



**Melbourne
Water**

Eastern Treatment Plant

**2006/2007 Annual Monitoring Report to the
Environment Protection Authority**

EM 35642

August 2007

PREAMBLE

The Eastern Treatment Plant (ETP), at Bangholme, treats about 42% of Melbourne's sewage, servicing about 1.5 million people in Melbourne's south-eastern and eastern suburbs. It uses physical and biological processes to treat the sewage to a secondary level before the treated effluent is discharged under an EPA Victoria licence via a 56 kilometre pipeline into Bass Strait. This treatment method produces sewage sludge or biosolids, biogas and treated effluent.

When the plant opened in 1975, it was a world leader in sewage treatment. Improvements have been undertaken since then and the plant has continued to serve the community well. However, works are currently underway to ensure that the plant is able to work well for the long-term and improve and protect the marine environment.

In 1997, Melbourne Water commissioned CSIRO to undertake a major, two-year, study on the effect of the discharge of treated effluent on the marine environment at Boags Rocks where the Eastern Treatment Plant's outfall is located. The study, which was completed in 1999, recommended reducing the level of ammonia in the effluent, reducing the volume of freshwater being discharged at Boags Rocks and undertaking long term microbiological testing at the outfall.

All these recommendations are being acted upon and Melbourne Water is currently upgrading the Eastern Treatment Plant. The upgrade is designed to improve and protect the marine environment. Ammonia levels in the final effluent will be reduced by over 75 percent. It was announced in October 2006 that an upgrade of the Eastern Treatment Plant to treat wastewater to the EPA Victoria Class A Recycled Water standard would begin in 2007 and would be completed by 2012.

The plant operates under an EPA discharge licence (No. EM35642). The licence requires Melbourne Water to provide an annual summary of the operation of the Eastern Treatment Plant premises including the results of monitoring programs, a summary of any works that have occurred, details on trade waste received and endeavours to further increase reuse of effluent. These are presented in this report.

Over the 2006/07 financial year the Plant met all of the EPA Victoria discharge licence requirements. The only significant disappointment during the year was an incident in March 2007. For 19 days recycled water was supplied as drinking water to the kitchen in a newly constructed administration building as a result of a cross-connection between potable and recycled water pipelines. Twenty two Melbourne Water staff and contractors reported short-term gastro-intestinal illnesses. The supply was isolated immediately after it was discovered. WorkSafe, Department of Human Services and EPA were notified. Melbourne Water initiated an independent investigation into the cause of the incident. The investigation identified a number of improvement actions which are currently being implemented. A debrief was held on the management of the incident with no significant issues identified.

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MONITORING RESULTS

1.1 Discharges to Water

1.1.1 Treated Effluent Quality

The following results represent samples taken from the treated effluent sample point referred to in condition 1.3 of the EPA discharge licence and flow measurements at the Eastern Treatment Plant from 1 July 2006 to 30 June 2007.

Table 1 EPA Victoria Discharge Monitoring Point Results

Parameter (units)	Median		90th Percentile		Maximum	
	Licence Limit	Result	Licence Limit	Result	Licence Limit	Result
BOD ₅ (mg/L)	NS	22	NS	36	NS	45
CBOD ₅ (mg/L)	20	4	40	7	NS	12
Suspended Solids (mg/L)	30	13	60	23	NS	65
pH (pH units)	NS	7.6	NS	7.9	≥ 6, ≤ 9	8.2
Ammonia as N (mg/L)	30	12	NS	21	40	26
Total Nitrogen (mg/L)	NS	25	NS	31	NS	36
Total Phosphorus (mg/L)	NS	8	15	10	NS	11
Anionic Surfactants (mg/L)	0.4	0.2	0.7	0.3	NS	0.40
Cadmium (mg/L) ¹	NS	0.0001	0.005	0.0001	0.01	0.0009
Chromium (mg/L)	NS	0.003	0.075	0.01	0.15	0.014
Copper (mg/L)	NS	0.014	0.05	0.023	0.1	0.039
Lead (mg/L) ¹	NS	0.001	0.05	0.0035	0.1	0.013
Mercury (mg/L) ¹	NS	0.00005	0.0005	0.00005	0.001	0.00005
Phenol (µg/L)	NS	0.5	NS	1.5	100	1.5
Toluene (µg/L)	NS	0.5	NS	1.9	50	4.0
Benzene (µg/L)	NS	0.5	NS	0.5	25	0.5
PAH's total (µg/L) ²	NS	4	NS	4	15	4
ETP discharge (ML/day) ³	NS	295	NS	405	NS	478
Outfall discharge (ML/day) ⁴	540	288	NS	404	NS	478
Total Residual Chlorine (mg/L)	NS	0.11	NS	0.22	1.0	0.31
E.coli (orgs/100mL)	200	26	1000	110	NS	610
Enterococci (orgs/100ml)	NS	10	NS	69	NS	490
Dissolved Oxygen (mg/L)	NS	6.8	NS	7.7	≥ 6.0	6.0 -9.1

Notes:

- All results found to be less than the detection limit were taken as half the limit of detection (LOD) e.g. <8 = 4.
 - Total Poly Aromatic Hydrocarbons (PAH's) are calculated using the sum of the following PAH's: (acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo(k)fluoranthene, 1,12-benzoperylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluorene and indeno(1.2.3-cd)pyrene. Note that laboratory error meant that one of the treated effluent PAH analytical results reported here was from a sample taken on 27th July 2006 rather than on a sample taken before 30th June 2006.
 - ETP outflow flow excluding South East Water treatment plants that also discharge treated effluent into the South East Outfall.
 - Calculated Total Outfall flow is the actual flow to the Outfall including South East Water discharges to the South East Outfall minus recycled water taken from the South East Outfall.
- NS = No specified limit

1.1.2 Treated Effluent Dioxin and Furan Analysis

During December 2006 and June 2007 samples for the Trueman's Road site were taken and analysed for Polychlorinated dibenzo-*p*-dioxins (PCDD's) and Polychlorinated dibenzofurans (PCDF's). The result gives a combined international toxic equivalent (I-TEQ), in pg/L, as detailed below. The Eastern Treatment Plant does not have a licence limit for this parameter.

Table 2 Treated Effluent Dioxin and Furan Results

Sample Site	December 2005 I-TEQ (pg/L) ¹	June 2006 I-TEQ (pg/L) ¹
Trueman's Road	1.7	3.6

Notes:

1. All values are reported as the middle bound, including 1/2 LOD's.

pg = pictogram = 0.000000000001 grams

For comparison, the NHMRC Tolerable Monthly Intake of dioxins for humans is 70 pg / kg body mass / month.

