Eastern Treatment Plant

2007/2008 Annual Monitoring Report to the Environment Protection Authority

EM 35642

August 2008

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.

A 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 was completed in 1999 by CSIRO. The study 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 by Melbourne Water. In the financial year 2007/08, Melbourne Water completed upgrading of existing six aeration tanks at ETP and the upgraded tanks are now operating well under ammonia reduction mode. The upgrade of the aeration tanks is designed to improve and protect the marine environment by reducing the ammonia concentration in the final effluent by over 75 percent.

In October 2006, the Victorian government announced an upgrade of the Eastern Treatment Plant to treat all wastewater to the EPA Victoria Class A Recycled Water standard by 2012. In February 2008, Melbourne Water commenced a 12-month technology trial, the first stage and a vital part of the design and implementation of the Eastern Treatment Plant's major upgrade. The trial will examine a range of different treatment systems, to determine the best possible treatment method to be taken to full scale delivery.

The Eastern Treatment 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 2007/08 financial year the Plant met all of the EPA Victoria discharge licence requirements including the new ammonia licence requirement which came into effect from July 2007.

ROB SKINNER
MANAGING DIRECTOR, MELBOURNE WATER

1 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 2007 to 30 June 2008

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	7	NS	22	NS	32
$CBOD_5$ (mg/L)	20	3	40	6	NS	16
Suspended Solids (mg/L)	30	11	60	22	NS	100
pH (pH units)	NS	7	NS	8	≥ 6, ≤ 9	6.8 - 8.1
Ammonia as N (mg/L) (Truemans Rd)	30	1.8	NS	11	40	19
Ammonia as N (mg/L) (final effluent at ETP)	5	2.4	NS	12.9	NS	19
Total Nitrogen (mg/L)	NS	16.5	NS	25	NS	27
Total Phosphorus (mg/L)	NS	8.3	15	9.8	NS	11
Anionic Surfactants (mg/L)	0.4	0.1	0.7	0.26	NS	0.57
Cadmium (mg/L)[1]	NS	0.0001	0.005	0.0001	0.01	0.0001
Chromium (mg/L)	NS	0.003	0.075	0.005	0.15	0.007
Copper (mg/L)	NS	0.015	0.05	0.015	0.1	0.048
Lead (mg/L)[1]	NS	0.0005	0.05	0.0006	0.1	0.003
Mercury (mg/L)[1]	NS	0.00005	0.0005	0.00005	0.001	0.00005
Phenol (µg/L)	NS	0.5	NS	4.6	100	5.0
Toluene (µg/L)	NS	0.5	NS	0.5	50	0.5
Benzene (µg/L)	NS	0.5	NS	0.5	25	0.5
PAH's total (µg/L)[2]	NS	0.13	NS	0.23	15	0.25
ETP discharge (ML/day)[3]	NS	300	NS	364	NS	521
Outfall discharge (ML/day)[4]	540	300	NS	373	NS	544
Total Residual Chlorine (mg/L)	NS	0.12	NS	0.27	1.0	0.42
E.coli (orgs/100mL)	200	23	1000	118	NS	2500
Enterococci (orgs/100ml)	NS	7	NS	39	NS	1300
Dissolved Oxygen (mg/L)	NS	7.2	NS	8.4	≥ 6.0	6.0 -8.5

Notes:

1. All results found to be less than the detection limit were taken as half the limit of detection (LOD) e.g. <8 = 4.
2. Total Poly Aromatic Hydrocarbons (PAH's) are calculated using the sum of the following PAH's: (acenapthylene, 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.
3. ETP outflow flow excluding South East Water treatment plants that also discharge treated effluent into the South East Outfall.
4. 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 2007 and June 2008 samples for the Truemans 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 2007 I-TEQ (pg/L)[1]	June 2008 I-TEQ (pg/L)[1]
Truemans Road	2.0	3.5

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 2007/08. Monthly median and maximums are shown below. The total outfall flows for 2007/08 are as follows:

Table 3 Annual Treated Effluent Flows

Description	Flow (ML)	Comment
ETP Outflow	112,202	Total outfall pump station flow minus internal plant use
Calculated Outfall flow	112,990	Boags Rocks Outfall flow (ETP plus South East Water treatment plant flows, less water recycling)

Table 4 Median and Maximum ETP Outflow

Month	Median (ML/d)	Maximum (ML/d)
July 2007	341	515
August 2007	282	437
September 2007	309	490
October 2007	307	360
November 2007	319	520
December 2007	312	521
January 2008	269	343
February 2008	327	433
March 2008	262	460
April 2008	267	334
May 2008	284	365
June 2008	330	411

1.1.4 Discharge to Water- Aesthetics

Eastern Treatment Plant complied with all aesthetic aspects for the discharge licence during 2007/08. The main activities in monitoring aesthetic conditions during 2007/08 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 2007 to 30 June 2008

1.2.2 Raw Sewage Monitoring

The following details the monitoring of raw sewage undertaken at the Eastern Treatment Plant in 2007/08 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)]	90th Percentile	Maximum
BOD_5 (mg/L)	455	609	660
Suspended Solids (mg/L)	495	885	1400
pH (pH units)	7.1	7.5	9.0
Ammonia as N (mg/L)	42	45	51
Total Combined Nitrogen (mg/L)	75	88	140
Total Phosphorus (mg/L)	15	20	27
Anionic Surfactants MBAS (mg/L)	4.4	7.4	9.3
Cadmium (mg/L)	0.0005	0.0009	0.0036
Chromium (mg/L)	0.02	0.040	0.13
Copper (mg/L)	0.13	0.24	0.45
Lead (mg/L)	0.008	0.015	0.025
Mercury (mg/L)[2]	0.00005[(2)]	0.0003[(2)]	0.0013[(2)]
Phenol (µg/L)	70[(2)]	250[(2)]	300[(2)]
Toluene (µg/L)	2.0[(2)]	16.6[(2)]	50[(2)]
Benzene (µg/L)	0.5[(2)]	0.5[(2)]	50[(2)]
PAH's total (µg/L)	0.14[(2,3)]	0.23[(2,3)]	0.25[(2,3)]

Notes:

1. 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.
2. Total PAH's are calculated using the sum of the following PAH's:
(acenapthylene, 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 2007-08. 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 November 2007 and May 2008. 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.

