

# Water Management Report



## Darebin International Sports Centre (DISC)

Darebin Road, Thornbury, Victoria, Australia



H Y D R A U T E C H   D E S I G N S

HydraTech Designs Pty Ltd  
Level 1, No.8 Rose Street  
Doncaster, Victoria, Australia 3108  
T: +61 3 9848 6566  
F: +61 3 9848 6644

C O N S U L T I N G   E N G I N E E R S

Issue 1 – DRAFT ISSUE FOR COMMENT – May 25, 2009



**DOCUMENT ISSUE REGISTER**

<b>Issue No.</b>	<b>Issue Description</b>	<b>Date of Issue</b>	<b>By</b>
1	Draft issue in PDF electronic format for comment.	25.05.2009	RRW



## EXECUTIVE SUMMARY

Darebin City Council engaged Hydrautech Designs Pty Ltd to prepare a Water Management Report for the Darebin International Sports Centre (DISC). The purpose of the report is to address the following key issues with reference predominantly to water conservation and water related management practices.

- Outline the current facilities and water practices.
- Identify water conservation opportunities.
- Identify water harvesting opportunities.
- Detail the systems that may be provided to achieve the identified forms of conservation and harvesting.
- Provide the environmental and financial benefits associated with the proposed initiatives.
- To provide budget estimates for the proposed initiatives with consideration to the environmental and financial benefits offered.
- To provide a clear plan for the stakeholders of the facility to consider.

The key recommendations and budget estimates outlined in the report may be summarized as follows;

- Increase the available catchment from the main building roof including additional catchment from the function room roof.
- Provide an additional rainwater storage tank for harvesting the south side of the main building roof (the existing in-ground tank to collect the north side of the main roof).
- Provide a rainwater storage tank and treatment system for the northern stadium.
- Provide solar boosted domestic hot water to the main building to offset the carbon emissions generated by the water recycling initiatives.
- Upgrade the capacity of the irrigation supply tank.
- Upgrade the existing irrigation pump and connecting pipework.
- Apply the irrigation cycles at the established frequency and seasonal durations.

These recommendations represent the following;

- A capital cost of **\$265,000 AUD+GST**
- An annual water saving of **3,673,085 litres**
- An annual resource saving of **\$16,191 AUD**
- An annual CO<sup>2</sup> emissions saving of **6,231 kg**
- An approximate payback period of **16 years**



## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b> .....	<b>6</b>
<b>2</b>	<b>OBJECTIVES OF THE REPORT</b> .....	<b>7</b>
<b>3</b>	<b>OUTLINE OF EXISTING FACILITIES</b> .....	<b>8</b>
<b>4</b>	<b>EXISTING SITE OBSERVATIONS</b> .....	<b>9</b>
4.1	SANITARY FACILITIES.....	9
4.2	RAINWATER HARVESTING FOR LAWN BOWLS IRRIGATION .....	9
4.3	ROOF CATCHMENT AND IN-GROUND RAINWATER STORAGE TANK.....	10
4.4	SUB-SURFACE DRAINAGE.....	11
4.5	IRRIGATION SYSTEM.....	12
4.6	ADDITIONAL IRRIGATION AREAS.....	15
4.7	SITE WATER USAGE .....	15
<b>5</b>	<b>WATER SUPPLY AND DEMAND BALANCE</b> .....	<b>16</b>
5.1	AVAILABLE RAINWATER SUPPLY YIELD .....	16
5.2	LAWN BOWLS IRRIGATION DEMAND.....	17
5.2.1	ROOT ZONE DEPTH (RZD) .....	18
5.2.2	WATER HOLDING CAPACITY (WHC).....	18
5.2.3	DETERMINING THE MAXIMUM IRRIGATION DEMAND (MID) .....	18
5.2.4	WATER REFILL POINT (WRP).....	19
5.2.5	SYSTEM APPLICATION EFFICIENCY (SAE).....	19
5.2.6	CONTINUAL IRRIGATION DEMAND (CID).....	19
5.2.7	IRRIGATION TIMING.....	20
5.2.8	TRANSPIRATION AND EVAPOTRANSPIRATION (ET).....	20
5.2.9	IRRIGATION INTERVAL (TI).....	21
5.2.10	IRRIGATION VOLUME (IV).....	22
5.2.11	IRRIGATION CONCLUSIONS .....	22
5.3	NORTHERN SOCCER PITCH IRRIGATION DEMAND.....	24
<b>6</b>	<b>TREATMENT CONSIDERATIONS</b> .....	<b>27</b>
6.1	PATHOGEN REMOVAL, DISINFECTION AND WATER SAFETY .....	27
6.2	TRIPLE BOTTOM LINE CONSIDERATIONS.....	27
<b>7</b>	<b>RECOMMENDATIONS</b> .....	<b>29</b>



7.1	RAINWATER HARVESTING .....	29
7.2	EXISTING IRRIGATION SYSTEM.....	32
7.3	SOLAR BOOSTED DOMESTIC HOT WATER.....	34
7.4	PIPEWORK RECOMMENDATIONS.....	36
7.5	SUMMARY OF RECOMMENDATIONS.....	38
<b>8</b>	<b>IMPLEMENTATION STRATEGY.....</b>	<b>40</b>
8.1	EXISTING INFRASTRUCTURE CAPACITY .....	40
8.2	SOLAR PANEL INSTALLATION.....	40
<b>9</b>	<b>COMPLIANCE .....</b>	<b>41</b>
9.1	WATER AUTHORITY .....	41
9.2	ENVIRONMENT PROTECTION AUTHORITY (EPA).....	41
9.3	DEPARTMENT OF HUMAN SERVICES (DHS).....	41
<b>10</b>	<b>LIFE CYCLE ANALYSIS.....</b>	<b>42</b>
<b>11</b>	<b>BUDGETS.....</b>	<b>43</b>
<b>12</b>	<b>RESOURCE SAVINGS AND ENERGY PENALTY.....</b>	<b>44</b>
<b>13</b>	<b>APPENDIX A – "RAINWATER USE IN URBAN COMMUNITIES" GUIDELINES .....</b>	<b>46</b>
<b>14</b>	<b>APPENDIX B – RAINFALL AND IRRIGATION MODEL.....</b>	<b>47</b>