

# City of Ryde Water Savings Action Plan



City of Ryde

Prepared by: Environment & Planning Group  
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# 1. OVERVIEW AND INTRODUCTION

## Organisation Name

City of Ryde

### Introduction to the business

The City of Ryde is a Local Government Authority with an area of 40.651 sq kms located in the central northern part of the Sydney Metropolitan area, approximately 12kms from the centre of Sydney. The city occupies most of the divide between the Parramatta and Lane Cove rivers, and has 16 suburbs within its boundaries and a residential population of approximately 100,000 people. Council owns property with Sydney Water connections at over 176 locations including parks, civic and administration buildings, community buildings and tenanted houses. In total these accounts used over 111780 KL of water in 2004/05. However many of these accounts are actually tenanted to community organizations or individuals even when the City of Ryde may be listed as the account holder often the City of Ryde is not responsible for paying water bills for these tenants. For example, Next Generation Gym is responsible for paying the water bills at this premise which is leased from Council.

### Background/History of water savings within the organisation

Council joined Sydney Water's Every Drop Counts (EDC) Program on the 4<sup>th</sup> of August 2004. As part of this program, Council committed to reducing water usage by 15% across all properties. Since then Council has progressed through the EDC program by undertaking various steps including: -

\*Undertaking two water management diagnostics and progressing from 2 stars to 3 stars according to the One-Two-Five rating system by implementing various improvements to water management measures.

\*Organised technical audits of the Ryde Aquatic Leisure Centre, undertaken by Department of Commerce, and of the Argyle Centre and the Operations Centre, undertaken by Sydney Water staff. Walk through technical audits of the other properties in the top ten list of water usage have also been undertaken by members of Council's Environment Unit with assistance as required from other staff members.

\*Undertaken various water savings measures including installation of flow restrictors at 24 properties, conversion of urinals to waterless operation at 5 properties and the use of backflow prevention devices, mulch and water saving crystals in parks and gardens. These water savings measures have mostly been undertaken using Council's operational budget and a limited amount of funding which is set aside for sustainability improvements each year.

\*Council has also applied for various grants and funding programs in order to enable further water savings measures to be undertaken. Council has recently been awarded \$431 841 from DEUS's Water Savings Fund in order to implement various water savings actions at the RALC which will cost \$724 062 yet save over \$27557KL of water or \$55069 per annum. The City of Ryde has a keen interest in seeing water savings measures be implemented not only for the cost and environmental benefits which may be achieved but also in order to provide a good example to the community.

\*As a result of water saving measures and changes to water management already implemented by Council across all properties, actual water usage across all Council properties has already decreased by 18% from 2004/05 to 2003/04 with water usage of 137471 KL to 111780 KL respectively for each year.

## **Introduction to water savings within the organization**

The plan has been developed by Council' Environment Unit working in partnership with other sections of Council including management, operational and planning staff. A City of Ryde Water and Energy Savings Team "CORWEST" was also formulated to assist with achieving a variety of environmental objectives including a reduction in water usage across the organization and the development of the Water Savings Action Plan. This plan is intended to save over 20% of water at Council's Top Eleven water using sites which are responsible for 65978 KL of Council' water usage in 2004/05. Senior management have committed to undertaking the management actions and low cost water savings measures outlined in the following Water Savings Action Plan.

## **How this plan integrates with existing business operations**

This plan integrates with the existing capital works program for each of the relevant sections identified. Each section is intended to absorb any ongoing operational costs resulting from the implementation of water savings measures. The CORWEST Team also has responsibility for overseeing and monitoring the implementation of the Water Savings Action Plan and spending a budget of over \$10000 per year on a variety of water and energy savings measures. The CORWEST Team reports directly to the Executive Team each quarter which means that progress towards water savings targets will be closely monitored and can be ensured to be fast tracked. The progress of the CORWEST Team and implementation of measures from the Water Savings Action Plan will also be reported in the State of the Environment Report each year.

## **Signoff of the Plan**

"I certify that this Savings Action Plan has been prepared in accordance with the Guidelines issued by the Minister for Utilities. I am authorized to submit this plan, on behalf of the designated user (City of Ryde), to DEUS"

Signed

\_\_\_\_\_

Date

\_\_\_\_\_

Michael Whittaker  
General Manager  
City of Ryde

## **PROPERTIES INCLUDED IN THE WATER SAVING ACTION PLAN**

Site Number	Sydney Water Account Number(s)	Level of review conducted and why	Site location and description
1	<b>3391149</b>	Detailed review (water use High)	RYDE AQUATIC LEISURE CENTRE
2	<b>3375604</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	E.L.S HALL PARK
3	<b>3365570 3358555</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	MEADOWBANK PARK
4	<b>4676510</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	CHRISTIE PARK
5	<b>3386313</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	MONASH PARK
6	<b>4680216</b>	Walk through review (water use medium and benchmarks available for Civic/Admin buildings)	CIVIC CENTRE
7	<b>3392837</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	EASTWOOD PARK
8	<b>3371871 3383421 3389010 3391782</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	MORRISON BAY PARK
9	<b>3362049 3362051</b>	Walk through review (water use medium and benchmarks available for Civic/Admin buildings)	ARGYLE CENTRE
10	<b>3383137 3383138</b>	Walk through review (water use medium and benchmarks available for Parks/Reserves)	PUTNEY PARK
11	<b>3365552</b>	Walk through review (water use medium and benchmarks available for Depots)	OPERATIONS CENTRE

## 2. BASELINE WATER USAGE

Baseline water usage for Council's top eleven water using sites is presented below.

### Baseline Water Use (Template 1)

**Site: Ryde Aquatic Leisure Centre – 504 Victoria Rd, Gladesville**

**Business Unit: Ryde Aquatic Leisure Centre**

Sydney Water Account Number	3391149
Baseline Start Date	Baseline End Date
30 Jun 2003	30 Jun 2004
Reason for pre-2004 baseline and/or baseline less than 12 months: Various Shutdowns in 2004/05 make it complex to estimate variation from normal usage. Easier to calculate baseline water usage for 03/04 as shutdown only occurred for six weeks during this financial year (Ozone system offline from 14 September 2002 to 15 August 2003). Also various water savings initiatives have been undertaken in 04/05 including installation of waterless urinals, Antibio system and flow restrictors. For this reason 03/04 was chosen as baseline year.	
<b>A: Baseline Water Use per annum</b>	54,063 kL
Is baseline representative of normal Water use	<b>No</b>
Description of variation: Due to shutdown of Ozone System for period including 1 July 02 to 15 Aug 03.	
<b>C: Impact of Variation on Water use (kL per annum)</b>	2,670 kL
<b>D: =(A-C) Baseline Water use corrected for variations</b>	56,733 kL
Business Activity Indicators	patrons
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	1,088,987
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	52.1 L/patron/day



## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: ELS Hall Park – Kent Rd, North Ryde**

**Business Unit: ELS Hall Park**

Sydney Water Account Number	3375604
Baseline Start Date 01 Jul 2004	Baseline End Date 30 Jul 2005
<b>A: Baseline Water Use per annum</b>	<b>9,251 kL</b>
Is baseline representative of normal Water use	<b>No</b>
Description of variation: There has been a leak at ELS Hall Park which measurements indicate could have been as high as 3090 KL per year being lost. Rectification of this leak has been identified in the Water Savings Measures section.	
<b>C: Impact of Variation on Water use (kL per annum)</b>	kL
<b>D: =(A-C) Baseline Water use corrected for variations</b>	<b>9,251kL</b>
Business Activity Indicators	m2
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	<b>107,240</b>
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	<b>.09 kL/m2/annum</b>

## Baseline Water Use (Template 1)

Organisation: City of Ryde

Site: Meadowbank Park – Adelaide St & Constitution Rd, Meadowbank

Business Unit: Meadowbank Park

## Baseline Water Use (Template 1)

Organisation: City of Ryde

Sydney Water Account Number	3365570, 3358555
Baseline Start Date	Baseline End Date
01 Jul 2004	30 Jun 2005
<b>A: Baseline Water Use per annum</b>	3,018 kL
Is baseline representative of normal Water use	<b>Yes</b>
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	3,018 kL
Business Activity Indicators	m2
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	237,527
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	.01 kL/m2/annum

## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Morrison Bay Park – Teemer St, Putney**

**Business Unit: Morrison Bay Park**

Sydney Water Account Number	3383421, 3371871, 3389010, 3391782	
Baseline Start Date	Baseline End Date	
30 Jun 2004	30 Jun 2005	
<b>A: Baseline Water Use per annum</b>	3,002 kL	
Is baseline representative of normal Water use	<b>Yes</b>	
<b>C: Impact of Variation on Water use (kL per annum)</b>		
<b>D: =(A-C) Baseline Water use corrected for variations</b>	3,002 kL	
Business Activity Indicators	m2	
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	57,069	
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	.05 kL/m2/annum	

## Baseline Water Use (Template 1)

**Organisation:** City of Ryde

**Site:** Christie Park – Christie Rd, Macquarie Park

**Business Unit:** Christie Park

Sydney Water Account Number	4676510
Baseline Start Date 30 Jun 2004	Baseline End Date 30 Jun 2005
<b>A: Baseline Water Use per annum</b>	2,527 kL
Is baseline representative of normal Water use	<b>Yes</b>
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	2,527 kL
Business Activity Indicators	m2
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	44,558
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	.06 kL/m2/annum

## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Monash Park – Monash Rd, Gladesville**

**Business Unit: Monash Park**

Sydney Water Account Number	3386313
Baseline Start Date 30 Jun 2004	Baseline End Date 30 Jun 2005
<b>A: Baseline Water Use per annum</b>	<b>2,424 kL</b>
Is baseline representative of normal Water use	<b>No</b>
Description of variation: Establishment of new playing field, laying of underground drainage pipes during 04/05. Not normal water usage. This corrected figure closer to measured usage for 03/04	
<b>C: Impact of Variation on Water use (kL per annum)</b>	<b>-1,527 kL</b>
<b>D: =(A-C) Baseline Water use corrected for variations</b>	<b>897 kL</b>
Business Activity Indicators	m2
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	<b>17,553</b>
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	<b>.05 kL/m2/annum</b>

## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Civic Centre – 1 Devlin St, Top Ryde**

**Business Unit: Civic Centre**

Sydney Water Account Number	4680216
Baseline Start Date	Baseline End Date
7 Jan 2004	4 Jan 2005
<b>A: Baseline Water Use per annum</b>	<b>2,224 kL</b>
Is baseline representative of normal Water use	<b>Yes</b>
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	<b>2,224 kL</b>
Business Activity Indicators	Employees
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	<b>149</b>
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	<b>40.9 L/Employees/day</b>

## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Eastwood Park – West Pde, Eastwood**

**Business Unit: Eastwood Park**

Sydney Water Account Number	3392834, 3392835,
Baseline Start Date 01 Jul 2004	Baseline End Date 30 Jul 2005
<b>A: Baseline Water Use per annum</b>	1,988 kL
Is baseline representative of normal Water use	<b>Yes</b>
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	1,988 kL
Business Activity Indicators	m2
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	34,293
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	.06 kL/m2/annum

## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Argyle Centre and Hall – 35/41 Blaxland Rd, Top Ryde**

**Business Unit: Argyle Centre and Hall**

Sydney Water Account Number	3362051, 3362 049
Baseline Start Date 30 Jun 2004	Baseline End Date 30 Jun 2005
<b>A: Baseline Water Use per annum</b>	1,851 kL
Is baseline representative of normal Water use	<b>Yes</b>
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	1,851 kL
Business Activity Indicators	Employees
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	29
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	174.87 L/Employees/day



## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Putney Park – Pellisier Rd, Putney**

**Business Unit: Putney Park**

Sydney Water Account Number	3383137, 3383138
Baseline Start Date	Baseline End Date
<b>A: Baseline Water Use per annum</b>	1,367 kL
Is baseline representative of normal Water use	
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	1,367 kL
Business Activity Indicators	67860.8m2
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	1,863
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	.02 kL/m2/annum

## Baseline Water Use (Template 1)

**Organisation: City of Ryde**

**Site: Operations Centre – Constitution Rd & Belmore St, Meadowbank**

**Business Unit: Operations Centre**

Sydney Water Account Number	3365552
Baseline Start Date 30 Jun 2004	Baseline End Date 30 Jun 2005
<b>A: Baseline Water Use per annum</b>	1,028 kL
Is baseline representative of normal Water use	<b>Yes</b>
<b>C: Impact of Variation on Water use (kL per annum)</b>	
<b>D: =(A-C) Baseline Water use corrected for variations</b>	1,028 kL
Business Activity Indicators	Employees
<b>B: Quantity of Site Business Activity Indicator per annum (Corrected for variations)</b>	59
<b>E: =(D / B) Baseline Water Use key performance indicator (KPI)</b>	47.7 L/Employees/day

### 3. WATER MANAGEMENT ASSESSMENT

#### WATER MANAGEMENT REVIEW

The results of the management review are presented below for each site.