Aquifer in the ETP area is characterised by variable salinities (less than 500 mg/L to greater than 6,000 mg/L). Groundwater bore MW77 (8 m deep), located up-hydraulic gradient with respect to the ETP site is thought representative of the local natural groundwater quality (average TDS 1,900 mg/L). Therefore the groundwater in the aquifers potentially at risk at the site is classified as 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 – 2008 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 groundwater quality based on analytical results reported in May 2008 is generally consistent with that reported in 2007 for the respective bores. Groundwater salinity varies across the site, with groundwater in the majority of the bores containing TDS concentrations generally consistent with previous

results for the respective bores, with the exception of the bore located in the SE corner of the site north of Thompson Rd which reported an increase. The major ion composition of the groundwater remained generally unchanged. The reported concentrations of groundwater parameters, ie. Nutrients, TOC, and metals did not indicate any significant trends developing.

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 further described in section 4.3.

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 of Gunnamatta and St. Andrews beach, 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 was 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.

This phase of the receiving water monitoring program for the Eastern Treatment Plant's treated effluent discharge commenced in January 2005 and was completed with a final report published in November 2007 and submitted to EPA (Eastern Treatment Plant: Monitoring the Receiving Environment 2004 – 2007). The program was jointly developed by CSIRO, SKM, EPA and Melbourne Water and approved by the EPA. The monitoring program summary is provided in the table below.

Table 6 Receiving Environment Monitoring Program 2004-2007

Task	Results	Conclusion
Effluent sampling and chemical analysis (Managed by MWC) Parameters (and frequency of sampling) as prescribed in discharge licence.	Results were reported in the ETP Annual Reports –effluent complied with the requirements of the discharge licence. Analysis of results was used to inform assessments for other monitoring tasks.	Assessment of effluent characteristics based on results of routine chemical analysis continues to inform the environmental assessment process. Inclusion of online measures will add value to the overall monitoring program.
Aesthetics – beach inspections (Managed by MWC) Staff undertake beach inspections at low tide; check general condition of water, noting colour, odour and foam on the Beach Inspection Report Log Sheet	Results from the inspections have been entered into a database for analysis and reported to the EPA as required. More detailed statistical analyses informed the understanding of the cause-and-effect associations which lead to odour, foam and plume visibility at Boags Rocks.	Redesign of the log sheet improved the reliability of the data, and has assisted in assessment of the causative agents for foam, odour and visibility. Selected inspectors will be trained to undertake qualitative biological assessments of the platforms at Boags Rocks and Boags Rocks East.
Effluent Toxicity Assessment (Undertaken by CSIRO) Direct toxicity assessment (DTA) of effluent using quarterly scallop (MimaChlamys asperrima) larvae development tests and other toxicity investigations to assess the impact of reduced ammonia and salinity on a range of test species.	DTA indicated no new chemical toxicants are evident in the effluent, and that toxicity was associated with ammonia. EC50 values ranged from 10 to 48%, and NOEC from 6 to 25%. The additional studies provided further confidence in the decision made to proceed with reducing the ammonia concentration in the effluent. The safe dilution of unadjusted nitrified effluent was 1:50	Monitoring should continue to use the scallop larval development test, given the depth of knowledge established and the availability of toxicant identification evaluation (TIE) protocols. The frequency for routine testing should be changed to 6-monthly, but in conjunction with a trigger based approach driven by online monitoring. Effluent safe dilutions should be recalculated after the completion of the aeration upgrade.

Contaminants – accumulation in biota and sediments (Undertaken by PIRVic) Composite samples of the local mussel *Brachidontes rostratus* obtained from Boags Rocks and a reference site, for analysis of metals in December 2005.	Average metal concentrations were similar to results obtained in 2001. Comparison with reference site indicates that copper may be accumulating in mussels at Boags Rocks, but at levels significantly less than guideline limits.	Program continues to provide confidence that contaminants that may pose a risk to human health (via seafood) are not accumulating in the receiving environment. The program should be repeated in 4 years.
Intertidal platform algal surveys (Undertaken by CEE P/L, with analysis by Uni Melb ACE) Quadrat presence/absence surveys on intertidal rock platforms (9 sites) to assess change in occurrence of common macroalgae (*Hormosira*, *Ulva*, *Cladophora*, and *Corallina*) and *Boccardia*. Surveys provide a coarse resolution test for assessing change in the impact (temporal and spatial) from the effluent on biological assemblages in the receiving environment.	The abundance of *Ulva* has varied throughout the monitoring period 2001-2007, but is consistently higher at Boags Rocks. *Hormosira* is absent from Boags Rocks, but continues to occur at Fingals Beach and at No.16 (more densely). Abundance of *Corallina* increases with distance from Boags Rocks. *Hormosira*, *Cladophora*, *Corallina* and filamentous red algae are negative indicators, and *Ulva* and *Boccardia* are positive indicators of the impact of effluent.	The quadrat based surveys should continue to be undertaken on a 6-monthly basis at the 9 sites surveyed previously. Additional statistical analysis has presented a correlation between nitrogen loads and *Ulva*. Relationships for other indicators were not as clear, but with further sample points correlation with loads may be deduced.
Intertidal platform mapping (Undertaken by PIRVic) Biological habitats were mapped at St Pauls, No.16, Boags Rocks, Boags Rocks East and Fingals West and East. One strip 30-150 m wide was mapped at each site from the outer edge to the shore. At Fingals Beach low density *Hormosira* patches were mapped together with the distribution of *Durvillaea* and other kelps on the outer edge of the reef.	Comparison of habitats mapped on each reef in December 2005 and 2006 indicated that in most cases differences were small. At Boags Rocks, the area dominated by *Boccardia* had extended further landward and further southeast. At Fingals East the dominant habitats were *Corallina* and *Corallina/Capreolia* in both years. The *Pterocladiella* habitat, *Corallina/Hormosira* habitat and the low density *Hormosira* habitats were located in essentially the same areas in 2005 and 2006. The increased prominence of *Ulva* was similar to changes observed at St Pauls, Number Sixteen and Fingals West between 2005 and 2006. The distribution of *Durvillea* potatorum was assessed only at Fingals Beach, where is had remained the same between years. Concurrent nutrient exposure investigations were also undertaken to support the hypothesis of a nutrient related cause of biological changes.	The use of mobile mapping methods by marine biologists proved efficient and effective. With two series of mapping undertaken, a basis against which to measure responses to ETP upgrades has been established. Changes in biological communities between 2005 and 2006 were small enough that large scale changes in representation of different habitat types would be detected using this method in future years. A summary of the area of *Hormosira* habitat on all reefs should be sensitive enough to detect appreciable recovery in *Hormosira* abundance at Fingals Beach compared to reefs beyond the influence of the Outfall. Mapping should be repeated.