1.1.3 Effluent Flow to the Outfall

Daily and monthly median and maximum flows (ML/day) were measured during 2006/07. Monthly median and maximums are shown below. The total outfall flows for 2006/07 are as follows:

Table 3 Annual Treated Effluent Flows

Description	Flow (ML)	Comment
ETP Outflow	110,452	Total outfall pump station flow minus internal plant use
Calculated Outfall flow	108,128	Boags Rocks Outfall flow (ETP plus South East Water treatment plant flows, less water recycling)

Table 4 Eastern Treatment Plant Monthly Final Effluent Flow

Month	Median (ML/d)	Maximum (ML/d)
July 2006	327	414
August 2006	358	450
September 2006	356	457
October 2006	298	460
November 2006	308	446
December 2006	276	440
January 2007	264	367
February 2007	259	442
March 2007	261	462
April 2007	267	342
May 2007	268	433
June 2007	307	478

1.1.4 Discharge to Water- Aesthetics

Eastern Treatment Plant complied with all aesthetic aspects for the discharge licence during 2006/07. The main activities in monitoring aesthetic conditions during 2006/07 were:

- Daily beach inspections by Melbourne Water personnel and its contractors in the vicinity of the Boags Rocks outfall;
- Reporting the finding of the beach inspections internally and externally to EPA Victoria.

1.2 Environmental Impact Monitoring

1.2.1 Discharges To Land

No effluent was discharged to land at the Eastern Treatment Plant for irrigation purposes for the period 1 July 2006 to 30 June 2007.

1.2.2 Raw Sewage Monitoring

The following details the monitoring of raw sewage undertaken at the Eastern Treatment Plant in 2006/07 in parallel with the monitoring of final effluent for licence compliance.

Table 5 Quality of Raw Sewage Treated at Eastern Treatment Plant

Parameter, Units	Median ⁽¹⁾	90 th Percentile	Maximum
BOD ₅ (mg/L)	470	609	790
Suspended Solids (mg/L)	455	788	1600
pH (pH units)	7.2	7.8	8.3
Ammonia as N (mg/L)	42	46	47
Total Combined Nitrogen (mg/L)	69	88	95
Total Phosphorus (mg/L)	16	21	23
Anionic Surfactants MBAS (mg/L)	5	7	8
Cadmium (mg/L)	0.0006	0.0013	0.0024
Chromium (mg/L)	0.026	0.040	0.072
Copper (mg/L)	0.14	0.21	0.66
Lead (mg/L)	0.009	0.017	0.026
Mercury (mg/L) ²	0.0001 ⁽²⁾	0.0004 ⁽²⁾	0.0008 ⁽²⁾
Phenol (µg/L)	14.5 ⁽²⁾	65.3 ⁽²⁾	327 ⁽²⁾
Toluene (µg/L)	2.0 ⁽²⁾	4.9 ⁽²⁾	42 ⁽²⁾
Benzene (µg/L)	0.5 ⁽²⁾	0.5 ⁽²⁾	0.5 ⁽²⁾
PAH's total (µg/L)	4 ^(2,3)	4 ^(2,3)	4 ^(2,3)

Notes:

1. Some raw sewage parameters for 2006/07 are lower as compared to 2005/06 as the draining of primary sludge (during some part of the year) was stopped for 24 hours before the compliance sampling. The draining of Primary Sludge back into the head of the plant from Primary Sedimentation Tanks was carried out on a significant number of days over the year as was done in the year 2005/06. This was done as part of the operational control measures to prevent excessive sludge accumulation in these tanks.
2. 1/2 Limit of Detection Values used. All results found to be less than the detection limits were taken as half the given value i.e. $<2 = 1$.
3. Total PAH's are calculated using the sum of the following PAH's: (acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo (k) fluoranthene, 1,12-benzoperylene, benzo(a) pyrene, chrysene, dibenzo(a,h)anthracene, fluorene and indeno(1.2.3-cd)pyrene. All results were less than the detection limit and were calculated at half the given value i.e. $<2 = 1$).

1.2.3 Soil Monitoring

According to the Soil Monitoring Program accepted by the EPA for Eastern Treatment Plant, Melbourne Water is to carry out soil sampling around the Eastern Treatment Plant at five yearly intervals. There was no soil monitoring carried out in the year 2006-07. A comprehensive soil monitoring programme was carried out in June 2006 and no significant issues were identified (results were reported in the 2005/06 Annual Monitoring Report). The next detailed assessment of soil quality is due to be completed in 2010.

1.2.4 Groundwater Monitoring

Groundwater monitoring for the Eastern Treatment Plant was conducted by URS during December 2006 and May 2007. The monitoring included:

- Measurement of standing water levels;
- Measurement of groundwater quality in the field for: pH, temperature, dissolved oxygen (DO), electrical conductivity (EC), reduction/oxidation potential (redox);
- Laboratory analysis for total dissolved solids (TDS), total organic carbon (TOC), total nitrogen (total N), calcium, magnesium, potassium, sodium, bicarbonate, carbonate, sulphate and chloride.

The May 2007 sampling round included all available bores, while the November sampling, as per previous years includes only background bores, down gradient bores and three new bores established along Patterson River.

The salinity concentration measured as TDS at the Eastern Treatment Plant reference bore varied from 1,910 mg/L to 2,160 mg/L. According to the State Environment Protection Policy (SEPP) – Groundwaters of Victoria, 1999, which classifies the groundwater on its beneficial use based on TDS concentrations, the groundwater flowing onto the site falls into Segment B.

Waters in Segment B are to be protected for the following applicable beneficial uses:

- Maintenance of Ecosystems;
- Potable Mineral Water Supply;
- Agriculture, Parks and Gardens;
- Livestock Drinking Water;
- Industrial Water Use;
- Primary Contact Recreation; and
- Buildings and structures.

Consequently, the groundwater quality is assessed and compared against ANZECC Livestock Drinking Water Guidelines – (Livestock Drinking Water 2000); and Australian Water Quality Guidelines for the Protection of Aquatic Ecosystems – Marine Waters (ANZECC, 2000). As the Patterson Lakes area is the receiving marine water body, the objectives used are the 95% level of protection trigger values for marine waters specified in the ANZECC guidelines.

Based on the findings of the 2007 monitoring, the following conclusions were made:

- Groundwater flow in both aquifers appears to follow the general regional gradient from north-east towards south-west, with local flow diversions associated with groundwater mounding in the areas of the effluent holding basins and in the vicinity of the Patterson River and in the shallow aquifer west of the Emergency holding basin.
- The majority of the reported TDS concentrations were consistent with the previous results without indications of any particular trends developing, with

exception of bores MW45 (east of sludge drying pan 37) and MW 68 (south of effluent holding basin 5), where a rising trend has been observed since May 2005. However the trends remain within the longer term historical fluctuations for the bores.

- The majority of the reported TOC concentrations were consistent with the previous monitoring round, with the exception of bore MW43 (western boundary of the site near the Patterson River) where an increasing trend has been observed and bores MW68/69 (located to the north of the Southern Effluent Holding Basin) where the decreasing TOC previously reported has reversed.;
- All heavy metals concentrations were within the range of the historically reported results.

The activity at the site deemed to pose the greatest risk to groundwater is dewatering and drying of digested sludge in the Sludge Drying Pans. To minimise the risk of groundwater contamination from the drying pans and associated infrastructure, Melbourne Water has an on-going program of refurbishment and upgrades. This is described further in section 5.3.