**Site: Ryde Aquatic Leisure Centre -**

#### Management Team

Peter Byrne	Manager Property
John Lee	Manager Finance
Paul Hartmann	Manager Ryde Aquatic Leisure Centre
Stephen Drury	Building Services Coordinator
Sarjit Singh	Coordinator Assets Ryde Aquatic Centre
Jenai Davies	Sustainability Engineer

#### Key Areas

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential				X	
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		

**Site: ELS Hall Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			<b>X</b>		
<b>B</b> Understanding of water savings potential			<b>X</b>		
<b>C</b> Water targets and key performance indicators			<b>X</b>		
<b>D</b> Water metering and monitoring			<b>X</b>		
<b>E</b> Water management reporting		<b>X</b>			
<b>F</b> Water supply management			<b>X</b>		
<b>G</b> Operating and maintenance procedures			<b>X</b>		
<b>H</b> Accountabilities for water management			<b>X</b>		
<b>I</b> Training and awareness procedures		<b>X</b>			
<b>J</b> Compliance with legal and/or regulatory requirements			<b>X</b>		

**Site: Meadowbank Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential				X	
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		

**Site: Morrison Bay Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential			X		
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		

**Site: Christie Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential				X	
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		

**Site: Monash Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential				X	
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		



**Site: Civic Centre****Management Team**

Peter Byrne	Manager Property
John Lee	Manager Finance
Stephen Drury	Building Services Coordinator
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			<b>X</b>		
<b>B</b> Understanding of water savings potential				<b>X</b>	
<b>C</b> Water targets and key performance indicators			<b>X</b>		
<b>D</b> Water metering and monitoring			<b>X</b>		
<b>E</b> Water management reporting		<b>X</b>			
<b>F</b> Water supply management			<b>X</b>		
<b>G</b> Operating and maintenance procedures			<b>X</b>		
<b>H</b> Accountabilities for water management			<b>X</b>		
<b>I</b> Training and awareness procedures		<b>X</b>			
<b>J</b> Compliance with legal and/or regulatory requirements			<b>X</b>		

**Site: Eastwood Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential				X	
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		

**Site: Argyle Centre and Hall****Management Team**

Peter Byrne	Manager Property
John Lee	Manager Finance
Stephen Drury	Building Services Coordinator
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			<b>X</b>		
<b>B</b> Understanding of water savings potential				<b>X</b>	
<b>C</b> Water targets and key performance indicators			<b>X</b>		
<b>D</b> Water metering and monitoring			<b>X</b>		
<b>E</b> Water management reporting		<b>X</b>			
<b>F</b> Water supply management			<b>X</b>		
<b>G</b> Operating and maintenance procedures			<b>X</b>		
<b>H</b> Accountabilities for water management			<b>X</b>		
<b>I</b> Training and awareness procedures		<b>X</b>			
<b>J</b> Compliance with legal and/or regulatory requirements			<b>X</b>		

**Site: Putney Park****Management Team**

Peter Hickmann	Manager Parks
Peter Byrne	Manager Property
John Lee	Manager Finance
Karl Cotter	Parks Asset Management Officer
Richie Griffiths	Maintenance Coordinators Sports Facilities
Jenai Davies	Sustainability Engineer

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			X		
<b>B</b> Understanding of water savings potential			X		
<b>C</b> Water targets and key performance indicators			X		
<b>D</b> Water metering and monitoring			X		
<b>E</b> Water management reporting		X			
<b>F</b> Water supply management			X		
<b>G</b> Operating and maintenance procedures			X		
<b>H</b> Accountabilities for water management			X		
<b>I</b> Training and awareness procedures		X			
<b>J</b> Compliance with legal and/or regulatory requirements			X		

**Site: Operations Centre****Management Team**

Peter Byrne	Manager Property
John Lee	Manager Finance
Stephen Drury	Building Services Coordinator
Jenai Davies	Sustainability Engineer
Barry Hodge	Manager Works

**Key Areas**

	Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
<b>A</b> Senior management Commitment			<b>X</b>		
<b>B</b> Understanding of water savings potential				<b>X</b>	
<b>C</b> Water targets and key performance indicators			<b>X</b>		
<b>D</b> Water metering and monitoring			<b>X</b>		
<b>E</b> Water management reporting		<b>X</b>			
<b>F</b> Water supply management			<b>X</b>		
<b>G</b> Operating and maintenance procedures			<b>X</b>		
<b>H</b> Accountabilities for water management			<b>X</b>		
<b>I</b> Training and awareness procedures		<b>X</b>			
<b>J</b> Compliance with legal and/or regulatory requirements			<b>X</b>		

## **WATER MANAGEMENT ACTIONS**

Identified Water Management Actions are listed below.

<b>Water Management Action</b>	<u>Mgt Review Area</u>	<b>Sites</b>	<b>Responsibility</b>	<b>Start Date</b>	<b>Completion</b>
<p><b>Define clear deliverables for water efficiency from facility management personnel/teams, which are included in formal reporting structure</b></p> <p><i>Steps to delivering action</i></p> <p>*Agree upon water efficiency targets for all Council properties</p> <p>*Ensure relevant staff in parks and facility management teams are aware of relevant benchmarks and agreed water efficiency targets</p> <p>*Reports to Executive Team each quarter by CORWEST Water and Energy Savings Team to include performance of water usage against agreed targets and benchmarks.</p>	Accountabilities for water management	Ryde Aquatic Leisure Centre ELS Hall Park Meadowbank Park Morrison Bay Park Christie Park Monash Park Civic Centre Eastwood Park Arygle Centre Putney Park Operations Centre	Paul Hartmann Peter Byrne Peter Hickman Sam Cappelli Barry Hodge	01 Apr 06	30 Jun 10
				01 Apr 06	01 Jul 06
				01 Aug 06	30 Jun 07
				31 Jul 06	30 Jun 10
<p><b>Arrange temporary or backup supply storage to cater for brief water supply disruptions, where appropriate.</b></p>	Water supply management	Ryde Aquatic Leisure Centre ELS Hall Park Meadowbank Park Morrison Bay Park Christie Park Monash Park Civic Centre Eastwood Park Arygle Centre Putney Park Operations Centre	Paul Hartmann Peter Byrne Peter Hickman Barry Hodge	01 Apr 06	30 Jun 10







Water Management Action	Mgt Review Area	Sites	Responsibility	Start Date	Completion
* Offer regular formal training in water efficiency, maintenance requirements and ensure this information is included in relevant position descriptions				01 Apr 07	19 Jun 10
<p><b>Provide formal training on legal requirements for Commercial Trade Waste Permit compliance.</b></p> <p><i>Steps to delivering action</i></p> <p>*Ensure management and operational staff in each area have copies of relevant Trade Waste Permit conditions</p> <p>*In conjunction with Environment and Human Resources develop appropriate training program</p> <p>*Offer regular formal training in Trade Waste Permit Compliance and ensure this requirement included in relevant staff training programs.</p>	Compliance with legal and/or regulatory requirements	Ryde Aquatic Leisure Centre Meadowbank Park Civic Centre Operations Centre	Jim Mitchell Debbie Martin Paul Hartmann Peter Byrne Peter Hickman Sam Cappelli Barry Hodge	01 Apr 06	30 Jun 10
<p><b>Develop, display and track water performance indices using existing building management systems or facility management systems.</b></p> <p><i>Steps to delivering action</i></p> <p>* Revise existing water performance indices for key sites as needed</p> <p>* Install data loggers or new meters at each facility to be input into centralised database and existing building and facility management systems using either telemetry or monthly readings.</p> <p>* Track water performance using centralised database being developed with links to be established to existing building and facility management systems</p>	Water Metering and Monitoring	Ryde Aquatic Leisure Centre ELS Hall Park Meadowbank Park Morrison Bay Park Christie Park Monash Park Civic Centre Eastwood Park Arygle Centre Putney Park Operations Centre	Glen Tanner Paul Hartmann Peter Byrne Peter Hickman Sam Cappelli Barry Hodge	01 Apr 06	30 Jun 10
				01 Apr 06	30 Jun 10
				01 Apr 06	30 Jun 08
				01 Jan 07	30 Jun 10



<b>Water Management Action</b>	<b><u>Mgt Review Area</u></b>	<b>Sites</b>	<b>Responsibility</b>	<b>Start Date</b>	<b>Completion</b>
<p><b>Undertake irrigation audits to assess the efficiency and possible improvements to reduce the amount of water required from irrigation</b></p> <p><i>Steps to delivering action</i></p> <p>*Engage consultants to undertake irrigation audits for the four parks listed.</p> <p>*Either train a staff member to become a certified irrigation auditor or investigate possible partnership with Ryde TAFE students undertaking audits as part of their subjects.</p>	Understanding of Water Savings Potential	ELS Hall Park Meadowbank Park Morrison Bay Park Christie Park	Peter Hickman	01 Apr 06	30 Jun 08
				01 Apr 06	30 Jun 08
				01 Apr 06	30 Jun 10
<p><b>Undertake program of monitoring of sites included in the Water Savings Action Plan, enabled by purchase of fixed data loggers.</b></p>	Water metering and monitoring	Ryde Aquatic Leisure Centre ELS Hall Park Meadowbank Park Morrison Bay Park Christie Park Monash Park Civic Centre Eastwood Park Arygle Centre Putney Park Operations Centre	Peter Hickman/ Peter Byrne Barry Hodge Paul Hartmann Sarjit Singh	1 Apr 06	30 Jun 10
<i>Steps to delivering action</i>					
*Purchase seventeen fixed data loggers.				1 Apr 06	30 Jun 07
*Continuously monitor water usage at each site using telemetry				1 Jul 07	30 Jun 10
*Repair any leakage identified from monitoring				1 Jul 07	30 Jun 10
*Data entered automatically into centralised database.				1 Jul 07	30 Jun 10

<b>Water Management Action</b>	<u>Mgt Review Area</u>	<b>Sites</b>	<b>Responsibility</b>	<b>Start Date</b>	<b>Completion</b>
<b>Undertake program of monitoring of sites not included in the Water Savings Action Plan, enabled by purchase of four mobile data loggers.</b>	Water metering and monitoring	Other sites not included in Water Savings Action Plan	Peter Hickman/ Peter Byrne		
<i>Steps to delivering action</i> *Purchase four mobile data loggers *Monitor usage over a two week period at each site using data download. *Repair any leakage identified from monitoring *Input data into centralised database.				1 Apr 06 1 Jul 07 1 Jul 07 1 Jul 07	30 Jun 07 30 Jun 10 30 Jun 10 30 Jun 10

## **4. WATER SAVINGS MEASURES**

### **Site 1- Ryde Aquatic Leisure Centre**

Based on consultation with Andrea Pape from DEUS, it was determined that the technical review undertaken by the Department of Commerce in June of 2005 would meet the requirements for a detailed technical review as described by the Water Savings Action Plan Guidelines. See Appendix A Part 1 for a copy of this audit.

Detailed on proposed water savings measures are presented on the following page.

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived and for the breakdown for specific items please see Appendix A.

**Site: Ryde Aquatic Leisure Centre - Gladesville**

**Business Unit: Ryde Aquatic Leisure Centre**

Baseline Information		
Total Usage in 03/04	Quantity of BAI	KPI
56,733 KL	1,088,987 patrons per annum	52.1 L/patron/day

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Previous Action Over Last Five Years</b>									
Installed Waterless Urinals	Paul Hartmann	-	4,586		9323.4		-	19 Nov 04	19 Nov 04
Installed Antibio Treatment System	Paul Hartmann	-	6,266		12738.8		-	24 Sep 04	24 Sep 04
Installed Flow Reducers on Showerheads and Taps	Paul Hartmann	-	3,727		7576.9		-	26 Aug 05	26 Aug 05
<b>Total Previous Action Over Last Five Years</b>			<b>14,580</b>		<b>\$29129</b>				
<b>Potential Cost-Effective Opportunities</b>									
Install Rainwater Tanks	Paul Hartmann	137,650	5,000		9,990		-12.81%	01 Jun 06	07 Jun 07
Convert Ozone Water Treatment System to UV	Paul Hartmann	289,455	16,970		33,906		-5.93%	01 Jun 06	30 Jun 07
Install Backwash Reuse System	Paul Hartmann	202,957	5,587		11,163		-16.32%	01 Jun 06	30 Jun 07
Install additional Meters to Track Water Usage	Paul Hartmann	94,000	0		0			01 Jun 06	30 Jun 07
<b>Total Potential Cost-Effective Opportunities % change resulting from all measures</b>		<b>724,062</b>	<b>27,557</b>		<b>55,059</b>				
<b>Summary of Business Unit: Ryde Aquatic Leisure Centre</b>									
<b>Total Water Savings</b>		<b>724,062</b>	<b>27,557</b>		<b>55,059</b>			<i>Does not include Savings achieved from previous actions</i>	
<b>Summary of Site: Ryde Aquatic Leisure Centre - Gladesville</b>									
<b>Total Water Savings</b>		<b>724,062</b>	<b>27,557</b>		<b>55,059</b>			<i>Does not include Savings achieved from previous actions</i>	

Adjusted Baseline Information following actions already implemented		
Total Usage in 03/04	Quantity of BAI	KPI
42,153 KL	1,088,987 patrons per annum	38.7 L/patron/day

## **Site 2- ELS Hall Park**

### ***Description of site***

ELS Hall Park is located between 109 and 111 Kent Rd in North Ryde. It is a large park of over 107, 240 sq m, including three spray irrigated fields, two amenity block incorporating canteens and various taps. The irrigated area of the park is approximately 39,500 sq m. An aerial photograph of the site including the location of water meters and major items is shown in Appendix B. The site is also used by numerous sporting groups and casual users with total numbers per week estimated to be around 1720 persons.

### ***Audit Methodology and details of assessor and other personnel involved***

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the park's Work Coordinator, Graeme Hance, and Sports Facilities Maintenance Coordinator, Richie Griffiths. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and also Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*The three fields in ELS Hall Park all require intensive watering, particularly for baseball which requires a good quality playing surface. Also, this site has a grass cricket pitch which is quite water intensive to maintain. The amenity blocks are both well utilised by sporting groups and casual users of the park.

\*Irrigation for Fields 1, 2 and 3 with a total irrigated area of 39,500 sqm is drawn from meters EDOH1350 and Meter EDOD0212 (removed on the 2<sup>nd</sup> of March). These meters also supply water to the two amenity blocks and various outdoor taps and bubblers within the park.

\*Meter BRPM0277 supplies water to one outdoor tap only.

