

# SEWERAGE

## STRATEGIC GOALS

- > Deliver safe sewage transfer, treatment and disposal
- > Improve the health and amenity of waterways and marine environments
- > Minimise waste disposal and maximise resource efficiency
- > Improve environmental outcomes from all aspects of the business
- > Listen to and engage the community to seek support for our projects and priorities
- > Conserve and improve biodiversity and ecosystems
- > Invest prudently and efficiently, taking account of environmental, social and financial considerations, whole-of-life costs, risks and service needs
- > Operate and maintain our assets efficiently, in accordance with sustainability principles

## KEY ACHIEVEMENTS

- > Met all environmental compliance obligations at our sewage treatment plants
- > Made good progress on the Eastern Treatment Plant upgrade, which will benefit the marine environment and increase opportunities to recycle water
- > Completed the final tunnel on the Northern Sewerage Project, which is ahead of program and under budget
- > Completed a new sewer across the Yarra River in the heart of the CBD as part of the Melbourne Main Sewer Replacement Project
- > Constructed the Western Trunk Sewer Aqueduct over the Werribee River
- > Led a collaborative review of the regulatory obligations for containing sewage spills

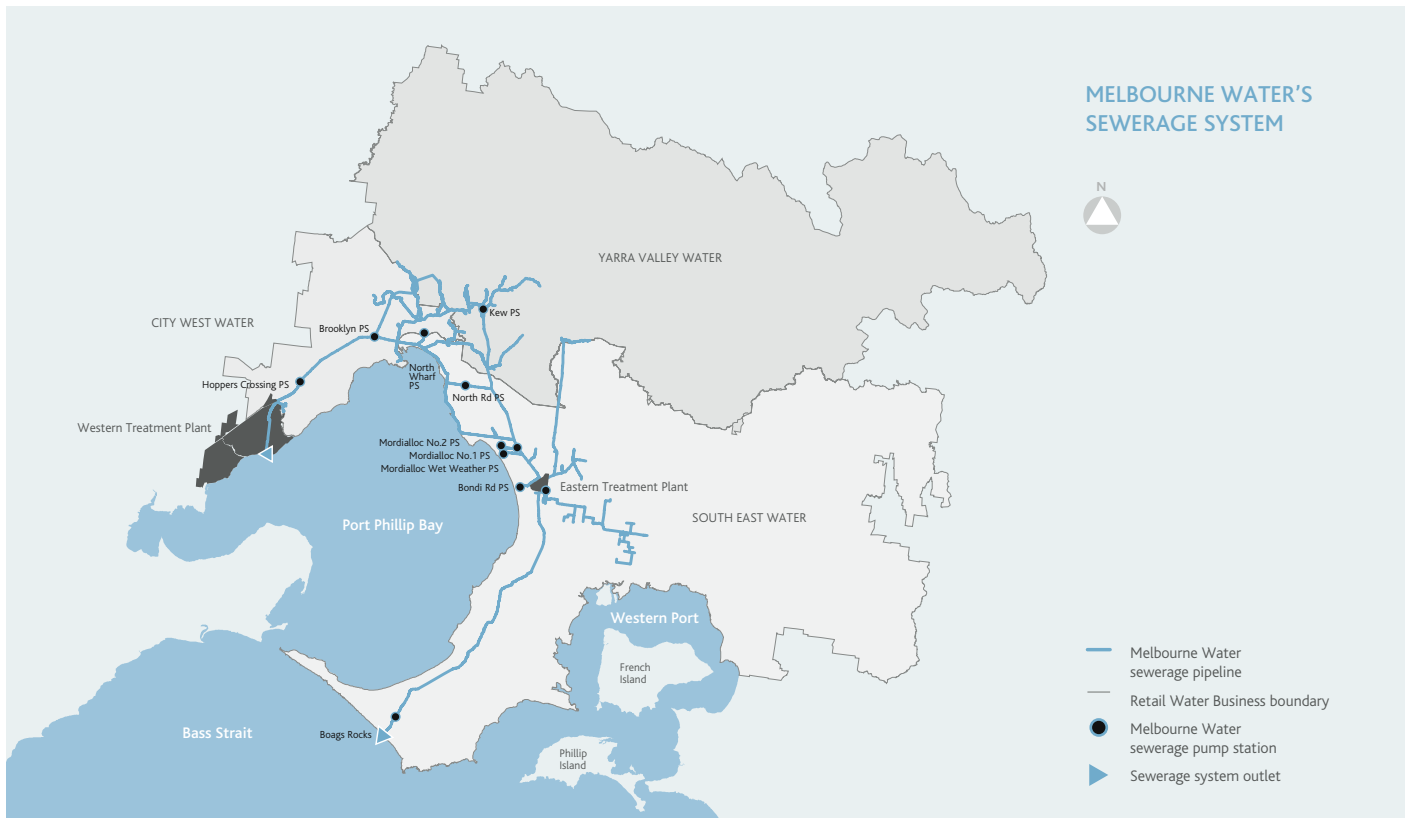
## DISAPPOINTMENTS

- > Failed odour complaints target for second consecutive year
- > Rectification work associated with faults detected in ETP aeration tanks has been slow, with the potential to reduce the plant's efficiency