1.3 Receiving Water Monitoring Program

1.3.1 Recreational Water Quality

Samples of receiving waters were taken throughout the year at six locations along the Gunnamatta and St Andrews beaches as detailed below:

- No.1 At the first bluff (Bellisleptia) east of the discharge point;
- No.2 At Gunnamatta West beach opposite the amenities block;
- No.3 At Gunnamatta West beach opposite the Surf Life Saving Club house;
- No.4 At Gunnamatta East beach approximately 350 metres east of sample point
- No.5 At Le Lievres beach 110 metres west of the discharge point;
- No.6 Rye back beach - main swimming area.

The results, presented as a rolling 30 day median and rolling 60 day 75th percentile as per recreational water quality guidelines given in the State Environment Protection Policy (SEPP), Waters of Victoria 2003 are presented in the Appendix. The results for E.coli and Enterococci counts for all samples taken at all the above sample points were consistent with the SEPP guidelines throughout the year.

Melbourne Water also has a continuing program of seawater sampling in the swimming and surf zones at a number of sample points. Samples have been taken monthly in winter (April to November) and fortnightly during summer (December to March) from June 2000 to date. Parameters tested are TDS, electrical conductivity, E. coli, Enterococci and ammonia. The program was initiated to assess microbial quality of the receiving water and to assess health risk to bathers via WHO and Australian guidelines. Microbiological results of this sampling program are published on Melbourne Waters internet site, along with results from the beach E. coli and Enterococci monitoring data.

1.3.2 Monitoring the Receiving Environment 2004 – 2007

The monitoring program is built on the two previous phases of monitoring, reported in June 1999 and June 2004. Collectively the monitoring programs provide a means of quantifying future environmental improvements in response to enhancement of treatment processes and flow reduction via recycling.

The program includes:

- Coordination and management of an environmental monitoring program;
- Analysis of collected data, interpretation of results;
- Assessment of compliance with regulatory objectives and evaluation of effectiveness of the management improvement programs.

The current phase of the receiving water monitoring program for the Eastern Treatment Plant's treated effluent discharge commenced in January 2005 and is still underway. This work is being carried out by CSIRO. The program was jointly developed by CSIRO and Melbourne Water and approved by the EPA. Subsequently the EPA required some additional studies and these were written into the current Eastern Treatment Plant EPA licence. The status of the studies is provided in the table below.

Table 6 Receiving Environment Monitoring Program

Monitoring	Notes and Progress
Effluent Toxicity Testing	Program (<i>Nitzschia</i> , <i>Hormosira</i> & Scallops) 5 sampling events on scallops. 1 sampling event on full suite of 5 species (microtox, amphipod, fish, <i>H. Banksia</i> , Sea urchin). <i>Ongoing program.</i>
Additional Studies	Ecotox testing of salinity adjusted and non-adjusted effluents for current, partially and fully nitrified effluent has been. <i>Completed.</i>
Water Quality Compliance	Statistical analysis of effluent chemistry, and beach/receiving water sampling. <i>Report being prepared for 2004-2007 period.</i>
Contaminant Accumulation	Using mussels <i>Brachidontes Rostratus</i> and possibly <i>Boccardia proboscidea</i> . <i>Completed.</i>
Platform Algal Surveys (presence/absence)	4 surveys with photographic records of survey sites, and more extensive statistical analysis. <i>Completed.</i>
Flora and Fauna survey Additional studies	Covers review of past work, literature review, field inspections with photographic record of flora and fauna on rocky platforms, nutrient measurements. <i>Completed and reported May 2006.</i>
Intertidal Platform Mapping (remote sensing)	Satellite imagery, with change mapping methodology developed previously; focus on nearby platforms (Boags Rocks to Cape Schanck).

Monitoring	Notes and Progress
Subtidal Reef Inspection (diver assisted & remote video)	Survey of the inner reefs parallel to shore and a line perpendicular to 3km, with analysis as developed previously. <i>Completed and reported June 2006.</i>
Data Management, Reporting & Coordination	Statistical analysis, investigation and review, data management and storage. <i>Data loading into Access database has commenced.</i>
Hydrodynamic model Additional studies	Additional hydrodynamic modelling has been undertaken as part of the additional studies. Aim to develop a near field dilution model of the current shoreline discharge to provide shoreline dilution profiles. <i>Results of initial modelling reported in ETP Works Approval WA48124 Scientific Studies, Sept. 2006.</i>
Recreational Water Quality Additional studies	Assessment of health risks to recreational users at Boags Rocks. Program of monitoring surf and shoreline for enterococci. Annual assessment based on NHMRC recreational water guidelines. Using NHMRC risk grading categories, microbial monitoring of treatment processes and Quantitative Microbial Risk Assessment techniques. <i>Draft report presented to EPA and DHS on 16 March 2006.</i>

A report covering the additional studies “ETP Works Approval WA48124 Scientific Studies Sept 2006” was completed and submitted to EPA.

1.4 Discharges to Air

1.4.1 Engine Emission Analysis

The Outfall Pump Station engine and the Power Station engine emissions were sampled and tested for nitrogen oxides, carbon monoxide, sulphur dioxide, hydrogen sulphide and Volatile Organic Carbons (VOC) on 6th & 7th June 2007.

The following table contains a comparison between the test results and the licence limits in Table 3 of the Licence EM 35642.

Table 7 Results of Engine emissions Test

(a) Outfall Pump Station Engine

Parameter	Maximum Rate (g/min)		Maximum Concentration (g/m ³)	
	Limit	Result	Limit	Result
hydrogen sulphide	0.5	<0.002	0.002	<0.00003
nitrogen oxides	500	120	2.6	1.8
carbon monoxide	300	55	2.6	0.78
sulphur dioxide ⁽¹⁾	7.5	0.10	0.04	0.0014
VOC's	20	0.5	0.1	0.036

VOC are organic compounds with a boiling point between 50° C and 260° C and measured in accordance with EPA method 4230

b) Power Station Engine

Parameter	Maximum Rate (g/min)	Maximum Concentration (g/m ³)
hydrogen sulphide	<0.0007	0.000005
nitrogen oxides	34	0.5
carbon monoxide	38	0.6
sulphur dioxide ⁽¹⁾	17	0.26

During 2006/07, three of the five outfall pump station engines were replaced with electrical motors. With this change, Melbourne Water will effectively eliminate emissions from the outfall pump station during normal operation. The remaining two engines will be used only during emergencies and breakdowns.

Also during 2006/07, the old power station generators were replaced by seven new generators. Testing and commissioning of these new generators has almost been completed.

1.4.2 Engine Operation

During 2006/07, sludge gas continued to be used primarily for the operation of the Outfall Pump Station engines. An increasing proportion of biogas was used by the new power station engines during engine commissioning and testing and during the periods when maintenance and upgrade activities limited availability of imported power or distribution of imported power around the site. During 2006/07, Melbourne Water finished replacing three old diesel/biogas outfall pump engines with new electric motors (part of the Eastern Green Energy Project). Outfall pump 1 started operating on electric motor from July 2006 and outfall pump 3 started operating with an electric motor from November 2006. Conversion works on outfall pump 2 were completed in July 2007. Following are the details of the total monthly operation of the engines in the Power Station and the Outfall Pumping Station during 2006/07.