\*The watering system runs on an automatic basis between 1AM-4AM, 6AM-9AM and 6AM-9PM on Monday in order to water each field for two hours once a week. Sometimes the turf wicket on Field One with an area of approximately 540 sqm is watered for more than one Monday session. Also when new turf has been laid, special exemptions are usually granted to allow watering for an eight week period starting in December. Following periods of extensive rain the automatic irrigation system is occasionally turned off manually to avoid overwatering.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 16<sup>th</sup> of January to the 21<sup>st</sup> of February was approximately 64.67 KL per week. Fortunately this leak was detected, otherwise it would have resulted in wastage of over 3362.3 KL per year.

\*The park is used by members of the general public during normal daylight hours, however there are numerous schools and other organisations which hire the fields during daytime hours between Tuesday and Sundays and during nighttime hours up to 9-10PM on Mondays to Thursdays.

### **Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON (04/05 FINANCIAL YEAR)				
BAI = 107240 m2				
Benchmark= 0.3 KL/sqm/annum				
CALCULATION	Q1	Q2	Q3	Q4
Water Usage KL	1829	1499	1841	4082
Rate per sq m per quarter	0.017055	0.013978	0.017167	0.038064
Rate converted to KL per sq m per annum	0.06822	0.055912	0.068668	0.152256

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks.

### **Site Water Use Profile based on monitoring**

\*The following meters were logged from the 16<sup>th</sup> of January to the 21<sup>st</sup> of February, EDOH1350, EDOD0217, BRPM0277. Data in tabular format is included in Appendix B. From this data average readings are presented below.

	EDOH1350	EDOD0217	BRPM0277
Average KL per weekday	13.47	13.29	0.003
Average KL per weekend	13.54	9.39	0.006
Average KL per irrigation session	58.26	50.97	NA
Average KL per week	149.1	142.4	0.014
Average KL per month	587.5	569.7	0.055
Average Leakage L/hour	384.9	679.2	0

\*Current water consumption is approximately 96.5 KL per week from the 6<sup>th</sup> of March to the 12<sup>th</sup> of March following repair of a leak on the 2<sup>nd</sup> of March, prior to which the water consumption was approximately 272.9 KL from the 17<sup>th</sup> of January to the 21<sup>st</sup> of February. This means that in the earlier period of monitoring leakage was approximately 176.4 KL.

\*The following meters were logged from the 6<sup>th</sup> of March to the 14<sup>th</sup> of March, EDOH1350 and BRPM0277. Meter EDOD0217 was removed on the 2<sup>nd</sup> of March and therefore was not monitored. Data in tabular format is included in Appendix B. From this data average readings are presented below.

	EDOH1350	EDOD0217	BRPM0277
Average KL per weekday	1.98	Not relevant as meter removed on the 2 <sup>nd</sup> of March and no longer used.	0
Average KL per weekend	2.201		0.005
Average KL per irrigation session	80.290		NA
Average KL per week	94.29		0.001
Average KL per month	377.19		0.004
Average Leakage L/hour	0		0



### Water Balance for the Site

A breakdown of water usage at the site is presented in the following spreadsheet.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>ELS Hall Park- Account 3375604</b>							
<b>SOCCER AMENITY BLOCK- FORMER ACCOUNT 3375 605 (A SUBMETERED ACCOUNT OF 3375604)</b>							
Amenity Block Soccer- Home (and visitor) Toilet Dual Flush	2	7.33	L	0.10	5.34	7.33	L
Amenity Block Soccer- Home (and visitor) Bathroom Showers	8	20	L/min	2.24	116.48	7.00	L/min
Amenity Block Soccer- Mens bathroom urinal pull chain	1	11	L	5.17	268.84	0.00	L
Amenity Block Soccer- Mens bathroom toilet dual flush	2	7.33	L	1.72	89.61	7.33	L
Amenity Block Soccer- Disabled bathroom handbasin	1	17	L/min	0.13	6.76	6.00	L/min
Amenity Block Soccer- Disabled bathroom toilet dual flush	1	7.33	L	0.33	17.16	7.33	L
Amenity Block Soccer- Female bathroom toilet dual flush	2	7.33	L	3.30	171.60	7.33	L
Amenity Block Soccer- Female bathroom handbasin	2	18	L/min	1.22	63.18	6.00	L/min
Amenity Block Soccer- Canteen tap	1	25	L/min	0.20	10.40	6.00	L/min
Amenity Block Soccer- Handbasin tap	1	16	L/min	0.06	3.33	6.00	L/min
Amenity Block Soccer- ZIP Miniboil	1	0.2	L	0.00	0.21	0.20	L
Leakage							
<b>TOTAL AMENITY BLOCK SOCCER- FORMER SUBMETER BRUL1436</b>				<b>14.48</b>	<b>752.91</b>		
<b>UPPER AMENITY BLOCK- FORMER ACCOUNT 3375 606 (A SUBMETERED ACCOUNT OF 3375604)</b>							
Amenity Block Upper- Gents bathroom handbasin	1	8	L/min	0.54	28.08	6.00	L/min
Amenity Block Upper- Gents bathroom urinal pull chain	1	11	L	3.30	171.60	0.00	L
Amenity Block Upper- Gents bathroom toilets single flush	2	11	L	1.65	85.80	7.33	L
Amenity Block Upper- Away showers	2	20	L/min	1.40	72.80	7.00	L/min
Amenity Block Upper- Ladies bathroom handbasin	1	8	L/min	0.42	21.84	6.00	L/min
Amenity Block Upper- Ladies bathroom toilets single flush	2	11	L	3.85	200.20	7.33	L
Amenity Block Upper- Hotwater room handbasin	1	8	L/min	0.01	0.42	6.00	L/min
Amenity Block Upper- Disabled toilet single flush	1	11	L	0.06	2.86	7.33	L
Amenity Block Upper-Disabled toilet handbasin	1	18	L/min	0.01	0.70	6.00	L/min
Amenity Block Upper- Canteen Tap	1	6	L/min	0.06	3.12	6.00	L/min
Amenity Block Upper- External Tap	1	8	L/min	0.36	18.72	6.00	L/min
<b>TOTAL AMENITY BLOCK UPPER- FORMER SUBMETER BDNK0756</b>				<b>11.66</b>	<b>606.14</b>		
<b>OTHER USES</b>							
Tap- Near Playground	1	9	L/min	0.18	9.36	6.00	L/min
Bubbler Near Playground	1	3	L/min	0.04	2.18	3.00	L/min
Tap- Between baseball field and northern oval	1	25	L/min	0.20	10.40	6.00	L/min
Irrigation			L	92.48	4808.74		L
Leakage (Based on Measured Leakage, since rectified)			L	58.81	3058.26		L
<b>TOTAL FOR ACCOUNT 3375604</b>				<b>177.85</b>	<b>9247.99</b>		
<b>TAP ON METER BRPM0207</b>							
Tap- Near park entrance no 109 Kent- METER BRPM0207	1	15	L/min	0.02	1.17	6.00	L/min
<b>Total</b>				<b>177.9</b>	<b>9249.2</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived and for the breakdown for specific items please see Appendix B.

**Site: ELS Hall Park - North Ryde**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
9,251	107,240	0.09 kL/m2/annum

**Business Unit: ELS Hall Park**

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Previous Action Over Last Five Years</b>									
Repaired a leak due to leaking pipes which began in the last quarter of 04/05 and which resulted in the loss of 2241 KL during 04/05 and which if not repaired would have resulted in continued leakage rates of 8453 KL to 8964 KL per annum.	Richie Griffiths		2241						
<b>Total Previous Action Over Last Five Years</b>			<b>2241</b>						
<b>Cost-Effective Opportunities</b>									
Install 5 Dual Flush Toilets	Karl Cotter	875	96		116		5.4%	1 July 06	1 July 07
Install 19 Flow Reducers on Taps>Showers	Karl Cotter	743	192.6		231.1		28.6%	1 July 06	1 July 07
Convert 2 Urinals to Waterless Operation	Karl Cotter	1000	440		528.5		30.5%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>2,618</b>	<b>728.6</b>		<b>875.6</b>				
<b>% change resulting from all measures</b>			<b>7.8%</b>						
<b>Potential Cost-Effective Opportunities</b>									
Install 2 Vandal Proof Taps	Karl Cotter	85	5		6.5		-4.7%	1 July 06	1 July 07
Install 2 Push Bib Cock Taps	Karl Cotter	394	11		13.2		-16.1%	1 July 06	1 July 07
Undertake Irrigation Audit	Karl Cotter	7500						1 July 06	1 July 07
<b>Total Potential Cost-Effective Opportunities</b>		<b>7979</b>	<b>16</b>		<b>19.7</b>				
<b>Summary of Business Unit:</b>									
<b>Total Water Savings</b>		<b>10,597</b>	<b>744.6</b>		<b>895.3</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site:</b>									
<b>Total Water Savings</b>		<b>10,597</b>	<b>744.6</b>		<b>895.3</b>				<i>Does not include Savings achieved from previous actions</i>

## **Site 3- Meadowbank Park**

### ***Description of site***

Meadowbank Park is located between Adelaide St and Constitution Rd in Meadowbank. It is a large park of over 237,527 sq m, including thirteen spray irrigated fields, four amenity blocks, a canteen, tennis courts and clubrooms a netball clubroom and various taps. The total irrigated area of the park is approximately 88,250 sqm. An aerial photograph of the site including the location of the water meters and major items is shown in Appendix C. The site is also used by numerous sporting groups and casual users with total numbers per week estimated to be around 1100 persons.

### ***Audit Methodology and details of assessor and other personnel involved***

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the Parks' Western Precinct Team Leader, Simon Freeman, and Sports Facilities Maintenance Coordinator, Richie Griffiths. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*The thirteen fields in Meadowbank Park are not irrigated on a regular basis. An assessment is made by parks staff whether irrigation is required given the condition of the grass.

\*The watering system can be scheduled to run on an automatic basis however the fields are generally only watered according to need between 6AM-9AM on Monday.

\*Irrigation for Field 20 with a total irrigated area of approximately 5050 sqm is drawn from Meter CDOG2481. This meter also supplies water for the Hockey Clubroom and western amenity block.

\*Irrigation for Fields 17, 13, 19 and 11 with a total irrigated area of approximately 24900 sqm is drawn from Meter EDTC0048. This meter also supplies water for the netball clubroom and amenities block.

\*Irrigation for Field 12 with a total irrigated area of approximately 7300 sqm is drawn from Meter EDJF0104.

\*Irrigation for Fields 1, 2, 9, 8, 6, 3 and 4 with a total irrigated area of approximately 49,000 sqm has historically been drawn from Meter EDVD0033. In the past potable water has been supplemented by groundwater sourced from a bore and stored in two 10KL irrigation tanks located near the Amenity Block on the eastern side of the canal before irrigation. In recent times however this potable water supply has been disconnected so that only groundwater is now used to irrigate these fields. This meter also supplies water to the eastern amenities block and various taps and bubblers.

\*Meter BRTC1109 supplies water to an outdoor tap and bubbler.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was approximately 21.98L per hour or 3.69 KL per week. This was checked again from the 5<sup>th</sup> to the 6<sup>th</sup> of March and had reduced to approximately 9.09L per hour or 1.53 KL per week. Further work is still needed to investigate these leaks for meter EDTC0048 which includes the Netball Clubroom and Adelaide St Amenity Block.

\*The park is used by members of the general public during normal daylight hours, however there are numerous schools and other organisations which hire the fields during daytime

hours between Tuesday and Sundays and during nighttime hours up to 9:30-10PM on Tuesday to Thursdays.

### **Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON (04/05 FINANCIAL YEAR)				
BAI = 237,527 m2				
Benchmark= 0.3 KL/sqm/annum				
CALCULATION	Q1	Q2	Q3	Q4
Water Usage KL- Account 3365570	966	1031	458	561
Water Usage KL- Account 3358555	0	0	0	0
Rate per sq m per quarter	0.004067	0.004341	0.001928	0.002362
Rate converted to KL per sq m per annum	0.016267	0.017362	0.007128	0.009473

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks.

### **Site Water Use Profile based on monitoring**

\*The following meters were logged from the 23<sup>rd</sup> of January to the 15<sup>th</sup> of February, EDTC0048, DDQB074, EDVD0033, EDJF0104, BRTC1109, CDOG249. Data in tabular format is included in Appendix C. From this data average readings are presented below.

	METER EDTC0048	METER DDQB0747	METER EDVD0033	METER EDJF0104	METER BRTC1109	METER CDOG249
Average L per weekday	376	1217	453	5	188	0
Average L per weekend day	355	473	605	6.5	69	0
Average KL per irrigation session	19.23	NA	6.206	Not measured	Not measured	Not measured
Average KL per month	28.242	60.837	16.817	0.123	4.776	0
Average KL per week	7.061	15.209	4.204	0.031	1.194	0
Average Leakage L/hour 5/2/6	9.2	11.3	0.2	1.2	0.02	0
Average Leakage L/hour 5/3/6	5.9	1.9	0	Not measured	Not measured	Not measured

\*Current water consumption is approximately 110.795 KL per month from 23<sup>rd</sup> of January to the 20<sup>th</sup> of February.

