

essentialfacts

Eastern Treatment Plant

Past, present and future

When the Eastern Treatment Plant at Bangholme opened in 1975 it was a world leader in the secondary treatment of sewage. Covering 1100 hectares, the plant was the biggest of its type in Australia when commissioned, providing a level of treatment not used in any other Australian city. At that stage, primary treatment was the standard treatment used in Australia and around the world.



The plant was designed and built to address the rapid expansion of Melbourne in the 1950s and 1960s, particularly in the south-eastern and eastern suburbs, and to relieve pressure on the Western Treatment Plant at Werribee, which was built in the late 1800s.

The plant has been continually improved over the years to incorporate the latest technical equipment.

Today, Melbourne produces about 925 million litres of sewage every day, which has to be managed and treated. The Eastern Treatment Plant provides an essential public health service, processing about 40%, or 370 million litres, of Melbourne's sewage each day. This serves about 1.5 million people. As our population increases so does the amount of sewage produced, and flows into the Eastern Treatment Plant are increasing by about 0.8% each year.

An increasing amount of treated effluent from the Eastern Treatment Plant is used for water recycling, and the rest is discharged under an EPA Victoria licence along a 56-kilometre pipeline - the South East Outfall - to Boags Rocks on the Mornington Peninsula.

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Tertiary upgrade

In October 2006, the Victorian Government announced that a \$300 million upgrade of the Eastern Treatment Plant to treat wastewater to Class A standard would begin in 2007 and would be completed by 2012.

This will mean 135,000 megalitres of treated water is available for recycling in new housing estates and industry.

A business case to confirm the estimated costs of the Eastern Recycling Proposal (to pump recycled water from the Eastern Treatment Plant to the Latrobe Valley for use by industry, instead of flowing into the ocean at Boags Rocks near Gunnamatta), the financial feasibility of the project, and the quality of water required by industry is being developed.

Tertiary Treatment Technology Research

In 2007, the next phase in the evolution of the Eastern Treatment Plant began with the construction of a \$10 million tertiary treatment technology trial facility at the site.

The construction of the trial facility is the first stage of the \$300 million plant upgrade that will mean in future that all water leaving the plant will be processed to Class A quality – making it suitable for use in new housing estates, irrigation and industry.

In 2008, the new facility will examine a range of different treatment systems, to enable analysts to clearly assess the best possible tertiary treatment method to be constructed and commissioned by 2012. The trials will enable Melbourne Water to test different technologies for filtration and disinfection of recycled water, and will provide the ability to intensively monitor and analyse results using online instruments and in an onsite laboratory. Melbourne Water will work closely with EPA Victoria and the Department of Human Services to achieve a result that ensures a well-proven and validated process.

Working with the community towards a sustainable environment

In addition to the independent regulation of the Eastern Treatment Plant's safety and environmental performance, Melbourne Water works closely with the community to monitor the plant's performance.

A Community Liaison Committee, which includes representatives from local councils, EPA Victoria, environment groups and retail water companies, plays a vital role in the planning and management of the Eastern Treatment Plant.

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Melbourne Water and the Community Liaison Committee have worked with EPA Victoria to develop an Environment Improvement Plan that is a blueprint for the environmental management of the plant. It will be reviewed and updated regularly.

The plan identifies the plant's impacts on the environment and specifies actions to protect and enhance the environment at and around the plant. Key actions covered by the plan are explained below. The plan is available on Melbourne Water's website at melbournewater.com.au

Quantity and quality of incoming sewage

Melbourne Water is working with retail water companies, partners and the community to reduce flows to the Eastern Treatment Plant from households and industry through water conservation, water recycling and community education.

We are also working with independent scientific experts to manage the quality of trade waste received at the Eastern Treatment Plant from retail water companies to limit pollutants such as heavy metals, salts and nonbiodegradable colour.

Improving sewage treatment to protect the environment

Aeration tanks at the Eastern Treatment Plant are being upgraded, to reduce the amount of ammonia in treated effluent being discharged into the marine environment at Boags Rocks.

A major two-year CSIRO study examined the effect of treated effluent on the marine environment. The study found that ammonia levels and freshwater volumes were having a detrimental impact on the marine environment.

Reducing the amount of ammonia will help the marine ecology recover, and Melbourne Water is now well advanced with an \$84 million project to cut levels by 75%.

In 2007, the first stage of this significant and complex project involves upgrading the existing aeration tanks at the plant. The construction of additional tanks will be completed in 2009.

Increasing water recycling

Water recycling reduces the discharge of treated effluent to bays and the ocean and conserves our precious drinking water. Melbourne Water has been selling recycled water from the Eastern Treatment Plant



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since the 1970s for use in agriculture, horticulture, vineyards, and to irrigate golf courses and sporting fields east of Melbourne.

Water is also recycled onsite in the plant's daily operations for cleaning screens, washing down work areas, cooling, steam cleaning and irrigating landscaped areas.