Table 8 Operational Hours of Engines in Power Station and Outfall Pumping Station

Date	Power Station ^{See Note}	Outfall Pumping Station
	Hours Run Per Month	Hours Run Per Month
July 2006	49	1135
August 2006	7	1270
September 2006	See note below	1028
October 2006	See note below	989
November 2006	See note below	956
December 2006	See note below	1011
January 2007	See note below	882
February 2007	See note below	828
March 2007	See note below	962
April 2007	See note below	847
May 2007	See note below	915
June 2007	See note below	953
Total (Hours)	1705	11776

Note: During 2006/07, the old power station generators were replaced by seven new generators with minimal operation of the old generators during 2006/07 (56 hours). The daily run hours of these new generators were not recorded for the year 2006/07. The total cumulative run hours for the new generators were 1,649 hours.

1.5 Odour Management

1.5.1 Odour complaints received during 2006/07

The following table details the 20 odour complaints received at the Eastern Treatment Plant during 2006/07.

Table 9 Details of Odour Complaints

Date	Address Zone	Possible Source	Observations and Action Taken
04 January, 2007	Chelsea Heights	Unknown	Complaint of an odour was received from a resident. The wind track data indicated that the plant was unlikely to be the source of odour.
12 January, 2007	Chelsea Heights	Edithvale Seaford wetland	Complaint of a rotten grass type smell was received via the EPA. The wind track data indicated that the plant was unlikely to be the source of odour. Melbourne water staff visited the site and determined that the odour was most likely from Edithvale-Seaford wetland.
30 January, 2007	Patterson Lakes	Unknown	Wind track data indicated ETP was unlikely to be the source of the odour.
05 February, 2007	Patterson Lakes.	ETP	Wind track data indicated ETP possibly caused the odour. Investigations at the time did not identify any operational problems.
20 February, 2007	Bangholme	ETP	A resident from Bangholme reported an odour. The wind track data showed that the plant was likely to be the source of odour. Investigations at the time did not identify any operational problems.
24 February, 2007	Patterson Lakes	Unknown	A resident reported an odour to Melbourne Water. The wind track data showed that ETP was unlikely to have been the odour source.
02 April, 2007	Patterson Lakes	ETP	The wind track data showed that ETP was likely to be the source of odour. Investigations at the time did not identify any operational problems.
10 April, 2007	Patterson Lakes	ETP	The wind track data showed that ETP was likely to be the source of odour. Investigations at the time did not identify any operational problems.

Date	Address Zone	Possible Source	Observations and Action Taken
11 April, 2007	Patterson Lakes	Unknown	A passing motorist reported an odour to EPA. The wind track data showed that the plant was unlikely to have been the odour source.
12 April, 2007	Patterson Lakes	Unknown	A resident reported an odour to Melbourne Water. The wind track data showed that ETP was unlikely to have been the odour source.
13 April, 2007	Patterson Lakes	ETP	The wind track data showed that ETP was possibly the odour source. Investigations at the time did not identify any operational problems.
14 April, 2007	Patterson Lakes	Unknown	A resident from Patterson Lakes reported odour. Wind track data showed that ETP was unlikely to have been the odour source.
17 April, 2007	Patterson Lakes	Unknown	A resident from Patterson Lakes reported an odour at 4 AM. The wind track data showed it was unlikely to be related to the plant.
17 April, 2007	Patterson Lakes	ETP	A resident from Patterson Lakes reported an odour at 10 PM. The wind track data showed that the plant was likely to be the source of odour. Investigations at the time did not identify any operational problems.
19 April, 2007	Patterson Lakes	ETP	The wind track data showed that ETP was possibly the odour source. Investigations at the time did not identify any operational problems.
20 April, 2007	Chelsea Heights	ETP	The wind track data showed that ETP was possibly the odour source. Investigations at the time did not identify any operational problems.
29 April, 2007	Patterson Lakes	ETP	A resident from Patterson Lakes reported an odour. The wind track data showed that ETP was likely to be the source of odour. Investigations at the time did not identify any operational problems.
02 May, 2007	Patterson Lakes	ETP	A resident from Patterson Lakes reported an odour from the previous day. The wind track data showed it was likely to be related to the plant although investigations at the time did not identify any operational problems.

Date	Address Zone	Possible Source	Observations and Action Taken
6 May, 2007	Patterson Lakes	ETP	A resident from Patterson Lakes reported an odour from the previous day. The wind track data showed it was likely to be related to the plant. Investigations at the time did not identify any operational problems.
29 May, 2007	Carrum Downs	Unknown	A resident reported odour on 29 May 2007. Wind track data showed that ETP was unlikely to be the source of odour.

1.5.2 Odour Control Initiatives

Odour sources at the plant are constantly reviewed. Melbourne Water developed a comprehensive Odour Control Strategy for the plant and finalised this strategy in 2003/04. The strategy comprised a number of key projects that are aimed to target the most significant sources of odour emission at the Plant. The projects include:

- 1) Installing an odour control plant for air vented via the plant Foul Air System
- 2) Refurbishment of the existing Return Activated Sludge (RAS) channel odour control plant
- 3) Reducing odour emissions from sewer ventilation air discharged at Manhole Two, and
- 4) Covering the primary sedimentation tanks and settled sewage channels, extracting air from beneath the new covers and treating this in a new odour control plant.

The following actions have been completed in 2006/07:

- The odour control plant treating air vented from the RAS channel was refurbished and the media replaced
- The Foul Air System odour control plant has been fully designed and Melbourne Water is awaiting Treasury approval to fund the project. Construction is due to commence September 2007.
- Functional design of the primary sedimentation tank and settled sewage channel covers has continued and options for the treatment technology have been assessed.

USE OF EFFLUENT, BIOSOLIDS AND BIOGAS

1.6 Water Recycling

Melbourne Water has committed to increase the amount of recycled water (treated effluent from sewage treatment plants) to help achieve the state government target to recycle 20% of treated effluent by 2010. During 2006/2007 10,424 ML of treated effluent was recycled off site to various customers along the South Eastern Outfall and about 13,000 ML was reused on site within the plant area.

In alignment with current water and sewage arrangements, Melbourne Water is responsible for the treatment and bulk supply of recycled water to retail water companies, which then supply to the end users. Treated effluent from the Eastern Treatment Plant is supplied by Melbourne Water to South East Water Limited and TopAq (operators of the Eastern Irrigation Scheme) for supply to end-use customers.

1.6.1 Recycled Water Monitoring

A recycled water-monitoring program was undertaken during 2006/07. The following table reports water quality against the requirements of "Class C" as specified in the EPA Victoria Publication 464.2 "Guidelines for Use of Reclaimed Water", 2003.