Subtidal video surveys of substrate (Undertaken by CEE P/L) Diver assisted underwater video footage along transects on sections of the subtidal reef (14-18m depth) that runs parallel to shore. Extent of area covered 7km either side of the discharge point. Plus remotely controlled underwater video footage of the substrate along transects perpendicular to the shore.	Video records show a healthy subtidal community offshore. *Ecklonia* kelp and associated macroalgal understorey assemblages continue to be the dominant community component. The major biological categories were Ecklonia kelp, red foliose algae and red coralline algae. Further offshore (1.5-3.5 km) in the deeper water, *Ecklonia* density generally decreases, with red algae becoming the predominant plants, and ascidians (stalked and encrusting) and sponges also becoming more common.	The video technique has been shown to be repeatable, and quantitative assessment has been developed which provides a means for comparison between years, and sites. Again this monitoring will provide a baseline prior to any changes occurring (treatment upgrades and or outfall extension).

1.4 Discharges to Air

1.4.1 Outfall Pump Engine Emission Analysis

The EPA Victoria discharge licence for the Eastern Treatment Plant requires that annual monitoring of at least one of the five outfall pump engine stacks when operating on sludge gas.

As part of the Eastern Green Energy Project, Melbourne Water replaced three of its five outfall pump engines in FY 2007, with electrical motors thus eliminating emissions from the outfall pump station during normal operation. In 2008, Melbourne water converted the remaining two engines to operate on natural gas with 10 % diesel pilot fuel. These two engines will only be operated during emergencies and breakdowns and for testing purposes..

As there was no outfall engine operating on sludge gas, no sampling was conducted for outfall pump engine emissions, as agreed upon by EPA.

1.4.2 Engine Operation

During 2007/08, sludge gas was used primarily for the operation of the generators in the Power Station.

The following table presents details of the total monthly operation of the generators in the Power Station during 2007/08.

Table 7 Operational Hours of Generators in Power Station

Date	Power Station Hours Run Per Month
July 2007	3499
August 2007	2729
September 2007	2471
October 2007	2927
November 2007	1239
December 2007	2502
January 2008	2642
February 2008	2530
March 2008	2476
April 2008	2398
May 2008	1940
June 2008	2630
Total (Hours)	**29983**

1.5 Odour Management

1.5.1 Odour complaints received during 2007/08

The following table details the 7 odour complaints received at the Eastern Treatment Plant during 2007/08.

Table 8 Details of Odour Complaints

Date	Address Zone	Possible Source	Observations and Action Taken
12/09/2007	Patterson Lakes	ETP Likely Source	A complaint of a bad sewage smell in the vicinity of Patterson Lakes. MW personnel visited the site soon after the complaint was received and the odour was unable to be detected. A wind track to the time of the complaint was completed and indicated that ETP was a possible contributor to the odour detected as the wind track crossed known sources of odour.
15/11/2007	Bangholme	ETP Likely Source	A complaint of a bad sewage smell received from CFA Training office (located on Thompson Rd directly adjacent to the southern sludge drying pans). Six of the sludge drying pans had been turned over the day as part of the sludge drying operations. The sludge drying pans have been identified as a source of odour from site. The wind track to the time of the complaint passed close to the edge of the sludge drying pans. To reduce the impact of the odours caused from the sludge drying operations harvesting activities will be reduced in the area of the southern drying pans when there is a low to moderate south westerly wind in the area.
29/11/2007	Boags Rocks		MW received a complaint of a mild odour detectable at the South East Outfall at Boags Rock. Melbourne Water conducted a beach walk on the same day and the log sheet from that day reported no abnormal issues. A faint treated effluent odour was detectable at Boags Rocks and 200m from the outfall at St Andrews Beach.
5/3/2008	Patterson Lakes	ETP Likely Source	MW received an odour complaint from a local Patterson lakes resident. As the complaint was received well after the odour was detected a site visit by MW personnel was unable to be conducted. The wind track to the time of the complaint was from an east north easterly direction and passed the edge of the southern sludge drying pans and also the local meat works, both sources may have contributed to the odour detected.
12/3/2008	Patterson Lakes	ETP Likely Source	MW received an odour complaint from a local Paterson Lakes resident. MW staff visited the site and the odour was unable to be detected. A check of process and operational records was completed and no issues were evident. The wind track passed close to the area where the foul air system discharge stacks are located on