## CHALLENGES

- > Managing a significant number of wet weather sewage spills
- > Reviewing our *Odour and Corrosion Strategy* to account for issues including the impacts of reduced sewer flows on odour causing compounds
- > Managing the sludge harvest at our sewage treatment plants following a wet summer that reduced the ability to dry out biosolids
- > Ensuring we have the latest information and knowledge about rapidly evolving treatment systems (for example sewer mining plants) designed to recover resources from sewage
- > Ensuring the business is positioned to benefit from markets for resources that can be produced from sewage and biosolids. These markets are developing quickly, driven by changes in carbon pricing, and increasing fuel and food prices

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## OUR SEWERAGE SYSTEM

Melbourne Water's sewerage system consists of:

- 391 kilometres of sewers
- 9 sewage pumping stations
- The Eastern Treatment Plant at Bangholme and the Western Treatment Plant at Werribee

Melbourne Water treated a total of 325,308 million litres of sewage at the Eastern Treatment Plant (ETP) and Western Treatment Plant (WTP) in 2010/11. This was 20% more than 2009/10 due to easing of water restrictions and an increase in rainfall. This total flow is comparable to the volumes experienced in 2004/05, before the recent drought.

About 44% of this sewage was treated at the Eastern Treatment Plant and 56% was treated at the Western Treatment Plant.

## EASTERN TREATMENT PLANT

### Upgrade on track

A major upgrade of the plant began in May 2010 and is progressing well. The upgrade will further reduce the impacts of treated effluent on the marine environment at the Boags Rocks discharge point and produce high quality fit-for-purpose recycled water suitable for a broad range of applications.

Despite site preparation and civil and structural work proceeding during the wettest year since 1997, construction by the Eastern Tertiary Alliance remains on track to be completed by December 2012.

Significant progress has been made on structural works including the ozone generation facilities, biological media filter bays, post ozone contact tank, ultraviolet disinfection building, and the chlorine contact basins. With these structures largely

in place, the project is moving into the critical mechanical and electrical installation phase.

### The benefits of screening

The raw sewage entering ETP is screened to remove gross solids – in particular plastics, rags, sanitary products, etc. Grit is also removed from the process. The objective is to protect downstream equipment and processes from blockages and damage, and to improve efficiency of the plant.

A project in the grit and screenings area to renew ageing assets and increase operational efficiency is nearing completion. The works will result in about 80% of the gross solids being removed through the installation of new band screens. New screenings handling equipment will ensure that almost all of the organic material will be returned to the process for treatment and the production of biogas.

As a result of the project, landfill quantities will be substantially reduced and the screenings will be much cleaner, opening up possibilities for reuse. Biosolids quality will be improved due to lower levels of contamination. The new screen installation also reduces the risk of flooding in the pre-treatment area. The project will be completed in late 2011.

### Keeping the bugs alive

The secondary treatment area for sludge processing at ETP has recently been upgraded to include ammonia reduction. The biological process requires air in order to treat the sewage.

The aeration blowers that provide this air are nearing the end of their useful life. An increase in Melbourne's population over time will see a rising demand for air for the treatment systems at the plant, placing greater demands on the blowers.



As a result, a strategy has been developed to provide the aeration requirements to meet today's demand and enable the plant to meet the forecast growth demands until 2040.

The first project in the strategy involved the construction of a new blower building and installation of two new blowers. Commissioning has begun and the blowers will be operational in the second half of 2011.

## WESTERN TREATMENT PLANT

### Capturing more biogas

The construction of a new biogas cover at the Western Treatment Plant (WTP) will enable more renewable energy to be produced and help to reduce odour. The new cover will be four times the size of the MCG and double the existing area covered across the 55 East Lagoon.

Based on an innovative design, the new lagoon cover forms part of an overall plan to increase biogas capture and production of renewable energy at the plant.

The works will enable the plant to be self-sufficient in its power needs and to export any excess electricity to other Melbourne Water sites, reducing system-wide power costs and our greenhouse gas emissions.

