Water Conservation Plan

(WCP)

for the

Management of Groundwater

in the

Town of Bassendean

June 2008

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1. Overview

The Town of Bassendean conducted a Water Conservation Planning workshop on 10 June 2008 with representatives from irrigation, parks and environmental attending. The aim of the workshop was to identify issues and develop objectives, strategies and actions to manage water more sustainably.

A component of a WCP is the collection, validation, collation and reporting of groundwater use and efficiency data. This data has been collected and a summary is presented in this report.

Groundwater resource summary

The breakdown of use and allocation by water resource for Town of Bassendean's licensed allocation is shown in the following table for 2006/07:

Table 1.2 Water use

Water resource	**Superficial**
Water use (kl/yr 2007/08)	270,092
Allocation (kl/yr)	344,890
Over/under % (amount)	-21.7%
Irrigated area (ha)	45.76
Av water use/ha irrigated (kl/ha/yr)	5,902
# bores	17
# irrigated parks & reserves	18

2. Water demand

The demand for Groundwater within the Town of Bassendean over the next 5 years is expected to remain within the existing allocation.

3. Major issues

The major groundwater issues facing the Town of Bassendean over the next 5 years are listed below.

Table 3.1 Water Conservation issues

1. Groundwater usage data is only an estimate based on flow rates that assume systems are operating at an optimum performance, there are no flow meters installed.
2. Artesian water (Leederville aquifer) needs to be monitored closely and assigned a high priority for water conservation.
3. Iron in bore water across areas of Bassendean (especially Jubilee Oval). This is creating significant problems in blocking sprinklers, flow and deteriorating infrastructure.
4. No accurate measurement of irrigated areas throughout the Town.
5. Park design is not conducive to water conservation, leading to limited ability to hydrozone.
6. Many bores are past their used by date. No information on the performance of irrigation systems – need performance audits.
7. Have a system for categorising the use of parks but these categories do not relate to water use or water conservation.
8. No design guidelines for theTown's irrigation systems
9. No centralised control system – need to look at the cost vs the benefit.
10. No system for annual monitoring of bore water quality and bore water levels.
11. No communication with the council and community on water conservation. Council needs to know about the groundwater situation and the WCP issues.
12. May need to rationalise irrigated turf areas as a component of POS review.
13. Need for tree planting program in dry parks and/or parks/areas that will be watered less. This gives a balance of green and brown.
14. Class 1 and 2 acid sulphate soils in the locality with no monitoring being done.
15. A lack of experienced staff to maintain proposed new and existing irrigation system efficiency requirements.
16. Tight clays make the superficial aquifer an unreliable supply of groundwater.
17. Water repellence on Bassendean sands
18. Training and information needed.
19. There are a lack of in-house resources to properly manage the development of hydrozoning within the Towns Parks and Reserves.

4. Water conservation goals and objectives

Objectives

The main groundwater conservation objectives for Town of Bassendean to achieve over the next 5 years are listed in the table below:

Table 4.1 WCP Objectives

1. To collect, collate and prepare a report on current irrigated area, groundwater use, irrigation efficiency and infrastructure performance. This will require the estimation of water use using meters and pump run times it will also require irrigation system audits, measuring flow rates, co-efficiency of uniformity, water quality and water levels – achieve this by December 2009.

2. Review the Town of Bassendean's irrigated POS with the intention of applying watering categorising to all parks and reserves, asses each parks potential for hydrozoning and start monthly water budgeting. - achieve this by December 2008.

3. Formalise and document a turf maintenance program that leads to water conservation outcomes such as the application of wetting agents, use of soil amendment and the limited use of nitrogen fertilisers – achieve this by December 2009.

4. To investigate and develop an irrigation asset replacement program for the Town of Bassendean and have recommendations completed by July 2009.

5. Investigate the use of water from the Water Corporations Main Drain and grey water sources such as the proposed new council building – complete investigation by December 2009.

6. To educate and inform Councillors, staff and the community of the Town of Bassendean's Water conservation plan including a presentation to council. Link the outcomes of the WCP to International Council for Local Environmental Initiatives (ICLEI) targets – achieve this by October 2008.

5. Water conservation strategies

The Town of Bassendean has identified 9 strategies that will be undertaken to achieve the objectives outlined in Table 4.1. These strategies are listed below and are covered in detail over the remainder of this plan.