\*See Appendix C for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>Park near James St and Hockey Clubrooms- Meter CDOG2491</b>							
Basin taps (cold) Ladies	1	20	L/min	0.00	0.15	6	L/min
Toilets Single Flush Ladies	2	11	L	0.00	0.08	6	L
Ladies Changeroom- Basin taps (hot and cold)	2	11	L	0.04	2.18	6	L
Ladies Changeroom- Showers	3	18	L/min	0.03	1.78	7	L/min
Mens Toilet- Basin taps (hot/cold) Mens	2	20	L/min	0.03	1.56	6	L/min
Mens Toilet- Urinals	2	11	L	0.08	4.00	0	L
Mens Toilet-Toilets Single Flush	1	11	L	0.01	0.57	6	L
Mens Toilet-Toilets Dual Flush	1	7.333	L	0.01	0.38	7.333	L
Disabled Toilets- Basin taps (hot/cold)	1	20	L/min	0.00	0.02	6	L/min
Disabled Toilets-Toilets Single Flush	1	11	L	0.00	0.08	6	L
Canteen- Kitchen Taps	1	20	L/min	0.00	0.07	6	L/min
Hockey Clubroom Toilet- Single Flush Toilet	1	11	L	0.00	0.04	6	L
Hockey Clubroom Toilet- Tap	1	20	L/min	0.00	0.01	6	L/min
Outdoor Tap	1	20	L/min	0.02	1.04	6	L/min
Bubbler	1	4	L/min	0.03	1.46	4	L/min
Irrigation for field 20				19.23	230.76		
<b>TOTAL FOR METER</b>				<b>19.49</b>	<b>244.20</b>		
<b>Netball Clubroom and Adelaide St Amenity Block and Irrigation Middle Section Park- Meter EDTC0048</b>							
Ladies- Basin taps (hot/cold)	2	18	L/min	0.15	7.80	6	L/min
Ladies- Toilets Single Flush	8	11	L	0.54	28.03	6	L
Middle Changeroom- Toilets Single Flush	1	11	L	0.01	0.57	6	L
Middle Changeroom- Basin taps (hot/cold)	2	18	L/min	0.02	1.11	6	L/min
Middle Changeroom- Showers	1	20	L/min	0.24	12.48	7	L/min
E end changeroom- Basin taps (hot/cold)	1	18	L/min	0.03	1.59	6	L/min
E end changeroom- Showers	2	20	L/min	0.12	6.24	7	L/min
E end changeroom- Urinals	1	9	L	0.09	4.68	0	L
E end changeroom-Toilets Single Flush	1	11	L	0.06	2.86	6	L
NE end changeroom- Basin taps (hot/cold)	1	18	L/min	0.09	4.77	6	L/min
NE end changeroom- Toilets Single Flush	1	11	L	0.13	6.86	6	L
NE end changeroom- Urinals	1	11	L	0.28	14.30	0	L
NE end changeroom- Showers	2	20	L/min	0.12	6.24	7	L/min
Kitchen Taps	2	20	L/min	0.04	2.08	6	L/min
Bubbler	1	5	L/min	0.07	3.64	5	L/min
Outdoor Tap	2	20	L/min	0.14	7.28	6	L/min
Netball Clubroom- Dual Flush Toilets	2	7.333	L	0.10	5.34	7.333	L
Netball Clubroom- Hot/Cold Taps	4	18	L/min	0.05	2.36	6	L/min
Netball Clubroom- Showers	1	18	L/min	0.00	0.00	7	L/min
<b>TOTAL FOR AMENITIES</b>				<b>2.27</b>	<b>118.24</b>		
Leakage				1.55	80.94		
Irrigation for fields 11, 13, 19, 17				32.29	1678.97		
<b>TOTAL FOR METER</b>				<b>38.39</b>	<b>1759.91</b>		

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>Ray Brennan Tennis School &amp; Amenities Block- Meter DDQB0747</b>							
<b>Public Amenity Block</b>							
Mens Amenity Block- Urinals	1	12	L	0.01	0.05	0	L
Mens Amenity Block- Toilets Single Flush	1	11	L	0.01	0.04	6	L
Mens Amenity Block- Basin taps (cold)	1	18	L/min	0.00	0.01	6	L/min
Ladies Amenity Block- Toilets Dual Flush	1	7.333	L	0.01	0.03	7.333	L
Ladies Amenity Block- Basin taps (cold)	1	18	L/min	0.00	0.01	6	L/min
<b>Ray Brennan Tennis School</b>							
Ladies Amenities- Taps Cold	2	22	L/min	0.16	8.51	6	L/min
Ladies Amenities- Toilets Single Flush	1	11	L	0.21	11.12	6	L
Ladies Amenities- Toilets Dual Flush	2	7.333	L	0.29	14.83	7.333	L
Ladies Amenities- Showers	1	15	L/min	0.18	9.36	7	L/min
Mens Amenities- Taps Cold	2	22	L/min	0.36	18.72	6	L/min
Mens Amenities- Toilets Single Flush	1	11	L	0.24	12.23	6	L
Mens Amenities- Toilets Dual Flush	1	7.333	L	0.16	8.16	7.333	L
Mens Amenities- Showers	1	15	L/min	0.18	9.36	7	L/min
Mens Amenities- Urinals	2	11	L	0.63	32.63	0	L
Canteen (hot/cold tap)	1	22	L/min	0.04	2.29	6	L/min
Clubroom Mixer Tap	1	8	L/min	0.06	2.91	6	L/min
Cabana cold tap	1	18	L/min	0.05	2.81	6	L/min
Outside Tap	1	18	L/min	0.34	17.55	6	L/min
Outside Bubbler	1	4	L/min	0.13	6.50	4	L/min
<b>TOTAL FOR AMENITIES ETC</b>				<b>3.06</b>			
Taps Left Running	333.2	20	mins	6.66	346.53		
Leakage				1.89	98.80		
<b>TOTAL FOR METER</b>				<b>11.61</b>	<b>602.45</b>		
<b>Field 12 to E of Netball Courts- Meter EDJF0104</b>							
Leakage	1			0.20	10.51		
Irrigation for Field 12				1.93	100.49		
<b>TOTAL FOR METER</b>				<b>2.13</b>	<b>111.00</b>		
<b>Main Amenities Block and Irrigation for Fields to E of Canal- Meter EDVD0033</b>							
Ladies Handbasin taps (cold)	3	18	L/min	0.24	12.29	6	L/min
Ladies Dual Flush Toilets	6	7.333	L	0.64	33.37	7.333	L
Mens Handbasin (cold)	1	18	L/min	0.22	11.41	6	L/min
Mens Urinals pullchain	1	9	L	0.65	33.80	0	L
Mens Dual Flush Toilets	2	7.333	L	0.26	13.77	7.333	L
Changeroom handbasin taps (cold)	7	18	L/min	0.02	0.98	6	L/min
Changeroom handbasin taps (hot/cold)	1	18	L/min	0.01	0.28	6	L/min
Changeroom Single Flush Toilet	1	11	L	0.08	4.00	6	L
Changeroom Showers	7	20	L/min	0.24	12.48	7	L/min
Canteen Taps (hot/cold)	2	20	L/min	0.06	3.12	6	L/min
Staffroom Taps Cold	1	20	L/min	0.02	0.94	6	L/min
Outdoor Taps	3	20	L/min	0.24	12.48	6	L/min
Bubblers	2	4	L/min	0.06	3.12	4	L/min
<b>TOTAL FOR GENERAL USAGE</b>				<b>2.73</b>	<b>142.03</b>		
Total Leakage				0.04	2.10		
Total Irrigation for Fields 1, 2, 9, 8, 3, 6 and 4 (No longer connected)				6.36	330.90		
<b>TOTAL FOR METER</b>				<b>9.14</b>	<b>475.03</b>		
<b>Total</b>				<b>80.76</b>	<b>3192.59</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix C.

**Site: Meadowbank Park -  
Meadowbank**

**Business Unit: Meadowbank  
Park**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
3,018	237,527	0.01 kL/m2/annum

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Potential Cost-Effective Opportunities</b>									
Install 9 dual flush cisterns	Karl Cotter	1,303	13		16		-27%	1 July 06	1 July 07
Harvest Stormwater from Canal running through Park, including diversion chamber, CDS unit, pumps, pipes, two 105KL storage tanks, UV treatment before reuse for irrigation	Karl Cotter	532,600	2,341		2809		-34%	Dependent on external funding	Dependent on external funding
Undertake Irrigation Audits	Karl Cotter	10,000					-	1 July 07	1 July 07
Install 8 push bib cock taps	Karl Cotter	1,576	33		40		-19%	1 July 06	1 July 07
Convert 5 urinals to waterless operation	Karl Cotter	2,500	56		67		-19%	1 July 06	1 July 07
Install 54 Flow Restrictors/ Aerators on taps/showers etc	Karl Cotter	2,383	86		103		-13%	1 July 06	1 July 07
<b>Total Potential Cost-Effective Opportunities</b>		<b>550,362</b>	<b>2,529</b>		<b>3,035</b>				
<b>Summary of Business Unit: Meadowbank Park</b>									
<b>Total Water Savings</b>		<b>550,362</b>	<b>2,529</b>		<b>3,035</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site: Meadowbank Park – Meadowbank</b>									
<b>Total Water Savings</b>		<b>550,362</b>	<b>2,529</b>		<b>3,035</b>				<i>Does not include Savings achieved from previous actions</i>

## Site 4- Christie Park

### **Description of site**

Christie Park is located at the northern end of Christie Rd in Macquarie Park. It is a park of over 44,558 sq m, including two spray irrigated fields and an amenity blocks incorporating a canteen, soccer clubroom and various taps. The total irrigated area of the park is approximately 17,000 sq m. An aerial photograph of the site including the location of water meters and major items is shown in Appendix D. The site is also used by the Gladesville-Hornsby football association and casual users with total numbers estimated to be around 1275 persons per week.

### **Audit Methodology and details of assessor and other personnel involved**

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the Parks' Northern Precinct Team Leader, Miles Freeman, and Sports Facilities Maintenance Coordinator, Richie Griffiths. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### **Description of major items/processes**

\*The two fields in Christie Park are scheduled to be irrigated on an automatic basis between 6AM-9AM on Monday however the irrigation system is manually turned off by Parks staff when they determine that irrigation is not required due to recent rain etc. Also, when new turf is laid, as occurred during the monitoring period, a special exemption exists which allows watering on other days apart from Mondays.

\*Irrigation to both fields with a total area of 17000 sqm is drawn by Meter EDOG0122 after being stored in a 10KL irrigation tank. This meter also supplies water to the soccer clubroom/amenity block and various outdoor taps throughout the park.

\*Drainage from the fields is collected by subsurface drainage pipelines.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was 0L per hour.

\*The park is used by members of the general public during normal daylight hours and is leased by the Gladesville-Hornsby Football Association throughout the year. The field is used for training during nighttime hours up to 8:00PM on Mondays to Thursdays and for weekend matches during the soccer season.

### **Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON		(04/05 FINANCIAL YEAR)			
BAI = 44,558 m <sup>2</sup>					
Benchmark= 0.3 KL/sqm/annum					
CALCULATION	Q1	Q2	Q3	Q4	
Water Usage KL- Account 4676510	966	1031	458	561	
Rate per sq m per quarter	0.02168	0.023138	0.010279	0.01259	
Rate converted to KL per sq m per annum	0.086718	0.092554	0.041115	0.050361	

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks.



### Site Water Use Profile based on monitoring

\*Meter EDOG0122 was logged from the 16<sup>th</sup> of January to the 17<sup>th</sup> of February, Data in tabular format is included in Appendix D. From this data average readings are presented below.

	Meter EDOG0122
Average L per weekday	1915
Average L per weekend day	3793
Average KL per irrigation session	47.488
Average KL per month	480.5 (due to new turf)
Average KL per week	120.1
Average Leakage L/hour 5/2/6	0

\*Monitored water consumption is approximately 480.5 KL per month from 18<sup>th</sup> of January to the 15<sup>th</sup> of February. The period of monitoring corresponded to higher than normal levels of irrigation due to an exemption being granted by Sydney Water to allow the watering of new turf. This is equivalent to an additional five watering sessions per month.

\*See Appendix D for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>CHRISTIE PARK- METER EDOG0122</b>							
Disabled Amenities- Single Flush Toilet	1	11	L	0.15	8.01	4	L
Away Change Room- Single Flush Toilet	1	11	L	0.17	8.58	4	L
Referees Amenities- Single Flush Toilet	1	11	L	0.07	3.43	4	L
Home Change Room- Single Flush Toilet	1	11	L	0.33	17.16	4	L
Mens Amenities- Single Flush Toilet	1	11	L	0.81	41.89	4	L
Ladies Amenities- Single Flush Toilet	2	11	L	1.45	75.50	4	L
Mens Amenities Urinals- Pull Chain	2	11	L	1.55	80.56	0	L
Away Change Room- Showers	4	18	L/min	0.76	39.31	7	L/min
Referees Room- Showers	1	18	L/min	0.25	13.10	7	L/min
Home Change Room- Showers	4	18	L/min	1.26	65.52	7	L/min
Away Change Room- Taps (hot and cold)	1	18	L/min	0.04	2.11	6	L/min
Referees Change Room- - Taps (hot and cold)	1	18	L/min	0.02	0.84	6	L/min
Home Change Room- Taps (hot and cold)	1	18	L/min	0.08	4.21	6	L/min
Mens Toilets- Taps (hot and cold)	2	18	L/min	0.57	29.66	6	L/min
Ladies Toilets- Taps (hot and cold)	2	18	L/min	0.36	18.53	6	L/min
Disabled Toilets- Taps	1	18	L/min	0.04	1.97	6	L/min
Soccer Administration Kitchen Tap	1	20	L/min	0.20	10.40	6	L/min
Soccer Administration Hotwater ZIP	1	0.2	L	0.00	0.15	0.2	L
Canteen Tap	2	18	L/min	0.11	5.62	6	L/min
Outside Standpipes	3	18	L/min	0.54	28.08	6	L/min
<b>TOTAL GENERAL USAGE</b>				<b>8.74</b>	<b>454.63</b>		
<b>IRRIGATION</b>				<b>39.85</b>	<b>2072.37</b>		
<b>LEAKAGE</b>				<b>0.00</b>	<b>0.00</b>		
<b>TOTAL FOR METER EDOG0122</b>				<b>48.60</b>	<b>2527.00</b>		
<b>Total</b>				<b>48.60</b>	<b>2527.00</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix D.