The new cover will further reduce odour and effectively support planned residential and recreational development surrounding the plant. The lagoon cover project is scheduled to be completed in 2012.

### Containing peak flows

Sewage carrier upgrade works to accommodate increases in peak sewage flows during storms are on track for completion in 2011.

The project will increase the plant's wet weather treatment capacity from 1,900 million litres a day to 2,500 million litres a day.

## TRANSFER SYSTEM

### Managing odour

Melbourne Water received 16 odour complaints related to the sewerage transfer system this year. This was four less than 2009/10, but more than our target of 10.

These odour complaints were due to a range of reasons, predominantly ventilation associated with works being undertaken in the sewer network and sewer vents performing as designed. Other causes included sewer gases escaping around or through manhole covers damaged or unsealed by traffic or corrosion, but these were not as prevalent as in previous years due to recent actions to upgrade manhole covers.

Melbourne Water is continuing to investigate the causes of odour complaints as part of our *Odour and Corrosion Strategy*, as well as through our participation in the Australian Research Council's Sewer Corrosion and Odour Research project.

### Odour and Corrosion Strategy

Melbourne Water is reviewing its strategy to manage odour and corrosion in the sewerage system to account for:

- The impacts of reduced sewer flows on odour-causing compounds
- The link between odour and corrosion and the impacts of reduced ventilation in managing odour

Above: Eastern Treatment Plant upgrade

- Climate change impacts (for example, increased sewage temperature)
- An increasing trend in odour complaints within the sewerage transfer system
- Increased development near sewer vents.

Melbourne Water is also working closely with other metropolitan water businesses to move to a more structured and integrated approach to corrosion and odour management throughout the sewerage system.

This collaborative work will provide a more consistent approach to corrosion and odour management and associated capital works for sewerage transfer networks, and result in community cost savings.

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### Effluent spills

The storms that led to widespread flooding in many parts of Melbourne in 2010/11 put pressure on the city's sewerage network and there was a significant increase in the number of wet weather spills.

Up to 75% of the capacity of sewerage mains is dedicated to handling stormwater that enters the system through cracks and joins in terracotta pipes and through a small number of inappropriate cross-connections with drainage pipes. While usually designed to contain 1-in-5 year storm events (consistent with national standards), some mains were overloaded with stormwater, resulting in 55 wet weather spills during the year.

Twenty-two of the spills occurred in the northern suburbs following storms that were less than 1-in-5 year events, however they were deemed compliant because they happened in parts of the sewerage system where a rectification plan endorsed by EPA Victoria is in place for a known capacity deficiency.

The Northern Sewerage Project will improve sewerage system capacity and virtually eliminate risks of similar spills from all but extreme rainfall events.

Nearly all of the other spills were associated with the significant storms in early February 2011, which dumped almost 200 mm of rainfall across Melbourne. This event exceeded the design standard by such a margin that many Emergency Relief Structures were automatically triggered, and a number of manholes discharged flows. The Emergency Relief Structures released diluted sewage from the mains into some waterways. These structures are designed to reduce hydraulic pressure that would otherwise result in sewage backing up into properties.

The sewage discharged under these circumstances is extremely diluted by stormwater and further diluted when released into waterways, which also flow at much higher levels during storms. However, in Bangholme and Alphington, spills were not flushed away and further diluted by waterway flows, resulting in considerable recovery efforts by Melbourne Water and our maintenance partners.

While the impact on waterway health from these spills is considered quite low, Melbourne Water recognises the importance of community awareness of stormwater pollution and has strengthened its public advice. We are working with the retail water businesses and consulting with EPA Victoria on a network-wide approach that will improve notification of incidents and understanding of risks associated with stormwater pollution.

### Containing sewage spills in wet weather

Melbourne Water has led a collaborative review of the regulatory obligations for sewage spills containment. The review, involving EPA Victoria and the water industry, found there is no national uniform approach to containing sewage spills.

The review identified that a risk-based approach (taking into account environmental and customer outcomes) may be appropriate depending on whether the receiving environment is more or less sensitive to sewer overflows compared to other sources of pollution.

The review determined investment priorities for sewage containment, and initiated a collaborative project involving a cross-functional team from Melbourne Water, South East Water and Yarra Valley Water.

The project will apply the risk-based approach to the Ringwood South Branch Sewer and identify priorities for managing pollution in the Dandenong Creek, including sewage spills, industrial runoff and urban stormwater.

