

# IMPROVING URBAN IRRIGATION EFFICIENCY “WATER USE AROUND THE WORLD USING IRRIGATION TECHNOLOGY”

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30 years in Irrigation industry with experience in Central Control Irrigation Systems in many locations in Australia and around the World.

## 1) INTRODUCTION

A whirlwind look at four diverse irrigation sites from around the World and how the use of irrigation technology has played a key role to their existence.

## 2) THE CHALLENGE FOR THE CITY OF GREATER GEELONG.

The City of Greater Geelong faces a considerable challenge to manage water resources in a more sustainable manner. Water restrictions have been in place in recent years due to low rainfall and increasing demand. It is estimated the total demand in the municipality will increase approximately 30% should potable water be used at current rates by 2030.

As a first step in addressing the challenge facing the entire municipality, Council has started with developing a strategy to reduce water consumption of its corporate facilities and services.

It is estimated that 3% of total water used in the municipality is for Council services and facilities;

Parks and gardens consume 70% of total Council water consumption; and

High water users identified are major sports ovals, parks and swimming centres.

Council is expected by residents and businesses within the municipality to provide a certain level of service with many of its services and facilities. The challenge for Council is to provide efficiencies in a sustainable way without loss of service to the community.

## OBJECTIVES OF THE SUSTAINABLE WATER USE PLAN

The purpose of the Sustainable Water Use Plan is to identify Council facilities and services that are high water users and identify areas of priority to reduce potable water consumption.

Highlights of this Sustainable Water Use Plan

The most significant outcome of this SWUP is that Council is targeting a 25% reduction in Potable water consumption by 2015 and a 30% reduction by 2020. By achieving this commitment Council will be setting the example for the Geelong community in relation to potable water.

PROPERTY TYPE	WATER USE 2005 (ML/YR)	WATER USE 2015 “DO NOTHING” (ML/YR)	WATER USE 2015 “STRATEGY IMPLEMENTATION ” (ML/YR)	ESTIMATED ANNUAL WATER SAVINGS IN 2015 (%)	ESTMATED ANNUAL WATER SAVINGS IN 2015 (\$.)
Building	134	138	115	14%	\$17,649
Open Space	173	179	130	25%	\$36,478
Playing Fields	523	618	373	29%	\$183,592
Recreation	98	118	76	22%	\$31,501
Commercial	15	14	12	22%	\$1,434
Other	22	15	15	33%	\$3,686
<b>Total</b>	<b>965</b>	<b>1,082</b>	<b>721</b>	<b>25%</b>	<b>\$268,968</b>

INITIATIVE	CUMULATIVE WATER SAVINGS 2005-2015 (ML)	COMMENT/ FUNDING SOURCES
Replace potable water with stormwater or recycled water for irrigation of major playing fields. Apply to 2 highest water using sports ovals. This accounts for approximately 26% of water use for all ovals	530	Smart Water Fund (approximately \$15 million) Australian Government Community Water Grants \$200 million over five years have been made available for grants of up to \$50,000. Stormwater and Urban Water Conservation Fund (Victorian Government) Water Smart Australia (Australian Government Water Fund)
Develop and implement strategies to improve irrigation management	816	Capital costs will include an audit of all irrigation systems, 42 sites to have central control system (part of highest 50 playing fields / reserves). Meter readings to be checked quarterly and annual inspection of pipe / system infrastructure. Outdated or inefficient irrigation systems to be gradually replaced.
Replace potable water with stormwater or recycled water for irrigation of major playing fields. Apply next 5 highest water using sports ovals. This accounts for approximately 14% of water use for all ovals	286	Smart Water Fund (approximately 15 million) Australian Government Community Water Grants \$200 million over five years have been made available for grants of up to \$50,000. Stormwater and Urban Water Conservation Fund (Victorian Government) Water Smart Australia (Australian Government Water Fund)
Develop and implement strategies to improve irrigation management, stage 1	143	20 sites to be added to the central control system and 20 sites to be replaced with drought tolerant grasses. Also applied to new playing fields but costs for new sites should be considered as part of the budget for a new development. Australian Government Community Water Grants \$200 million over five years have been made available for grants of up to \$50,000.
Implement a user pays system for clubs	195	Costs will include investigation of the feasibility of this initiative and consultation with a sample of users.
Backwash recycle system in pools	161	A backwash recycle system that treats backwash and recycles back into pool system. Smart Water Fund (approximately \$15 million). Australian Government Community Water Grants \$200 million over five years have been made available for grants of up to \$50,000. Stormwater and Urban Water Conservation Fund (Victorian Government) Water Smart Australia (Australian Government Water Fund)
Develop and implement strategies to improve irrigation management, stage 2	143	Capital costs include audit all irrigation systems, 8 sites to have central control system (part of highest 50 playing fields / reserves), 30 sites fitted with rain or moisture sensors and feasibility study for sub-surface irrigation. Outdated or inefficient irrigation systems to be gradually updated.