**Christie Park - Macquarie Park**

**Business Unit: Christie Park**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
2,527	44,558	0.06 kL/m2/annum

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Cost-Effective Opportunities</b>									
Install 20 Flow Restrictors	Karl Cotter	782	121		146		13%	1 July 06	1 July 07
Convert 1 urinal to waterless operation	Karl Cotter	500	81		97		14%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>1282</b>	<b>202</b>		<b>243</b>				
<b>% change resulting from all measures</b>			<b>8.9%</b>						
<b>Potential Cost-Effective Opportunities</b>									
Install 3 Push Bib Cock Taps	Karl Cotter	591	19		22		-15%	1 July 06	1 July 07
Install 7 Dual Flush Cisterns	Karl Cotter	1225	98		118		-1%	1 July 06	1 July 07
Conduct Irrigation Audit	Richie Griiffiths	5000							
Construct 2 ML Dam to harvest subsurface drainage and reuse for irrigation	Karl Cotter	119600	2072		2487		-22%	1 July 07	1 July 08
<b>Total Potential Cost-Effective Opportunities</b>		<b>126416</b>	<b>2189</b>		<b>2627</b>				
<b>Summary of Business Unit: Christie Park</b>									
<b>Total Water Savings</b>		<b>127698</b>	<b>2391</b>		<b>2870</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site: Christie Park</b>									<i>Does not include Savings achieved from previous actions</i>

## Site 5- Monash Park

### ***Description of site***

Monash Park is located at 142 Monash Rd in Gladesville. It is a park of over 17,553 sq m, including one spray irrigated fields with subsurface drainage and a grandstand with toilets, separate amenity block and various taps. The total irrigated area of the park is approximately 7,000 sq m. An aerial photograph of the site including the location of water meters and major items is shown in Appendix E. The site is also used by numerous sporting groups and casual users with total numbers estimated to be around 375 persons per week.

### ***Audit Methodology and details of assessor and other personnel involved***

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the Parks' Central Precinct Team Leader, Daniel Tassone, and Sports Facilities Maintenance Coordinator, Richie Griffiths. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*The oval at Monash Park is scheduled to be irrigated on an automatic basis between 6AM-9AM on Monday however the irrigation system is manually turned off by Parks staff when they determine that irrigation is not required due to recent rain etc.

\*Irrigation for the oval with a total area of 7,000 sq m is drawn from Meter EDOG0309 after being stored in a 10KL irrigation tank. This meter also supplies water to the amenity block and grandstand amenities as well as various outdoor taps.

\*Drainage from the fields is collected by subsurface drainage pipelines.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was 0L per hour.

\*The park is used by members of the general public during normal daylight hours and the field is hired by school groups during daytime hours from Tuesday to Friday and by sporting clubs on Saturdays and Sundays.

### ***Benchmarking of historical water usage against (KPIs)***

BENCHMARK COMPARISON (04/05 FINANCIAL YEAR)				
BAI = 17,553 m <sup>2</sup>				
Benchmark= 0.3 KL/sqm/annum				
CALCULATION	Q1	Q2	Q3	Q4
Water Usage KL- Account 3386313	45	673	1237	469
Rate per sq m per quarter	0.002564	0.038341	0.070472	0.026719
Rate converted to KL per sq m per annum	0.010255	0.153364	0.281889	0.106876

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks apart from in Q3 when the Park was being watered more than normal due to the establishment of a new subsurface drainage system for the park.

**Site Water Use Profile based on monitoring**

\*Meter EDOG0309 was logged from the 18<sup>th</sup> of January to the 20<sup>th</sup> of February, Data in tabular format is included in Appendix F. From this data average readings are presented below.

	Meter EDOG0309
Average L per weekday	325
Average L per weekend day	365
Average KL per irrigation session	33.708
Average KL per month	74.567
Average KL per week	18.641
Average Leakage L/hour 5/2/6	0.103

\*Current water consumption is approximately 74.567 KL per month from 23<sup>rd</sup> of January to the 20<sup>th</sup> of February.

\*See Appendix F for the actual data upon which this is based.

**Water Balance for the Site**

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>Amenities Block and Field Account EDOG0309</b>							
Basin taps (cold) Ladies Amenities	1	20	L/min	0.11	5.80	6	L
Toilets Single Flush Ladies Amenities	2	11	L	0.57	29.55	4	L
Basin taps (cold) Mens	1	20	L/min	0.11	5.49	6	L
Urinals Mens	2	11	L	0.40	20.97	0	L
Toilets Single Flush Mens	1	11	L	0.10	5.24	4	L
Toilets Dual Flush Mens	1	7.333	L	0.07	3.50	7.333	L
Basin taps (cold) Grandstand Amenities	1	20	L/min	0.02	0.87	6	L/min
Showers (hot/cold) Grandstand Amenities	1	20	L/min	0.14	7.28	7	L/min
Basin taps (cold) Grandstand Amenities Storeroom	1	20	L/min	0.00	0.00	20	L/min
Showers (hot/cold) Grandstand Amenities Storeroom	1	20	L/min	0.00	0.00	20	L/min
Outdoor Taps	1	20	L/min	0.10	5.45	6	L/min
Bubbler	1	5	L/min	0.07	3.64	5	L/min
<b>Total Amenities/General Usage</b>				<b>1.69</b>	<b>87.81</b>		
Leakage				0.02	0.91		
Irrigation				15.56	809.00		
				<b>17.26</b>	<b>897.71</b>		



## **Site 6- Civic Centre**

### ***Description of site***

The Civic Centre and Civic Hall are located at 1 Devlin St, Top Ryde. The Civic Centre is a seven storey civic and administration building containing various amenities to cater for 149 employees and numerous visitors to Council meetings and workshops etc. The Civic Hall is a one storey cultural building hired on a casual basis by community groups for small events such as musical recitals and other community activities. The Civic Centre has a total floorspace of approximately 3675 sqm and the Civic Hall has a total floorspace of approximately 650 sqm.

### ***Audit Methodology and details of assessor and other personnel involved***

The Civic Centre and Civic Hall were audited by Jenai Davies from City of Ryde's Environmental Unit and additional information was also sought from Stephen Drury of Council's Property Services Division. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Jenai Davies and maintenance staff were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*Usage for the Civic Centre and Civic Hall is estimated from the Meter DDQL0604 minus the submeter BRSB3563 (which corresponds to the Ryde Library which has not been included in this audit)

\*The Civic Centre has toilets for both male and female located on six levels and lunchrooms or kitchenettes located on six levels. There are also two full catering kitchens which cater for numerous functions and meetings which are held throughout the year.

\*There is a manual irrigation system around the Civic Centre and Hall which is linked to meter DDQL0604 and there is also a standpipe attached to CRUH0063 which is rarely utilised for hand watering of grass.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was 6.8L per hour. No obvious leaks were encountered during the site audit, therefore this leak will require further investigation and monitoring.

\*The Civic Centre is used by employees generally from 8AM to 5:30PM Monday to Friday. Cleaners attend to the Civic Centre between 4:30AM to 8:30AM Monday to Friday. Parking Enforcement Officers also utilise the Civic Centre on weekends between 8:30AM and 5:30PM. The Civic Centre is also used late at nights on Tuesdays for Council Meetings and workshops and on a non regular basis for other functions.

\*The Civic Hall is used on a non regular basis by various community groups and organisations with hire typically occurring after 6:00PM on Monday to Friday and from 8AM to midnight on weekends. The Civic Hall is also used by Council for various functions during business hours.

**Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON				
BAI = 149 employees				
Benchmark= 75 L/person/day				
CALCULATION	7/1/05- 4/4/05	4/4/05- 4/7/05	4/7/05- 4/10/05	4/10/05- 4/1/06
Water Usage Civic Centre KL- Account 4680216 (Meter DDQL0604 minus BRSB3563 for Account 4680 215 and Meter CRUH0063)	1,093	804	553	579
Water Usage Civic Centre Gardens KL- Account 4680216 (Meter CRUH0063)	56	0	0	0
Water Usage Ryde Library (Account 4680 215 Meter BRSB3563)	130	105	77	59
Rate per employee per period KL	7.3356	5.3960	3.7114	3.8859
Rate converted to L per employee per day	84.3169	59.2964	40.3414	42.2381

As the above analysis of previous bills shows, the previous water usage per employee exceeded Sydney Water Benchmarks for the 3<sup>rd</sup> quarter of 04/05. This may be due to this bill for 7/1/5 to 4/4/5 being a correction resulting from previous problems with the water meter DDQL0604 not registering properly from 6 October 2004 to 7 January 2005. Analysis of the bill for the 4<sup>th</sup> quarter of 04/05 shows that water usage has reduced to below the Sydney Water Benchmark. The subsequent bills in the 1<sup>st</sup> and 2<sup>nd</sup> quarters of 05/06 show a greatly reduced water usage due to conversion of urinals to waterless operation and installation of flow restrictors on the 1<sup>st</sup> of August.

**Site Water Use Profile based on monitoring**

\*Meters DDQL0604, BRSB3563 and CRUH0063 were logged from the 23<sup>rd</sup> of January to the 24<sup>th</sup> of February, Data in tabular format is included in Appendix F. From this data average readings are presented below.

	Meter DDQL0604 minus BRSB3563 and CRUH0063 (Civic Centre and Hall)	Meter BRSB3563 (Ryde Library)	Meter CRUH0063 (Civic Centre Gardens)
Average L per weekday	4369.600	617.025	0
Average L per weekend	2046.617	444.404	0
Average KL per month	112.702	15.944	0
Average KL per week	28.175	3.986	0
Average Leakage L/hour 7/2/6	6.8	0	0

\*Current water consumption for the Civic Centre and Hall is approximately 112.7 KL per month from 27<sup>th</sup> of January to the 24<sup>th</sup> of February.

\*See Appendix F for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>CIVIC CENTRE</b>							
Female Amenities Levels 1-6- Flusherette Toilets	11	10.5	L	12.18	621.18	4.83	L
Male Amenities 1-6- Flusherette Toilets	9	10.5	L	3.57	182.07	6.17	L
Female Amenities Ground Level- Dual Flush	2	7.333	L	0.38	19.45	4.83	L
Male Amenities Ground Level- Dual Flush	1	7.333	L	1.10	56.10	6.17	L
Disabled Toilet Level 6- Dual Flush	1	7.333	L	0.37	18.70	7.33	L
Female Amenities Handbasin Taps (Level 4,2,6,1)	5	18	L/min	0.84	42.77	6.00	L/min
Female Amenities Handbasin Taps (Level 4,2,G)	5	15	L/min	0.50	25.46	7.00	L/min
Female Amenities Handbasin Taps (Level 5)	1	12	L/min	0.30	15.30	7.00	L/min
Female Amenities Handbasin Tap (Level 4)	1	6	L/min	0.04	2.04		
Male Amenities Handbasin Taps (Level 4, 6)	5	18	L/min	0.35	17.90	7.00	L/min
Male Amenities Handbasin Taps (Level 2, Ground)	3	15	L/min	0.29	14.92	6.00	L/min
Male Amenities Handbasin Taps (Level 5, 1)	3	12	L/min	0.23	11.93	6.00	L/min
Disabled Amenities Handbasin	1	5	L/min	0.03	1.72	5.00	L/min
Female Amenities- Shower Level 2	1	18	L/min	0.50	25.70	6.00	L/min
Male Amenities- Shower Level 2	1	15	L/min	0.42	21.42	6.00	L/min
Lunchroom Tap Level 4	2	16	L/min	0.34	17.44	6.00	L/min
Lunchroom Tap Level 3	1	15	L/min	0.25	12.62	5.00	L/min
Lunchroom Tap Level 2	1	6	L/min	0.24	12.39	6.00	L/min
Lunchroom Tap Level 1	1	15	L/min	0.46	23.24	6.00	L/min
Lunchroom Tap Ground	1	18	L/min	0.47	23.75	6.00	L/min
Lunchroom Hotwater ZIP Level 4	2	0.2	L	0.03	1.45	0.20	L
Lunchroom Hotwater ZIP Level 3	1	0.2	L	0.05	2.52	0.20	L
Lunchroom Hotwater ZIP Level 2	1	0.2	L	0.05	2.75	0.20	L
Lunchroom Hotwater ZIP Ground	1	0.2	L	0.05	2.75	0.20	L
Lunchroom Cold Water Filtered Level 4	1	0.2	L	0.02	0.97	0.20	L
Lunchroom Cold Water Filtered Level 3	1	0.2	L	0.03	1.68	0.20	L
Lunchroom Cold Water Filtered Ground	1	0.2	L	0.04	1.84	0.20	L
Level 5 Kitchen- Taps	2	3.5	L/min	0.48	24.54	3.50	0.481
Level 5 Kitchen- Hotwater ZIP	1	1	L	0.10	5.10	1.00	0.100
Level 5 Kitchen- Washtec Dishwasher GLV5335	1	3	L	0.38	19.13	3.00	0.375
Level 6 Kitchen- Taps	2	4	L/min	0.40	20.40	4.00	0.400
Level 6 Kitchen- Washtec Dishwasher GLV5335	1	3	L	0.15	7.65	3.00	0.150
<b>CIVIC HALL</b>							
Male Amenities- Dual Flush Toilets	2	7.333	L	0.15	7.48	7.33	L
Ladies Amenities- Dual Flush Toilets	7	7.333	L	0.44	22.44	7.33	L
Mens Amenities- Taps	3	6	L/min	0.05	2.75	6.00	L/min
Ladies Amenities- Taps	4	6	L/min	0.05	2.75	6.00	L/min
Kitchen- Nozzle Taps	1	5	L/min	0.03	1.28	5.00	L/min
Kitchen- Handbasin Taps	1	5	L/min	0.05	2.55	5.00	L/min
Kitchen- Tap	1	20	L/min	0.20	10.20	6.00	L/min
Kitchen- Hot Water ZIP	1	0.2	L	0.01	0.31	0.20	L
Disabled Amenities- Single Flush Toilet	1	12	L	0.01	0.61	6.00	L
Disabled Amenities- Handbasin Tap	1	20	L/min	0.00	0.15	6.00	L/min
Changeroom- Single Flush Toilet	1	15	L	0.02	0.77	6.00	L
Changeroom- Handbasin Tap	1	20	L/min	0.00	0.15	6.00	L/min
Leakage				1.14	59.40		
<b>Total during monitoring period</b>				<b>26.80</b>	<b>1367.75</b>		
<b>Works Already Implemented before Monitoring</b>							
Civic Centre Urinals Levels 1 to 6- Urinals Pull Chain	6	12	L	7.80	397.80	0.00	L
Flow Restrictors already installed in Civic Centre and Hall	17	Various	L	6.16	314.24	Various	L
Civic Hall Male Amenities- Urinals on timer	1	27	L	2.38	123.55	0.00	L
<b>Total Measures Already Implemented</b>				<b>16.34</b>	<b>835.59</b>		
<b>TOTAL</b>				<b>43.13</b>	<b>2203.34</b>		



