electronic meter will eliminate the need for manual data collection and will provide real time data to the building management system. This will allow for in-depth analysis of water use over a 24-hour period to determine when water is being used. The data provided by the meter will also allow for early detection of inefficiencies.

**Project Objectives**
- Reduce water consumption at Craigie Leisure Centre through improved data management systems.
- Increase capacity at Craigie Leisure Centre to measure outcomes of water efficiency projects and trends in water consumption.

**Deliverables**
- Installation of an automated, electronic meter at Craigie Leisure Centre.

**Approach**
The installation of the automated meter will be coordinated by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2013

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Leisure and Cultural Services

# Planet Footprint

**Existing Project**

**Project Description**
The availability of consistent and accurate water consumption data assists in identifying anomalies and the outcomes of City water efficiency projects. Frequent monitoring and reporting of water consumption data is also important in tracking progress towards water management targets.

The City subscribes to Planet Footprint to measure the City's environmental performance, providing energy, water, waste, fleet and greenhouse performance including consumption, costs and greenhouse gas emissions data quarterly. This information is presented on the Planet Footprint website where the City has access to data and reports on environmental performance.

Planet Footprint monitors 29 of the City's buildings, as well as its overall water use, and has water consumption data for each property for the past five years. Planet Footprint also reports on anomalies and notifies the City of any significant increases in water consumption. The performance of City buildings is benchmarked against National and International properties in a similar category. Data from Planet Footprint will be used to inform the priorities for *Environmental Building Audits* as well as measure the consumption and cost benefits of changes the City makes as a result of the audits.

**Project Objectives**
- Enable consistent and ongoing monitoring of water consumption data to measure targets, and to identify trends and anomalies.
- Provision of qualitative data to inform City decisions, reports and strategic direction relating to water management.
- Provision of data to inform the development of environmental education programs relating to water conservation.

**Deliverables**
- Development of a priority list of high water using buildings.
- Development of water consumption and anomaly reports.
- Development of water use data module on the Corporate Dashboard.
- Establishment of a working group to investigate anomalies.

**Approach**
The City annually subscribes to Planet Footprint to collect and collate water use data; however the interpretation and reporting of data internally and externally is the responsibility of the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# Water Quality Monitoring and Mapping Project

**Existing Project**

**Project Description**
Wetlands in Yellagonga Regional Park are surrounded by land uses that have the potential to contribute to declining water quality. Legacy water quality issues also impact receiving environments, including groundwater. A better understanding of water quality is needed so that remediation projects can be implemented to achieve water quality outcomes.

The Yellagonga Monitoring and Mapping Project is a project within the *Yellagonga Integrated Catchment Management Plan 2009-2014* (YICM Plan), which has been developed to provide a comprehensive and integrated approach in order to maintain and enhance the amenity, recreation, education, scientific, and conservation values of Yellagonga Regional Park, for present and future generations.

The YICM Plan represents a commitment by State and Local Governments, community and stakeholder groups to ensure the long-term health of Yellagonga Regional Park. The YICM Plan is jointly funded by the adjoining Cities of Joondalup and Wanneroo to provide for a holistic, strategic approach to managing natural resources within the Yellagonga catchment.

**Project Objectives**
- Establish the current state of surface water and groundwater quality within the Catchment Area.
- Improve water quality entering the Park's wetlands.
- Reduce pollution entering the Park from land use activities.
- Ensure land use activities avoid environmental degradation without compromising the ability for economic activity.

**Deliverables**
- Implementation of monitoring projects in partnership with Edith Cowan University, the City of Wanneroo and Department of Environment and Conservation.
- Installation of additional water quality monitoring bores and other infrastructure as needed.

**Approach**
This project will be coordinated by the City of Joondalup. Implementation of sub-projects will be the responsibility of the Cities of Joondalup and Wanneroo and external consultants and educational institutions will be engaged as needed.

**Timeframe for Implementation**
July 2012 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# Yellagonga Acid Sulphate Soils Project

**New Project**

**Project Description**
Disturbance of Acid Sulphate Soils (ASS) can lead to the acidification of surface waters, groundwater and soil, which can have a negative impact on the surrounding environment and infrastructure. As part of the *Yellagonga Integrated Catchment Management Plan 2009-2014* (YICM Plan), acid sulphate soils are being monitored and further mapping will be completed to identify the level of risk across the Yellagonga Catchment Area.

State-wide maps have been developed to identify risk of ASS based on geology, depth to groundwater and in situ investigations. These maps provide a broad-scale indication only; further mapping is needed in order for the City to prioritise management actions.

**Project Objectives**
- Identify the extent of disturbed acid sulphate soils in the Yellagonga Catchment.
- Develop management strategies to manage the impact of disturbed acid sulphate soils within the Yellagonga Catchment Area.

**Deliverables**
- Development of detailed maps identifying acid sulphate soil risk, with multiple risk categories, in the Yellagonga Catchment Area.
- Development of recommendations for remedial action for City-managed areas where acid sulphate soils are impacting upon Yellagonga Regional Park.

**Approach**
This project will be coordinated by the City of Joondalup. External consultants and research institutions will be engaged as needed.

**Timeframe for Implementation**
July 2012 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

## WATER MANAGEMENT AREA: BUILT ENVIRONMENT

*Objective: Create and maintain City assets that minimise the use of water and protect local water resources through appropriate design, construction and operation.*

# Building Sub-metering Project

**New Project**

**Project Description**
This project will involve the installation of sub-meters to assist the City to identify water consumption trends and provide greater accountability to water users. Many of the City's water accounts are for buildings with a number of different occupants or for combined indoor and outdoor uses. Sub-metering will help to separate water consumption and identify anomalies. Separate account information will also help the City to target its water education and awareness campaigns.

An investigation into the City's water accounts will be completed to identify where sub-metering is required. Meters will be installed according to a priority listing based on water consumption data and trends.

**Project Objectives**
- Identification of high water consuming uses within City facilities and buildings.
- Measurable reductions in water consumption at City owned and managed buildings.

**Deliverables**
- Development of a priority listing for buildings that require sub-metering as identified through water account investigations or through the *Environmental Building Audits* project.
- Installation of sub-meters in City facilities according to priority listing.
- Development and dissemination of separate accounting information where required.

**Approach**
Initial investigations and installation of sub-meters will be conducted by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2014

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Asset Management

# Lessee Water Education Program

**New Project**

**Project Description**
A number of the City's buildings are leased to external organisations and groups. There is an opportunity to improve communication with lessees of City buildings to promote water efficiency and conservation. The provision of water use information and educational resources will create awareness regarding water conservation to users of City buildings. The City will provide educational materials to lessees to encourage the sustainable use of water within City facilities.

**Project Objectives**
- Increase awareness of water conservation to lessees of City buildings through the delivery of education initiatives and dissemination of water usage data.
- Achieve measurable reductions in the consumption of water at City owned buildings and facilities.

**Deliverables**
- Provision of 2011/12 water use data to lessees including individual water use and comparisons across the City.
- Development and implementation of a water education program for lessees of City-owned facilities.