Table 5.1 WCP Strategies

1. Measure and record water use and irrigated area to accurately determine water use.
2. The progressive incorporation of watering categories and hydrozoning across irrigated playing fields and Public Open Space Purpose of Strategy
3. Improve the performance of irrigation systems.
4. Implement improved irrigation scheduling practices.
5. Maintain irrigation systems at optimum performance.
6. Prepare and implement "water conservation design guidelines" for the development of new and existing turfed areas, and/or the redevelopment of garden landscapes.
7. Investigate the use of alternative water sources.
8. Develop and implement turf maintenance programs that lead to water savings.
9. Communicate the outcomes of the WCP to the community.

5.1. Strategy 1

Measure and record water consumption and irrigated area to accurately determine total water use.

The purpose of this strategy is to accurately determine the Town of Bassendean's groundwater use and irrigated area. This information will be used to determine baseline information from which conservation and efficiency measures can be compared against.

Current situation

The table below summarises Town of Bassendean's water use and metered and non-metered irrigated area.

Table 5.1.1 Town of Bassendean's water use and irrigated area.

Aquifer and sub-area	No of bores	# meters	% area metered	Water use (kl/yr)
Superficial	13	0	0%	205,556
Leederville	5	0	0%	64,536

High quality data is required to accurately measure water use and irrigated areas. Town of Bassendean's data quality ratings are listed below.

Table 5.1.2 Town of Bassendean's data quality rating

Aquifer and sub-area	Water use data quality rating	Area data quality rating.
Leederville	**	*
Superficial	**	*

The assessment of quality is described using the rating scale below:

Area		**Water Use**	
*****	GIS > 1:2000	*****	Approved meter
****	GIS < 1:2000	****	Non approved meter
***	From aerial photo	***	Central control – run times x pump output
**	Manual from maps	**	No control - run times x pump output
*	Licenced area	*	Educated Guess or don't know

A 5 star rating is required to ensure accuracy of areas and water use.

The Town of Bassendean aims to achieve a 5 star data quality rating by measuring irrigated area using GIS at >1:2000 and installing meters on all bores.

Planned targets

The Town of Bassendean's 5 year target for water use and metering is listed in the following table.

Table 5.1.3 Town of Bassendean targets

Aquifer and sub-area	No of bores	# meters	% area metered	Water use (kl/yr)
Superficial	13	13	100%	Licenced allocation
Leederville	5	5	100%	Licenced allocation

The 5 meters installed comprise the high priority active parks that draw water from the Leederville aquifer. This aquifer is believed to be highly stressed and is under scrutiny by the Department of Water. A high priority should be given to implementing water conservation measures on parks and ovals that draw from this source.

It is important that the Department of Water is informed of the type meter and installation procedures before a metering program begins.

Action	Timeframe
Verify with the Department of Water that all and future flow meters fit their approval requirements.	Ongoing as required.
Map all irrigated area using GIS >1:2000 for all 18 active reserves and other areas of irrigated turf.	Within 24 months
Install flow meters on all active reserves	Within 18 months
Estimate water use over the 2008/09 irrigation season using meters and pump run times.	Within 12 months
To complete the roll-out of flow meters across all bores in the Town of Bassendean.	Within 5 years

5.2. Strategy 2

The progressive incorporation of watering categories and hydrozoning across irrigated playing fields and Public Open Space and landscapes

Purpose of Strategy

The purpose of this strategy is to become site-specific in the allocation of groundwater to turf areas.

For example, being able to vary the amount of water being applied to different categories of parks such as major and minor active and passive reserves.

Current practice

The Town of Bassendean has a reserve category but this classification is not entirely suitable for using as watering categories. In general active reserves receive more water than passives and more high profile reserves receive more water than others.

Planned targets

A review of all POS will be undertaken with the aim of allocating parks a watering category and identifying the potential for hydrozoning within parks. The suggested categories and corresponding water allocation are listed below: (see appendix 1 for information on watering categories and hydrozoning)

Water Category or Hydrozone	Allocation
1. 1st grade and club sporting grounds	10,000 kl/ha/yr
2. Lower grade sporting activity or high profile high use areas such as LGA admin centres and parks with regular functions	8,500 kl/ha/yr
3. Low use low profile parks or areas surrounding active ovals/major passive areas	7,000 kl/ha/yr
4. Low use low profile parks or areas surrounding active ovals/major passive areas or verges	6,000 kl/ha/yr
5. Dry POS, bush, dry parks, dry verges etc.	0 kl/ha/yr

The following actions will taken by the Town of Bassendean to categories and hydrozone playing fields and POS.