**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix F.

**Site: Civic Centre - Top Ryde**

**Business Unit: Civic Centre**

Baseline Information		
Total Usage 04/05	Quantity of BAI	KPI
2,224KL	149 Employees	40.9 L/employee/day

Adjusted Baseline Information following actions already implemented		
Total Usage 04/05	Quantity of BAI	KPI
1,389	149 Employees	25.5 L/employee/day

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Previous Action Over Last Five Years</b>									
Converted 7 Urinals to Waterless Operation	Stephen Drury	2500	521		905		34.3%%		1 August 05 Civic Centre. 24 January 05 Civic Hall
Installed 17 Flow Restrictors	Stephen Drury	665	314		545		81.4%		1 August 05
<b>Total Previous Action Over Last Five Years</b>		<b>3165</b>	<b>835</b>		<b>1450</b>				
<b>Cost-Effective Opportunities</b>									
Install 28 Flow Restrictors/aerators	Stephen Drury	1095	162		281		22.7%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>1095</b>	<b>162</b>		<b>281</b>				
<b>% change resulting from all measures</b>			<b>7.3%</b>						
<b>Potential Cost-Effective Opportunities</b>									
Install submetering and leakage detection	Stephen Drury	3000	59.6		103		-15.8%	1 July 06	1 July 07
Install 20 Custom Built Dual Flush Valves for toilets	Stephen Drury	8900	410		712		-3.9%	1 July 06	1 July 07
<b>Total Potential Cost-Effective Opportunities</b>		<b>11900</b>	<b>469.6</b>		<b>815</b>				
<b>Summary of Business Unit:</b>									
<b>Total Water Savings Civic Centre</b>		<b>12995</b>	<b>631.6</b>		<b>1152</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site: Civic Centre - Top Ryde</b>		<b>12995</b>	<b>631.6</b>		<b>1152</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Total Water Savings</b>									

The adjusted baseline figure corresponds to 25.5L/person/day which is below the Sydney Water Benchmark of 75L/person/day for Civic and Administration Buildings with less than 200 patrons per day.

## Site 7- Eastwood Park

### ***Description of site***

Eastwood Park is located at West Pde & Lakeside Rd in Eastwood. It is a park of over 34,293 sq m, including two spray irrigated ovals including a grass wicket, a grandstand with toilets, a separate amenity block incorporating a canteen and various taps. The total irrigated area of the park is approximately 13,900 sqm. An aerial photograph of the site including the location of the water meters and major items is shown in Appendix G. The site is also used by numerous sporting groups and casual users with total numbers estimated to be around 3000 persons per week.

### ***Audit Methodology and details of assessor and other personnel involved***

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the Parks' Western Precinct Team Leader, Adam King, and Sports Facilities Maintenance Coordinator, Richie Griffiths. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*The ovals at Eastwood Park are irrigated on an automatic basis between 6AM-9AM on Monday however the irrigation system is manually turned off by Parks staff when they determine that irrigation is not required due to recent rain etc. During the monitoring period there was also periodic irrigation of new turf due to an exemption granted for an eight week period following the laying of new turf in December.

\*Irrigation to both fields with a total area of 13,900 sq m is supplied by Meter EDJL0067. This meter also supplies water to the amenities block, grandstand amenities and various taps and bubblers.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was 0L per hour.

\*The park is used by members of the general public during normal daylight hours and the field is hired by school groups during daytime hours from Tuesday to Friday and by sporting clubs on Saturdays and Sundays. The park is also used for nighttime hire by sporting groups from Tuesday to Fridays until 9PM.

### ***Benchmarking of historical water usage against (KPIs)***

BENCHMARK COMPARISON (04/05 FINANCIAL YEAR)				
BAI = 34,293 m <sup>2</sup>				
Benchmark= 0.3 KL/sqm/annum				
CALCULATION	Q1	Q2	Q3	Q4
Water Usage KL- Account 3392837	562	681	509	231
Water Usage KL- Account 3392834	4	0	1	0
Total Water Usage KL	566	681	510	231
Rate per sq m per quarter	0.016505	0.019858	0.014872	0.006736
Rate converted to KL per sq m per annum	0.066019	0.079433	0.059487	0.026944

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks.

### **Site Water Use Profile based on monitoring**

\*Meter EDJL0067 was logged from the 10<sup>th</sup> of January to the 24<sup>th</sup> of February, Data in tabular format is included in Appendix G. From this data average readings are presented below.

	Meter EDJL0067
Average L per weekday	2274
Average L per weekend day	768
Average KL per irrigation session	20.07
Average KL per month	157.515
Average KL per week	39.378
Average Leakage L/hour 5/2/6	0

\*Current water consumption is approximately 67.08 KL per month on average when new turf is not being laid and approximately 236.1 KL per month to the 8<sup>th</sup> of February whilst new turf was being laid.

\*See Appendix G for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>AMENITY BLOCK LOWER- LADIES</b>							
Basin taps (hot/cold)	2	18	L/min	0.07	3.64	6	L/min
Toilets Single Flush	2	11	L	0.29	14.83	4	L
<b>AMENITY BLOCK LOWER- MENS</b>							
Basin taps (hot/cold)	2	18	L/min	0.10	5.20	6	L/min
Urinals	2	11	L	0.14	7.06	0	L
Toilets Single Flush	1	11	L	0.14	7.06	4	L
<b>AMENITY BLOCK LOWER- CHANGEROOMS</b>							
Basin taps (hot/cold)	4	18	L/min	0.11	5.62	6	L/min
Showers	4	18	L/min	1.01	52.42	7	L/min
Toilets Single Flush	2	11	L	0.44	22.88	4	L
<b>AMENITY BLOCK LOWER- DISABLED</b>							
Basin taps (hot/cold)	1	15	L/min	0.05	2.34	6	L/min
Toilets Single Flush	1	11	L	0.22	11.44	4	L
<b>AMENITY BLOCK LOWER- STOREROOM</b>							
Toilets Single Flush	1	11	L	0.01	0.57	4	L
<b>CRICKET STAND- MENS TOILETS</b>							
Mens Toilet Basin taps- cold	1	20	L/min	0.39	20.22	6	L/min
Mens Toilets Single Flush	3	11	L	0.48	24.72	4	L
Urinals- Pull chain	1	11	L	0.95	49.43	0	L
<b>CRICKET STAND- LADIES TOILETS</b>							
Ladies Toilets Single Flush	2	11	L	0.67	34.60	4	L
Ladies Toilets Dual Flush	1	7.333	L	0.22	11.53	7.333	L
<b>Canteen</b>							
Kitchen Handbasin	1	15	L/min	0.06	3.12	6	L/min
Kitchen Tap	1	20	L/min	0.08	4.16	6	L/min
<b>Outdoor</b>							
Bubbler	1	4	L/min	0.13	6.63	4	L/min
Outdoor Taps	5	20	L/min	0.82	42.50	6	L/min
<b>TOTAL GENERAL USAGE</b>				<b>6.35</b>	<b>329.97</b>		
Irrigation			L	33.28	1730.34		
<b>TOTAL</b>				<b>39.62</b>	<b>2060.31</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix G.

**Site: Eastwood Park - Eastwood**

**Business Unit: Eastwood Park**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
1,983	34,293	0.06 kL/m2/annum

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Cost-Effective Opportunities</b>									
Install 16 Flow Restrictors	Karl Cotter	626	60		72		3%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>626</b>	<b>60</b>		<b>72</b>				
<b>% change resulting from all measures</b>			<b>3.0%</b>						
<b>Potential Cost-Effective Opportunities</b>									
Install 5 push bib cock taps	Karl Cotter	985	30		36		-15%	1 July 06	1 July 07
Install 12 dual flush toilets	Karl Cotter	2,100	74		89		-13%	1 July 06	1 July 07
Convert 2 Urinals to Waterless Operation	Karl Cotter	1,000	56		68		-7%	1 July 06	1 July 07
<b>Total Potential Cost-Effective Opportunities</b>		<b>4085</b>	<b>160</b>		<b>193</b>				
<b>Summary of Business Unit: Eastwood Park</b>									
<b>Total Water Savings</b>		<b>4,711</b>	<b>220</b>		<b>265</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site: Eastwood Park - Eastwood</b>									
<b>Total Water Savings</b>		<b>4,711</b>	<b>220</b>		<b>265</b>				<i>Does not include Savings achieved from previous actions</i>

## **Site 8- Morrison Bay Park**

### ***Description of site***

Morrison Bay Park is located between Teemer St and Frances Rd in Putney. It is a large park of over 57,069 sq m, including four spray irrigated fields an amenity blocks incorporating a canteen and various taps. The total irrigated area of the park is approximately 33,000 sq m. An aerial photograph of the site including the location of water meters and major items is shown in Appendix H. The site is also used by numerous sporting groups and casual users with total numbers per week estimated to be around 1870 persons.

### ***Audit Methodology and details of assessor and other personnel involved***

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the Parks' Morrison Precinct Team Leader, Craig Williamson, and Sports Facilities Maintenance Coordinator, Richie Griffiths. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*The four fields in Morrison Bay Park are scheduled to be irrigated on an automatic basis, generally between 6AM-9AM on Monday however Park staff manually turn off the sprinklers when they determine that watering is not needed due to recent rain etc.

\*Irrigation for Fields 1, 2 and 3 with a total area of 18,150 sqm is drawn from Meter EDSO0054 and stored in a 10KL irrigation tank before being used. This meter also provides water for various outdoor taps.

\*Irrigation for Field 5 with a total area of 7600 sqm is drawn from Meter EDOG0170 which also supplies potable water to the amenities block/canteen and various outdoor taps.

\*Irrigation for Fields 7 and 8 with a total area of 7250 sqm is drawn from Meter EDOG0194.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was approximately 2L per hour or 0.38 KL per week from Meter EDOG0170. No obvious signs of leakage could be determined from the audit.

\*The park is used by members of the general public during normal daylight hours, however there are numerous schools and other organisations which hire the fields during daytime hours between Thursday and Saturday and during night time hours up to 8:00PM on Mondays to Thursdays.

**Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON (04/05 FINANCIAL YEAR)				
BAI = 57,069 m <sup>2</sup>				
Benchmark= 0.3 KL/sqm/annum				
CALCULATION	Q1	Q2	Q3	Q4
Water Usage KL- Account 3371 871	1	1	12	34
Water Usage KL- Account 3389 010	290	491	815	220
Water Usage KL- Account 3383 421	1	0	3	5
Rate per sq m per quarter	0.005117	0.0086211	0.0145437	0.0045384
Rate converted to KL per sq m per annum	0.020466	0.0344846	0.0581752	0.0181534

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks

**Site Water Use Profile based on monitoring**

\*The following meters were logged from the 23<sup>rd</sup> of January to the 20<sup>th</sup> of February, EDOG0170, BDOM7780, EDOG0194, EDSO0054. Data in tabular format is included in Appendix H. From this data average readings are presented below.

	METER EDOG0170	METER BDOM7780	METER EDOG0194	METER EDSO0054
Average L per weekday	1367	14.4	0	59.1
Average L per weekend day	611	16.1	0	49.4
Average KL per irrigation session	12.563	Not applicable	3.911	11.034
Average KL per month	57.417	0.466	4.863	13.097
Average KL per week	14.354	0.116	1.215	3.274
Average Leakage L/hour 5/2/6	2.2	0	0	0

\*Current water consumption is approximately 75.839 KL per month from 23<sup>rd</sup> of January to the 20<sup>th</sup> of February.

