Smart Water Fund
Round 2

State Netball and Hockey Centre
Water Harvest Project

Final Evaluation Report

Revision 1 27 June 2005

1. INTRODUCTION

The purpose of this Final Evaluation Report is to provide a complete record and overview of the State Netball and Hockey Centre water conservation project.

The Project, which is supported by the Smart Water Fund, has installed a recycled water and rainwater harvesting scheme for use on the two SNHC Hockey pitches. The process of recycling involves the following key steps:

- Installation of a reclaimed pitch irrigation and rainwater treatment plant to produce unrestricted surface irrigation water of quality fit for purpose for pitch irrigation;
- Collection of rainwater from hockey pitches and surrounds
- Collection of rainwater from sections of main building roof
- Water is pumped through Gross Pollutant Traps with 300 micron mesh
- Water is then pumped into storage (2 x 90 kl underground fibreglass storage tanks)
- When water is drawn from the storage tanks it is filtered to 50 microns and disinfected via UV light and chlorine dosing and delivered to an irrigation tank
- Water is then reused for hockey pitch watering

The Project aims to substitute potable water with rainwater and recycling of used pitch water with target saving of 78% or 19 ML per year.

Other benefits of the Project are expected to be:

- Enhance the long-term operation of the SNHC,
- Contribute to its reputation as Victoria's premier hockey and netball venue,
- Advance government policy in this area.
- Demonstrate an holistic approach to water resource management;
- Educate the community and promote the facility as a "best practice" model for sustainable management of a sporting venue.
- Reduce peak flows and sediments/pollutants entering waterways.

2. PROJECT OVERVIEW

2.1 Design, Construction, Commissioning and Water Quality

System Concept

The design intent of the system is to collect rainfall and water irrigated on the hockey pitches by intercepting the water using stormwater wet wells either side of the site. The wells are designed to by-pass in storm events greater than a 3 month Annual Recurrence Interval (ARI). The collected water is transferred through three 300 micron, GPT's before flowing into two elongated 90m3 cylindrical fibreglass tanks run in series. The tanks are sized to provide approximately 75% of the centres' annual pitch irrigation supply. The GPT's keep debris and litter dry and separated from the stored water reducing the oxygen demand and food sources for microbes during storage.

The tanks are elongated and configured to remove further settlable particles down to 125 micron with some reduction in smaller particle sizes. Water is transferred from the tanks through a 50 micron auto-flushing screen filter which is UV disinfected, dosed with Calcium Hypochlorite and transferred to a contact tank. Free chlorine levels are monitored after 30 minutes contact in order to maintain a residual of 1mg/l with a recirculation option in the event that a residual is not maintained. Treated water is transferred to an irrigation tank with mains water backup in the event that water is not available from the storage tanks. Turbidity, free chlorine, flow and pH are continuously monitored in the plant room through monitoring probes and transmitters. The tank levels are monitored at the control panel.

The design philosophy is to remove target sediment sizes in order to remove associated adsorbed pollutants from the stormwater stream primarily associated with atmospheric pollution. Constituents including nutrients and various heavy metals along with pathogens attach to sediments and are the main source of transport through the stormwater system.

Disinfection through UV treatment and chlorine dosing are used to protect human health.

Operation & Maintenance

The system has been designed to be easily operated and maintained to ensure continuing water quality.

Flow, turbidity, free chlorine and pH levels are continuously monitored. In the event that any parameter falls outside its determined range, a fault is registered and the transfer of water to the irrigation tank is immediately stopped.

In the case of low chlorine, the most likely cause of any fault (due to the tablet dispenser running low or out of calcium hypochlorite) recirculation through the dose feeder will try to correct the residual. If successful, transfer of water to the irrigation tank will resume, should water still be required. If unsuccessful within a defined time period, a fault is registered. The tablet dispenser is clear, enabling easy assessment of the amount of stored tablets. The dispenser is simply kept topped up with calcium hypochlorite tablets. When the transfer of recycled water to the irrigation tank has been halted due to any of the aforementioned faults, the system automatically diverts back to the mains pressure potable supply, to ensure on-going availability of water for irrigation.

