

URBAN WORKSHOP - BLACK WATER TREATMENT COMMISSIONING REPORT JANUARY 2007



Smart Water Fund



ISPT



CliftonConey
Group

Melbourne
Water

SOUTH EAST
WATER 

 Yarra Valley Water



City West Water

The Urban Workshop **50 Lonsdale Street Melbourne, VIC 3000**

The Urban Workshop is a 34 storey commercial office building with adjacent 3 level Leisure Precinct. The building also includes 5 levels of basement car-parking with areas for motorbikes and bicycles.

The Urban Workshop has been designed as a Grade-A multi-dimensional facility incorporating mixed retail, leisure and commercial areas in the one building. The ground floor includes 16 retail tenancies set around a bluestone street that creates a thoroughfare between Lonsdale and Little Lonsdale Streets. Overlooking the retail street is a 3 storey Leisure Precinct, which features and gymnasium use tenancy.

The building comprises a Gross Floor Area of approximately 107,068m² and a Net Lettable Area of 64,662m². The commercial office floor plates have NLAs of between 1,799m² and 1,952m². The Department of Human Services is the major tenant including occupying parts of the Ground floor to Level 4 and all of Levels 5 to 28.

How This Building is Water Smart?

Highlighted by eight years of drought and unreliable rainfall, community awareness in water related issues has increased significantly and the community is working together to ensure the long term sustainability of our water supplies. One important way we can do this is through the re-use of our waste water. The Urban Workshop is designed as a water smart building with the installation of a black water recycling system. This system allows water used in the flushing of toilets to be treated within the building and up to 95% of the treated effluent recycled, being re-used in the flushing of toilets. This system alone will save up to 97,500 litres of drinking quality water a day, water which would typically be flushed into the sewerage system for treatment.

Black Water Treatment Plant Components

The main plant used in the treatment process includes:

- Stainless Steel Buffer Tank
- Rotary drum screen
- Balance/anoxic tank
- Aeration tank
- Chemical dosing systems (Magnesium Hydroxide and Calcium Hypochlorite)
- Membrane operating system
- UV disinfection unit
- Water quality analysis sensors and analyzers/transmitters

Development water usage

Maximum amount of water used for sanitary flushing is estimated to be 130,000 litres in a single working day.

Re use water capacity

Maximum amount of water treated is approximately 97,500 litres in a single working day with 32,500 litres diverted to the authority connection.

Re use water usage areas

Recycled water is for toilet flushing only (297 toilets and 99 urinals).



Potable water savings

Savings of 97,500 of potable water is saved every working day.

Expected plant operating costs

Annual costs commence at \$13,000 ranging up to \$27,000 per annum over the first 10 years.

Cost savings on water / sewerage charges

Cost savings on water and sewerage charges commence at \$19,744 and \$21,938 in the first year, with a total saving estimated of \$970,310 over 15 years.

Monitoring of payback period

The financial viability estimates a payback period of 14 - 15 years.

Commissioning

Although the Installation of the Black Water Treatment Equipment was completed in Early 2006, it was not until November 2006 that the system was fully commissioned. This was due to the extensive commissioning process required not only of the Black Water Treatment Equipment but also the Hydraulic system for distribution around the building.

The initial testing of the hydraulic system was undertaken with clean water for verification of pump operation, and process flow. Once satisfied that the various stages of the process were operating correctly, the membranes were installed into the MBR (Membrane Bio Reactor).

Once the membranes were installed initial seeding of the plant took place with sludge from a municipal treatment plant, which was screened before being introduced into the aeration tank. The plant was then "on-line" in taking sewerage from the building and filtering it whilst the MLSS (Mixed Liquor Suspended Solids) level was being elevated.

Routine testing of MLSS was undertaken until levels were within the preferred range, being between 8,000 and 12,000 mg/l. The base filtration rate was gradually increased as MLSS level increased, until up to design filtration rate. During this period the filtrate was discharged to sewer.

Over this time continuous on-line testing of the filtrate is in place, testing for pH, chlorine, turbidity and conductivity, enabling these parameters to be monitored during this process. Laboratory testing was used to check BOD5, Suspended Solids, Turbidity, pH and E.Coli (pH and Turbidity as independent check). Chemical dosing is also commenced with regular testing and monitoring to ensure correct operation.

The Aeration Tank pH and dissolved oxygen levels are also continuously monitored on site ensuring the Aeration treatment is in order. The MLSS levels within the Aeration system were determined by laboratory testing.

The most problematic issue during the commissioning stage was dealing with the screening from the drum screen, to prevent blockages in the drainage pipe work. Primarily this was caused because there is no sludge wasting process occurring while the MLSS level is being raised. Once the MLSS level is achieved periodic wasting to maintain the MLSS level provides sufficient "flushing" to keep the drain line clean.



When all the building interfaces from the Hydraulic contractor were in place, fully functional water samples were taken over a five day period, and tested by an independent laboratory for compliance with the specification. These positive test results confirmed that the Blacker Water Treatment Equipment was operating as intended and therefore ready for recycled to be sent up the building.

The product of the Black Water Treatment Equipment when commissioned is Class A water. Refer to the attached Water Quality Test Results for the chemical breakdown of the Laboratory Tested samples taken over the five day period as the final check prior to commissioning the system.

On-going monitoring on site is in place for turbidity, residual chlorine, pH and conductivity. In accordance with the contract specification for the Recycled Water Plant further laboratory testing is required at month 6 and month 11 after commissioning, however an increased testing regime is in place during the early months of operation with occasional testing undertaken for the building owner and contractors benefit to ensure that the results are consistent with those achieved initially. Similarly as part of the contractors two year maintenance agreement, they take samples of the MLSS to check it is within the required range.