To achieve the Victorian Government's new target of 20% water recycling by 2010, Melbourne Water is working with water retail companies and other stakeholders on a range of recycling initiatives.

The Eastern Irrigation Scheme will deliver about 5000 million litres of Class A recycled water each year to the Cranbourne-Five Ways area, to the south-east of Melbourne. The recycled water will be used for irrigation of market gardens, open space irrigation and for use through dual pipe systems in residential developments. The project commenced in April 2005 and is a partnership between Melbourne Water and TopAq, which manages the scheme. TopAq is owned and operated by Earth Tech, a global provider of consulting, engineering and construction services.

In 2004, the State Government announced a two-year study to determine the feasibility of transferring water from the Eastern Treatment Plant for use in Gippsland. Under the Eastern Water Recycling Proposal, which has now been confirmed as technically feasible, recycled water treated at the Eastern Treatment Plant would be pumped to the Latrobe Valley for use by industry - instead of flowing into the ocean at Gunnamatta.

In accordance with its Works Approval, Melbourne Water has completed a range of scientific studies into the impact of treated effluent discharges at Boags Rocks, taking into account a range of conditions including changes in treatment standards and possible future water recycling proposals including the Eastern Water Recycling Proposal.

Managing odour

By their nature, some of Melbourne Water's operations, including sewage treatment, generate odour. Melbourne Water aims to improve odour management so that by 2007 no offensive odour is emitted from our assets.

Odour control technology is being installed at our sewage treatment plants. At the Eastern Treatment Plant, Melbourne Water will cover tanks and channels, treat the trapped air and improve odour-control facilities in our management of sewage sludge.

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We will assess the effectiveness of these measures and, if further works are needed, we will begin planning by January 2010.

Making the most of biosolids

Biosolids are the treated, dried sludge produced from sewage treatment and, until recently, these have been stored onsite. This is not sustainable and we are seeking new uses for biosolids.

Melbourne Water is exploring options to further reuse 100% of biosolids produced at the Eastern Treatment Plant. We are also aiming to reduce the quantity stored at the plant to sustainable levels by 2010.

Biosolids have been used successfully in Australia for soil conditioning and potting mixes, composting, land rehabilitation, landscaping, forestry, brick manufacture, agriculture and silviculture. Biosolids from the Eastern Treatment Plant have been used as conditioners and fertilisers by soil-blending companies.

Reducing greenhouse emissions

Since its inception, the Eastern Treatment Plant has used green energy produced from sludge gas as an electrical power source. As part of the Eastern Green Energy project, the plant is being modernised to improve efficiency and increase renewable energy production to meet about 50 per cent of the plant's energy needs.

Eliminating sewage spills

Melbourne Water aims to have no sewage spills as a result of operational failures. In recent years, we have invested in our sewerage infrastructure to ensure we have a robust system that meets world standards. We have targeted spill points with the most potential for environmental impact and we are working with the retail water companies to upgrade our systems to meet future needs.

During extreme rain, stormwater can infiltrate sewers leading to overflows when sewer capacity is exceeded. Such overflows are directed through emergency relief structures to minimise their environmental impact on local rivers and creeks and public health.

How the treatment process works

Sewage includes everything that goes down the kitchen, laundry and bathroom sink, as well as what is flushed down the toilet.

The sewage treatment process:

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- Sewage arrives at the Eastern Treatment Plant and is pumped through fine screens, removing objects such as sanitary products, cotton buds and other debris. These objects should not be flushed into the sewerage system.
- Sewage is aerated and grit is removed. The liquid waste passes to primary sedimentation tanks, and settled sludge and floating debris is pumped to larger tanks, known as digesters, where it is broken down.
- The primary-treated water passes through the secondary treatment process, breaking down organic material in the plant's aeration tanks. The water passes to circular sedimentation tanks, which settle out more sludge and produce a final clarified effluent.
- The treated effluent flows to large holding basins before it passes through three millimetre microscreens. It is then disinfected using a process called chlorination.
- An increasing amount of fully treated effluent is recycled, and the rest is discharged into Bass Strait at Boags rocks under an EPA Victoria licence.

Treated effluent is then discharged to Bass Strait through a long pipeline, called the South East Outfall.

Sewage from South East Water's treatment plants at Boneo, Mount. Martha and Somers is also discharged into the South East Outfall downstream of the Eastern Treatment Plant.

Ongoing research and monitoring program

We monitor every aspect of the sewage treatment process, from the moment the sewage arrives at the plant, to when it is discharged as fully treated effluent into Bass Strait.

The Eastern Treatment Plant has been granted HACCP accreditation – it's the largest sewage plant in Australia to achieve this.

HACCP (Hazard Analysis and Critical Control Point) is a quality control system that allows Melbourne Water to manage sewage treatment at a number of points along the treatment process rather than simply rely on testing the end product. The same strict procedure applies to food production.