The UV disinfection system is fitted with fault indicator lamps and an hour-run meter to enable easy monitoring of the lamps and to ensure that routine maintenance and lamp replacement can be carried out by the SNHC.

Mounted on the plantroom external wall are two lights, a green and red. The green light when illuminated indicates that the system is fully on- line, and that water is available from the storage tanks to be used for irrigation. If the system is off-line (turned off, shut down due to a fault, or no water available from the storage tank) the green light will not be illuminated, and the system will have reverted to normal mains water supply. The red light will illuminate & flash when a fault exists, indicating that service personnel need to attend to the plantroom to further determine the nature of the fault. No water can be transferred to the irrigation tank whilst any water chemistry fault condition exists. The red and green lights are both visible from the top of the steps at the main entry foyer, enabling SNHC staff to monitor the status of the system easily.

The designed system has maximum safeguards to ensure that the system operates effectively, and yet is simple for the SNHC to operate and maintain.

Testing

A testing schedule is in place, including continuous monitoring of turbidity, pH and residual chlorine, as well as laboratory testing for BOD, SS and E.Coli.

This schedule includes a verification stage, and a performance guarantee stage.

As expected from the nature of the catchments, and the management practices outlined, all the laboratory tested samples to date have easily met the parameters required for safe use of the treated water.

As the system continues to operate SNHC will be able to determine what level of on-going laboratory testing may be warranted, if any, in the future, consistent with its own risk management policies.

The project has obtained an independent sign off for the quality of water produced by the system and its fitness for purpose. This was primarily in response to the lack of EPA/DHS guidelines or requirements for water use in this particular application.

The Benefits

- Enhance the long-term operation of the SNHC,

The project will reduce the volume of fresh water drawn into the centre, making the centre a sustainable long term operation, and minimising the burden on Melbournes water supplies.

Expected savings on water bills are in the region of $14,000. This is offset by the capital cost and the operating costs expected around $4,000. Under this scenario the project pay back is expected to be of the order of 34 years. Obviously with the likely increase in the cost of domestic water this period would reduce equivalently.

- Contribute to its reputation as Victoria's premier hockey and netball venue,

The centre's operation is now easier to justify with the harvesting system in place. It is of great benefit to the community that such facilities are able to allay the fears and concerns of both the action groups and the Melbourne community at large.

- Demonstrate an holistic approach to water resource management;

SNHC are replacing potable water for uses that do not require drinking quality water, thus reducing demand on reticulated supply while making more value of other sources.

- Educate the community and promote the facility as a "best practice" model for sustainable management of a sporting venue.

Provide a working example of best practice in respect of water use and management that can be visited and shown as proof that the systems are able to add value.

The project has the potential to provide excellent educational and promotional tools for visitors to the centre and from international coverage of hockey during the Commonwealth games.

It would also be beneficial to the community to encourage environmental awareness with its performance and records in future years.

- Reduce peak flows and sediments/pollutants entering waterways.

Onsite water storage facilities act as stormwater retarding basins. As the tank empties through demand, there is a gap between the storage overflow and the water level of the tank. This void helps reduce the volumetric load placed on the stormwater network, including streams and rivers. The initial flood peak is reduced, as stormwater flow does not leave the premises until the tanks are filled or the duty of the transfer pumps are exceeded. This effect reduces the incidence of flooding within stream networks and mimics the natural hydrology of a green field catchment.

Reducing runoff volumes from the centre retains sediments and toxic particles such as heavy metals and hydrocarbons that do damage to the river and bay ecosystems. Reducing runoff volumes leaving the catchment area also reduces the flushing effect of storm events.

2.2 Public Communication Activity

A number of creative applications have been considered and the following points describe the activity to date

Information Boards. (see Appendix 3)

Two information boards have been situated in the main entry foyer ensuring the majority of patrons visiting the State Netball and Hockey Centre have the opportunity to learn more

about the project. This has been achieved through a simplistic diagram of the system and a step by step explanation of the processes that takes place. One of the information boards will be moved out the front of the Centre come warmer weather as it will engage people utilising the surrounding facilities and park land.