**Approach**
Auditing and communication with lessees will be conducted by the City of Joondalup.

**Timeframe for Implementation**
July 2013 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# Craigie Leisure Centre Water Demonstration Project

**New Project**

**Project Description**
As Craigie Leisure Centre is the City's flagship building for implementing environmental initiatives, it presents an opportunity to demonstrate new technologies and water use efficiency to the community.

This project will promote existing water conservation technologies at Craigie Leisure Centre and new initiatives implemented over the life of the City Water Plan. Future projects may include greywater reuse, pool backwash recycling, rainwater harvesting and upgrading existing plumbing and taps to water efficient products. These innovations will be promoted to encourage waterwise behaviour in the community.

**Project Objectives**
- Promote water efficiency and water efficient technologies to the wider community.
- Increase water efficiency at Craigie Leisure Centre through community education and installation of new technologies.
- Demonstrate City leadership in environmental sustainability.

**Deliverables**
- Promotion of existing technologies and new projects resulting from Craigie Leisure Centre environmental audit.
- Development of a communications campaign in Craigie Leisure Centre to promote sustainable technologies and encourage sustainable behaviour in patrons.

**Approach**
This project will be managed by the City of Joondalup.External service providers will be engaged for the installation of water efficient technologies as required.

**Timeframe for Implementation**
July 2013 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Leisure and Cultural Services

# Green Stamp

**New Project**

**Project Description**
The Green Stamp Program is an environmental initiative that assists small to medium scale automotive businesses to improve their environmental performance. The Program was developed by the Motor Trade Association of WA, with funding assistance from the Western Australian Waste Management Recycling Fund.

Practices such as inappropriate storage and use of chemicals, wash down procedures, water wastage and waste disposal can affect local water quality. By incorporating environmental performance into processes and practices, the City can achieve Green Stamp accreditation. The accreditation process involves a baseline audit, audit report and secondary audit to determine the level of Green Stamp accreditation achieved.

**Project Objectives**
- Ensure the City's mechanical processes and practices do not have a detrimental impact on local water quality.
- Ensure water conservation and water quality improvement opportunities are harnessed at the City's mechanical workshop.
- Achieve a minimum Level 2 Green Stamp accreditation.

**Deliverables**
- Baseline Audit of the mechanical workshop to identify materials used, waste disposal and processes that potentially impact local water quality.
- Implementation of recommendations from the Green Stamp Baseline Audit Report.
- Secondary Audit of mechanical workshop to identify where improvements have been made and further opportunities to improve environmental performance.

**Approach**
This project will be organised and implemented by the City of Joondalup in conjunction with Green Stamp.

**Timeframe for Implementation**
July 2013 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Operation Services

# Review of Contaminant Disposal at Works Operations Centre

**New Project**

**Project Description**
A review of existing chemical and solvent disposal methods will identify where improvements can be made to protect local water quality. Contaminants including solvents used for cleaning, oils, other chemicals and hydrocarbons from vehicle use are used within the Works Operations Centre. If disposed in an inappropriate manner, these contaminates can leach into groundwater and impact on local water quality.

This project will identify where improvements can be made to existing processes and practices to reduce the impact of chemical use on water quality.

**Project Objectives**
- Improve local water quality through the identification of contaminant disposal practices that lead to its decline.
- Implement best practice safety and environmental practices for contaminant disposal.

**Deliverables**
- Implementation of an Audit of current contaminant use and disposal methods at the Works Operation Centre.
- Research into current best practice for contaminant disposal and opportunities for safe disposal that has a low environmental impact.
- Implementation of processes and practices that lead to improved water quality outcomes.
- Education to staff on new processes and practices.

**Approach**
The review of contaminant disposal will be carried out by the City of Joondalup.

**Timeframe for Implementation**
July 2013 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Operation Services

## WATER MANAGEMENT AREA: MANAGEMENT OF NATURAL AREAS AND PUBLIC OPEN SPACE

*Objective: Manage and protect local water resources through best practice management of the natural environment and public open space.*

# Parks Asset Management Plan

**New Project**

**Project Description**
A Parks Asset Management Plan will assist to improve knowledge and management of City parks assets and also provide policy direction to improve service levels for these assets. As an initial step, the City has developed a Parks Classification System. An audit of all park assets will be conducted to ensure information is consistent and up to date. A consultant has been appointed to collect information, including GIS locations, of major irrigation assets. Once all relevant data has been collected, it will be integrated into a central database and linked to the City's GIS system.

Information including details of above-ground irrigation system components, vegetation types and infrastructure specifications, as well as associated infrastructure, will be collected to allow maintenance schedules to be developed appropriately and ensure they include all necessary upgrades and replacements.

**Project Objectives**
- Ensure that information on the City's parks and irrigation assets is up to date so that maintenance schedules can be implemented effectively.
- Centralising of parks asset data information so staff can access and amend data when needed.

**Deliverables**
- The collection of major irrigation system component data, gathered on-site and compared with existing plans maintained by the City's irrigation team, including geo-location of these assets.
- Development of a master list of park and asset names.
- Development of a central database for irrigation asset data to be used in the development of a GIS layer on the City's Intramaps system.
- Development of Parks Asset Management Plan to guide service levels and policy decisions associated with park assets.

**Approach**
Auditing of above-ground irrigation infrastructure will be coordinated by the City of Joondalup. External consultants will be engaged as needed.

**Timeframe for Implementation**
July 2012 – June 2013

**Proposed Budget Source**
Operational

**Responsible Business Units**
Infrastructure Management Services
Strategic and Organisational Development

# Parks Assets GIS Layer

**New Project**

**Project Description**
A parks asset GIS layer would enable staff to view and update parks asset data in real time, reducing errors and inaccuracies in the City's parks assets data. This would allow for appropriate asset management and timely replacement and upgrades of infrastructure to the highest water efficiency standards.

Information on the City's parks assets will be collected as part of *the Parks Asset Data Management Plan* project. This information needs to be integrated into a digital format that can be updated regularly and that is accessible to all staff. This project will transfer all parks and irrigation asset data to a GIS layer to show the location of these assets and will incorporate additional information as required.

**Project Objectives**
- Ensure the City implements appropriate asset management practices to ensure water infrastructure upgrades and replacements are implemented in a timely manner to improve efficiency.
- Ensure that asset data is accessible to all staff and is updated in a central location to reduce errors and inaccuracies.

**Deliverables**
- Creation of a parks assets GIS layer on the City's Intramaps system.
- Provision of information to parks staff on appropriate processes for updating and accessing parks assets information.

**Approach**
The creation of the GIS layer will be carried out by the City of Joondalup.

**Marketing and Promotion**
Marketing and promotion will be carried out internally as required.

**Timeframe for Implementation**
July 2014 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Information Technology

# Bore Maintenance Program

**New Project**

**Project Description**
Iron build up in bores and irrigation systems is a significant problem which leads to blockages in the irrigation system and inefficient watering of City parks. A program for regular maintenance using a bore cleaning agent and air compressor will be implemented to reduce and prevent iron build up. This system reduces the need to remove pumps for repair.

