

Name:	Frankston City Council
Project Description:	Sustainable Water Resource Practices in Public Aquatic Centres
Milestone Number and Title:	Milestone 2 – Jubilee Park Aquatic Centre
Date of Milestone Report:	25 March 2004

1. Background

In 2002, Frankston City Council conducted a 'walkthrough' water audit of its two aquatic centres to identify viable water saving opportunities related to each of the facility's operation. There were a number of water conservation measures that were identified through this audit that aimed to reduce water usage and associated water costs.

Proposed water saving measures identified in the water audit for Jubilee Park Aquatic Centre included:

1. Installation of rainwater collection tanks to supply toilet flush cisterns;
2. Installation of flow regulators in shower and hand wash basin taps;
3. Installation of timer push-button taps in showers and hand wash basin taps;
4. Installation of dual flush cisterns in toilets;
5. Installation of pool blankets;
6. Installation of 'surface evaporation suppressant' system in pools;
7. Repair or replace leaking taps and toilets; *and*
8. Education of pool users and staff in water saving initiatives (e.g., briefing sessions, interpretative signage, ongoing consultation).

The annual water consumption for Jubilee Park Aquatic Centre is 14.6 ML (million litres) per annum at a total cost of \$18,840. Savings predicted as a result of the implementation of the proposed water saving measures amount to 53% reduction in water usage (7.8 ML) per annum and a 55% cost saving (\$10,340).

In November 2002, Frankston City Council applied for funding of the water saving initiatives identified in the water audits through the Smart Water Fund. The Smart Water Fund is an initiative of the Victorian government and the Metropolitan Water Industry. In April 2003, Frankston City Council was advised that it had been successful in its bid for funding, and that the value of \$50,000 would be made available from the Smart Water Fund to support the implementation of the water saving measures as identified in the original water audits.

1.1 Site Description

Jubilee Park Aquatic Centre is owned and operated by Frankston City Council. It was established in 1974 and is located in Jubilee Park on Hillcrest Road, Frankston.

Jubilee Park Aquatic Centre consists of an indoor swimming pool facility which houses a 25 metre large pool, a 12 metre small pool, spa pool, plunge pool, amenities and offices. Average total attendance rate over a 12-month period is approximately 90,000.

2. Description of Milestone and Date

Milestone 2 of Frankston City Council's Smart Water Fund Application consisted of the implementation of the proposed water saving measures identified in the water audit for Jubilee Park Aquatic Centre. The completion date for Milestone 2 was the 31 January 2004.

Frankston City Council is taking a leadership role in water conservation through the retrofit of Jubilee Park Aquatic Centre and the implementation of a range of water saving measures. To Council's knowledge, the potable water treatment system is the first of its kind in Australia to provide potable water from rainwater to an Aquatic Centre.

3. Key Activities Completed

Key activities conducted to achieve Milestone 2 were undertaken over an 18 month period, involving Council staff, the Project Manager being Utilities Management Group Pty Ltd, representatives from the Smart Water Fund, Plumbing Industry and the successful tenderer (Contractor) being Total Water Management Solutions Pty Ltd.

The key activities completed during this time included the following:

1. Water audit of Jubilee Park Aquatic Centre (completed Nov 2002)
2. Smart Water Funding application by Council (approved Apr 2003)
3. Consultant employed to develop project specifications with council staff and provide technical knowledge where required (engaged Apr 2003)
4. Design, specification and tender documentation prepared (complete Jul 2003)
5. Tender to at least 3 suppliers/contractors (complete Sep 2003)
6. Tender evaluation/selection and report (complete Nov 2003)
7. Implementation of water saving measures (complete Dec 2004)
8. Final site inspection and approval of all completed projects (Jan 2004)
9. Issue final project report (Mar 2004)
10. Information session and open day to interested parties (Jun 2004)
11. Case studies prepared to promote the outcomes of the project (2004)
12. Monitoring and review of measures over the next 12 month period (ongoing).