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EPA Victoria requires that recreational water quality be assessed through weekly E. coli monitoring at six shoreline points, including Gunnamatta Beach, St Andrews Beach and Boags Rocks. Testing is undertaken by a NATA (National Association of Testing Authorities) accredited independent laboratory, Water EcoScience. Since February 2005, Melbourne Water has also been monitoring for *Enterococci*. *Enterococci* is recognised by the World Health Organization (WHO) as the most appropriate bacterial indicator for measuring faecal contamination. The results are published on the website as they become available.

Water quality monitoring is undertaken for environmental compliance. The results for 2005 found that the water quality meets EPA health-based water quality objectives. The Department of Human Services has advised that the South Eastern Outfall does not make Gunnamatta Beach unsuitable for recreational use. A study by Monash University on the health effects of ocean outfalls concluded that surfers and swimmers were at no additional risk of contracting disease from the area compared with other beaches studied. As Gunnamatta is an ocean beach, swimming is only recommended in the area patrolled by the Gunnamatta Surf Lifesaving Club.

Understanding water quality monitoring results

The nature of microorganisms means that numbers can vary significantly from sample to sample and day to day. For this reason, assessment is not made on individual samples. Assessment over a period more accurately reflects the beach condition. Fluctuations in microorganisms can be the result of factors such as wind conditions and bird activity as well as changes that may occur to the sample after it has been collected.

Assessment against National Health and Medical Research Council (NHMRC) Guidelines for Managing Risks in Recreational Water (June 2005)

In addition to the weekly compliance monitoring, Melbourne Water has also initiated a program to assess water quality against National Health and Medical Research Council (NHMRC) guidelines. This program involves sampling E. coli and Enterococci levels at 19 sites - 18 sites in the swim and surf zones and at a reference site 2 kms offshore. Testing is designed to monitor long-term trends in water quality. Results are made available in Melbourne Water's Social and Environment Data, produced annually with the Sustainability Report. The programs are managed by experienced water quality scientists.

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Visit Melbourne Water's website for more information on this comprehensive water quality monitoring program.

A haven for birds

Sewage treatment plants are large all-year water bodies that provide abundant food in the form of water plants, zooplankton, aquatic insect larvae and flying insects.

The Eastern Treatment Plant is home to a large native bird population, including several species of regional, state and national significance. The plant also provides valuable habitat for large numbers of migratory waders, which are covered by international treaties.



Migratory waders such as the sharp-tailed sandpiper and red-necked stint fly from northern Siberia, while Latham's snipe come from Japan, arriving around August and leaving for the northern hemisphere between February and May. Some travel up to 24,000 kilometres a year.

Since monthly bird counts started in 1998, 177 species have been recorded at the site. This is nearly one-fifth of the bird species found in Australia.

The ponds support species including the black swan, pacific black duck, blue-billed duck, grey teal and chestnut teal. The plant also provides valuable habitat for shorebirds or 'waders', including migratory species and resident species such as the black-winged stilt and masked lapwing.

Native bush birds such as the superb fairy-wren, magpie-lark, red wattlebird and white-plumbed honeyeater also inhabit the plant.

In 1992 a spotted redshank was seen, which was the first sighting of the bird in Australia. Birds Australia conducts a regular census of birds at the plant and keeps track of changes in the national wading bird population.

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Birds Australia has a representative on the Community Liaison Committee who leads monthly surveys by volunteers. About 45 volunteers help with each count. Since bird counts began 25 years ago, the average number recorded at the plant at any one time has been 4024. But during drought, numbers have swelled beyond 7000 as the plant's lagoons, ponds and marshes provide a valuable refuge for stressed birds seeking refuge from dry conditions inland. In 2003, the survey confirmed the presence of three nationally significant birds - the Australian Painted Snipe, the Australasian Bittern and the Swift Parrot - as well as 21 species of state significance.

Melbourne Water and Birds Australia are developing ways to make the Eastern Treatment Plant an even better place for birdlife. This has resulted in the initial low-depth filling of an effluent holding basin, the filling of a moat on the north-west of the site, the filling of three decommissioned sludge pans and low-depth filling of another infrequently used basin.

Educational discovery

Melbourne Water holds open days and tours of the Eastern Treatment Plant to show interested groups - predominantly students - how sewage is treated and how effluent, biogas and biosolids are recycled. Walking tours take about 90 minutes, and teachers are given education kits based on the Victorian school curriculum.

We have developed a range of education resources, including the *Eastern Treatment Plant Explorer* which takes users on an interactive journey around the plant.

The foyer includes a display screen, which models the computer software used by operators who manage the sewage treatment process. Visitors can see how much sewage enters the plant, and how much treated effluent is pumped out.



Further information

If you would like further information on any aspect of Melbourne Water's role as Melbourne's Water resource manager, please call 131 722 or visit melbournewater.com.au

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