Date	Address Zone	Possible Source	Observations and Action Taken
			the C & I building (which is being addressed in Stage 1 of the odour control strategy). The wind track also crossed the sludge drying pans where recent sludge harvesting works may have contributed to the odour detected by the local resident
19/3/2008	Patterson Lakes	ETP Likely Source	MW received an odour complaint from a local Patterson Lakes Resident. The wind conditions leading up to the time of the complaint were calm to moderate from an east, north easterly direction. The EPA was notified and a wind track to the time of the complaint was completed. The check of plant process records indicated that there were no issues that may have contributed to the odour detected. The wind track to the time of the complaint passed across the sludge drying pans south of Thompson Road and also crossed the local meat works which may have also contributed to the odour detected.
20/3/2008	Bangholme	ETP Likely Source	MW received an odour complaint from the CFA training facility located on Thompson Road.The complainant did not specify the exact times of day that the odour was detected only that it was noticeable for most of the day. Wind tracks were completed. A check of plant process and operational records was also conducted. ETP is likely to have contributed to the odours detected, as the wind tracks crossed over known odour sources of the plant and during sludge harvesting works which is a known odorous activity. A meeting was held with MW and CFA representatives on the 28th March 2008 to discuss the outcomes of the investigation and to identify some measures that can be taken to reduce the impact of odour at the CFA training ground.

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 2007/08:

- The Foul Air System odour control plant is under construction and is due for completion mid- 2009.
- Functional design of the primary sedimentation tank and settled sewage channel covers has been finalised. Concept design for treating the air from under the primary sedimentation tank covers is nearing completion. Options for treating the air under the settled sewage channels are being finalised.

2 USE OF EFFLUENT, BIOSOLIDS AND BIOGAS

2.1 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 2007/2008 7,881 ML of treated effluent was recycled off site to various customers along the South Eastern Outfall and about 13,255 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.

2.2 Recycled Water Monitoring

A recycled water-monitoring program was undertaken during 2007/08. 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 9 Quality of Recycled Water Produced at the Eastern Treatment Plant

	E. coli **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)	6	6.0	3	12	7.0 – 8.0
Ballarto Rd Sample Point (SEO Manhole No. 069)	3	7	3	12	7.0 – 8.0
Range Rd Sample Point (SEO Manhole No. 035)	2	7	3	9	7.0 – 8.0
Truemans Rd Gunnamatta (SEO Manhole No. 003)	23	7	3	11	7.0 – 8.1

Notes:
1. Eastern Treatment Plant Reuse sample point

2.3 Additional Reuse Monitoring

The following tables detail results of additional monitoring undertaken on the final effluent at the Eastern Treatment Plant during 2007/08 in order to improve understanding of effluent quality and the potential to maximise effluent reuse, and ensure compliance with Class C Reuse standards.

Table 10 Results of Additional Reuse Monitoring of Final Effluent

Parameter, Units	EPA Guideline Limit[1]	Median	90th Percentile	Maximum
Total Dissolved Solids (mg/L)	<500	510	542	590
Sodium (mg/L)	-	125	130	130
Calcium (mg/L)	-	17	20	22
Magnesium (mg/L)	-	9.4	10.9	11
Chloride (mg/L)	-	160	170	170
Potassium (mg/L)	-	25	28	29
SAR	-	6.0	6.5	6.6
Alkalinity (mg/L $CaCO_3$)	-	94	120	140
Aluminium (mg/L)	5	0.21	0.27	0.35
Boron (mg/L)	0.75	0.15	0.17	0.18
Iron (mg/L)	5	0.19	0.22	0.25
True Colour (Pt/Co)	-	80	107	160
Turbidity (NTU)	-	5.6	9.9	11
Arsenic (mg/L)	0.1	0.002(2)	0.0029	0.003(2)
Beryllium (mg/L)	0.1	0.0005(2)	0.0005(2)	0.0005(2)
Cobalt (mg/L)	0.05	0.001(2)	0.002(2)	0.003(2)
Fluoride (mg/L)	1	0.90	1.1	1.1
Lithium (mg/L)	2.5	0.01(2)	0.01(2)	0.1(2)
Manganese (mg/L)	0.2	0.042	0.048	0.049
Molybdenum (mg/L)	0.01	0.004	0.005	0.006
Selenium (mg/L)	0.02	0.0005(2)	0.0005(2)	0.003(2)
Zinc (mg/L)	2	0.060	0.076	0.081

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.

2.4 Biosolids

2.4.1 Biosolids Reuse during 2007/08

Melbourne Water has commenced the implementation of a Biosolids Strategy developed in 2006/07 that identified options for use of biosolids from the Eastern and Western Treatment Plant. The options aim to capture the benefits of the resource while mitigating the environmental impact of the embedded contaminants. The

strategy draws on the findings of a number of feasibility studies. In these studies, options for pre-treatment and reuse of biosolids in agriculture, organic soils, construction materials and energy recovery were investigated.

Use of biosolids as a geotechnical fill was identified as a preferred reuse option for clay-rich biosolids from ETP.

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 2007/08. The 2007/08 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 continuing to work with the EPA to develop guidelines for use of biosolids for geotechnical fill. The EPA have indicated that the geotechnical fill guidelines will be issued in August, after which time Melbourne Water will be able to pursue geotechnical fill reuse opportunities.

Melbourne Water has completed a review into known hazards and associated risks for land application of biosolids. The risks identified were used to 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. This study is due to be completed in 2008/09.