During this process, a number of changes to the original work plan were proposed and implemented (also see section 5. *Issues Arising*). Some measures that were originally proposed in the water audit were not implemented, and others were modified based on the opportunities and improvements that were identified during the project pre-design stage. For example, the original proposal included the installation of rainwater tanks for the supply of water to flush the toilet cisterns. However, the successful tenderer proposed a cost effective alternative to supply a potable water treatment system. The system permits the harvested rainwater or stormwater to be utilised to its maximum potential by supplying water for all potable purposes. This achieves greater water savings and eliminates the necessity to provide a separate non-potable reticulation system for rainwater.

4. Results Achieved

It is too early to determine the effectiveness of the water saving measures implemented in reducing water consumption at the facility. However, water usage will be monitored and evaluated on an ongoing basis over the next 12 months and ongoing.

The estimated water consumption distribution for Jubilee Park Aquatic Centre is shown in the table below (see Table 1).

Table 1: Estimated water consumption distribution for Jubilee Park Aquatic Centre

Item	Water Usage (kL)
Toilet Sets	1,100
Showers	8,000
Hand Wash Basins	2,300
Pools	2,700
Garden Sprinklers	550
TOTAL	14,650

4.1 Water Saving Measures

The water saving measures implemented at Jubilee Park Aquatic Centre included:

Rainwater Tanks

Two 31,500 litre polyethylene rainwater storage tanks were installed on ground to supply potable water to the facility (includes water for drinking and hygiene purposes). The down pipes from the roof were isolated and redirected to discharge water into these tanks. Two additional 5,000 litre feeder tanks were installed to collect water around the facility and feed via a pump into the storage tanks. The rainwater tanks come complete with an automatic mains water backup, and the potable water treatment system consists of first flush methodologies, filtration and ultra violet disinfection (see Figure 1).

Council's original proposal to the Smart Water Fund involved capturing the stormwater only for the flushing of toilets, however, a system was proposed by Total Water Management Solutions Pty Ltd, to supply potable water to the entire facility by including a treatment system at no additional upfront cost.

The estimated water savings from the implementation of the rainwater storage tanks are 1,200 kL (kilolitres) of water per annum at a total cost saving of \$1,598. The cost of implementation was \$31,250, with a payback period of 19.6 years. Though this project does not provide an opportunity for Council to recover its investment in the short-term, the project does demonstrate a significant opportunity by Council to save water, and this type of project is unlikely to be cost effective until the price of water reflects more accurately the actual cost of supply. In this instance, the environmental benefits of the tanks take precedence.

The *Safe Drinking Water Act 2003* makes provision for the supply of safe drinking water, and becomes operational on the 1 July 2004. The Act requires water suppliers to prepare and implement plans to manage risks in relation to drinking water, to ensure that the drinking water supplied meets quality standards. Although it is unclear at this stage whether Frankston City Council is considered to be a 'water supplier' under the Act, Council is currently developing and implementing a Risk Management Plan regardless, in accordance with the *Safe Drinking Water Act 2003* to ensure due diligence. Council is employing a preventative risk management approach to managing water quality, rather than relying on just end-point testing. The water quality monitoring is based on recommendations as specified by the Australian Drinking Water Guidelines (NHMRC/ARMCANZ, 1996).



Figure 1: Photo of rainwater tanks (2 x 31,500 litres) providing potable water to the Jubilee Park Aquatic Centre for drinking and hygiene purposes.

Flow Regulators

JemFlo flow regulators were installed in the showers and hand wash basin taps. The flow regulators reduce water flow and pressure at the water delivery point and so save on water usage without affecting the 'quality' or 'feel' of the water supply.

The flow regulators have reduced the flow in the showers and hand wash basins between 30 to 40% without affecting the operation and performance of the outlets. The original showerheads flowed at 11 litres per minute and now operate at 7 litres per minute. That's a saving of 4 litres each minute in the shower. The hand basins flowed at 10 litres per minute and now operate at 6 litres per minute, that's a saving of 4 litres for each minute of operation.

The estimated water savings from the implementation of the JemFlo flow regulators is 3,090 kL per annum at a total cost saving of \$4,115 (for a full account of the estimated savings, see Table 2).