Develop and implement strategies to improve irrigation management, stage 3	71	20 sites to be added to the central control system and 30 sites to have rain / moisture sensors. Initiative includes replacing high water using plants with drought tolerant plants at rate of 10 sites per.
Reduce open space areas to be irrigated by 10%	89	Minimal implementation cost, however undertake a study to investigate which open space areas can cease irrigation. Study to include community consultation.
Install water savings Devices	64	Assumes \$25,000 per facility to retrofit with water savings devices. Applied to the 5 swimming centres over 5 years Smart Water Fund Australian Government Community Water Grants 200 million over five years has been made available for grants of up to \$50,000
Leakage management	64	Undertake quarterly site specific audit at each swimming centre. Audit includes assess condition of infrastructure, monitor and check for pool shell leakage and infrastructure leakage. Audit is part of facility management job scope. Maintenance / upgrades identified from audit to be incorporated in capital works program. Install water savings devices
Community Centres	49	Costs include retrofitting of 50% of all community centres, phased in over 10 years. Water savings devices in new buildings will be part of the building design and therefore not included in costs. Smart Water Fund (approximately \$15 million). Australian Government community Water Grants \$200 million over five years has been made available for grants of up to \$50,000.

### 3) BEIJING OLYMPIC SITES, CHINA

Modern irrigation technology is not just about saving water it is equally about using it. It allows the 'Greatest show on Earth' to take place. Here is a quick look at the major sites for the Olympic Games in China.

1) Project name: Beijing Olympic Center Park

Location: Chaoyang District Beijing

It is the center park of the Olympic game, the "Birds Nest Stadium", "Water Cube", "Olympic Sports Center Stadium building" are located here.

Games:

- ✧ Opening and Closing Ceremony
- ✧ Swimming, Diving, Synchronized Swimming
- ✧ Football
- ✧ Athletics
- ✧ Gymnastics, Trampoline, and handball

Irrigation Installation:

Landscape Area: 40Ha

Over 1,000 valves controlling 22,000 heads

2) Project Name: Beijing Shunyi Rowing-Canoeing Park

Location: Mapo Village, Shunyi District, Beijing

Games:

- ✧ 2007 Rowing-Canoeing invitation Championship
- ✧ 2007 Canoe/Kayak Slalom
- ✧ Olympic Rowing, Canoe/Kayak – Flat water Canoe / Kayak Slalom and Triathlon

Irrigation Installation:  
Irrigation Area: 31Ha  
170 valves and 2,000 heads

3) Project Name: Shenyang Olympic Sports Center Stadium  
Location: Shen Yang city, Liao Ning Province  
One of the most important football stadiums of the Olympic Games 2008  
Games:

- ✧ 4 countries invitation games, 2007
- ✧ 2008 Olympic Games football

Irrigation Installation:  
Two fields included, one for the match and one for practice  
Automated pop-ups

4) Project Name: Beijing Fengtai Soft Ball Center  
Location: Fengtai District Beijing City  
Games:

- ✧ ISF XI Women's Fast Pitch World Championship
- ✧ 2008 Olympic Games Soft Ball

Irrigation Installation:  
Four fields included, two for the match and three for practice  
Fully automated pop up sprinklers

5) Project Name: Wukesong Baseball Field  
Location: Haidian District, Beijing  
Games:

- ✧ 2007 International Baseball Tournament
- ✧ 2008 baseball

Irrigation Installation  
Three fields included, one for the match and two for practice  
Fully automated pop-up sprinkler system

6) Project Name: Hockey Field, Olympic Green  
Location: in the Olympic Forest Park  
Games:

- ✧ Olympic Hockey tournament

Irrigation Installation:  
Three fields included, one for the match and two for practice  
Fully automated pop-up sprinkler system

7) Project Name: Olympic Forest Park  
Location: North of the Olympic Park  
Usage during the Olympic game 2008: Temporary parking lot and green for the visitors

Irrigation Installation:  
✧ 4,000 QCV sets

8) Project Name: Hong Kong Equestrian Venues  
Location: Shatin, Hong Kong  
Games:

- ✧ Jumping
- ✧ Dressage

Irrigation Installation:  
Fully automated Rain Gun system

The Olympic games could not run without modern irrigation technology!

**4) NIKE WORLDWIDE HEAD QUARTERS, BEAVERTON, ORLANDO, USA**

In recent years Major corporate sites have also seen the benefits of efficient irrigation technology. Bill Bowerman and Phil Knight started a business under the name of Blue Ribbon Sports (BRS) with their first year’s annual sales of \$8,000 in 1962. In 1972 BRS changed its name and in 1980 went public.

Today the same company employs 23,000 people worldwide and its annual sales exceed \$10 billion.