Bores will also be fitted with recirculation valves to allow for filtration of bore water and injection of a bore cleaning product.

**Project Objectives**
- Implement routine maintenance of City bores to reduce the impact of iron build-up in order to improve water efficiency.

**Deliverables**
- Development and implementation of a Bore Maintenance Program that includes injection bore cleaning agent.
- Development of a Program to install recirculation valves in at least one bore each year.
- Ongoing implementation of the Pump and Bore Replacement Program through the Capital Works Budget.

**Approach**
Fitting of bore filters and implementation of the maintenance program will be carried out by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Operation Services

# Rain Sensor Program

**New Project**

**Project Description**
Rain sensors identify localised rain events and can be used to automatically turn off irrigation systems when rainfall is present. Rain sensors will be installed across all City parks to prevent water from being wasted.

Rain sensors will also improve staff efficiency by allowing for automatic shut down of irrigation systems in response to local weather conditions. Currently, staff need to turn irrigation systems off at individual sites or shut down the entire system across all parks from the Works Operation Centre.

**Project Objectives**
- Improve irrigation efficiency by utilising the best available local climate information.
- Improve community perception about the City's water management practices.

**Deliverables**
- The establishment of a program to install rain sensors in City parks, focusing initially on active and high profile parks, at a rate of 10 per year**.**

**Approach**
Rain sensors will be installed and managed by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Operation Services

# Review of Herbicide Use Procedure Manual

**New Project**

**Project Description**
Herbicides, if used inappropriately, can have adverse water quality impacts. Herbicides are used to effectively manage weeds in the City's natural areas and parks. The City will undertake a review of its existing Pesticide Use Procedure Manual (to be renamed Herbicide Use Procedure Manual) to evaluate current procedures, identify alternative procedures, methods, or products to be used in the City's Weed Management Programs. Guidelines for chemical use near waterways and in sumps will be incorporated into the Manual to ensure these sensitive areas are managed appropriately.

**Project Objectives**
- Ensure the City uses herbicides in line with best management practice.
- Improve water quality of receiving water bodies by reducing the level of herbicide use within sensitive areas.

**Deliverables**
- Undertake a review the City's current Pesticide Use Procedure Manual to determine if environmentally sensitive procedures, methods or products can be utilised while retaining the same level of weed and pest management.
- The development of criteria for identifying environmentally sensitive areas to enhance the protection of receiving water bodies.
- The development of guidelines for the use of chemicals near environmentally sensitive areas to be incorporated into the revised Herbicide Use Procedure Manual.

**Approach**
The review of the *Herbicide Use Procedure Manual* and the development of guidelines for chemical use will be implemented by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2013

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Operation Services

# Review of Nutrient Management Practices

**New Project**

**Project Description**
A number of operational activities undertaken by the City have the potential to impact on ~~local~~ the water quality of wetlands, groundwater and drinking water resources. Water quality can be impacted through direct contamination and discharge to water bodies, and through groundwater leaching. The City will review its nutrient management practices to see where improvements can be made to ensure that City operations have minimal impact on local water quality.

The Review will include an overview of:

- fertiliser use;
- lawn mowing;
- street sweeping;
- litter management;
- vehicle wash down procedures; and
- drainage system maintenance.

The South East Regional Centre for Urban Landcare (SERCUL) will be engaged to provide advice on best practice for Local Government as part of the Annual Nutrient Survey. The recommendations in the Annual Nutrient Survey will be used to develop potential procedures to improve the City's nutrient management practices.

The Review will make recommendations for improved nutrient management practices.

**Project Objectives**

- Ensure the implementation of best practice by determining where improvements can be made in the City's nutrient management practices.
- Protect local water quality by improving City operations and practices.

**Deliverables**

- Undertaking of a Review of all City practices that potentially impact on water quality.
- Development of a Report with recommendations to improve nutrient management practices in City operations.

**Approach**
The Review and actions arising from this project will be implemented by the City of Joondalup.

**Timeframe for Implementation**
July 2014 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# ~~Artificial~~ Constructed Wetlands Management Plan

**New Project**

**Project Description**
The City will develop a~~n Artificial~~ Constructed Wetlands Management Plan to ensure the implementation of best management practices for the City's ~~artificial~~ constructed wetlands. The ~~Artificial~~ Constructed Wetlands Management Plan will ensure that hydrology, water quality, erosion and habitat protection are considered within the management of the City's ~~constructed~~ artificial lakes and wetlands.

Water monitoring is conducted at wetland sites and this data will be used to inform the development of the ~~Artificial~~ Constructed Wetlands Management Plan.

**Project Objectives**
- Ensure City management of ~~artificial~~ constructed wetlands considers hydrology, water quality, erosion and habitat protection to improve the ecological values of these wetlands.

**Deliverables**
- Completion of water quality monitoring and fauna/flora surveys at artificial wetlands.
- Development of ~~an Artificial~~a Constructed Wetlands Management Plan that covers all ~~artificial~~ constructed and rehabilitated water bodies in the City.

**Approach**
The ~~Artificial~~ Constructed Wetlands Management Plan will be developed and implemented by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2013

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Infrastructure Management Services

# Parks Redevelopment Program

**Existing Project**

**Project Description**
As part of the implementation of the Landscape Master Plan the City is implementing a Program of hydrozoning and ecozoning, and redesigning irrigation systems, to reduce groundwater use within its parks and open space areas.

A hydrozone relates to water delivery and is the practice of establishing separate areas or zones to receive different amounts of irrigation water. An ecozone relates to the vegetation that can best accommodate a given watering regime and is usually a grouping of plants with similar water requirements.
~~Hydrozoning is the grouping of plants with similar water requirements so that irrigation scheduling can be designed to ensure only required amounts of water are applied. Ecozoning is the exclusion of areas from irrigation because they do not require high quality turf or landscaping to support recreation, amenity or sporting activities.~~

As part of the project, amenity is also being improved to ensure community expectations are balanced with sustainable water management. The project has been successful in reducing groundwater use by up to 50 per cent in some parks.

**Project Objectives**
- Implement hydrozoning and ecozoning principles to reduce groundwater use in City parks.
- Increase the amenity and diversity of parks in the City.

**Deliverables**
- Development of detailed landscaping and irrigation design for identified parks to reduce irrigated areas.
- Implementation of redevelopment projects including: site preparation, reticulation removal and reconnection, turf removal, landscaping, installation of hard surfaces, mulching and provision of signage, at a rate of at least one park per year.
- Development of consultation strategies and provision of information to the local community on projects in their area.

**Approach**
The Parks Redevelopment Program will be implemented by the City of Joondalup and external contractors as required.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Infrastructure Management Services

# Operating Strategy for Groundwater Utilisation Review

**Existing Project**

**Project Description**
The development of an Operating Strategy is a licensing requirement for certain water users that addresses the operational management of groundwater and associated assets in order to improve water use efficiency.

The City developed its Operating Strategy in 2006 for its three groundwater licences (GWL 155582, 155515 and 155510) to operate and draw water from the Perth superficial aquifer. The Operating Strategy 2006-2016 supports the City's *Water Conservation Plan* and is in place for the 10 year duration of the City's licences. A mid-term review will ensure that the City's Operating Strategy is in line with current best practice.