Fliers. (see Appendix 2)

2500 full colour take home fliers have been made available to the public at multiple points around the facility where other SNHC, sports related and general information hand outs are posted. These fliers have also been attached to fixtures and club newsletters posted by the Netball and Hockey associations to further communicate the project and its merits to a wider audience. All tours of the State Netball and Hockey Centre include a brief outline of the water harvesting system and a flier is given to all that attend.

Tours

To date tours have only been conducted when interested parties approach the centre and the tour itself is tailored to the party's curriculum. A tour on average is conducted every 2 weeks and the Smart Water Fund project is mentioned when ever the tour encompasses the operational aspects of hockey.

SNHC is currently finalising plans to host fortnightly tours instigated and promoted by the centre to expose school students and the general public to aspects of the centre such as centre history, back of house players areas, event set up and operational efficiencies including the new water-friendly harvesting system.

Appendix 4 includes some photographs of the site and the various aspects of the project that are easily visible.

Signage. (see Appendix 1)

4 double sided vinyl banners promoting the centres approach to water conservation are being displayed on the poles either side of the main entry stairs.

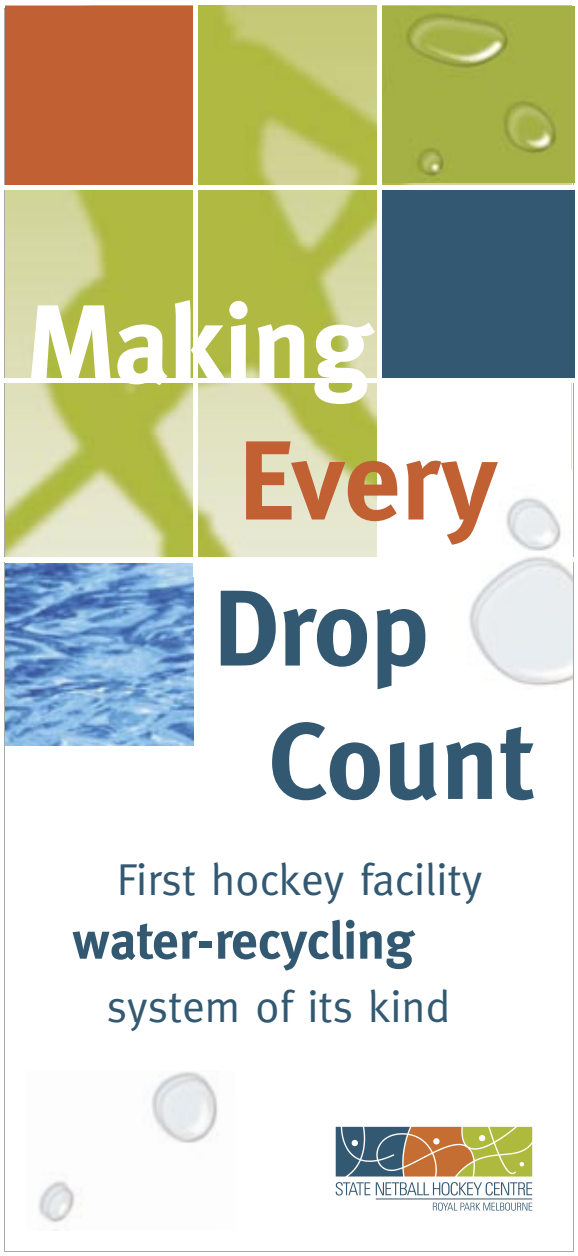
Website

SNHC's web site has been updated by Cookin Design. The content regarding the Smart Water Fund project is simular to that of the information boards and brochure and can be located at www.snhc.com.au, excerpts are attached in Appendix 5