### Northern Sewerage Project

The \$650 million Northern Sewerage Project (NSP) is the single largest sewerage tunnelling infrastructure project undertaken by Melbourne Water. Stage 1 is being constructed by Melbourne Water (\$422 million) and Stage 2 by Yarra Valley Water (\$228 million).

Several milestones have been safely achieved this year. In October, a tunnel boring machine finished excavating the project's longest drive (2.9 kilometres) from Brearley Reserve, Pascoe Vale South, to Carr Street, Coburg North.

The project has successfully completed tunnelling under significant pieces of infrastructure, such as CityLink and Coburg Lake, to construct 12.5 kilometres of new sewer beneath 2,500 properties in Melbourne's densely populated northern suburbs.

In June, the project celebrated another significant milestone when the last piece of 2.5 metre diameter glass reinforced plastic sewer pipelining was grouted into position 64 metres under Brearley Reserve.

Also in June, construction of an air treatment facility in Pascoe Vale was completed in readiness for the new sewer system.

The project is now in its final stages with permanent manhole construction and demobilisation works underway at several sites. Landscaping and revegetation will return these sites to their original condition.

The NSP is under budget and ahead of time, with an expected completion date of late 2011.

# Melbourne Water and the retail water businesses have been working together on implementing the Metropolitan Sewerage Review, which is designed to ensure Melbourne's sewerage system can sustainably meet the challenges of the next 50 years



## Replacing the Melbourne Main Sewer

In 2005, Melbourne Water and project partners took on the challenge to replace a section of the century-old Melbourne Main sewer from Port Melbourne to Docklands. The project - involving the construction of more than 2.3 kilometres of new sewer and 1.9 kilometres of local reticulation sewers - will triple sewerage capacity for the city's growing population.

The \$220 million Melbourne Main Sewer Replacement has achieved many key milestones this year. In February, the 140 metre pipeline under the Yarra River was successfully completed. Construction on the river crossing was undertaken in three stages to ensure the Yarra River remained open to users.

In April, tunnel boring machine "Lucy Loo" broke through at the South Wharf site, ending more than 18 months of tunnelling and construction of 2.3 kilometres of new main sewer. The 875 metre northern tunnel drive was a challenging engineering feat, due to soft ground conditions and surrounding infrastructure such as the M1 Freeway.

Works have begun to excavate the sixth and final shaft within the median of Wurundjeri Way. This shaft will be used to connect the new section of the Melbourne Main into the existing sewerage network, which services the CBD and surrounding areas. The project is due for completion in 2012.

## MANAGING BIOSOLIDS

Biosolids are the dried, stabilised matter that remain at the end of the sewage treatment process, and comprise organic and inorganic compounds. Melbourne Water's *Biosolids Strategy* seeks new, sustainable uses for this renewable resource.

Over the past year, we began a third trial of using clay-rich biosolids as geotechnical fill for roads, in consultation with the construction industry. This trial, at ETP, is designed to develop the use of biosolids in large construction projects requiring a stable fill (for example, freeway ramps).

Work has begun on a review of our *Biosolids Strategy* with global market research completed, research proposals identified, and an internal assessment undertaken. Next steps include a public expression of interest

for commercial biosolid reuse proposals.

Melbourne Water has also expanded sampling and analysis of biosolids at WTP as part of a comprehensive quantitative risk assessment and completed a life cycle assessment of biosolid use in an energy recovery process.

## METROPOLITAN SEWERAGE REVIEW

Melbourne Water and the retail water businesses have been working together on implementing the Metropolitan Sewerage Review which is designed to ensure Melbourne's sewerage system can sustainably meet the challenges of the next 50 years.

Actions arising from the review undertaken by Melbourne Water in 2010/11 include:

- Updating Melbourne Water's hydraulic model so that it has the capacity to model sewage quality. The model will be available to support any future analysis of sewer mining plants, as proposed by the Ministerial Advisory Council and the *Water Supply Demand Strategy*. It also offers the potential to improve efficiency in forecasting sewage flows and loads in Melbourne

Above: Northern Sewerage Project

- Continuing to improve the integrated sewage quality management system. A significant piece of work was developed to manage the risk of system-wide pollutants and is being trialled. A quantitative risk assessment for recycled water continued, identifying several new pollutants for further investigation
- Completing the first stage of a study into the source of salt in the Hobsons Bay Main. In conjunction with South East Water, Melbourne Water surveyed the sensitivity of customers to salt in recycled water. This information will be used to help manage recycled water quality at our sewage treatment plants
- A study into the production of a fertiliser at ETP. Melbourne Water will develop a business case to further investigate fertiliser production during 2011/12.