Actions	**Timeframe**
Apply categories to all POS across the Town of Bassendean, do this in conjunction with determining accurate irrigated turf areas.	Within 18 months
Investigate the opportunity to Hydrozone areas within parks.	Within 24 months
Link category or hydrozone allocation to water budgeting e.g apply water to category allocation and monitor use on a monthly basis using flow meters.	Within 24 months

5.3. Strategy 3

Improve the performance of irrigation systems

Irrigation audits are the best way to asses the performance of an irrigation system.

Current practice

No system audits have been conducted on parks within the Town of Bassendean. There is a requirement to undertake audits across all parks to determine the efficiency of systems and priorities a replacement of retrofitting program for poor performing systems.

The new or retrofitted systems will be designed to achieve a Coefficient of Uniform CU of 85% or greater and will be audited by a certified irrigation auditor.

Planned targets

The irrigation industry benchmark for irrigation systems in Perth is a CU of 85%. It is suggested that Town of Bassendean aims for this level of performance across all major POS areas starting with the active and high priority passive parks.

Action	Timeframe
Complete audits across active reserves to identify poor performing systems and establish a priority maintenance and system replacement program in order to achieve a Coefficient of Uniform (CU) of 85%.	Within 12 months
Complete audits across all remaining irrigated parks to identify poor performing systems and establish a priority maintenance and system replacement program in order to achieve a CU of 85%.	Within 24 months
Use the audit information to develop an irrigation asset replacement plan that aims to priorities the replacement of old systems on high profile and/or high use parks or ovals.	Within 2 years

5.4. Strategy 4

Implement improved irrigation scheduling practices.

This strategy aims to apply irrigation water efficiently and effectively. Irrigation scheduling involves matching the water used by the turf with the regular application of irrigation water (taking into account any rainfall events and prevailing weather conditions). Matching irrigation with turf water requirements will result in greater water use efficiencies and potential water savings.

Current practices

Town of Bassendean assess how much water and how often to apply it by using the following information

- Visual assesment
- Historical averages

The major watering decisions are mainly made by historical run times, some soil moisture monitoring and weather conditions. To be more efficient and conserve water the Town of Bassendean may look at the following practices for irrigation scheduling:

- Compare actual water use against budgeted on a monthly basis adjust usage based on targeted allocation for the hydrozone.
- Set run times for the month for each park based on historical evaporation data, the category, the irrigation system precipitation rate and the uniformity of the irrigation system.
- Monitor weather so that run times can be adjusted due to un-seasonal weather or rainfall.

Action	Timeframe
Review the scheduling of irrigation and consider the use of irrigation budgeting to monitor water use across active reserves on a monthly basis.	Within 18 months
Use station run times to estimate water use across active parks.	Within 6 months
Apply irrigation budgeting across all remaining categories.	Within 24 months

5.5. Strategy 5

Maintain irrigation systems at optimum performance.

For the same reasons outlined in Strategy 3 it is important that the irrigation system works at its peak performance, so that uniformity of application is maintained. In addition, any leaks in the system need to be picked up early to stop wastage.

A well maintained irrigation system helps prevent problems occurring and reduces water loss.

Current practices

The following table outlines the maintenance program for Town of Bassendean.

Fault fixing	System checks	System audits	# parks not on centralised control	# parks on centralised control
Prioritised on demand	Fortnightly	Never	0	0

Fault fixing – leaks, sprinklers not working etc, *System checks* – hydraulic, pressure, blockages, meters working etc, *System audits* – CU/DU, pressure tests system output tests.

The Town of Bassendean is maintaining irrigation systems to a good standard. The main focus is to introduce a centralised control system to save labour, identify faults and have more control over the watering regimes, irrigation scheduling and water conservation and efficiency.

Action	Timeframe
To identified a suitable centralised control system for the Town of Bassendean	Within 2 years
To install and have all active reserves connected to centralised control system.	Within 3 years
To have all remaining parks connected to the centralised control system.	Within 5 years

5.6. Strategy 6

Prepare and implement "water conservation design guidelines" for the development of new and existing turfed areas or the redevelopment of garden landscapes.

It is important that a set of guidelines are available to assist park management in the design of water efficient parks and the specifications and standards required for the installation of efficient irrigation systems. These guidelines will aim to conserve water and maintain an area of turf acceptable to the community.

This strategy is important for the implementation of many of the preceding strategies.