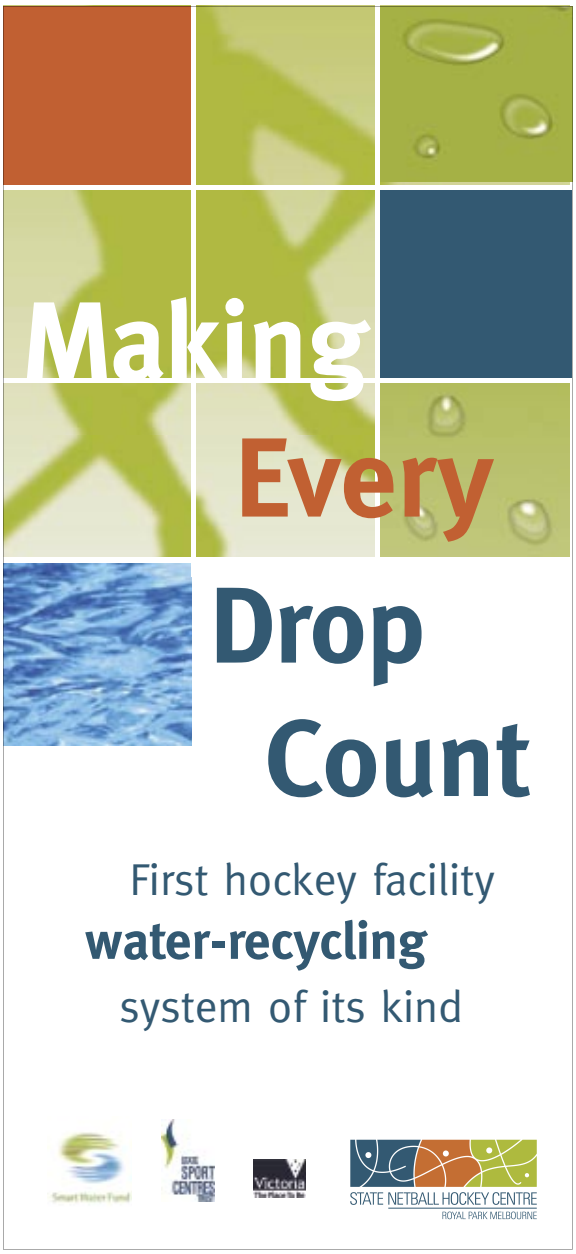
3. MILESTONES AND PROGRESS

Milestone	Description	Milestone Date dd/mm/yy	Milestone Progress
Milestone 1 • Project plan completed and approved by SNHC. Project plan to include communications plan and water quality test plan • All required approvals obtained • Design completed and approved by SNHC • Project Plan including communications plan and water quality test plan approved by Smart Water Fund	Planning and Design	30 Sep 2004	• Project plan completed and approved by SNHC. Communications plan and water quality test plan have been approved by SNHC and are appended to this report. • All contracts and agreements executed and work underway • Detailed design reviewed and accepted by SNHC • Budget has been confirmed on target • Required approvals are in place subject to final inspection by EPA
Milestone 2 • stormwater collection and storage system installed and operational • greywater treatment plant installed and operational • Certification that water produced is fit for purpose	Construction and Commissioning	30 Jan 2005	• Construction of the works is complete • Commissioning testing is complete and system is operational with all user training complete and water quality monitoring in place
Milestone 3 • Approved communications plan implemented • Final report noting activities conducted and benefits achieved completed and approved by SNHC • Final report noting activities conducted and benefits achieved approved by Smart Water Fund	Communications and Evaluation	30 June 2005	• Information boards installed • Fliers distributed • Banners erected • Tours being conducted
Completion Date 30 June 2005	N/A	N/A	

Appendix I
Information Boards



Version 1



Version 2

Appendix 2
Communication Fliers

First hockey facility
water-recycling
system of its kind

In 2004, the State Netball Hockey Centre received a grant from the Smart Water Fund to recycle the water collected on the hockey pitches and roof structure. The Smart Water Fund encourages innovation in water conservation and recycling.

Upon installation, the centre will reduce the wastage of potable water by up to 75% annually. The project will provide a more responsible approach to the preservation of Melbourne's drinkable water reserves, and will also create the first hockey facility water-recycling system of its kind in the world.