Additional benefits of the flow regulators include reduced energy consumption and greenhouse gas emissions, as less gas is required to heat a smaller volume of water, and the flow regulators have also eliminated water temperature and flow fluctuations in the facility (e.g., when one person is showering and a tap is turned on elsewhere).

Timer Push-button Tapware

Enware timer push-button taps were installed in the showers and hand wash basin taps. A common problem that appears in public facilities is the leaving on of showers and taps after their use. To address this problem, the push-button timer was selected over the spring loaded lever variety as this was considered more practical for people with disabilities (see Figure 2).

With this system, the operator presses the push-button timer to activate the tap or shower which then supplies water for a pre-determined period. In this instance, the hand wash basin taps were set at 7 seconds and the showers set at 30 seconds.

The estimated water savings from the implementation of the Enware timer push-button taps is 2,057 kL per annum at a total cost saving of \$2,739 (for a full account of the estimated savings, see Table 2).

The timer system also saves energy as less gas is required to heat the smaller volume of water, which in turn reduces greenhouse gas emissions. A temperature regulator also ensures that the water is an even and consistent temperature for users.



Figure 2: Photo of Enware timer push-button taps on hand wash basins in female change rooms.

Dual Flush Cisterns

The single flush cisterns in the men's toilets and disabled toilet have been replaced with Caroma 3/6 litre dual flush cisterns (see Figure 3). The women's toilets were not retrofitted as they already were dual flush. New building regulations require the installation of new cisterns to have the dual flush capacity. The old cisterns had a flush capacity of 9 litres. The dual flush enables a full flush (6 litres) and half flush (3 litres) to be used.

The estimated water savings from the implementation of the Caroma 3/6 dual flush cisterns is 176 kL per annum at a total cost saving of \$234 (for a full account of the estimated savings, see Table 2).



Figure 3: Photo of Caroma 3/6 dual flush cistern in disabled toilets

Pool Blankets

Swimming pool thermal blankets are commonly used in aquatic centres to cover the pool water to reduce water evaporation loss. This results in savings for both water consumption and energy heating costs, as well as minimising the risk of excessive condensation in the facility.

Two 25 metre by 6 metre polyethylene thermal pool blankets including rollers from Sunbather Pty Ltd, were installed on the main pool, with a motorised drive unit to assist in the installation (see Figure 4). The estimated water savings from the implementation of the Sunbather Pty Ltd pool blankets is 876 kL per annum at a total cost saving of \$1,166 (for a full account of the estimated savings, see Table 2).

In addition, savings to heating costs are anticipated, as the pool blankets insulate the pool water and reduce heat loss. The annual savings in gas consumption through the implementation of the pool blankets are estimated at 1,225 GJ per annum with a cost saving of \$9,195, and a reduction in greenhouse gas emissions of 62.5 tonnes CO₂ (carbon dioxide) per annum.

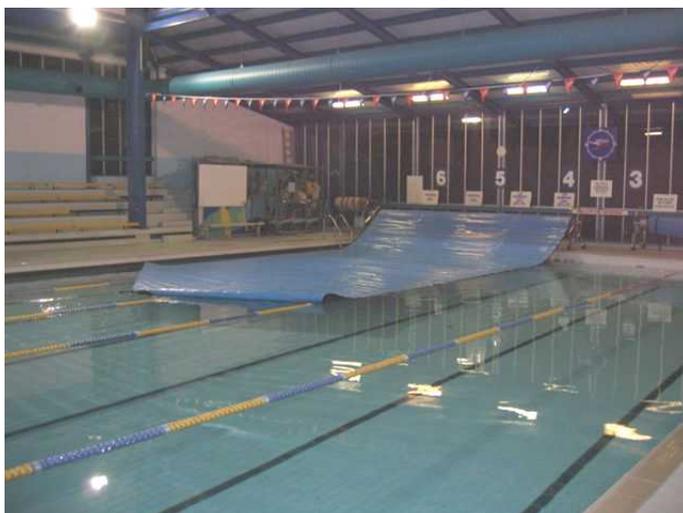


Figure 4: Photo of pool thermal blankets being installed

Repair or Replace Leaking Taps and Toilets

The initial walkthrough water audit of the facility identified a number of leakages from the irrigation system and plant room that needed to be addressed. These water leakage problems were addressed immediately prior to the Smart Water Fund application, though nonetheless will contribute to water savings in the facility.