The Operating Strategy describes the City's water use and abstraction regime, the water source being accessed and any relevant outcomes which need to be achieved to manage impacts on other users and the environment. The Strategy also includes a series of licensee's commitments that are incorporated into the licence conditions. These include clearly defining the licensee's responsibilities for managing and monitoring the impacts of taking the water and reporting requirements. The reviewed Operating Strategy will need to be approved by the Department of Water.

**Project Objectives**
- Ensure that the City's Operating Strategy is consistent with current best practice.
- Fulfil statutory licence conditions for the City's groundwater licences.

**Deliverables**
- A review of commitments in the Operating Strategy for Groundwater Utilisation.
- Submission of updated document to Department of Water for approval.

**Approach**
The Review will be conducted by the City of Joondalup under the guidance of the Department of Water.

**Timeframe for Implementation**
July 2012 – June 2013

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Operation Services

## WATER MANAGEMENT AREA: WATER SENSITIVE URBAN DESIGN

*Objective: Promote and implement stormwater management practices that improve local water quality and reduce water consumption.*

# City of Joondalup Dual Density Code Policy

**New Project**

**Project Description**
The Dual Density Code Policy was developed as part of the City's Local Housing Strategy and encourages sustainable infill development to reduce water use and impacts to local water bodies. Through the Policy, the City will encourage and guide the implementation of water sensitive urban design (WSUD) in all new development and redevelopment. The Dual Density Code Policy has provisions for WSUD that protect local water quality from new and redevelopment occurring in the City.

**Project Objectives**
- Encourage redevelopment in the City that is water efficient and has minimal impact to local water bodies.
- Ensure new development optimises opportunities for harvesting and reuse of alternative water sources.

**Deliverables**
- Implementation of the Dual Density Code Policy through the City's planning process and through the provision of WSUD advice to developers.
- Achievement of WSUD principles within new and in-fill development within the City's Housing Opportunity Areas.

**Approach**
The implementation and policy review will be undertaken by the City of Joondalup.Collaborative projects with land developers will also be negotiated.

**Timeframe for Implementation**
July 2014 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Planning Services

# Stormwater Management Policy

**New Project**

**Project Description**
The City can improve water management through the implementation of water sensitive urban design in stormwater infrastructure maintenance. Water Sensitive Urban Design (WSUD) is considered best practice because it considers the total water cycle, improves water quality and increases amenity.

The development and implementation of the Stormwater Management Policy will provide direction and guidance on the design and maintenance of drainage systems and the installation of infrastructure that facilitates infiltration and/or treatment. Flush kerbing, vegetated swales and soakwells will be used to protect property from flooding, with the added benefit of water quality and amenity improvement.

The adoption of best practice in new and redeveloped sites will also be ensured through the implementation of the Stormwater Management Policy and provision of advice on water sensitive urban design principles.

**Project Objectives**
- Ensure that City management of stormwater protects water quality of receiving environments and utilises opportunities for treatment, infiltration and reuse where possible.
- Improve amenity of stormwater infrastructure while retaining or improving flood management and treatment properties.
- Ensure best practice stormwater management is provided through planning and development.

**Deliverables**
- Development of the Stormwater Management Policy.
- WSUD is considered in land use planning process by the City's Planning Officers.
- WSUD is integrated into the City's management of stormwater and projects promoted to the community.

**Approach**
The development and implementation of the Stormwater Management Policy will be carried out by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Infrastructure Management Services

# City Sump Retrofit Program

**Existing Project**

**Project Description**
Drainage sumps are infiltration points for untreated stormwater and contribute to groundwater quality decline. Stormwater that is directed to sumps carries pollution such as fertilisers, pesticides and petrochemicals.

The City is implementing its City Sump Retrofit Program to increase the ecological and amenity values of its sumps. This 10-year Program has initially focused on sumps near Yellagonga Regional Park. Six sumps have been retrofitted, with the aim to expand the Program at a rate of two sumps per year.

The Retrofit Program focuses on the functionality of sumps to manage local flooding events. Biofiltration within sumps will also be maximised to ensure stormwater is treated before it infiltrates groundwater. Projects are limited by the depth, location and surrounding land uses, however, where possible, fencing will be removed to provide additional amenity benefit. Sump redevelopment is also an opportunity for underground storage of stormwater and allows for the improved utilisation of land for public open space.

**Project Objectives**
- Improve the water quality of local waterways, including groundwater, through the implementation of treatment measures in City sumps.
- Increase the amenity and functionality of drainage sumps in the City.

**Deliverables**
- Development of detailed engineering and landscape design for identified priority sumps to improve drainage function, treatment and amenity.
- Implementation of retrofit projects at a rate of two sumps per year.

**Approach**
The City Sump Retrofit Program will be implemented by the City of Joondalup. **Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Capital

**Responsible Business Unit**
Infrastructure Management Services

## WATER MANAGEMENT AREA: CONTRACTS & PURCHASING

*Objective: Minimise the consumption of, and impact to, water resources through the consideration of environmental criteria in City purchasing and tender decisions.*

# Green Purchasing Program

**New Project**

**Project Description**
The City can contribute to water conservation and water quality management through various purchasing mechanisms, which consider suppliers and products that are environmentally sustainable.

The City will develop a Green Purchasing Program that will integrate water criteria, as well as other environmental impacts, into purchasing decisions. This will ensure that the City purchases services and products that are environmentally sustainable.

**Project Objectives**
- Ensure that water use and water quality is considered in City purchasing decisions and formalised through the Green Purchasing Program.

**Deliverables**
- Development and integration of water criteria into the City's purchasing mechanisms.

**Approach**
This project will be implemented by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2013

**Proposed Budget Source**
Operational

**Responsible Business Units**
Strategic and Organisational Development

## WATER MANAGEMENT AREA: STAFF EDUCATION AND PARTICIPATION

*Objective: Provide staff with information regarding water consumption and water quality management that enables them to operate sustainably within the organisation.*

# Green Office 'Think Green' Program

**Existing Project**

**Project Description**
Staff education and awareness-raising is important in encouraging sustainable behaviour across the organisation. The Green Office 'Think Green' Program currently delivers water conservation education and awareness raising projects to City staff. The Program is focused on increasing participation by City staff in environmental projects and fostering behaviour change. There is opportunity to expand the Program to include more water related resources and activities and to review existing staff practices to improve sustainable water management.

The Program will be expanded to include:

- Regular reporting of scheme and groundwater use
- Water related resources and tips for staff
- Water quality improvement projects

**Project Objectives**

- Raise the awareness of the importance of water resources amongst City employees
- Ensure that staff utilise water resources in a sustainable manner during work activities.
- Ensure that City facilities and civic buildings have appropriate procedures, processes and infrastructure in place to achieve sustainable water management outcomes.

**Deliverables**

- Inclusion of water consumption data on the Corporate Dashboard of the City's Intranet.
- Development of waterwise and water quality management tips on the Intranet.
- Delivery of water related activities and events that provide opportunities for staff participation.