Table 10 Quality of Recycled Water Produced at the Eastern Treatment Plant

	<i>E. coli</i> median org/100mL	BOD ₅ mg/L Median	CBOD ₅ mg/L Median	Suspended Solids mg/L Median	pH Median (Range)
Class C Limits	< 1000	NA	< 20	< 30	6.5 – 9.0
Rising main leaving the Eastern Treatment Plant ⁽¹⁾	20	34.5	5	12	7.0 – 8.3
Ballarto Rd Sample Point (SEO Manhole No. 069)	7	11	4	12	7.0 – 8.6
Range Rd Sample Point (SEO Manhole No. 035)	4	12	4	10	7.0 – 8.3
Trumans Rd Gunnamatta (SEO Manhole No. 003)	26	22	4	13	7.0 – 8.1

Notes:

1. Eastern Treatment Plant Reuse sample point

1.6.2 Additional Reuse Monitoring

The following tables detail results of additional monitoring undertaken on the final effluent at the Eastern Treatment Plant during 2006/07 in order to improve understanding of effluent quality and the potential to maximise effluent reuse, and ensure compliance with Class C Reuse standards.

Table 11 Results of Additional Reuse Monitoring of Final Effluent

Parameter, Units	EPA Guideline Limit¹	Median	90th Percentile	Maximum
Total Dissolved Solids (mg/L)	<500	505	585	940
Sodium (mg/L)	-	110	120	130
Calcium (mg/L)	-	16	20	23
Magnesium (mg/L)	-	8.3	9.5	9.6
Chloride (mg/L)	-	150	170	170
Potassium (mg/L)	-	21.5	25.9	28

Parameter, Units	EPA Guideline Limit ¹	Median	90th Percentile	Maximum
SAR	-	5.6	6.2	6.5
Alkalinity (mg/L CaCO ₃)	-	140	170	190
Aluminium (mg/L)	5	0.16	0.51	0.58
Boron (mg/L)	0.75	0.17	0.33	0.35
Iron (mg/L)	5	0.20	0.30	0.39
True Colour (Pt/Co)	-	90	120	200
Turbidity (NTU)	-	7.5	17	21
Arsenic (mg/L)	0.1	0.002 ⁽²⁾	0.0038	0.004 ⁽²⁾
Beryllium (mg/L)	0.1	0.0005 ⁽²⁾	0.0005 ⁽²⁾	0.0005 ⁽²⁾
Cobalt (mg/L)	0.05	0.0005 ⁽²⁾	0.001 ⁽²⁾	0.001 ⁽²⁾
Fluoride (mg/L)	1	0.93	1.0	1.1
Lithium (mg/L)	2.5	0.01 ⁽²⁾	0.01 ⁽²⁾	0.1 ⁽²⁾
Manganese (mg/L)	0.2	0.042	0.049	0.054
Molybdenum (mg/L)	0.01	0.003	0.004	0.005
Selenium (mg/L)	0.02	0.0005 ⁽²⁾	0.0005 ⁽²⁾	0.003 ⁽²⁾
Zinc (mg/L)	2	0.052	0.075	0.29

Notes:

1. EPA Publications 168 (1991), 464.2, (2003)

2. All results found to be less than the detection limit reported as half the LOD i.e. <0.001 = 0.0005.

1.7 Biosolids

1.7.1 Biosolids Reuse during 2006/07

Previously, biosolids produced at the Eastern Treatment Plant have been used by local soil suppliers, as a constituent in their blended topsoils. The blends met unrestricted use under the EPA's Guidelines for Environmental Management - Biosolids Land Application (EPA Publication 943, 2004).

No biosolids were beneficially used in 2006/07. The 2006/07 reuse target and corporate KPI was not achieved due to a decision by soil-blending customers not to renew their biosolids supply agreements which expired in June 2005. During an Expression of Interest process in April 2006 the soil blending market indicated that it did not wish to obtain more biosolids in the short-term.

Melbourne Water is working with the EPA to develop guidelines for use of biosolids for construction fill. Discussions with road construction contractors and VicRoads for using ETP biosolids as construction fill are still ongoing.

Melbourne Water has completed a review into known hazards and associated risks for land application of biosolids. The risks identified will be used to help develop the sampling program in 2007/08 as part of wider due diligence study to identify business risks associated with large scale biosolids land application.

The 2007/08 reuse target and corporate KPI remains 100% beneficial use of annual production which equates to 36,280 cubic metres (28,300 tonnes dry solids) of biosolids. The biosolids inventory at ETP as of May 2007 is 1,100,100 cubic metres.

1.8 Biogas Utilisation

Biogas has been used primarily in the Outfall Pump Station during 2006/07 to run engines and boilers. The following table details the volumes of biogas used in the Outfall Pump Station and Power Station, and the volume of biogas flared off for each month of the 2006/07 financial year and for the financial year as a whole. The volume of biogas used during 2006/07 is lower than 2005/06 due to the construction works in Outfall Pump Station and Power Station for the Eastern Green Energy Project (EGEP). With the completion of EGEP, the utilisation of biogas volume is expected to increase significantly in the future.

Table 12 Volume of Biogas Used and Flared at Eastern Treatment Plant

Date	Volume of Biogas Used (m³)	Volume of Biogas Flared (m³)
July 2006	973,622	721,543
August 2006	1,054,400	620,473
September 2006	1,173,955	485,193
October 2006	1,185,213	508,741
November 2006	1,004,477	492,330
December 2006	936,678	461,144
January 2007	789,598	530,971
February 2007	960,998	317,135
March 2007	1,024,763	285,827
April 2007	584,358	580,946
May 2007	645,598	619,424
June 2007	949,753	302,635
Financial Year	11,283,413	5,926,362

TRADE WASTE MANAGEMENT

The Eastern Treatment Plant receives flow from South East Water and Yarra Valley Water. The following tables detail the top ten dischargers by volume and by risk for South East Water and for Yarra Valley Water respectively.

Table 13 South East Water Top Ten Dischargers by Volume⁽²⁾

Sewer Catchment	Risk Rank⁽¹⁾	Variation Parameters⁽³⁾	Volumes Discharged (ML/annum) 2006/07
Chelsea	1	TDS	285
Eumemmerring Creek	1	TDS ,Ammonia, pH, Temperature	245
Eumemmerring Creek	1	TDS	213
Dandenong Creek	2	TDS	179
Westall Road	1	TDS, pH, Ammonia	153
Elster Creek South	3	TDS	117
Corhanwarrabul Creek	3	TDS	96
Clayton East and West	4	Nil required	85
Chelsea	1	TDS	84
Koornang and Grange	1	Nil required	69
TOTAL			1525

Table 15 South East Water Top Ten Dischargers by Risk

Sewer Catchment	Risk Rank⁽¹⁾	Variation Parameters⁽³⁾	Volumes Discharged (ML/annum) 2006/07
Eumemmerring Creek	1	TDS, Ammonia, pH, Temperature	245
Westall Road	1	TDS, Ammonia, pH	153
Eumemmerring Creek	1	TDS, Ammonia, pH	34
Chelsea	1	TDS	84
Eumemmerring Creek	1	TDS, Ammonia, pH	81
Eumemmerring Creek	1	Nil Required	1.2
Eumemmerring Creek	1	Nil Required	2.1