Timer and Rain Sensor Control on Irrigation Sprinklers

The previous irrigation system at Jubilee Park Aquatic Centre consisted of large in-ground sprinkler heads that were manually operated by staff members. To avoid human error and over watering, a timer and rain sensor control system was installed to ensure that the sprinklers operate at a preset time period and not during wet weather periods.

Reduction in water consumption with the new system is estimated at 35% of the annual usage (see Table 2). The estimated water savings from the implementation of the timer and rain sensor control is 193 kL per annum at a total cost saving of \$257 (for a full account of the estimated savings, see Table 2).

Water-efficient Landscaping

Though not part of the Smart Water Fund project, the Jubilee Park Aquatic Centre is landscaped using local indigenous plants which are adapted to the local conditions. These plants are water efficient, requiring limited watering, and mulch is provided for the garden beds to avoid evaporation from the soil. A small lawn area around the facility is provided for recreational purposes and this area is now irrigated using the timer and rain sensor control.

Education and Awareness

Pool users as well as staff have been involved in the Smart Water Fund project from the onset. Staff have been educated about the water saving initiatives through ongoing consultation, and pool users have been provided with updated information through interpretative signage. Comments and suggestions about the project have been encouraged and are captured through a feedback form which is provided through the centre.

Further case studies, information sessions and promotion of the project outcomes will ensure that a greater understanding and awareness of water related issues relevant to the aquatic industry are achieved.

4.2 Total Water Savings

The annual water consumption for Jubilee Park Aquatic Centre is 14.6 ML per annum at a total cost of \$18,840. Savings predicted as a result of the implementation of the proposed water saving measures amount to 7.8 ML (53%), equating to annual water expenditure savings of \$10,340 (55%). The implementation cost of these measures is \$95,771, offering a total payback period of 9.3 years (refer Table 2).

Table 2: Water saving measures implemented at Jubilee Park Aquatic Centre and the proposed savings.

Water Saving Measure	Ongoing Water Savings	Ongoing Expenditure Savings	Implementation Cost	Simple Payback Period
	(kL pa)	(\$ pa)	(\$)	(Years)
Install Rainwater Collection Tanks and Potable Water Treatment System	1,200	\$1,598 pa	\$31,250	19.6
Install Flow Regulators in Shower and Hand Wash Basin Taps*	3,090	\$4,115 pa	\$1,500	0.4
Install Timer Push-button Taps in Showers and Hand Wash Basin Taps*	2,057	\$2,739 pa	\$15,870	5.8
Install Dual Flush Cisterns	176	\$234 pa	\$4,855	20.7
Install Pool Blankets on Main Pool*	876	\$1,166 pa	\$40,546	34.7
Install Timer and Rain-Sensor Control on Irrigation Sprinklers	193	\$257 pa	\$1,550	6.0
Repair or Replace Leaking Taps	175	\$233 pa	\$200	0.9
TOTAL	7,767 kL pa	\$10,342	\$95,771	9.3

* Does not include estimated savings on heating costs.

Additional benefits of the water saving measures implemented include:

- Reducing energy use, therefore, lowering carbon dioxide emissions from the burning of fossil fuels;
- Reducing the need for new infrastructure, whether dams or electricity generating plants which must often be sited in environmentally sensitive areas; *and*
- Reducing sewage treatment capacity and thus the pollution of our rivers and oceans.

Figure 5 indicates the annual water usage and water cost if all the water saving targets were met at Jubilee Park Aquatic Centre. The water reduction target and cost targets are demonstrated below.