In addition to the selection of the structural fill option to pursue further for ETP, the Biosolids Strategy proposed further research and development of alternative reuse options. In 2007/08 a research and development program commenced, incorporating projects focusing on decontamination, energy extraction, stabilisation and alternative recycling projects.

The 2007/08 reuse target and corporate KPI remains 100% beneficial use of annual production which equates to 30,556 tonnes dry solids of biosolids. The biosolids inventory at ETP as of July 2007 is 1,194,800 cubic meters.

2.5 Biogas Utilisation

During the financial year 2007/08, biogas has been used primarily for the operation of the generators in the power station. The following table details the volumes of biogas used in the Power Station, and the volume of biogas flared off for each month of the 2007/08 financial year and for the financial year as a whole. With the completion of EGEP, the utilisation of biogas volume is expected to increase in the future.

Table 11 Volume of Biogas Used and Flared at Eastern Treatment Plant

Date	Volume of Biogas Used (m^3)	Volume of Biogas Flared (m^3)
July 2007	1,073,265	659,829
August 2007	1,040,781	765,735
September 2007	1,055,002	690,446
October 2007	1,385,802	493,419
November 2007	1,245,367	472,706
December 2007	1,223,174	357,348
January 2008	1,245,113	235,870
February 2008	1,193,088	242,393
March 2008	805,599	519,585
April 2008	974,651	653,904
May 2008	1,440,223	297,611
June 2008	1,403,264	254,895
Financial Year	**14,085,329**	**5,643,741**

3 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 12 South East Water Top Ten Dischargers by Volume[2]

Sewer Catchment	Risk Rank[1]	Variation Parameters[3]	Volumes Discharged (ML/annum) 2007/08
Westall Road	1	TDS, Ammonia, pH	270
Chelsea	1	TDS	244
Eumemmerring Creek	1	TDS, Ammonia, pH, Temperature	220
Eumemmerring Creek	1	TDS	154
Corhanwarrabul Creek	2	TDS	132
Clayton East & West	3	TDS	80
Chelsea	1	TDS	63
Corhanwarrabul Creek	3	TDS	58
Eumemmerring Creek	3	Nil Required	56
Murrumbeena	2	Nil Required	53
TOTAL			**1331**

Table 13 South East Water Top Ten Dischargers by Risk[2]

Sewer Catchment	Risk Rank[1]	Variation Parameters[3]	Volumes Discharged (ML/annum) 2007/08
Eumemmerring Creek	1	TDS, Ammonia, pH, Temperature	220
Westall Road	1	TDS, Ammonia, pH	270
Eumemmerring Creek	1	TDS, Ammonia, pH	30
Chelsea	1	TDS	63
Eumemmerring Creek	1	Nil Required	0.4
Eumemmerring Creek	1	TDS, Ammonia, pH	6.3
Eumemmerring Creek	1	TDS, Ammonia, pH	26
Eumemmerring Creek	1	Nil Required	1.3
Eumemmerring Creek	1	TDS, Ammonia, pH	14
Eumemmerring Creek	1	TDS	154
TOTAL			**786**

Table 14 Yarra Valley Water Top Ten Dischargers by Volume[2]

Sewer Catchment	Risk Rank[1]	Variation Parameters[3]	Volumes Discharged (ML/annum) 2007/08
Gardiners Creek Box Hill	1	TDS, Temp	919.95
Eltham	2	Mn, Al, Fe, SS	225.71
Lower Plenty	3	TDS	134.21
Westall	2	TDS	109.73
Clayton East and West	3	Nil Required	80.49
Westall	4	pH, Colour,TPH	69.85
Westall	2	Nil Required	64.04
North Yarra & Rosanna	2	pH	57.37
Gardiners Creek and Box Hill	4	TDS	52.09
Gardiners Creek and Box Hill	3	Colour, TDS	38.8
TOTAL			**1752**

Table 15 Yarra Valley Water Top Ten Dischargers by Risk[2]

Sewer Catchment	Risk Rank[1]	Variation Parameters[3]	Volumes Discharged (ML/annum) 2007/08
Gardiners Creek Box Hill	1	TDS, Temp	919.95
Gardiners Creek Box Hill	1	Ammonia	9.43
Croydon and Ringwood South	1	TDS	1.56
Croydon and Ringwood South	1	TDS, PAH	3.95
Westall	2	Nil Required	64.04
Westall	2	TDS	109.73
Eltham	2	Mn, Fe, SS	225.71
Ringwood	2	TDS	4.9
Clayton East and West	2	Nil Required	5.5[4]
Westall	3	Nil Required	20.91
TOTAL			**1366**

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.

4 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 project

The status of these projects is as follows:

4.1 Ammonia Reduction Project

The Ammonia Reduction Project will result in the plant producing an effluent with an annual median ammonia concentration of less than 5 mg/L and 90th percentile less than 10 mg/l (to comply in 2010) . 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 four additional aeration tanks to ensure process stability and reliability in ammonia reduction mode under a broader range of conditions;

Conversion of all six tanks is now complete.

The construction of the additional aeration tanks has commenced with good progress being made on the civil works. Commissioning of the additional aeration tanks will be completed by 2010. Following the commissioning of the new aeration tanks the annual median ammonia concentration in the effluent will be less than 5 mg/L and the annual 90th percentile will be less than 10 mg/L.

4.2 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 equipment is now commissioned and in full production.

4.3 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 17.0 ha of existing, operational drying pans.
- Completion of digested sludge and supernatant pipeline improvement works.

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

Table 16 Summary of Works under Sludge Drying Pan projects

Works	Area	period	Comments
Refurbishment	Pans 8,9, 26 to 32, 38A & 38B (17.0 Ha)	2007/08	Pans relined to protect groundwater.
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.