**Approach**
The Green Office 'Think Green' Program will be implemented by the City of Joondalup.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

## WATER MANAGEMENT AREA: COMMUNITY EDUCATION AND PARTICIPATION

*Objective: Provide opportunities for community education and participation in water efficiency and water quality improvement initiatives.*

# Interactive Parks and Reserves Database

**New Project**

**Project Description**
Communication of the City's water management projects and assets could be improved through the development of a publicly accessible Parks and Reserve Database. The development of this feature on the City's website will allow for the integration of locally specific information on parks and reserves in the City to promote water conservation and water efficiency practices in the wider community. The project will also make the community more aware of the environmental issues at specific sites and encourage environmentally sensitive use of parks and reserves.

**Project Objectives**
- Provide information to City residents relating to location of parks and reserves, environmental condition, infrastructure, facilities and water management projects.
- Promote City water conservation and water quality projects to the wider community.
- Encourage appropriate use of the City's parks and reserves and associated assets.
- Foster a greater community appreciation for the City's parks and reserves.

**Deliverables**
- Development of information on key focus areas, including water, biodiversity, facilities, for each park and reserve to be displayed on the interactive database.
- Development of an interactive database on the City's website.
- Promotion of database to the community.

**Approach**
This Project will be developed by the City of Joondalup.

**Timeframe for Implementation**
July 2013 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Governance and Marketing

# Environmental Education Program

**Existing Project**

**Project Description**
Community education is vital in influencing behaviour change and this fosters improved environmental management in the community. The City has developed a coordinated program of environmental education activities through its Environmental Education Program (EEP). Water management activities and resources will be incorporated into the existing Program, under the banner of *Think Green – Water,* to promote water conservation and water quality improvement practices. Some of the activities that will be implemented as part of this project include those targeting households, schools and businesses.

The Environmental Education Program includes the development of:

- Water related education resources, including information regarding the water table and climate
- Water conservation and efficiency information in community newspapers, other publications and the City's website
- Waterwise workshops and other water education events

**Project Objectives**

- Promote behaviour change in the community through the provision of water conservation information and resources.
- Awareness-raising in the community about water quality management.
- Interaction with the City of Joondalup community to achieve sustainable water management across the City.

**Deliverables**

- Development of water related resources for the community.
- Development and delivery of water related workshops and events.

**Approach**
This Program will be developed by the City of Joondalup, although external experts will be engaged as required.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# Yellagonga Community Awareness Project

**Existing Project**

**Project Description**
The Yellagonga Community Awareness Project addresses key behaviours that have a negative impact on water quality in Yellagonga Regional Park. Some of these behaviours include bird-feeding, littering, irresponsible pet ownership, inappropriate access to foreshore areas and practices in the home and garden.

The Project aims to create awareness about impacts on the wetland environment and empower the community to change their behaviour and contribute to improved water quality management. Some of the sub-projects being implemented include:

- Green Frog Stencilling Program
- Prevention of Hand-feeding Wildlife Campaign
- Feral Animal Awareness Campaign
- Responsible Pet Ownership Campaign
- Turtle Awareness Campaign

**Project Objectives**
- Increase environmental awareness of the Yellagonga Catchment amongst the local community.
- Reduce negative impacts in Yellagonga Regional Park caused by misunderstanding in the community.
- Encourage volunteer involvement in park management.

**Deliverables**
- Implementation of the Green Frog Stencilling Program near stormwater drains.
- Development of resources that promote appropriate behaviour in Yellagonga Regional Park.
- Provision of information to the community regarding Yellagonga Regional Park and current projects.

**Approach**
This project will be implemented by the City of Joondalup, although external experts will be engaged as required.

**Marketing and Promotion**
Marketing and promotion of this project will be carried out as per the Yellagonga Community Awareness Project Plan.

**Timeframe for Implementation**
July 2012 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# ECOSTAR

**Existing Project**

**Project Description**
ECOSTAR is a community awareness initiative developed by the City of Newcastle, that uses a star rating system to show improvements in both water and energy efficiency. ECOSTAR ratings are used in City of Joondalup facilities to promote retrofitting projects and to encourage the community to improve water and energy efficiency in their homes.

The Program utilises the ECOSTAR plaque which is a passive communication tool that demonstrates to the community the progress of each site towards achieving a six star energy and water efficiency rating. This communication helps to build greater trust in the community of sustainable technologies.

**Project Objectives**
- Improve the City's environmental performance through systematically upgrading the City's community facilities with water saving technologies.
- Raise the community's awareness of environmental technologies through the demonstration and promotion of technologies within City facilities.
- Communicate the progress of the City's environmental improvement initiatives through the placement of ECOSTAR plaques and completed stars.

**Deliverables**
- Installation of water efficient technologies in City facilities.
- Evaluation and rating of City facilities using the ECOSTAR rating framework.
- Promotion of ECOSTAR rated facilities to the community through ECOSTAR plaques and on the City's website.

**Approach**
This project will be implemented by the City of Joondalup, although external experts will be engaged as required.

**Marketing and Promotion**
Marketing and promotion of this project will be carried out at sites utilising the ECOSTAR rating system and promoted on the City's website.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

## WATER MANAGEMENT AREA: PARTNERSHIPS AND POLICY

*Objective: Develop partnerships with the State Government and external stakeholders to enhance water conservation and water quality improvement opportunities within the City.*

# Water Recycling Feasibility Study

**New Project**

**Project Description**
Wastewater has traditionally been viewed as a waste product; however with declining water availability, is now recognised as a valuable resource. The City will investigate the feasibility of reusing wastewater from Beenyup Wastewater Treatment Plant and other water recycling opportunities in the City. The City will liaise with the Water Corporation and other stakeholders to investigate partnership opportunities.

This project supports the WA Water Recycling Target of 30 per cent by 2030 and could potentially reduce the 45 gigalitres of wastewater that is discharged from Beenyup Wastewater Treatment Facility each year.

Potential water recycling opportunities from City owned facilities will also be investigated and could include utilising pool backwash at Craigie Leisure Centre or small scale greywater reuse schemes.

A feasibility study investigating water recycling opportunities will be produced detailing the feasibility in terms of economic, social and environmental considerations.

**Project Objectives**
- Determine the feasibility, in consideration of economic, social and environmental implications and benefits, of using recycled water for irrigation purposes.

**Deliverables**
- Development of a Feasibility Study into water recycling opportunities from Beenyup Wastewater Treatment Plant and other water recycling opportunities areas in the City.

**Approach**
Initial investigations will be carried out by the City of Joondalup. Stakeholders may be engaged if the project progresses.

**Timeframe for Implementation**
July 2013 – June 2014

**Proposed Budget Source**
Operational

**Responsible Business Units**
Infrastructure Management Services

# Cities as Water Supply Catchments Research Program

**New Project**

**Project Description**
Cities as Water Supply Catchments (CWSC) is a national research program that was expanded to include WA in 2011. Its vision is to harness the potential of stormwater to overcome water shortages, reduce urban temperatures, and improve waterway health and the landscape of Australian cities**.** CWSC has eight separate but interlinked research projects. Its integrated demonstration and communications strategies address key issues which have so far restricted the on-site capture and use of stormwater.