Nike is one of the worlds most recognisable companies and its branded ‘Swoosh’ has become a universal corporate identifier.

The 176 acre Nike World Headquarters in Beaverton Orlando consisting of 16 buildings each one named after a famous athlete, is diversely landscaped, intensively used and environmentally friendly. The complete complex is managed by several experienced landscape professionals, including a profession irrigation management company and full time on-site irrigation technician. This along with a state of the art central control system has resulted in an 80 million litre water reduction of the past 2 years In addition the site has seen a significant decrease in plant loss.

**5) CLARK COUNTY, NEVADA, USA**

Clark County is home to the world-famous Las Vegas Strip, heart of the Entertainment Capital of the World and site of 14 of the nation's 15 largest hotels. Many other venues stretch beyond the Strip to include the gambling destinations of Mesquite, Primm and Laughlin, located on the fun-filled Colorado River. But they also feature Lake Mead National Recreation Area and engineering marvel Hoover Dam, Mt. Charleston and the Toiyabe National Forest, Red Rock Canyon, the Valley of Fire and parks, museums and recreational and cultural attractions.

Clark County is a wonderfully diverse place, and Clark County government is organised and positioned to provide urban and regional services for 2 million residents and 43 million tourists a year (2007) and occupies an area (8,012 square miles).

On April 1, 2003, the Clark County Board of county Commissioners approved the Department of Parks and Community Services Water Conservation Action Plan. The plan provided a framework of actions needed to reduce outdoor water use in Clark County parks, medians and building landscapes by 25 percent. At that time, the board directed staff to begin to address implementation of the action plan in anticipation of continuing drought conditions and approval of water conservation ordinance(s).

MEASURE	COST	WATER SAVINGS (GAL/YEAR)	COST SAVING (ANNUAL)
<b>YEAR 1</b>			
Maxicom Improvements	\$142,000	20,318,000	\$39,000
Park Xeriscape Renovations*	\$1,821,000	34,583,000	\$66,000
Street Median Conversions*	\$494,000	8,054,000	\$15,000
Ball Fields Synthetic Turf*	\$3,260,000	30,900,000	\$59,000
Preventative Water Loss	0	8,000,000	\$15,000
<b>YEAR 1 TOTALS</b> Net Capital Outlay	<b>\$5,717,000</b>	<b>101,855,000</b>	<b>\$194,000</b>

<u>YEAR 2</u>			
Xeriscape Renovations*	\$1,491,000	28,312,000	\$54,000
Soccer Fields Synthetic Turf*	\$1,067,000	11,125,000	\$22,000
Preventative Water Loss	0	8,000,000 \$	15,000
<b>YEAR 2 TOTALS</b> Net Capital Outlay	<b>\$2,558,000</b>	<b>47,437,000</b>	<b>\$91,000</b>

<u>YEAR 3</u>			
Xeriscape Renovations*	\$1,385,000	26,303,000	\$50,000
Preventative Water Loss	0	8,000,000	\$15,000
<b>YEAR 3 TOTALS</b> Net Capital Outlay	<b>\$1,385,000</b>	<b>34,303,000</b>	<b>\$65,000</b>

<u>YEAR 4</u>			
Xeriscape Renovations*	\$1,109,000	19,756,000	\$38,000
Preventative Water Loss	0	8,000,000	\$15,000
<b>YEAR 4 TOTALS</b> Net Capital Outlay	<b>\$417,000</b>	<b>27,756,000</b>	<b>\$53,000</b>

MEASURE	COST	WATER SAVINGS (GAL/YEAR)	COST SAVING (ANNUAL)
<u>YEAR 5</u>			
Xeriscape Renovations*	\$408,000	7,136,000	\$15,000
Preventative Water Loss	0	8,000,000	\$15,000
<b>YEAR 5 TOTALS</b> Net Capital Outlay	<b>\$408,000</b>	<b>15,136,000</b>	<b>\$30,000</b>

<b><u>5 YEAR GRAND TOTALS</u></b> Net Capital Outlay	<b>\$11,177,000</b>	<b>204,414,000</b>	<b>\$501,000</b>
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The measures contained in the Water Conservation Plan will reduce outdoor water consumption in county parks by approximately 24 percent at the end of five years. Coupled with other operational efficiencies and new park designs, it is not unreasonable to realise overall water savings of about 30 percent.

## **6) SUMMARY – THREE THOUGHTS.**

- Water is like money, we save money for a 'rainy day', we save water in case of drought.
- We don't waste money, we try and get best value when using it, water should be the same!
- Like money, water is useless until we use it!

### **References:**

- City of Greater Geelong, Sustainable Water Use Plan
- Rain Bird International archive literature
- Clark County Water Conservation Plan Implementation Report
- Landscape Management Journal (Sept 2005) USA.