4.4 Other Capital Works Planned for 2008/09

Works in addition to those described above and scheduled for 2008/09 include:

- Waste Activated Sludge Thickening capacity augmentation works - tendering and detailed design have been completed and the sequenced construction has commenced with completion of 2 tanks.
- Odour reduction works (new foul air system Biofilter) – Construction has commenced and completion is expected in early 2009.
- Sludge digestion capacity augmentation works - Construction has commenced and completion is expected in early 2009.
- Grit and Screening Facility works – concept design is complete and functional design is about to commence.

5 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 December 2007 and March 2008, 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 2007/08.

6 ENVIRONMENT IMPROVEMENT PLAN

The Eastern Treatment Plant's 2005 Environmental Improvement Plan (EIP) was reviewed in 2007. The 2007 Action Plan was updated through 3 workshops and one of those workshops included members of the Eastern Treatment Plant's Community Consultation Committee, EPA Victoria and the Department of Sustainability and the Environment. The final draft of the updated plan was submitted to the EPA in November 2007 for final comments. The review of the 2005 EIP showed that 22 out of a total of 38 actions had been completed by July 2007. There are 16 actions that are in the process of being completed and 22 new actions have been added to the 2007 updated plan.

7 TERTIARY TECHNOLOGY TRIALS PROJECT

In October 2006, the Victorian Government announced that Melbourne Water will upgrade the Eastern Treatment Plant to produce recycled water of Class A standard in 2012. The upgrade will involve the addition of tertiary filtration and enhanced disinfection treatment processes.

The upgrade will be a significant step in promoting water recycling and increasing the potential to reduce effluent discharge to the marine environment at Boags Rocks on Bass Strait. Class A water can be used for a wide range of non-drinking applications such as garden watering, car washing and toilet flushing, and a range of industrial and agricultural uses. The resulting effluent quality will also significantly improve recreational amenity at the discharge point at Boags Rocks by eliminating any litter, and further reducing foam, turbidity, and oil and grease.

In addition to the above treatment processes, Melbourne Water is considering the option of introducing an advanced colour and odour reduction process that would address residual amenity issues at Boags Rocks and provide a more robust platform for possible future recycling applications. The receiving environment improvements resulting from this process together with the current ammonia reduction works, tertiary filtration and disinfection, and ongoing development of recycling diversions, may improve the amenity and environment at the shoreline to the extent that an extended outfall is not required.

The tertiary technology trials facility commenced operation in February 2008. The facility has proven to be reliable and is providing great insight into the potential of each tertiary and advanced treatment process being trialled for ETP, which will appropriately inform the decision to be made on the preferred full scale treatment process by early 2009. The trial facility will continue to be used following the initial

12 month period to support the detailed design process for the selected treatment technology.

The trials have been useful for highlighting the relativity in performance and key operational and sizing parameters such as recovery and throughput. Significant progress has been made to determine the sustainable loading rates, the key parameter which determines the amount of filtration area required for a full scale plant. Further work over the coming 6 months will cover optimal cleaning regimes, pathogen removal and gaining an understanding into the longer term reliability with varying feedwater quality.

The first 4 months of the ETP technology trials have provided a useful insight into the various candidate technologies for tertiary and advanced treatment of ETP effluent.

The advanced treatment process is looking technically feasible for ETP with ozone doses in the range predicted by the laboratory scale testing in 2006/07, and further work will continue over the coming 6 months to resolve several outstanding issues.

The Class A treatment processes are demonstrating their capability to achieve Class A water quality requirements. These trains do not address the colour and odour aspects of the current discharge and further work regarding pathogen removal and the role of UV disinfection will be undertaken.

The trials program is essentially on track, with the information from the trials being used to determine the preferred process train for full scale. Although significant work has been undertaken over the past 4 months, there is still significant work to do before a recommendation on the preferred final process train can be made.

The next 6 months will be spent working through the experimental plan, conducting detailed option assessment and full scale design development, preparing robust cost estimates and resolving the preferred final process train to take forward to full scale. Melbourne Water is currently selecting a designer to assist with this work which should be appointed by early July 2009.

APPENDIX - BEACH E. COLI AND ENTEROCOCCI RESULTS

Beach E. coli data (orgs / 100 mL)

	BEACH 1		BEACH 2		BEACH 3		BEACH 4		BEACH 5		BEACH 6	
SAMPLE DATE	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*
03-Jul-07	8		0		0		2		18		0	
11-Jul-07	0		2		0		2		7		0	
19-Jul-07	0		0		0		0		34		0	
24-Jul-07	6		0		2		0		14		0	
27-Jul-07	10	6	10	0	0	0	20	2	20	18	0	0
02-Aug-07	0	0	0	0	68	0	0	0	50	20	0	0
08-Aug-07	2	2	0	0	0	0	0	0	0	20	0	0
14-Aug-07	58	6	34	0	150	2	0	0	0	14	0	0
20-Aug-07	0	2	0	0	0	0	0	0	16	16	2	0
28-Aug-07	4	2	0	0	0	0	0	0	5	5	0	0
05-Sep-07	0	2	0	0	0	0	0	0	3	3	0	0
13-Sep-07	2	2	0	0	0	0	0	0	0	3	0	0
21-Sep-07	0	0	0	0	0	0	0	0	0	3	0	0
27-Sep-07	0	0	0	0	0	0	0	0	0	0	0	0
3-Oct-07	2	0	2	0	0	0	2	0	14	0	2	0
9-Oct-07	0	0	0	0	0	0	0	0	8	0	0	0
15-Oct-07	0	0	0	0	0	0	2	0	0	0	0	0
23-Oct-07	2	0	0	0	2	0	0	0	10	8	0	0
31-Oct-07	0	0	0	0	2	0	0	0	2	8	0	0
7-Nov-07	2	0	0	0	0	0	0	0	6	6	0	0
12-Nov-07	4	2	0	0	0	0	0	0	18	6	2	0
20-Nov-07	4	2	0	0	0	0	0	0	18	10	0	0
28-Nov-07	10	4	0	0	0	0	0	0	7	7	0	0
30-Nov-07	0	4	0	0	0	0	0	0	50	18	2	0
5-Dec-07	0	4	0	0	0	0	0	0	13	18	0	0
11-Dec-07	0	0	0	0	0	0	0	0	10	13	0	0
19-Dec-07	6	0	0	0	0	0	0	0	34	**13**	0	0