Sewer Catchment	Risk Rank⁽¹⁾	Variation Parameters⁽³⁾	Volumes Discharged (ML/annum) 2006/07
Eumemmerring Creek	1	TDS, Ammonia, pH	28
Eumemmerring Creek	1	TDS, Ammonia, pH	121
Eumemmerring Creek	1	TDS	213
TOTAL			962

Table16 Yarra Valley Water Top Ten Dischargers by Volume

Sewer Catchment	Risk Rank⁽¹⁾	Variation Parameters⁽³⁾	Volumes Discharged (ML/annum) ⁽⁴⁾ 2006/07
Gardiners Creek Box Hill	1	TDS, Temp	12000
Westall	2	TDS	1728
Eltham	2	Mn, Al, Fe	1728
Ringwood	2	TDS	1017.6
Gardiners Creek and Box Hill	3	Colour	650
Scotchmans Creek	5	Nil required	518
Gardiners Creek and Box Hill	4	TDS	429
Clayton East and West	3	Nil required	400
Ringwood	3	TDS	400
Ringwood	4	Nil required	330
TOTAL			19201

Table17 Yarra Valley Water Top Ten Dischargers by Risk

Sewer Catchment	Risk Rank⁽¹⁾	Variation Parameters⁽³⁾	Volumes Discharged (ML/annum) ⁽⁴⁾ 2006/07
Gardiners Creek Box Hill	1	TDS, Temp	12000
Gardiners Creek Box Hill	1	Ammonia, pH	70.3
Croydon and Ringwood South	1	TDS	8
Croydon and Ringwood South	1	TDS, PAH	36

Sewer Catchment	Risk Rank⁽¹⁾	Variation Parameters⁽³⁾	Volumes Discharged (ML/annum)⁽⁴⁾ 2006/07
Croydon and Ringwood South	1	Nil required	7
Westall	2	Nil required	280.5
Westall	2	TDS	1728
Eltham	2	Nil required	1728
Clayton East and West	2	Nil required	83.3
Westall	3	Nil required	100
TOTAL			16041

Notes:

1. Risk Value of 1 indicates a highest risk discharger.
2. Melbourne Water was supplied with this information on trade waste by the retail water companies.
3. Shows where variations to trade waste standards were required.
4. Indicates the Agreement volumes, not billed (or measured) volumes.

EASTERN TREATMENT PLANT IMPROVEMENT PROJECTS

Progress continued on a number of major projects being undertaken as part of the Eastern Treatment Plant upgrade works program. Key projects included:

- Ammonia Reduction Project;
- Eastern Green Energy Project;
- Sludge Drying Pan refurbishment and construction of new pans.

The status of these projects is as follows:

1.9 Ammonia Reduction Project

The Ammonia Reduction Project will result in the plant producing an effluent with an annual median ammonia concentration of 5 mg/L. The key elements of the project are:

- The conversion of the existing aeration tanks to a configuration that will facilitate ammonia reduction;
- The construction of additional aeration tanks to ensure process stability and reliability in ammonia reduction mode under a broader range of conditions;

Conversion of four of the existing aeration tanks is complete while the fifth is nearing completion. Five of the existing six aeration tanks will be upgraded by September 2007 and the process will then be converted to operate in the ammonia reduction mode. The upgrade of the existing aeration tanks is scheduled for completion late in 2007 or early 2008.

The detail design for the additional aeration tanks has commenced as has the construction. Commissioning of the additional aeration will be completed by 2010.

1.10 Eastern Green Energy Project

The Eastern Green Energy Project will reduce greenhouse gas emissions and reduce reliance on imported electricity. The key elements of the project are:

- The replacement of five inefficient 30-year-old generators with seven new generators to efficiently and fully utilise the sludge gas as a renewable energy source;
- The conversion of three outfall-pumping engines to electric motors to facilitate the efficient utilisation of the increased power generating capacity.

The EPA Victoria granted a Works Approval for the upgrade in May 2002. Implementation of the project commenced but had to be put on hold due to industrial relations issues having significant impacts on the project delivery. Site works have since recommenced under an alternative contracting strategy.

As of July 2007 all seven generators have been pre-commissioned as have the outfall pumps and are all in operation. Final project handover is due by October 2007.

1.11 Sludge Drying Pan Projects

The sludge drying pan construction and rehabilitation works will provide additional drying pans to cater for growth in sewage flows to the plant and refurbish existing pans to maintain performance and protect groundwater. The key elements of the project are:

- Rehabilitation of 12.5 ha of existing drying pans that had never been used
- Construction of new drying pans
- Refurbishment of existing, operational drying pans
- Digested sludge and supernatant pipeline improvement

The following table summarises the works under the sludge drying pan projects.

Table18 Summary of Works under Sludge Drying Pan projects

Works	Area	period	Comments
Rehabilitation	Pans 56 to 60 (12.5 ha)	2005/06	Rebuilt existing pans to meet EPA requirements and so increase capacity.
Refurbishment	Pans 5 to 7, 21 to 25, 43 to 46, 39 and 39A. (25.7 ha)	2006/07 – 2007/08	Pans relined to protect groundwater.
New Construction	Pans 61 – 63 (7.5 ha)	2006/07	New pans constructed to make existing, operational pans available for refurbishment and provide for future growth.

Works	Area	period	Comments
Pipeline Construction	Supernatant return pipeline	2006/07	Construction of new 3.5 km pipe line as part of the construction of new drying pans 61-63.
Pipeline Construction	Digested sludge and Supernatant pipe lines	2007/08	Construction of digested sludge pipeline and improvement of supernatant pipelines to reduce OH&S risks to Melbourne Water personnel and contractors and to reduce risks of a supernatant spill.

1.12 Other Capital Works Planned for 2007/08

Works in addition to those described above and scheduled for 2007/08 include:

- Waste Activated Sludge Thickening capacity augmentation works - tendering and detailed design have been completed and the construction has commenced.
- Odour reduction works (new foul air system Biofilter) – Melbourne Water is currently waiting for Department of Treasury and Finance approval to proceed with the works;
- Sludge digestion capacity augmentation works - detailed design has been completed and Melbourne Water is currently waiting for Department of Treasury and Finance approval to proceed with the works;
- Grit and Screening Facility works – concept design is complete and functional design is about to commence.

BLUE GREEN ALGAE MANAGEMENT

Visual inspections of all effluent basins at Eastern Treatment Plant were regularly undertaken as part of operational activities. During the months between January and April 2007, weekly samples were collected from the effluent holding basins for algal analysis. No potential blue-green algal blooms were experienced in the effluent holding basins during 2006/07.

ENVIRONMENT IMPROVEMENT PLAN

The Environment Improvement Plan (EIP) actions from the 2005 site EIP continue to be implemented and the progress is regularly reported to the Community Liaison Committee. The process for reviewing and updating the EIP is well advanced.