The WA Research hub is located at the University of Western Australia and the newly formed WA Consortium includes the Department of Water, Swan River Trust, Water Corporation and ten WA Local Governments. A WA Research hub was established to ensure that stormwater harvesting research, which has traditionally been undertaken in the eastern states, considers the climatic and hydro geological conditions in WA. The Program is scheduled to end in 2013/14 after which it will become the Water Sensitive Cities Cooperative Research Centre and look at water management more holistically.

**Project Objectives**
- Collaborate with leading research organisations and other Local Governments to ensure that research into stormwater harvesting is WA specific.
- Ensure the City has access to the best available science on stormwater harvesting and peripheral research into institutional barriers, land use planning, capacity building and adaptive governance.

**Deliverables**
- Recognition of the City as a financial partner of the consortium as identified in promotional material.
- City attendance and participation in workshops and training opportunities.
- City participation in research, workshop and resource development opportunities.

**Approach**
The City of Joondalup will be involved in the Program as part of the WA Consortium.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Infrastructure Management Services

# Waterwise Council Program

**Existing Project**

**Project Description**
The Waterwise Council Program is a joint initiative between the Water Corporation and Department of Water, with support from ICLEI – Local Governments for Sustainability. The aim of the Program is to build a co-operative working relationship with Local Governments to improve water use efficiency.

The City joined the Waterwise Council Program in 2009 and was officially endorsed as a Waterwise Council in the same year. Criteria for Waterwise endorsement included implementation of water projects identified in the City's Local Water Action Plan and Waterwise training for staff in the areas of: Internal water auditing; External water auditing; and Waterwise irrigation. The City is required to demonstrate an ongoing commitment to water conservation and is assessed against criteria, set annually by the Water Corporation, to retain Waterwise endorsement

**Project Objectives**
- Demonstrate leadership in water conservation through the gaining of knowledge and new skills regarding best practice water conservation.
- Foster partnerships with the State's Water Utility, Water Corporation and the State's Water Management Agency, Department of Water.
- Leverage opportunities for staff training, access to resources and promotion.
- Promote the City's water performance through the use of Waterwise branding.

**Deliverables**
- Implementation of projects that achieve Waterwise criteria on an annual basis to retain Waterwise status.
- Development and submission of the City's annual review detailing water use data and status of water conservation projects to the Water Corporation.

**Approach**
The Waterwise Council Program is implemented by the City of Joondalup in liaison with the Water Corporation and Department of Water.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Strategic and Organisational Development

# Midge Steering Group

**Existing Project**

**Project Description**
Midge populations in and around the City's wetlands are closely linked to water quality. Improvements to water quality are therefore likely to reduce midge populations and the overall health of receiving water bodies.

The City of Joondalup has had a formal agreement with the City of Wanneroo and Department of Environment and Conservation (DEC) for managing midge within the wetlands of the Yellagonga Regional Park since 1999. This partnership was established as it was considered that the midge issue emanates from the surrounding catchment areas and that midge management requires the expertise and resources of the three agencies to be integrated.

The main objective of the Midge Management Strategy Partnership Agreement 2010-2015 is to encourage an effective and sustainable partnership for the purposes of managing nuisance midge within wetlands of the Yellagonga Regional Park. This is achieved through improving cooperation, communication and collaboration between the two spheres of government.

**Project Objectives**
- For control and management of nuisance midge within the wetland system of the Yellagonga Regional Park, through funding midge larval and water monitoring, nuisance reduction using pesticide application when required, other intervention strategies, research projects in an effort to better understand the factors contributing to the seasonal midge plagues and public information and education.
- To arrange for the allocation, management and administration of funds for the strategy.

**Deliverables**
- Development and implementation of a larval and water quality monitoring program.
- Application of chemical treatment as required in line with current DEC regulations.
- Undertaking of research into midge populations and their environment.
- Implementation of a Midge Education Program to inform local residents about water quality and midge management.
- Development of a Report on the *Midge Management Strategy Implementation Plan* (2010 – 2015).

**Approach**
The Midge Steering Group is a partnership project with the City of Wanneroo and DEC. The City of Joondalup participates in the Steering Group and implement projects as required.

**Timeframe for Implementation**
July 2012 – June 2015

**Proposed Budget Source**
Operational

**Responsible Business Unit**
Compliance and Regulatory Services

# 10.0 Monitoring and Review

In line with the City's Project Management Framework, the City Water Plan 2012 – 2015 will be reviewed on an annual basis. The review will include an assessment of the status of each Water Management Project with an update being provided for each project.

## 10.1 Water Indicators

Water indicators have been developed to allow for appropriate reporting and evaluation of the City Water Plan 2012 - 2015. These indicators will be reported on during the annual review process.

| Indicator | Sector | Goal |
|---|---|---|
| Annual corporate groundwater consumption per capita<br>Number of parks redeveloped for water conservation outcomes per year | Corporate – water conservation (groundwater) | Reduce corporate groundwater use by 10 per cent per capita below 2010/11 consumption by 2014/15 |
| Annual corporate scheme water consumption per capita<br>Number of upgrades to water fittings in City buildings per year | Corporate – water conservation (scheme) | Reduce corporate scheme water use by 5 per cent per capita below 2010/11 consumption by 2014/15 |
| Annual community scheme water consumption per capita<br>Number of community education resources/workshops developed per year | Community – water conservation (total scheme) | Reduce community scheme water use by 5 per cent per capita below 2010/11 consumption by 2014/15 |
| Number of sumps retrofitted for water quality outcomes per year<br>Number of staff education programs implemented per year | Corporate – water quality | Implement water quality improvement projects through best practice City operations, procedures and policy that target: Water Monitoring and Reporting; Built Environment; Management of Natural Areas and Public Open Space; and Staff Education and Participation |
| Number of community education initiatives implemented per year<br>Number of community resources/ workshops developed per year | Community – water quality | Implement water quality improvement projects that encourage community responsibility for water quality improvement through: Water Sensitive Urban Design, Community Education and Participation; and Partnerships and Policy |