Current practice

There are no water conservation specifications or guidelines for the development or redevelopment of turfed areas at Town of Bassendean. To ensure new areas of turf that are developed follow "waterwise" principals a set of guidelines or a basic checklist is required for example:

1. When re-designing or constructing a new park, reduce the area of turf to be irrigated, and select low water use turf or plant species where practical.
2. Designing of the irrigation control system to accommodate hydrozones.
3. Use low water use plants.
4. A Coefficient of Uniformity greater than 85%.
5. A manageable number of stations per bore.
6. One main sprinkler type and nozzle size (ease of maintenance)
7. Stations should have similar numbers of sprinklers (ease of scheduling)
8. Flow meters should be fitted (this is considerably cheaper to do during bore headwork's)
9. Soil moisture meters should be fitted.
10. Minimizing water on paved surfaces
11. Audit of system performance at transfer to the long term manager (council)

Action	Timeframe
Develop irrigation system and park water conservation design guidelines for the establishment or redevelopment of ~~new~~ turf areas.	Within 24 months

5.7. Strategy 7

Investigate the use of alternative water sources such as drainage water and grey water.

Purpose

To ensure that the abstraction of groundwater has a minimal impact on the environment.

Current practice

There is limited monitoring undertaken by the Town of Bassendean in environmentally sensitive areas such as Sandy Beach Reserve and acid sulphate prone areas.

Action	Timeframe
Investigate Water Corporations Main Drain and grey water sources such as the proposed new council building – complete investigation by December 2009.	Within 2 years

5.8. Strategy 8

Develop and implement turf maintenance programs that lead to water savings.

Purpose

Turf maintenance measures such as the use of wetting agents, application of nitrogen fertilisers, removal of mat layers and the use of soil amendments can lead to water savings.

Current practice

Current turf maintenance practices do not make allowances for water savings.

Action	Timeframe
Develop a turf maintenance practices that lead to water conservation outcomes such as the application of wetting agents, use of soil amendment and the limited use of nitrogen fertilisers.	Within 2 years
Investigate the opportunity to utilise a weather station that will assist in the management of our groundwater resources and lead to water savings.	Within 5 years

5.9. Strategy 9

Communicate the outcomes of the WCP to the community.

Purpose of Strategy

The purpose of this strategy is to communicate the outcomes of the Town of Bassendean's WCP to the community.

Current practice

There has been limited promotion of Town of Bassendean's water conservation achievements. The adoption of the WCP by the Town of Bassendean could be the first step in promotional campaign.

Action	Timeframe
Develop a communication plan for informing the community on the Water Conservation achievements of Town of Bassendean. Link the outcomes of the WCP to ICLEI targets	Ongoing

Appendix 1

Watering categories and Hydrozoning

Purpose of Strategy

The purpose of this strategy is to become site-specific in the allocation of groundwater to turf areas. The total area of irrigated turf needs to be divided into well-defined categories based on use and profile – these are termed Categories and apply across a park. For example a high use, high profile sports field would be designated Category 1 whilst a low use passive park or passive surround would be designated Category 2 or 3, with Category 1 having a higher water allocation compared to Category 2.

Water conservation can be achieved by moving more areas of turf into the medium and low categories or by discontinuing irrigation.

Hydrozoning applies within a park where active areas are separated from passive areas and irrigated differently.

Hydrozoning also gives a framework for making more major cutbacks in water usage if over allocation or allocations are cut back.

Best practice

The following is industry best practice for hydrozoning of turf:

- Parks unable to be hydrozoned are assigned a watering category. This may involve the review of all POS.
- Parks that can be hydrozoned have areas within the park assigned a hydrozone.
- If required, reduce water usage based on hydrozones.
- Rationalise lower priority categories or hydrozones if there is insufficient water for high priority categories or hydrozones.

Please refer to the Hydrozone information sheet to find out more about hydrozoning.

Suggested categories or zones

Based on UWA research and weather data from the Perth Airport, kikuyu will have the following quality when irrigated with the following amounts of water over the summer period.

Zone or category 11000 1st grade and club sporting grounds	
Zone or category 9000 lower grade sporting activity or high profile high use areas such as LGA admin centres and parks with regular functions	
Zone or category 7500 low use low profile parks or areas surrounding active ovals/major passive areas	
Zone or category 6000 low use low profile parks or areas surrounding active ovals/major passive areas	
Zone or category 4500 low profile areas	
Zone or category 0 Dry POS, bush, dry parks, dry verges etc.	