	BEACH 1		BEACH 2		BEACH 3		BEACH 4		BEACH 5		BEACH 6	
SAMPLE DATE	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*
27-Dec-07	5	0	0	0	0	0	0	0	190	34	0	0
2-Jan-08	0	0	0	0	0	0	0	0	420	34	2	0
9-Jan-08	11	5	0	0	0	0	0	0	120	120	0	0
16-Jan-08	6	6	0	0	0	0	0	0	130	130	3	0
23-Jan-08	2	5	0	0	0	0	0	0	24	130	0	0
30-Jan-08	2	2	0	0	0	0	0	0	330	130	2	2
6-Feb-08	4	4	0	0	0	0	0	0	120	120	6	2
13-Feb-08	0	2	0	0	0	0	0	0	11	120	6	3
21-Feb-08	4	2	0	0	0	0	0	0	260	120	0	2
27-Feb-08	10	4	0	0	0	0	0	0	16	120	0	2
5-Mar-08	0	4	0	0	0	0	0	0	24	24	0	0
12-Mar-08	100	4	0	0	0	0	0	0	44	24	0	0
19-Mar-08	0	4	0	0	0	0	0	0	17	24	0	0
26-Mar-08	34	10	8	0	4	0	8	0	86	24	4	0
2-Apr-08	4	4	0	0	0	0	0	0	2	24	0	0
9-Apr-08	30	30	2	0	0	0	0	0	0	17	0	0
16-Apr-08	2	4	0	0	0	0	0	0	6	6	0	0
23-Apr-08	21	21	0	0	0	0	0	0	16	6	0	0
30-Apr-08	8	8	0	0	0	0	0	0	0	2	0	0
7-May-08	0	8	4	0	2	0	0	0	8	6	0	0
14-May-08	2	2	0	0	0	0	0	0	0	6	0	0
21-May-08	4	4	2	0	14	0	0	0	6	6	0	0
28-May-08	4	4	0	0	2	2	6	0	0	0	0	0
4-Jun-08	0	2	4	2	4	2	0	0	8	6	2	0
11-Jun-08	0	2	0	0	2	2	0	0	14	6	0	0
18-Jun-08	0	0	0	0	0	2	0	0	0	6	0	0
25-Jun-08	0	0	2	0	0	2	0	0	2	2	0	0

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

Beach Enterococci data (orgs / 100 mL)

	BEACH 1			BEACH2			BEACH 3		
SAMPLE DATE	**Day results**	**30 d Median****	**75th Percentile***	**Day Result**	**30 d Median****	**75th Percentile***	**Day Result**	**30 d Median****	**75th Percentile***
03-Jul-07	0			0			0		
11-Jul-07	0			9			0		
19-Jul-07	0			2			0		
24-Jul-07	0			0			2		
27-Jul-07	10	0		34	2		0	0	
02-Aug-07	120	0		47	9		46	0	
08-Aug-07	13	10		2	2		0	0	
14-Aug-07	310	13		790	34		550	2	
20-Aug-07	0	13		0	34		0	0	
28-Aug-07	16	16		0	2		0	0	
05-Sep-07	0	13	14.5	0	0	21.5	3	0	2.5
13-Sep-07	0	0	14.5	0	0	21.5	2	2	2.5
21-Sep-07	0	0	14.5	0	0	18	0	0	2.5
27-Sep-07	0	0	14.5	0	0	18	0	0	2.5
3-Oct-07	0	0	14.5	0	0	18	0	0	2.5
9-Oct-07	0	0	14.5	0	0	1	0	0	2.5
15-Oct-07	0	0	6.5	0	0	0	0	0	1
23-Oct-07	0	0	0	0	0	0	0	0	1
31-Oct-07	0	0	0	0	0	0	0	0	0
7-Nov-07	0	0	0	0	0	0	0	0	0
12-Nov-07	0	0	0	0	0	0	0	0	0
20-Nov-07	0	0	0	0	0	0	0	0	0
28-Nov-07	2	0	0	0	0	0	0	0	0
30-Nov-07	0	0	0	2	0	0	0	0	0
5-Dec-07	0	0	0	0	0	0	0	0	0
11-Dec-07	2	0	0	0	0	0	2	0	0
19-Dec-07	0	0	0	0	0	0	0	0	0
27-Dec-07	4	0	1	3	0	0	0	0	0
2-Jan-08	4	2	2	0	0	0	2	0	0