# 11.0 References


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**Draft City Water Plan Community Consultation Summary May 2012**

| Feedback Form Question | ID | Comment | City Response |
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| What do you like about the Draft City Water Plan 2012 - 2015? | Marilyn Zakrevsky | That you have a plan but when is action starting? 2015 is too far off. Act Now! | The City is committed to sustainable water management and will begin implementation of the City Water Plan on July 1, 2012. |
| | | Reduction in water usage for recreational areas by hydrozoning and ecozoning is good BUT ecozoning one oval per annum is tokenism and unrealistic, if the city is serious about sustainable water usage. | The *Parks Redevelopment Program* requires significant resources to be allocated from the City's capital works budget (CWB). Although this investment leads to significant water savings, it must be implemented in a staged approach to ensure the City also operates under the principle of responsible economic sustainability.<br><br>Currently there is no external funding available to assist in the costs of implementing the Program. Additional ovals will be hydrozoned where funds are available.<br><br>No amendments to Draft Water Plan required. |
| | Barry Fitzsimmons | The fact that there is one is a great start! | Comment noted. |
| | Rainer Repke | That more Park/Reserve areas are covered with mulch. | Mulching of parks and reserves is being implemented through the City's *Parks Redevelopment Program*. Community consultation is conducted for each proposed site to ensure that community needs, including amenity and function, are balanced with water conservation.<br><br>No amendments to Draft Water Plan required. |
| | | That trees are planted along the medium strips of roads. | The City is planting native, endemic plant species, including trees, along median strips and road reserves as part of the Iconic Landscaping Project. This Project is not included in the Draft City Water Plan. Although native plants generally use less water than exotics, the project focus is on biodiversity and thus has not been included in the City Water Plan.<br><br>No amendments to Draft Water Plan required. |
| | | That Craigie develops to a water wise centre. | The aim of the *Craigie Leisure Centre Water Demonstration Project* is to develop Craigie Leisure Centre into a water wise centre. The project will focus on reducing water use within the Centre and providing waterwise education opportunities for the community.<br><br>No amendments to Draft Water Plan required. |

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| Are there any changes/improvements that you think should be made to the Draft City Water Plan 2012-15? | Marilyn Zakrevsky | Budget for and commence hydrozoning of recreational areas in 2012-202 budgets (5 or more for a start). | A separate budget schedule has been developed for the City Water Plan; however this is subject to the City's Annual Budget process. The Annual Budget is endorsed by Council each year and projects for the City Water Plan will be included.<br><br>The City is committed to hydrozoning at least one park per year and will invest in further projects where funds are available.<br><br>No amendments to Draft Water Plan required. |
| | | Stop all reticulation of verges and median strips and parks that are not used for active sport. Dry parks that are now reticulated parks need to be watered occasionally, or not at all. (The protests that will ensue will have to be countered with the fact that we are using our underground water resource unsustainably and that drastic measures must be undertaken). As happened in World War II with food rationing, water needs to be rationed for the sake of all. | The City determines irrigation regimes for active sporting fields, passive reserves and verges and median strips based on evaporation rates. Passive reserves currently receive 30-40% less water than active reserves to ensure that amenity is maintained whilst balancing water conservation needs.<br><br>The City does not irrigate verges and median strips, except in areas covered by a Specified Area Rate.<br><br>No amendments to Draft Water Plan required. |
| | | Treated water from Beenyup should be available for council reserves, industry, farming, underground replenishment etc. It should not be going into the ocean. | The City will investigate the use of recycled water from Beenyup Treatment Plant through the *Water Recycling Feasibility Study* Project. This is proposed for July 2013 and will investigate the feasibility of using treated recycled water, in partnership with the Water Corporation, for the irrigation of City parks.<br><br>No amendments to Draft Water Plan required. |
| | | Overhead watering should be replaced ASAP by more efficient reticulation methods which requires bold budgeting. | Overhead reticulation is the most appropriate method for irrigating active reserves. The City Water Plan will help increase the efficiency of the City's irrigation systems through the *Irrigation Infrastructure Audits, Groundwater Monitoring and Data management, Soil Moisture Monitoring, Parks Asset Management Plan, Bore Maintenance, Rain Sensor Program, Parks Redevelopment Program* and *Operating Strategy for Groundwater Utilisation Review* projects.<br><br>No amendments to Draft Water Plan required. |
| | Barry Fitzsimmons | Rainwater Harvesting eg from roadways; parking areas; future commercial buildings etc should be implemented rather than just an aspiration for the City Water Plan. | Rainwater harvesting opportunities will be investigated and developed, where deemed appropriate, after the *Environmental Building Audits* project is completed. |

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| | | | Stormwater harvesting is addressed through the City's *Stormwater Management Policy*. Appropriate auditing of the City's building and catchment areas is necessary to ensure that rainwater and stormwater harvesting projects are implemented strategically.<br><br>No amendments to Draft Water Plan required. |
| | Rainer Repke | Difficult to analyse. I think the residents should be informed/involved to a larger extent. Residents should be convinced that waterwise trees are the best protection against a drying climate, so that they keep trees on properties. Groundwater levels and the quality of it should be published by wards. The City should plant waterwise trees wherever possible and not cut trees down. | The Draft City Water Plan includes a comprehensive *Environmental Education Program* that aims to build awareness in the community regarding water availability issues.<br><br>The Department of Water publishes information regarding groundwater levels. This information will be incorporated into the *Environmental Education Program* to ensure residents are kept informed. The Project Description for the *Environmental Education Program* has been amended to include the addition of groundwater levels.<br><br>The comments regarding City management of trees has been noted. |
| | | Can you explain what really happens to water extracted by a bore? How much is used by plants, how much evaporates, how much runs back into the aquifer. And in the end the water in the aquifer flows into the ocean. Do we know how much we can extract until we will see seawater regression? That of course depends on usage, rain and replenishment. Any idea? | Information regarding groundwater resources will be provided to the community through the *Environmental Education Program,* with the assistance of the Department of Water. The City is guided by information provided by the Department of Water in regards to water allocation and resource management.<br><br>The City also provides educational resources, including a brochure titled 'Extracting Groundwater in Perth' that was developed as part of the *Environmental Education Program.*<br><br>No amendments to Draft Water Plan required. |
| Other comments? | Marilyn Zakrevsky | Metropolitan Perth dwellers need to understand that our underground water and dam water is a finite resource and that desalination alone will not meet present and future population growth needs. The City can show by example. Presently we live in an "oasis utopia" which cannot be sustained without jeopardizing ourselves and the next generations. | The Draft City Water Plan includes a comprehensive *Environmental Education Program* that aims to build awareness in the community regarding water availability issues. This includes water education and gardening workshops, the development of resources and targeted education campaigns.<br><br>No amendments to Draft Water Plan required. |
| | Barry Fitzsimmons | Refer to the Mosman Park/ Cottesloe/ Peppermint Grove Library for an excellent example of sustainability and use and re-use of otherwise wasted water. Any future public buildings should implement these systems in the planning | City Officers have visited The Grove, an excellent example of a sustainability building used for community education. Through the *Craigie Leisure Centre Water Demonstration Project*, the City will promote sustainable technologies. The City also promotes water and energy efficiency technologies that can be |