SB+D - 2119

10 Brens Drive, Royal Park Parkville,
Victoria, 3052, Australia
Tel: (03) 8379 4222, Fax: (03) 8379 4233
Email: info@snhc.com.au

STATE NETBALL HOCKEY CENTRE
ROYAL PARK MELBOURNE

Making Every Drop Count

SNHC scores
a rst with it's
water conservation
initiative

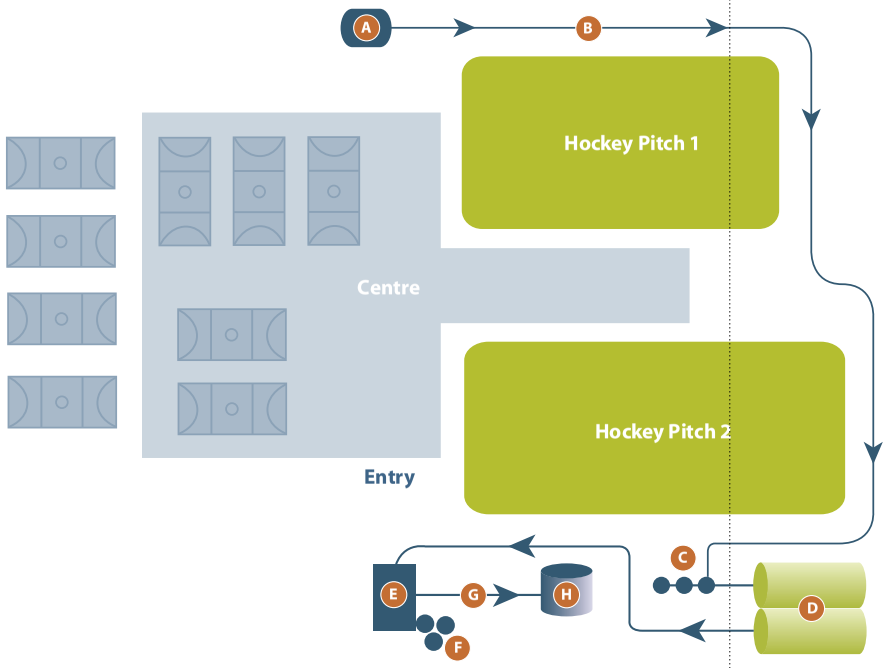
STATE NETBALL HOCKEY CENTRE
ROYAL PARK MELBOURNE

The State Netball Hockey Centre opened in 2001 primarily to house the Hockey Victoria and Netball Victoria state sporting associations, and is now one of Victoria's premier sporting event facilities.

The Centre now proudly boasts 2 international standard hockey wet pitches, hockey grandstand seating, five indoor netball courts including those located in the Centre's impressive main stadium, and four outdoor courts in scenic Royal Park parklands. The Centre also incorporates two multi-purpose function rooms ideally positioned above the main stadium and show pitch and offering views of Melbourne's CBD.

In line with the Centre's growth and in readiness for the imminent 2006 Commonwealth Games, the Centre initiated and researched a water re-harvesting project which would see the State Netball Hockey Centre create the first sports facility water-recycling system of its kind in the world. This project was submitted to the Round 2 Smart Water Fund applications early in 2004.

Here's how it works...



A Stormwater Collection Point
All excess water (run-off water) from Hockey pitch 1 and Hockey pitch 2 and the mainroof structure is transported to this point.

B Water Transfer
Two pipes transfer the water from collection point A to 2 x 90,000 litre holding tanks.

C 3 x Gross Pollutant Traps
These traps remove any foreign items that may have been collected in the water. This includes anything larger than a 10c coin (i.e. mouthguards, strapping).