	BEACH 1			BEACH2			BEACH 3		
SAMPLE DATE	**Day results**	**30 d Median****	**75th Percentile***	**Day Result**	**30 d Median****	**75th Percentile***	**Day Result**	**30 d Median****	**75th Percentile***
9-Jan-08	2	2	2	0	0	0	0	0	0
16-Jan-08	4	4	3	0	0	0	0	0	4
23-Jan-08	0	4	3	0	0	0	0	0	0
30-Jan-08	2	2	3	0	0	0	0	0	0
6-Feb-08	5	2	4	0	0	0	0	0	0
13-Feb-08	0	2	4	0	0	0	0	0	0
21-Feb-08	0	0	4	0	0	0	0	0	0
27-Feb-08	4	2	4	0	0	0	0	0	0
5-Mar-08	0	0	4	0	0	0	0	0	0
12-Mar-08	2	0	4	0	0	0	0	0	0
19-Mar-08	0	0	3	0	0	0	0	0	0
26-Mar-08	4	2	4	0	0	0	0	0	0
2-Apr-08	0	0	3	0	0	0	0	0	0
9-Apr-08	5	2	4	0	0	0	0	0	0
16-Apr-08	0	0	4	0	0	0	0	0	0
23-Apr-08	8	4	4	0	0	0	0	0	0
30-Apr-08	0	0	4	0	0	0	0	0	0
7-May-08	2	2	4	0	0	0	0	0	0
14-May-08	0	0	3	0	0	0	0	0	0
21-May-08	0	0	3	0	0	0	2	0	0
28-May-08	6	0	4.5	0	0	0	0	0	0
4-Jun-08	2	2	4.5	2	0	0	4	0	0
11-Jun-08	0	0	3.5	0	0	0	0	0	0
18-Jun-08	0	0	3.5	0	0	0	0	0	0
25-Jun-08	4	2	3	2	0	0	0	0	0

** State Environmental Protection Policy (SEPP), Waters of Victoria requirement for primary contact recreation is a rolling 30 day median of ≤ 35 Orgs/100 mL * SEPP (Waters Victoria) requirement for primary contact recreation is a rolling 60 day 75th Percentile of ≤ 150 orgs/100 mL

Beach Enterococci data (orgs / 100 mL)

	BEACH4			BEACH5			BEACH6		
SAMPLE DATE	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*	Day Result	30 d Median**	75th Percentile*
03-Jul-07	2			10			0		
11-Jul-07	6			0			0		
19-Jul-07	0			42			2		
24-Jul-07	0			4			0		
27-Jul-07	90	2		130	10		2	0	
02-Aug-07	58	6		94	42		4	2	
08-Aug-07	16	16		8	42		0	2	
14-Aug-07	49	49		30	30		39	2	
20-Aug-07	0	49		0	30		14	4	
28-Aug-07	0	16		40	30		0	4	
05-Sep-07	0	0	32.5	0	8	41	0	0	3
13-Sep-07	0	0	32.5	0	0	41	0	0	3
21-Sep-07	0	0	32.5	0	0	41	0	0	3
27-Sep-07	0	0	32.5	0	0	35	0	0	3
3-Oct-07	0	0	32.5	6	0	35	0	0	3
9-Oct-07	0	0	8	2	0	19	0	0	2
15-Oct-07	0	0	0	0	0	7	0	0	0
23-Oct-07	0	0	0	0	0	4	0	0	0
31-Oct-07	0	0	0	0	0	1	0	0	0
7-Nov-07	0	0	0	4	0	3	0	0	0
12-Nov-07	0	0	0	6	0	3	2	0	0
20-Nov-07	0	0	0	32	4	5	0	0	0
28-Nov-07	0	0	0	4	4	5	0	0	0
30-Nov-07	0	0	0	10	6	6	0	0	0
5-Dec-07	0	0	0	2	6	6	0	0	0
11-Dec-07	0	0	0	0	4	5	0	0	0
19-Dec-07	0	0	0	4	4	5	0	0	0

	BEACH4			BEACH5			BEACH6		
SAMPLE DATE	**Day Result**	**30 d Median****	**75th Percentile***	**Day Result**	**30 d Median****	**75th Percentile***	**Day Result**	**30 d Median****	**75th Percentile***
27-Dec-07	0	0	0	65	4	8	0	0	0
2-Jan-08	0	0	0	53	4	21	6	0	0
9-Jan-08	0	0	0	78	53	42.5	0	0	0
16-Jan-08	0	0	0	32	53	42.5	20	0	1
23-Jan-08	2	0	0	20	53	42.5	3	3	1.5
30-Jan-08	0	0	0	39	39	46	0	3	1.5
6-Feb-08	0	0	0	0	32	46	0	0	1.5
13-Feb-08	0	0	0	0	20	46	0	0	1.5
21-Feb-08	0	0	0	28	20	46	0	0	1.5
27-Feb-08	0	0	0	0	0	46	0	0	1.5
5-Mar-08	0	0	0	2	0	46	2	0	2.5
12-Mar-08	0	0	0	6	2	35.5	8	0	4.5
19-Mar-08	0	0	0	0	2	30	6	2	4.5
26-Mar-08	0	0	0	7	2	24	0	2	4.5
2-Apr-08	0	0	0	2	2	13.5	0	2	2.5
9-Apr-08	0	0	0	0	2	6.5	0	0	1
16-Apr-08	0	0	0	2	2	4	0	0	1
23-Apr-08	0	0	0	0	2	4	0	0	1
30-Apr-08	0	0	0	0	0	4	0	0	1
7-May-08	0	0	0	2	0	2	0	0	1
14-May-08	0	0	0	0	0	2	0	0	1
21-May-08	2	0	0	0	0	2	0	0	0
28-May-08	0	0	0	0	0	2	0	0	0
4-Jun-08	0	0	0	2	0	2	0	0	0
11-Jun-08	0	0	0	0	0	2	0	0	0
18-Jun-08	0	0	0	0	0	1	0	0	0
25-Jun-08	2	0	0	0	0	1	0	0	0

** State Environmental Protection Policy (SEPP), Waters of Victoria requirement for primary contact recreation is a rolling 30 day median of ≤ 35 Orgs/100 mL * SEPP (Waters Victoria) requirement for primary contact recreation is a rolling 60 day 75th Percentile of ≤ 150 orgs/100 mL