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| | | stage and any possible changes to existing buildings to this end should be considered strongly. | applied to domestic homes, through the *Ecostar* project.<br><br>As a first step, *Environmental Building Audits* will be conducted to determine where water efficiencies can be made in City buildings. |
| | Department of Water | The interconnection of water use, stormwater management, City and community activities and water resources within the City of Joondalup could be better reflected in the draft plan. Consider framing the plan within the context of the total water cycle, i.e. The urban water cycle should be managed as a single system in which all urban water flows are recognised as a potential resource and where the interconnectedness of water supply, groundwater, stormwater, wastewater, flooding, water quality, wetlands, watercourses, estuaries and coastal waters is recognised (Western Australian Planning Commission (2008), Better Urban Water Management, http://www.water.wa.gov.au/PublicationStore/first/82305.pdf) | The Draft City Water Plan focuses on the water resources that are most impacted by City and community activities, and those for which the City has the most influence over. The City has an important role to play in managing the total water cycle and acknowledges the importance of the interconnectedness between water resources and land uses.<br><br>The Water Quality section in the City of Joondalup Water Profile has been expanded to include a section on Stormwater Management.<br><br>An additional section on Total Water Cycle has been included in Part 1 of the City Water Plan. |
| | | By considering the interconnection between land uses and activities, water use, stormwater management and water resources in the plan, the inter-related benefits of reducing water use and improving water resources (water quantity and quality) will be more apparent. For example, reducing water use from the superficial aquifer has environmental benefits and could be considered 'improving water resources', while improving the quantity and quality of water recharging the superficial aquifer can have benefits for public drinking water supply and irrigation. | The City acknowledges the importance of managing both water quality and water quantity, and the need to balance the various water resources available in the City.<br><br>Additional information has been added to section 2.1.5 Water Resources to reflect this. |
| | | The draft plan focuses mainly on water use and water efficiency improvements. Stormwater management and improving water resources could be expanded to provide more information on stormwater management and water resources within the City and the expected benefits from the related projects. See the specific comments below for more details. | The Water Quality section in the City of Joondalup Water Profile has been expanded to include a section on Stormwater Management. |

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| | | The Department of Water (DoW) acknowledges the defined strategic approach that the City of Joondalup is taken to guide the city's future water conservation and water quality initiatives as important. The project based implementation framework is a logical approach to stage the delivery of the initiatives. | Comment noted. |
| **Section** | **ID** | **Comment** | **City response** |
| Section 1.0 Purpose | Department of Water | Consider broadening the objective 'water quality improvement' to include both water quality and quantity improvements. | The objective has been broadened to include water quantity improvement. |
| Section 2.1 – Water Management in the City of Joondalup | | Sections 2.1.4.1 and 2.1.4.2 refer to scheme water and groundwater use. Note that scheme water is supplied from the superficial aquifer within the City of Joondalup. A priority 3 Public Drinking Water Source Area is defined over much of the City to help identify and protect drinking water supplies from risks to water quality. | Further information has been included under 2.1.4.1 Scheme Water. |
| | | Infiltration basins are not considered managed aquifer recharge as per the Department's Operational Policy 1.01 Managed aquifer recharge in Western Australia. | Comment noted. DoW's Policy has been referred to in the Draft City Water Plan. |
| Consider adding a new section for total water cycle management (2.2?) | | Consider adding another section to describe the total water cycle and the interconnectedness of:<br>o Water use<br>o Stormwater management<br>o Groundwater<br>o Surface water<br>o Coastal waters<br>o Land uses and activities. | An additional section, 2.1.5 Total Water Cycle, has been added to Section 2 of the Draft City Water Plan which describes the total water cycle and the interconnectedness between water resources and land use impacts in the City. |
| | | Consider including subsections describing each of the environmental water resources in the City, e.g. groundwater, surface water, wetlands (constructed and natural) and coastal waters. | Section 2.1.4 includes information of these water resources. 2.1.4.5 Surface Water has been updated to include coastal waters. |
| | | Consider explaining the reasons for managing water quantity and quality in these water resources. Section 2.1.4 touches on the importance of maintaining the water | The City adopts a holistic approach to water management in the Draft City Water Plan. Further information regarding the extraction of groundwater for public water supply has now been included. This use of water is not managed |

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| | | balance (quantity) and water quality for wetlands (amenity and ecological values); however, maintaining water quality is important for all of the water resources within the City including coastal waters (amenity and ecological values), the superficial aquifer (used to supply drinking water, City irrigation and residential bores) and constructed wetlands (amenity and ecological values). | by the City; however the City provides information to the community regarding the importance of maintaining water quality and water quantity for all water resources.<br><br>Additional information has been included under 2.1.4.1 Scheme Water. |
| Section 5.0 – Water Quality (and quantity?) | | This section could be expanded to provide an overview of the status of water resources within the City such as:<br>• an overview of the stormwater system, including water quantity and quality management, e.g. managing infiltration of stormwater to recharge the superficial aquifer; managing water quality from piped outfalls to Yellagonga wetlands, constructed wetlands and coastal waters.<br>• an explanation of the ways current City and community activities may impact water resources within the city, eg Fertiliser use in public open space or residential gardens, herbicide use, stormwater management, etc.<br>• reporting available water information (water level, quantity and quality) for the Yellagonga wetlands and other groundwater, surface water or coastal water sites (e.g. Department of Water (2007), Contaminants in Stormwater Discharge, and Associated Sediments, at Perth's Marine Beaches http://www.water.wa.gov.au/PublicationStore/first/74844.pdf). | Part 2, City Water Profile, is intended to present current data on water consumption and water quality management. As there is very little consistent water quality data available, this has not been included. The City acknowledges that the balance between water consumption and water quality information has not been achieved in this section of the Draft City Water Plan.<br><br>Additional information on water quality impacts to coastal ecosystems has been included.<br><br>Additional information on water quantity management has been included.<br><br>Additional information on stormwater management has been included. |
| Section 6.0 – Water management targets | | Consider rephrasing the headings to better reflect the scope of each target, e.g. Corporate Groundwater Use, Corporate Water Quality Management. | The water management targets have been amended to include the words 'consumption' and 'management'. |
| Section 9.0 – Project Descriptions | | *Review of nutrient management practices*<br>The review of nutrient management practices needs to consider nutrient leaching into the superficial aquifer, which is used for public drinking water supplies, irrigation of public open space and residential gardens, as well as surface waters and environmental impacts. | The Project Description has been revised to include reference to wetlands, groundwater and drinking water resources. Direct contamination and groundwater leaching impacts have also been noted. |

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| | | *Artificial wetlands management project*<br>• Consider using the term 'constructed' or 'rehabilitated' (if appropriate) instead of 'artificial' wetland.<br>• The Artificial wetlands management plan should be integrated with the Stormwater management policy and stormwater management planning | The project name has been changed to Constructed Wetlands Management Plan.<br><br>This project will link closely to the *Stormwater Management Policy*, and lead to the on-ground implementation of the principles endorsed in the policy. |
| | | *Parks redevelopment Program*<br>Definition of eco and hydro zones.<br>• A hydrozone relates to water delivery and is the practice of establishing separate areas or zones to receive different amounts of irrigation water.<br>• An ecozone relates to the vegetation that can best accommodate a given watering regime and is usually a grouping of plants with similar water requirements. | Definitions have been included in the revised draft City Water Plan. |
| | | *Operating Strategy for Groundwater Utilisation Review*<br>The City of Joondalup operating strategy was approved in 1 August 2006 and valid duration of the licence. Two licences are expiring in 2016 and one licence expires in 2020. The department would be supportive of any review initiated by the City of Joondalup with the objective of updating the existing operating strategy to reflect current best practice. | Comment noted. This is the intent of the *Operating Strategy for Groundwater Utilisation Review* project. |