Other Environmentally Sustainable Development features including water saving initiatives

Under the Victorian Government Property Group's Building Performance Benchmark Document the project must incorporate the following:

- Water flow conservation devices fitted to taps and shower outlets to achieve AAA rating water use.
 - **Hansaprado Mixers AAA-Rating**, which can operate with a flow rate as low as 7 litres per minute, (only 9 litres per minute required to attain AAA rating).
 - **Flexispray ParaHealth Rail Shower, (known as the System 2)**, which has a AAA water conservation rating.
- Collection and reuse of rainwater for fire water has been implemented.
- Photovoltaic cells to generate 1% of power.
- SEDA energy rating system of 4.5 Stars
ISPT have also committed to seek a Green Star rating for the building. It is anticipated the project will achieve between 4 and 4.5 star rating.



Acknowledgements:

- **Smart Water Fund**

Melbourne's water authorities, City West Water, South East Water, Yarra Valley Water and Melbourne Water, with the support of the Victorian Government have established the Smart Water Fund to encourage and support innovative development of water, biosolids recycling and water saving projects within the community. The Smart Water Fund is applicable to projects that deliver broad environmental, community, and commercial benefits within the Melbourne metropolitan area.

The Smart Water Fund has contributed \$100,000 towards the Black Water Treatment Plant in the Urban Workshop.

- **Hydrautech Designs / CJ Arms & Associates**

The Black Water Treatment Plant was designed by Hydrautech Designs in Conjunction with CJ Arms.

Hydrautech Designs Pty. Ltd. provides detailed design for all facets of hydraulic services, water treatment and environmental services.

- **Walter J. Pratt**

The Black Water Treatment Plant was manufactured and installed by Walter J Pratt.

Walter J Pratt Pty. Ltd. offer consulting, design, documentation, construction and maintenance of commercial and industrial water treatment, trade waste, wastewater treatment and reuse systems.

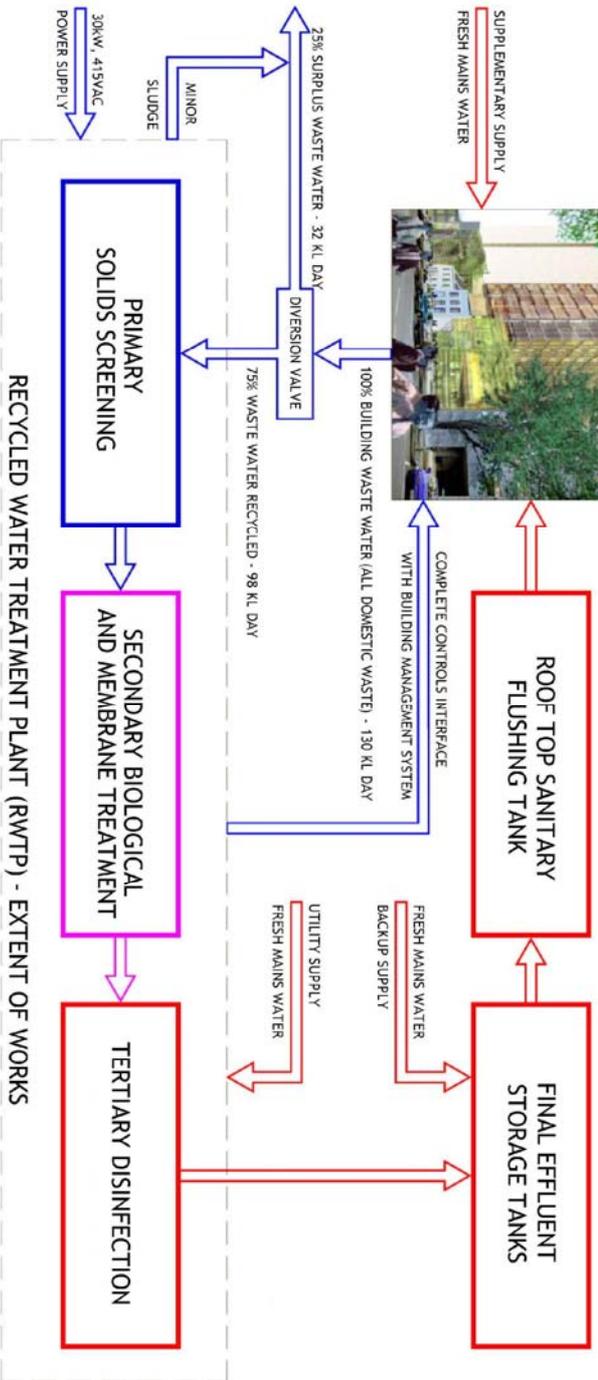




HD Hydratech Design Pty. Ltd.



C. J. ARMS & ASSOCIATES



WATER QUALITY TEST RESULTS - LABORATORY TESTING

Location: CONTACT TANK - B5

	Indicator				
	Biological Oxygen Demand BOD ₅	Suspended Solids	Turbidity	E. Coli	pH
Unit	mg/l	mg/l	NTU	Org/ 100ml	pH

GEM Table 1 Class A	Median			2		6.0 to 9.0
	Maximum	10	5	5	10	

Sample Details - as per EML Report N117438

25/9/06 - as per EML Lab No. 18677	< 5	1	0.9		8.0
26/9/06 - as per EML Lab No. 18680	< 5	2	1.1	< 1	7.6
27/9/06 - as per EML Lab No. 18786	< 5	2	0.6	< 1	7.7
28/9/06 - as per EML Lab No. 19013	< 5	< 1	1.7	< 1	7.6
29/9/06 - as per EML Lab No. 19119	< 5	1	2.3	< 1	7.7