APPENDIX - BEACH E. COLI AND ENTEROCOCCI RESULTS

Beach E. coli data (orgs / 100 mL)

SAMPLE DATE	BEACH 1		BEACH 2		BEACH 3		BEACH 4		BEACH 5		BEACH 6	
	Day result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*
3-Jul-06	44		0		0		0		14		0	
11-Jul-06	0		2		2		0		0		0	
13-Jul-06	2		6		6		2		2		2	
19-Jul-06	24		0		0		0		14		0	
27-Jul-06	0	2	0	0	0	0	0	0	12	12	0	0
3-Aug-06	0	0	0	0	0	0	0	0	0	2	0	0
9-Aug-06	12	2	6	0	6	0	0	0	4	4	0	0
15-Aug-06	6	6	0	0	0	0	0	0	16	12	0	0
21-Aug-06	4	4	0	0	0	0	0	0	0	4	0	0
28-Aug-06	6	6	0	0	0	0	0	0	28	4	0	0
1-Sep-06	4	6	0	0	0	0	0	0	2	4	0	0
4-Sep-06	0	4	0	0	0	0	0	0	0	2	0	0
12-Sep-06	0	4	0	0	0	0	0	0	7	2	0	0
20-Sep-06	26	4	2	0	2	0	6	0	160	7	0	0
28-Sep-06	0	0	0	0	0	0	0	0	2	2	2	0
6-Oct-06	0	0	0	0	0	0	0	0	0	2	0	0
12-Oct-06	0	0	2	0	2	0	2	0	0	2	0	0
18-Oct-06	2	0	0	0	0	0	0	0	28	2	0	0
24-Oct-06	6	0	0	0	0	0	0	0	28	2	0	0
30-Oct-06	0	0	0	0	0	0	0	0	4	4	0	0
6-Nov-06	0	0	0	0	0	0	0	0	16	16	2	0
14-Nov-06	2	2	0	0	0	0	0	0	2	16	0	0
22-Nov-06	0	0	0	0	0	0	0	0	10	10	2	0

SAMPLE DATE	BEACH 1		BEACH 2		BEACH 3		BEACH 4		BEACH 5		BEACH 6	
	Day result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*
28-Nov-06	0	0	0	0	0	0	0	0	46	10	0	0
30-Nov-06	0	0	0	0	0	0	0	0	6	10	0	0
7-Dec-06	7	0	0	0	0	0	0	0	7	7	0	0
13-Dec-06	0	0	0	0	0	0	0	0	6	7	0	0
19-Dec-06	0	0	0	0	0	0	0	0	26	7	0	0
27-Dec-06	2	0	0	0	0	0	0	0	19	7	0	0
29-Dec-06	2	2	2	0	0	0	0	0	26	19	2	0
4-Jan-07	12	2	0	0	0	0	0	0	24	24	0	0
12-Jan-07	2	2	2	0	0	0	0	0	27	26	0	0
19-Jan-07	11	2	2	2	0	0	2	0	80	26	20	0
25-Jan-07	2	2	12	2	0	0	0	0	38	27	0	0
31-Jan-07	17	11	2	2	0	0	0	0	0	27	0	0
1-Feb-07	12	11	0	2	0	0	0	0	36	36	0	0
8-Feb-07	0	11	0	2	0	0	0	0	28	36	0	0
14-Feb-07	2	2	0	0	2	0	0	0	16	28	0	0
20-Feb-07	14	12	0	0	10	0	0	0	110	28	0	0
26-Feb-07	150	12	0	0	0	0	0	0	36	36	8	0
6-Mar-07	2	2	0	0	0	0	0	0	45	36	6	0
14-Mar-07	0	2	0	0	0	0	0	0	32	36	0	0
22-Mar-07	0	2	0	0	0	0	0	0	22	36	0	0
30-Mar-07	8	2	2	0	0	0	2	0	26	32	0	0
5-Apr-07	360	2	340	0	40	0	4	0	420	32	2	0
11-Apr-07	0	0	0	0	2	0	0	0	45	32	0	0
17-Apr-07	2	2	0	0	0	0	0	0	14	26	0	0
19-Apr-07	27	8	2	2	6	2	2	2	170	45	0	0

SAMPLE DATE	BEACH 1		BEACH 2		BEACH 3		BEACH 4		BEACH 5		BEACH 6	
	Day result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*	Day Result	30 d Median*
23-Apr-07	2	2	0	0	0	2	0	0	38	45	0	0
1-May-07	70	2	2	0	2	2	0	0	4	38	0	0
9-May-07	36	27	32	2	26	2	34	0	64	38	0	0
17-May-07	60	36	0	2	0	2	0	0	150	64	4	0
25-May-07	54	54	90	2	240	2	2	0	26	38	2	0
31-May-07	12	54	2	2	0	2	0	0	4	26	0	0
6-Jun-07	4	36	0	2	2	2	14	2	27	27	0	0
13-Jun-07	6	12	0	0	2	2	0	0	4	26	0	0
18-Jun-07	0	6	2	2	0	2	2	2	16	16	0	0
19-Jun-07	0	4	8	2	2	2	3	2	10	10	2	0
25-Jun-07	0	0	0	0	0	2	2	2	12	12	0	0

* State Environmental Protection Policy (SEPP), Waters of Victoria requirement for primary contact recreation is a rolling 30 day median of \leq 150 Orgs/100 mL.

Beach Enterococci data (orgs / 100 mL)

SAMPLE DATE	BEACH 1			BEACH 2			BEACH 3		
	Day results	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
3-Jul-06	35			0			2		
11-Jul-06	2			0			0		
13-Jul-06	2			14			2		
19-Jul-06	4			0			0		
27-Jul-06	0	2		0	0		0	0	
3-Aug-06	2	2		0	0		0	0	
9-Aug-06	2	2		0	0		2	0	
15-Aug-06	2	2		0	0		0	0	
21-Aug-06	0	2		0	0		0	0	
28-Aug-06	2	2		0	0		0	0	
1-Sep-06	0	2	2	0	0	0	0	0	1
4-Sep-06	0	0	2	0	0	0	0	0	0
12-Sep-06	2	0	2	0	0	0	0	0	0
20-Sep-06	0	0	2	3	0	0	6	0	0
28-Sep-06	0	0	2	0	0	0	0	0	0
6-Oct-06	3	0	2	0	0	0	0	0	0
12-Oct-06	0	0	2	2	0	0	0	0	0
18-Oct-06	0	0	2	2	2	1	0	0	0
24-Oct-06	0	0	1	0	0	1	0	0	0
30-Oct-06	0	0	1	0	0	1	0	0	0
6-Nov-06	2	0	1	0	0	1	0	0	0
14-Nov-06	0	0	1	0	0	1	0	0	0
22-Nov-06	0	0	1	0	0	1	2	0	0