D 2 x 90,000 litre underground holding tanks

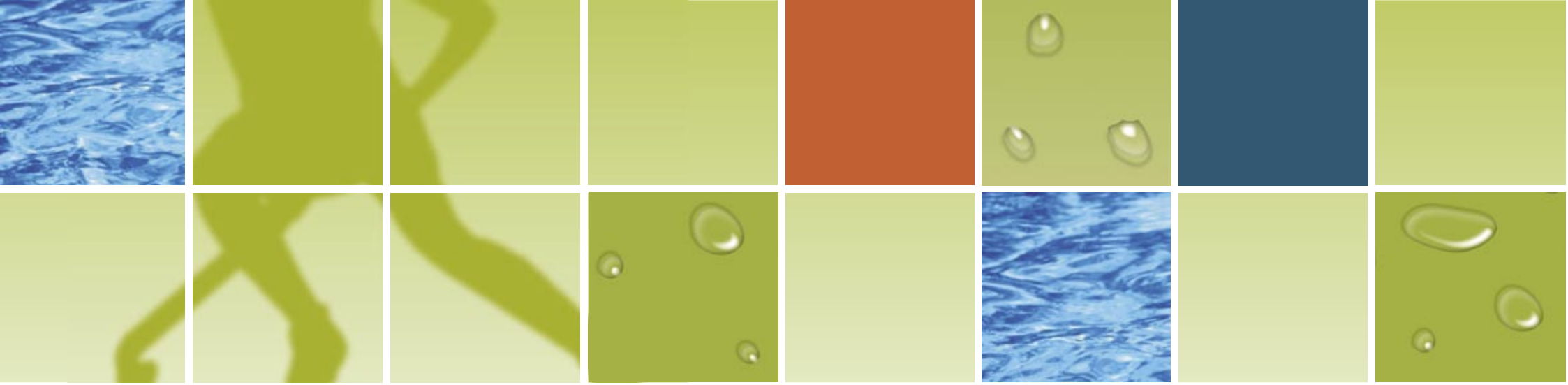
E Plant Room
This plant room houses the existing pitch irrigation equipment. This room now also incorporates the recycled water purification system.

F Water Circulation Tanks
These tanks circulate the water for testing & dosing purposes.

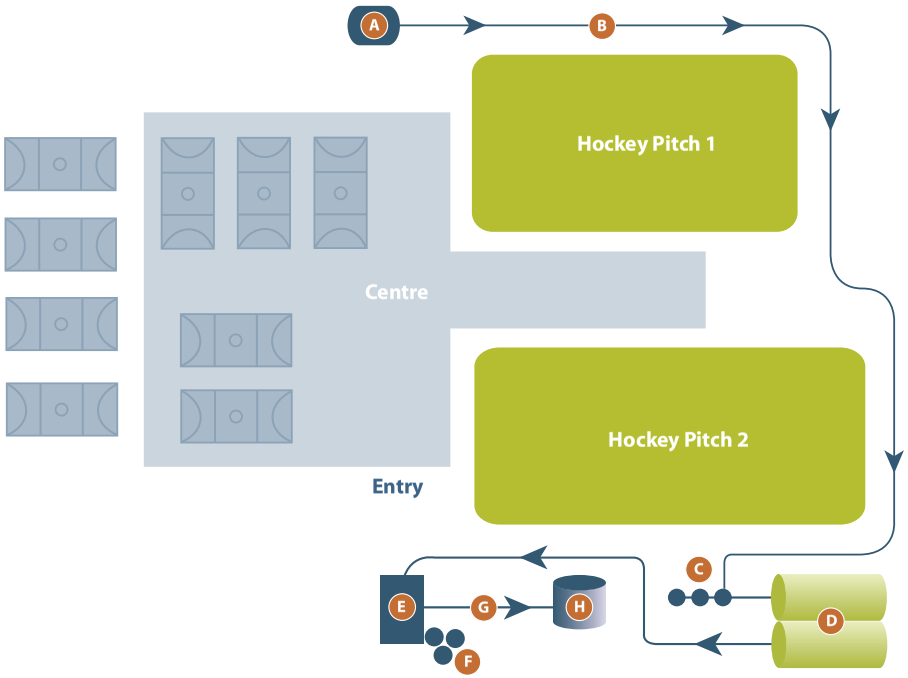
G Pipeline
This is a pipeline installed to transfer tested and treated water to the existing holding tank (H).

H The Holding Tank
This tank is filled on demand (i.e. when the sprinklers are activated). Upon arrival into the holding tank the water is purified & ready for use.

Appendix 3
Signage



Making Every Drop Count



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STATE SPORT CENTRES TRUST

Victoria The Place To Be

Smart Water Fund

STATE NETBALL HOCKEY CENTRE
ROYAL PARK MELBOURNE

Appendix 4
Photographs

Figure 1 Overview of Pitch 1

Figure 2 Installation of Storage tanks

Figure 3 Storage Tanks prior to backfilling.

Figure 4 Installation of pipe network

Figure 5 System control and filter equipment