\*See Appendix H for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>Park to West of Frances Rd- Meter BDOM7780</b>							
Outdoor Tap	1	18	L/min	0.08	3.93	6	L/min
Bubbler	1	5	L/min	0.02	0.91	5	L/min
<b>TOTAL FOR METER BDOM7780</b>				<b>0.09</b>	<b>4.84</b>		
<b>Fields 1 &amp; 2- Account EDSO0054</b>							
Outdoor Tap	1	18	L/min	0.36	18.79	6	L/min
Irrigation for Fields 1 and 2	1		L	11.03	573.77		L
<b>TOTAL FOR METER EDSO0054</b>				<b>11.40</b>	<b>592.55</b>		
<b>Amenity Block &amp; Field to South- Account EDOG0170</b>							
Basin taps (hot/cold) Ladies	1	10	L/min	0.24	12.46	6	L/min
Toilets Dual Flush Ladies	2	7.333	L	1.15	59.74	7.333	L
Basin taps (hot/cold) Mens	2	20	L/min	0.98	50.90	6	L/min
Urinals Mens	1	11	L	2.66	138.23	0	L
Toilets Single Flush Mens	2	11	L	1.33	69.12	4	L
Basin taps (hot/cold) Disabled	1	20	L/min	0.05	2.62	6	L/min
Toilets Single Flush Disabled	1	11	L	0.23	12.01	4	L
Canteen- Kitchen Taps	2	20	L/min	0.20	10.40	6	L/min
Outdoor Tap	1	20	L/min	0.98	51.16	20	L/min
Leakage				0.37	19.32	0	L
Irrigation for Field 5				7.77	404.02		L
<b>TOTAL FOR METER EDOG0170</b>				<b>15.96</b>	<b>829.99</b>		
<b>Irrigation Field near Phillip Rd &amp; Tap- Account EDOG0194</b>							
Leakage	1		L	0.00	0.10		
Irrigation for Field 8			L	3.87	7.92		L
<b>TOTAL FOR METER EDOG0194</b>				<b>3.87</b>	<b>8.02</b>		
<b>Total</b>				<b>31.32</b>	<b>1435.40</b>		



**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix H.

**Site: Morrison Bay Park - Putney**

**Business Unit: Morrison Bay Park**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
3,002	57,069	0.05 kL/m2/annum

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Cost-Effective Opportunities</b>									
Install 3 Dual Flush Cisterns	Karl Cotter	525	52		62		3.1%	1 July 06	1 July 07
Convert 1 Urinal to Waterless Operation	Karl Cotter	500	138		166		5.4%	1 July 06	1 July 07
Install 8 Flow Restrictors/Aerators on taps	Karl Cotter	932	191		229		20.9%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>1,957</b>	<b>381</b>		<b>457</b>				
<b>% change resulting from all measures</b>			<b>12.7%</b>						
<b>Potential Cost-Effective Opportunities</b>									
Install 2 Push Bib Cock Taps	Karl Cotter	394	28		33		-2.8%	1 July 06	1 July 07
Undertake Irrigation Audit	Karl Cotter	7500						1 July 06	1 July 07
<b>Total Potential Cost-Effective Opportunities</b>		<b>7894</b>	<b>28</b>		<b>33</b>				
<b>Summary of Business Unit: Morrison Bay Park</b>									
<b>Total Water Savings</b>		<b>9,851</b>	<b>409</b>		<b>490</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site: Morrison Bay Park – Putney</b>									
<b>Total Water Savings</b>		<b>9,851</b>	<b>409</b>		<b>490</b>				<i>Does not include Savings achieved from previous actions</i>

## Site 9- Argyle Centre

### **Description of site**

The Argyle Centre is located at 35/41 Blaxland Rd, Top Ryde. The Argyle Centre is a one storey administration building containing various amenities to cater for 29 employees. A submeter to the main meter links to the Argyle Hall which is used for occasional community events and Council functions. The Argyle Theatre is located in the second storey above the Argyle Centre and Hall and is essentially unused. The Argyle Centre and Hall has a floor space of over 1160 sq m.

### **Audit Methodology and details of assessor and other personnel involved**

The Argyle Centre, Hall and Theatre were audited by Sydney Water employee, Fernando Ortega, together with City of Ryde staff members Stephen Drury and Sam Cappelli on the 16<sup>th</sup> June 2005. Simple cup measuring devices were used to estimate flows together with monitoring of meters. Jenai Davies from City of Ryde's Environmental Section revised this audit in February 2006 to reflect monitoring results, water saving measures already implemented and changes to employee numbers since the last audit in 2005. Additional information was also sought from Stephen Drury of Council's Property Services Division. Jenai Davies was responsible for undertaking the monitoring of readings from each meter.

### **Description of major items/processes**

\*Usage for the Argyle Centre/Argyle Theatre is estimated from the Meter EDJL0043 minus the submeter 820123 (which corresponds to the Argyle Hall which is also included in this audit).

\*The Argyle Centre has toilets for both male and female located on two locations. There are also kitchenettes in two locations.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was 1.4L per hour for the Argyle Centre/Theatre and 8.6L per hour for the Argyle Hall. No obvious leaks were encountered during the revised site audit, therefore this leak will require further investigation and monitoring.

\*The Argyle Centre is used by employees generally from 8AM to 5:30PM Monday to Friday. Cleaners attend to the Argyle Centre between 4:30AM to 8:30AM Monday to Friday. The Argyle Hall is also available for hire by the public and community groups at all hours on both weekends and weekdays.

### **Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON						
BAI = 29 employees						
Benchmark= 75 L/person/day						
CALCULATION	12/8/04 - 23/11/04	23/11/04- 19/02/05	19/2/05- 20/5/05	20/5/05- 19/8/05	19/8/05- 19/11/05	19/11/05- 27/2/06
Water Usage Argyle Centre/Theatre KL- Account 3362051 (Meter EDJL0043 minus 820123)	426	475	345	182	75	68
Water Usage Argyle Hall KL- Account 3362049 (Meter 820123 a submeter of EDJL0043)	96	90	89	69	22	41
Total Water Usage KL	522	565	434	251	97	109
Rate per employee per period KL	18.000	19.483	14.966	8.655	3.345	3.759
Rate converted to L per employee per day	174.757	221.395	166.284	95.112	36.357	37.586

As the above analysis of previous bills shows, the previous water usage per employee exceeded Sydney Water Benchmarks until the bill period beginning 19/8/2005. This is due to a leak from a urinal which was not recognised until the Sydney Water Audit was undertaken

on the 16<sup>th</sup> of June 2005. Subsequent to this audit numerous water saving initiatives were undertaken including turning off the leaking urinals in the Argyle Theatre and installing flow reducers on the 1<sup>st</sup> August 2005. As a result of these measures, analysis of bills for 19/8/2005 onwards shows that water usage has reduced to below the Sydney Water Benchmark of 75L/person/day for Civic and Administration Buildings with less than 200 people.

**Site Water Use Profile based on monitoring**

\*Meters EDJL0043 and 820123 were logged from the 23<sup>rd</sup> of January to the 24<sup>th</sup> of February, Data in tabular format is included in Appendix I. From this data average readings are presented below.

	Argyle Centre/Theatre (Meter EDJL0043 minus 820123)	Meter 820123 (Argyle Hall a submeter to EDJL0043)
Average L per weekday	1472	277
Average L per weekend day	145	176
Average KL per month	25	6.44
Average KL per week	6.25	1.61
Average Leakage L/hour 5/2/6	1.43	8.57

\*Current water consumption for the Argyle Centre is approximately 25 KL per month from 27<sup>th</sup> of January to the 24<sup>th</sup> of February.

\*See Appendix I for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>ARGYLE CENTRE AND ARGYLE HALL ACCOUNT NUMBER 336205, METER EDJL0043</b>							
<b>COMMUNITY SERVICES AREA ONE</b>							
Amenities- Basin taps	3	6	L/min	0.13	7.00	6	L/min
Amenities- Single Flush Toilets	4	15	L	2.24	116.61	4	L
Kitchen Taps	1	9	L/min	0.18	9.13	9	L/min
Kitchen -Hot Water Boiler	1	0.2	L	0.03	1.35	0.2	L
<b>PARKS AND COMMUNITY SERVICES AREA TWO</b>							
Amenities- Basin taps	3	6	L/min	0.17	8.61	6	L/min
Amenities- Single Flush Toilets	3	15	L	2.76	143.52	6	L
Amenities- Showers	1	9	L/min	0.13	6.55	9	L/min
Kitchen Taps	2	9	L/min	0.32	16.85	9	L/min
Kitchen- Hot Water Boiler	1	0.2	L	0.03	1.66	0.2	L
<b>ARGYLE THEATRE</b>							
Basin taps	5	12	L/min	0.00	0.09	6	L/min
W/C	7	15	L	0.02	0.78	6	L
Urinals	2	12	L				L
Kitchen Taps	2	19	L/min	0.00	0.15	9	L/min
LEAKAGE RATE ARGYLE CENTRE MEASURED 5 FEB TO 6 FEB				0.24	12.51		
<b>TOTAL FOR MONITORING PERIOD</b>				<b>6.25</b>	<b>324.82</b>		
<b>SAVINGS MEASURES ALREADY IMPLEMENTED IN CIVIC CENTRE</b>							
FLOW RESTRICTORS ETC ALREADY INSTALLED PREVIOUS TO MONITORING				1.17	92.33		
FIXED LEAKING URINAL				20.86	1084.90		
<b>TOTAL FOR ARGYLE CENTRE AND THEATRE</b>				<b>28.28</b>	<b>1502.04</b>		
<b>COMMUNITY HALL- ACCOUNT 3362049 SUBMETER 820123 OF ACCOUNT 3362051</b>							
Amenities- Basin taps	6	6	L/min	0.10	5.38	6	L/min
Amenities- Dual Flush Toilets	3	7.333	L	0.84	43.85	7.333	L
Amenities- Urinals	1	12	L				L
Kitchen Taps	2	9	L/min	0.08	4.21	9	L/min
Hot Water Boiler	1	0.2	L	0.01	0.62	0.2	L
LEAKAGE RATE ARGYLE HALL FROM 5 FEB 06 TO 6 FEB 06				0.21	75.09		L
<b>TOTAL FOR MONITORING PERIOD</b>				<b>1.24</b>	<b>129.15</b>		
<b>SAVINGS MEASURES ALREADY IMPLEMENTED</b>							
SAVINGS FROM WATERLESS URINALS				4.03	209.66		
SAVINGS FROM FLOW RESTRICTORS				0.19	10.06		
<b>TOTAL FOR ARGYLE HALL</b>				<b>5.47</b>	<b>348.88</b>		
				<b>33.75</b>	<b>1850.92</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix I.

**Site: Argyle Centre and Hall - Top Ryde**

**Business Unit: Argyle Centre and Hall**

Baseline Information		
Total Usage in 04/05	Quantity of BAI	KPI
1,851 KL	29 Employees	174.89 L/Employees/day

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Previous Action Over Last Five Years</b>									
Installed 16 flow restrictors	Stephen Drury	624	102		168		23.8%		1 Aug 05
Installed AAA Rated Showerhead	Stephen Drury	55	7		12		18.2%		1 Aug 05
Converted urinals in Argyle Hall to waterless operation	Stephen Drury	500	210		252		49.4%		23 Jan 06
Fixed leaking urinal in Argyle Theatre	Stephen Drury	0	1085		1836		-		20 Jun 05
<b>Total Previous Action Over Last Five Years</b>		<b>1179</b>	<b>1404</b>		<b>2268</b>				
<b>Cost-Effective Opportunities</b>									
Install adjust 10 Cistern Floats	Stephen Drury	150	87		146		97.6%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>150</b>	<b>87</b>		<b>146</b>				
<b>% change resulting from all measures</b>			<b>4.7%</b>						
<b>Summary of Business Unit: Argyle Centre and Hall</b>									
<b>Total Water Savings</b>		<b>150</b>	<b>87</b>		<b>146</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site: Argyle Centre and Hall - Top Ryde</b>									
<b>Total Water Savings</b>		<b>150</b>	<b>87</b>		<b>146</b>				<i>Does not include Savings achieved from previous actions</i>

Adjusted Baseline Information following actions already implemented		
Total Usage in 04/05	Quantity of BAI	KPI
672 KL	29 Employees	63.5 L/Employees/day

This adjusted baseline figure corresponds to 63.5 L/person/day which is within the Sydney Water Benchmark of 75L/person/day for Administration buildings with less than 200 people. The reason for this figure being higher than other administration centres is that the KPI also incorporates the Argyle Hall which is hired by the public occasionally.

## Site 10- Putney Park

### ***Description of site***

Putney Park is located at Pellisier Rd & Putney Pde, Putney. It is a park of over 67,861 sq m, including one shallow play pool of approximately 10.6 KL capacity, two amenity blocks and numerous taps and bubblers. An aerial photograph of the site including the location of water meters and major items is shown in Appendix J. The site is a very popular recreation and tourism destination, attracting several coachloads of tourists each day. Total numbers of visitors are estimated to be around 3500 persons per week.

### ***Audit Methodology and details of assessor and other personnel involved***

The park was audited by Jenai Davies from City of Ryde's Environmental Section and additional information was also sought from the Parks' Morrison Precinct Team Leader, Craig Williamson. Estimates were made of the flow to various items of equipment using simple cup flow measuring devices and also by analysis of meter readings as required. Parks operational staff and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### ***Description of major items/processes***

\*The play pool runs continuously and overtops regularly. In addition, the pool requires emptying approximately once a month to remove rubbish from the pool.

\*The amenity blocks, bubblers and taps are well utilised by a large number of visitors.

\*The park amenities blocks are generally cleaned once a week by cleaners and grounds staff manage other aspects of park maintenance including monitoring of meters on a weekly basis.

\*Leakage during the period from the 5<sup>th</sup> of February to 6<sup>th</sup> of February was 14.9L per hour from Meter BROA0569 and 17.8L per hour for Meter CDLL0157. The leak at Meter BROA056 was due to a leaking cistern which has since been rectified. The leak at CDLL0157 is due to a combination of once timed discharge from the urinal at the northern amenity block and overtopping from the pool. The urinal settings have since been adjusted so that less water is used less frequently in flushing this urinal.

\*The park is used by members of the general public during normal daylight hours and after dark the park is still well utilised even though the park is largely unlit.