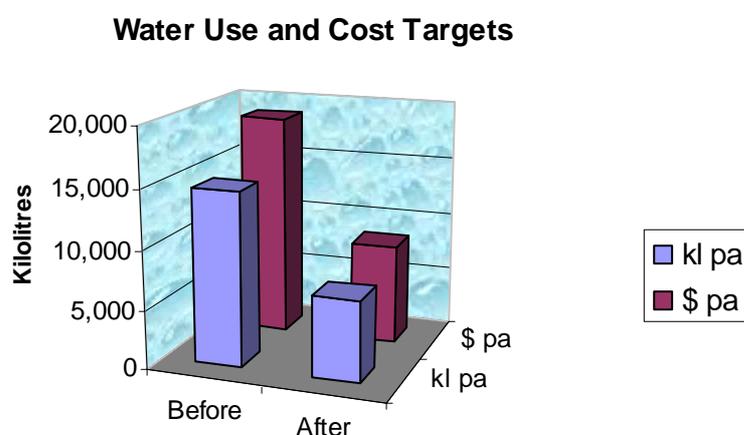


Figure 5: Water Use and Cost Targets for Jubilee Park Aquatic Centre

4.3 Monitoring

Though too early to determine the precise effectiveness of the water saving measures implemented in reducing water consumption at the facility, the water usage will be monitored and evaluated on an ongoing basis over the next 12 months and ongoing.

5. Issues Arising

Surface Evaporation Suppressant

One of the original recommendations from the water audit that was identified for Jubilee Park Aquatic Centre was not implemented. The installation of a 'surface evaporation suppressant' system was not undertaken. Though the use of surface evaporation suppressant in pools has been demonstrated, there was some concern by Council staff that this was not well documented and that the health and environmental impacts of its use were not well known. As a result, this was not implemented as part of the water saving measures.

Backwash Water

In addition, Council explored the feasibility of implementing a retrofit solution to the effective treatment and recycling of backwash water in Jubilee Park Aquatic Centre. It was anticipated that the Smart Water Fund project would include a feasibility assessment into the installation of a backwash water treatment system that would allow for the water to be reused for pool filling. However, the knowledge and lessons learnt during this investigation demonstrated to Council staff that this was not a cost effective water saving measure at this time, and that there were

limited opportunities within the private industry sector to provide a streamlined retrofit solution that was suitable for this proposal. There was also a lack of clarity in regards to Department of Human Services and EPA Victoria regulations.

Push-button Timers

An assessment is currently being undertaken in relation to the recently installed Enware push-button timers, as they do not meet the original specifications. The timers currently provide water for 22 seconds in the showers, rather than 30 seconds (the minimal accepted time period by Council). It is anticipated that this will be resolved in the coming weeks between Council, the Contractor and Enware representatives.

Tendering

Council experienced difficulty in securing a response from the tenderers (contractors) in regards to the tender request. From discussion with prospective contractors, Council staff ascertained that this project included non familiar work which presented a number of significant challenges to most companies within the plumbing industry. This was demonstrated by the limited response Council received to the tender process, where only three contractors responded, though 13 tenderers were invited to respond. As a result, amendments to the Milestone 2 completion date were sought from and agreed by the Smart Water Fund to; a) accommodate the extended tender periods, and b) time spent investigating the feasibility of the backwash water treatment system.

Additional Budget

The tender process also demonstrated that an additional budget was required from Council to meet an increased cost in the supply and installation of the project works. The original costings identified in the water audit were not reflective of the actual cost of supply and installation confirmed during the tender process. The water audit did not effectively scope the project and identify the constraints which led to an increase in the cost of the measures. However, the additional funding required for this project was secured by Council through its Capital Works Budget for 2004/05.

6. Next Steps

Frankston City Council will begin implementation works at the Pines Forest Aquatic Centre in June 2004 (Milestone 3). Council staff are still seeking a solution to the backwash water treatment system and have sought funding for this option from Round 2 of the Smart Water Fund.

In addition, there will be an evaluation of the measures implemented at Jubilee Park Aquatic Centre to ascertain the suitability of these measures for Pines Forest Aquatic Centre. The evaluation of these measures will take place over the coming months.

A public information session and 'open' day is also planned by Frankston City Council, Smart Water Fund and Water Industry representatives. The open day will provide opportunities for Council staff and the community to learn about the project at Jubilee Park Aquatic Centre and its anticipated 'water saving' outcomes.