SAMPLE DATE	BEACH 1			BEACH 2			BEACH 3		
	Day results	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
28-Nov-06	0	0	0	0	0	1	0	0	0
30-Nov-06	0	0	0	0	0	0	0	0	0
7-Dec-06	2	0	1	0	0	0	0	0	0
13-Dec-06	0	0	0	0	0	0	0	0	0
19-Dec-06	0	0	0	0	0	0	0	0	0
27-Dec-06	0	0	0	0	0	0	0	0	0
29-Dec-06	0	0	0	0	0	0	0	0	0
4-Jan-07	4	0	1	0	0	0	0	0	4
12-Jan-07	0	0	0	0	0	0	0	0	0
19-Jan-07	0	0	0	2	0	0	0	0	0
25-Jan-07	0	0	0	0	0	0	0	0	0
31-Jan-07	4	0	1	0	0	0	2	0	0
1-Feb-07	8	0	3	0	0	0	0	0	0
8-Feb-07	0	0	2	0	0	0	0	0	0
14-Feb-07	0	0	2	0	0	0	0	0	0
20-Feb-07	0	0	2	2	0	0	0	0	0
26-Feb-07	0	0	2	0	0	0	0	0	0
6-Mar-07	0	0	2	0	0	0	0	0	0
14-Mar-07	0	0	0	0	0	0	0	0	0
22-Mar-07	6	0	2	0	0	0	0	0	0
30-Mar-07	0	0	2	6	0	0	0	0	0
5-Mar-07	23	0	5	0	0	0	0	0	0
11-Apr-07	0	0	3	0	0	0	2	0	0
17-Apr-07	8	6	3	0	0	0	0	0	0
19-Apr-07	2	2	4	0	0	0	0	0	0

SAMPLE DATE	BEACH 1			BEACH2			BEACH 3		
	Day results	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
23-Apr-07	0	2	4	0	0	0	0	0	0
1-May-07	0	0	4	0	0	0	0	0	0
9-May-07	33	2	7	59	0	0	19	0	0
17-May-07	24	2	15.5	0	0	0	0	0	0
25-May-07	770	24	23.5	930	0	3	1800	0	0
31-May-07	0	24	23.5	0	0	3	0	0	0
6-Jun-07	0	24	23.5	2	2	1	26	19	0
13-Jun-07	2	2	16	0	0	1	0	0	0
18-Jun-07	4	2	16	10	2	6	2	2	0
19-Jun-07	4	2	14	10	2	10	2	2	0
25-Jun-07	0	2	14	0	2	10	8	2	0

** State Environmental Protection Policy (SEPP), Waters of Victoria requirement for primary contact recreation is a rolling 30 day median of \leq 35 Orgs/100 mL

* SEPP (Waters Victoria) requirement for primary contact recreation is a rolling 60 day 75th Percentile of \leq 150 orgs/100 mL

Beach Enterococci data (orgs / 100 mL)

SAMPLE DATE	BEACH4			BEACH5			BEACH6		
	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
3-Jul-06	0			2			2		
11-Jul-06	0			2			0		
13-Jul-06	2			12			4		
19-Jul-06	0			2			0		
27-Jul-06	2	0		0	2		0	0	
3-Aug-06	0	0		0	2		0	0	
9-Aug-06	0	0		0	0		0	0	
15-Aug-06	2	0		86	0		2	0	
21-Aug-06	0	0		0	0		0	0	
28-Aug-06	0	0		0	0		0	0	
1-Sep-06	0	0	1	0	0	2	0	0	1
4-Sep-06	0	0	1	0	0	2	2	0	1
12-Sep-06	0	0	1	2	0	2	0	0	1
20-Sep-06	0	0	0	16	0	2	0	0	0
28-Sep-06	0	0	0	2	2	2	0	0	0
6-Oct-06	0	0	0	0	2	2	0	0	0
12-Oct-06	8	0	0	2	2	2	0	0	0
18-Oct-06	0	0	0	0	2	2	0	0	0
24-Oct-06	0	0	0	10	2	2	0	0	0
30-Oct-06	0	0	0	0	0	2	0	0	0
6-Nov-06	0	0	0	2	2	2	0	0	0
14-Nov-06	0	0	0	6	2	4	0	0	0
22-Nov-06	0	0	0	4	4	5	0	0	0

SAMPLE DATE	BEACH4			BEACH5			BEACH6		
	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
28-Nov-06	0	0	0	9	4	7.5	0	0	0
30-Nov-06	0	0	0	0	4	5	0	0	0
7-Dec-06	0	0	0	0	4	5	0	0	0
13-Dec-06	0	0	0	2	2	5	0	0	0
19-Dec-06	0	0	0	0	0	5	0	0	0
27-Dec-06	0	0	0	0	0	5	0	0	0
29-Dec-06	0	0	0	4	0	4	0	0	0
4-Jan-07	0	0	0	10	2	5	2	0	0
12-Jan-07	0	0	0	8	4	7	18	0	0
19-Jan-07	2	0	0	4	4	6	0	0	0
25-Jan-07	0	0	0	2	4	6	0	0	0
31-Jan-07	0	0	0	0	4	4	0	0	0
1-Feb-07	0	0	0	7	4	5.5	0	0	0
8-Feb-07	0	0	0	0	2	5.5	0	0	0
14-Feb-07	0	0	0	0	0	5.5	0	0	0
20-Feb-07	0	0	0	0	0	5.5	0	0	0
26-Feb-07	0	0	0	7	0	7	2	0	1
6-Mar-07	0	0	0	2	0	7	0	0	1
14-Mar-07	0	0	0	10	2	7	0	0	0
22-Mar-07	0	0	0	0	2	5.5	0	0	0
30-Mar-07	0	0	0	6	6	6.5	0	0	0
5-Mar-07	0	0	0	16	6	7	0	0	0
11-Apr-07	0	0	0	0	6	7	0	0	0
17-Apr-07	0	0	0	0	0	6.5	0	0	0
19-Apr-07	0	0	0	8	6	7.5	0	0	0

SAMPLE DATE	BEACH4			BEACH5			BEACH6		
	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
23-Apr-07	0	0	0	0	0	7.5	2	0	0
1-May-07	0	0	0	0	0	7.5	0	0	0
9-May-07	150	0	0	9	0	8.5	2	0	0
17-May-07	0	0	0	26	8	9.5	2	2	1
25-May-07	6	0	0	38	9	12.5	14	2	2
31-May-07	12	6	3	0	9	12.5	0	2	2
6-Jun-07	2	6	4	8	9	12.5	0	2	2
13-Jun-07	0	2	4	4	8	8.5	0	0	2
18-Jun-07	6	6	6	2	4	8.5	0	0	2
19-Jun-07	6	6	6	2	2	8.5	0	0	2
25-Jun-07	170	6	9	7	4	8.5	0	0	2

** State Environmental Protection Policy (SEPP), Waters of Victoria requirement for primary contact recreation is a rolling 30 day median of \leq 35 Orgs/100 mL

* SEPP (Waters Victoria) requirement for primary contact recreation is a rolling 60 day 75th Percentile of \leq 150 orgs/100 mL