### ***Benchmarking of historical water usage against (KPIs)***

BENCHMARK COMPARISON (04/05 FINANCIAL YEAR)				
BAI = 67,861 m <sup>2</sup>				
Benchmark= 0.3 KL/sqm/annum				
CALCULATION	Q1	Q2	Q3	Q4
Water Usage KL- Account 3383137	47	60	63	49
Water Usage KL- Account 3383138	268	284	395	202
Total Water Usage KL	315	344	458	251
Rate per sq m per quarter	0.0046	0.0051	0.0067	0.0037
Rate converted to KL per sq m per annum	0.0186	0.0203	0.0270	0.0148

For all quarters, water usage has been well below the Sydney Water Benchmark of 0.3KL/sqm/annum for parks.

### Site Water Use Profile based on monitoring

\*Meter BROA0569 and Meter CDLL0157 were logged from the 23<sup>rd</sup> of January to the 20<sup>th</sup> of February, Data in tabular format is included in Appendix J. From this data average readings are presented below.

	Meter BROA0569	Meter CDLL0157
Average L per weekday	663	3379
Average L per weekend day	3750	3539
Average KL per month	45.423	65.773
Average KL per week	11.355	16.443
Average Leakage L/hour 5/2/6	14.9	17.8

\*Current water consumption is approximately 111.196 KL per month from 23<sup>rd</sup> of January to the 20<sup>th</sup> of February.

\*See Appendix J for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>Putney Park- Account 3383 138, Meter CDLL0157</b>							
Ladies Amenities Single Flush Toilet	2	11	L	4.24	220.22	6	L
Ladies Amenities Handbasin Tap	1	22	L/min	1.27	66.07	6	L/min
Mens Amenities Single Flush Toilet	1	11	L	1.41	73.41	4	L
Mens Amenities Urinals	1	4	L	3.42	177.63	3	L
Mens Amenities Handbasin Tap	1	22	L/min	1.27	66.07	6	L
Disabled Amenities Single Flush Toilet	1	11	L	0.31	16.02	4	L
Disabled Amenities Handbasin Tap	1	22	L/min	0.09	4.80	6	L/min
Outdoor Taps	5	20	L/min	1.49	77.46	6	L/min
Bubbler	2	4	L/min	0.35	18.20	4	L/min
<b>TOTAL FOR AMENITIES/GENERAL USAGE</b>				<b>13.844</b>			
Pool Overtopping/Leakage/Evaporation	1	0.24888056	L/min	2.51	130.45		
Pool Refilling- Approx every two weeks	1		L	5.74	298.68	1	L
<b>TOTAL FOR METER CDLL057</b>				<b>35.94</b>	<b>1149.00</b>		
<b>Putney Park- Account 3383 137, Meter BROA0569</b>							
Ladies Amenities Single Flush Toilet	1	12	L	0.88	45.50	4	L
Ladies Amenities Dual Flush Toilet	1	7.3333	L	0.53	27.81	7.3333	L
Ladies Amenities Handbasin Tap	2	22	L/min	0.48	25.03	6	L/min
Mens Amenities Single Flush Toilet	1	12	L	0.29	15.17	4	L
Mens Amenities Dual Flush Toilet	1	7.3333	L	0.18	9.27	7.3333	L
Mens Amenities Urinals Pull Chain	1	11	L	1.07	55.61	11	L
Mens Amenities Handbasin Tap	1	22	L/min	0.48	25.03	6	L/min
Disabled Amenities Single Flush Toilet	1	11	L	0.31	16.02	6	L
Disabled Amenities Handbasin Tap	1	22	L/min	0.09	4.80	6	L/min
Outdoor Taps	4	22	L/min	0.94	48.69	6	L/min
Bubblers	3	4	L/min	0.34	17.71	4	L/min
<b>TOTAL FOR AMENITIES/GENERAL USAGE</b>				<b>5.5888</b>	<b>290.620</b>		
Leakage				0.230	11.964		
<b>TOTAL FOR METER BROA0569</b>				<b>5.819</b>	<b>302.584</b>		
				<b>41.759</b>	<b>1451.588</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix J.

**Site: Putney Park - Putney**

**Business Unit: Putney Park**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
1,367	678,60.8	0.02 kL/m2/annum

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in KL	Energy in GJ	Water (\$)	Other (\$)			
<b>Cost-Effective Opportunities</b>									
Install/Adjust Cistern Weight	Karl Cotter	15	7		9		58%	1 July 06	1 July 07
Install 7 flow restrictors/aerators	Karl Cotter	274	124		148		53%	1 July 06	1 July 07
Install 6 dual flush cisterns	Karl Cotter	875	151		181		15.9%	1 July 06	1 July 07
<b>Total Cost-Effective Opportunities</b>		<b>1164</b>	<b>282</b>		<b>338</b>				
<b>% change resulting from all measures</b>			<b>20.6%</b>						
<b>Potential Cost-Effective Opportunities</b>									
Install 9 push bib cock taps	Karl Cotter	1,773	90		108		-8%	1 July 06	1 July 07
Install Cistern with Motion Sensor and Timer adjusted to low setting. Adjust main amenity block urinal timer to lower setting.	Karl Cotter	800	62		75		-1%	1 July 06	1 July 07
Install 16KL tank for reuse of overtopping and surcharge pool water. Also install pump to transferred pool water to tank overnight to minimize amount of pool overtopping, evaporation and dirtying of water.	Karl Cotter	25650	403		483.65		-22.6%	1 July 07	1 July 08
<b>Total Potential Cost-Effective Opportunities</b>		<b>28223</b>	<b>555</b>		<b>666.6</b>				
<b>Summary of Business Unit:</b>									
<b>Total Water Savings</b>		<b>29387</b>	<b>837</b>		<b>1004.6</b>				<i>Does not include Savings achieved from previous actions</i>
<b>Summary of Site:</b>									
<b>Total Water Savings</b>		<b>29387</b>	<b>837</b>		<b>1004.6</b>				<i>Does not include Savings achieved from previous actions</i>



## Site 11- Operations Centre

### **Description of site**

The Operations Centre is located at the corner of Belmore Rd and Constitution Rd, Meadowbank. The Operations Centre is used as the main Council Depot and as a base for Parks and Operational staff. There are also two levels of offices which house Public Works office staff. The Operations Centre has a total floor space of approximately 4070 sq m and 59 fulltime staff members.

### **Audit Methodology and details of assessor and other personnel involved**

The Operations Centre was audited by Sydney Water employee, Fernando Ortega, and City of Ryde staff Jim McClymont and Sam Cappelli on the 20<sup>th</sup> of September 2005. Simple cup measuring devices were used to estimate flows together with monitoring of meters. Jenai Davies from City of Ryde's Environmental Section revised this audit in February 2006 to reflect monitoring results, water saving measures already implemented and changes to employee numbers since the last audit in 2005. Additional information was also sought from Stephen Drury of Council's Property Services Division. Peter Augustis and Jenai Davies were responsible for undertaking the monitoring of readings from each meter.

### **Description of major items/processes**

\*Usage for the Operations Centre is estimated from the Meter DDQH0489.

\*The Operations Centre has male and female bathrooms with showers and toilets, lunchrooms, a laundry, car washing bay and various outdoor taps which are used for filling of Council Street Sweepers and irrigation of the grounds.

\*Leakage during the period from the 20<sup>th</sup> of February to 20<sup>th</sup> of February was 5.8L per hour. This is thought to be mostly due to a leaking chilled water tap in the main kitchen which still requires repair.

\*The Operations Centre is used by employees generally from 6AM to 5:30PM Monday to Friday. Cleaners attend to the Argyle Centre between 6PM to 8:30PM Monday to Friday. Nightstaff also use the Operation Centre between 11AM to 7PM Monday to Sundays.

### **Benchmarking of historical water usage against (KPIs)**

BENCHMARK COMPARISON						
BAI = 59 employees (30 until approximately 1/9/05)						
Benchmark= 40 L/person/day						
CALCULATION	13/8/04 - 3/12/04	3/12/04- 20/02/05	20/2/05- 23/5/05	23/5/05- 23/8/05	23/8/05- 21/11/05	21/11/05- 27/2/06
Water Usage Operations Centre KL- Account 3365552 Meter DDQH0489	308	211	256	283	213	238
Total Water Usage KL per period	308	211	256	283	213	238
Rate per employee per period KL	10.2667	7.0333	8.5333	9.4333	3.6102	4.0339
Rate converted to L per employee per day	91.6667	89.0295	92.7536	102.5362	40.1130	41.1622

As the above analysis of previous bills shows, the previous water usage per employee exceeded Sydney Water Benchmarks until the bill period beginning 23/8/2005. This is due to various flow restrictors being fitted by the 1<sup>st</sup> of August and a leak from a urinal which was not recognised until the Sydney Water Audit was undertaken on the 20<sup>th</sup> of September 2005. Prior to this audit numerous water saving initiatives were undertaken including fixing the leaking urinal and installing flow reducers on the 1<sup>st</sup> August 2005. As a result of these measures, analysis of bills for 23/8/2005 onwards shows that water usage has reduced to be only slightly above the Sydney Water Benchmark of 40L/person/day for Council Depots. One reason why measured water usage is slightly higher than benchmark water usage is that the

Operations Centre is also used to fill Council Street Sweepers approximately six times per week.

***Site Water Use Profile based on monitoring***

\*Meter DDQH0489 was logged from the 27<sup>th</sup> of January to the 24<sup>th</sup> of February, Data in tabular format is included in Appendix K. From this data average readings are presented below.

	Meter DDQH0489
Average L per weekday	4427
Average L per weekend day	774
Average KL per month	89.354
Average KL per week	22.339
Average Leakage L/hour 10/2/6	5.8

\*Current water consumption is approximately 89.354 KL per month from 27<sup>th</sup> of January to the 24<sup>th</sup> of February.

\*See Appendix K for the actual data upon which this is based.

### Water Balance for the Site

A breakdown of water usage at the site is presented below.

Items	No.	Measured		Current		Recommended	
		Rate	Unit	kL/week	kL/year	Flow	Unit
<b>Main Building</b>							
Basin taps	15	6	L/min	0.28	14.56	6	L/min
Basin taps	3	6	L/min	0.28	14.56	6	L/min
W/C Dual Flush	18	6	L	2.19	114.08	6	L
Urinals	1	12	L	2.69	139.99	0	L
Showers	4	9	L/min	0.34	17.55	9	L/min
<b>Workshops</b>							
Basin taps	3	4	L/min	0.19	9.88	4	L/min
Basin taps	1	6	L/min	0.37	19.24	6	L/min
<b>Kitchen</b>							
Kitchen Taps	3	6	L/min	0.28	14.56	6	L/min
Hot Water Boiler	1	0.2	L	0.10	5.20	0	L
<b>Laundry</b>							
Basin taps	2	4	L/min	0.09	4.68	4	L/min
Washing Machine	2	150	L	1.50	78.00	97	L
<b>Washbay</b>							
Basin taps	1	6	L/min	0.14	7.28	6	L/min
Washing	5	60	L/vehicle	1.50	78.00		L
<b>Outdoor</b>							
Outdoor Taps	4	20	L/min	1.12	58.24	6	L/min
Outdoor Washing	2	20	L/min	3.00	156.00		L
<b>Filling of Street Sweepers</b>							
Water for Street Sweepers		1216	L average capacity	7.30	379.39	1216	L
Leakage Measured During Monitoring Period			L/min	0.98	51.10		
<b>TOTAL FOR MONITORING PERIOD</b>				22.35	1162.32		
<b>WATER SAVINGS MEASURES ALREADY IMPLEMENTED</b>							
<b>Flow Restrictors already fitted</b>				1.09	56.46		
<b>Leaking Urinal Fixed</b>				0.38	20.00		
<b>TOTAL</b>				<b>23.82</b>	<b>1238.78</b>		

**Details of all identified measures and savings target**

Identified Savings Measures are summarised below. For more information on how these costs were derived, please see Appendix K.

**Site: Operations Centre - Meadowbank**

**Business Unit: Operations Centre**

Baseline Information		
Total Usage in KL	Quantity of BAI	KPI
1,028	59	47.7 L/Employees/day

Measure Description	Responsibility	Savings Annual			Cost Savings Annual		IRR (%)	Start Date	Completion
		Cost to Implement (\$)	Water in kL	Energy in GJ	Water (\$)	Other (\$)			
<b>Previous Action Over Last Five Years</b>									
Installed 11 flow restrictors on taps and showerheads	Stephen Drury	430	56		98		18.7%		1 August 05
Fixed leaking urinal	Stephen Drury	0	20		34.7		-		26 September 05
<b>Total Previous Action Over Last Five Years</b>		<b>430</b>	<b>76</b>		<b>132.7</b>				
<b>Potential Cost-Effective Opportunities</b>									
Install Waterless Urinal	Stephen Drury	10,000	140		243		-19.9%	1 July 06	1 July 07
Change 2 washing machines to front loader	Stephen Drury	2,000	28		48		-20.1%	1 July 07	1 July 08
Capture Roof Water for Truck Washing, Install reuse system for carwash bay, store in two 105KL tanks for filling Street Sweepers/Flushers	Stephen Drury	179,000	613		1,065		-33.2%	Dependent on external funding	Dependent on external funding
<b>Total Potential Cost-Effective Opportunities</b>		<b>191,000</b>	<b>781</b>		<b>1,356</b>				
<b>Summary of Business Unit:</b>									
<b>Total Water Savings</b>		<b>191,000</b>	<b>781</b>		<b>1,356</b>		<i>Does not include Savings achieved from previous actions</i>		
<b>Summary of Site:</b>									
<b>Total Water Savings</b>		<b>191,000</b>	<b>781</b>		<b>1,356</b>		<i>Does not include Savings achieved from previous actions</i>		

Adjusted Baseline Information following actions already implemented		
Total Usage in 04/05	Quantity of BAI	KPI
952	59	44.2 L/Employees