



Melbourne Water

2000/01



**Safety
Review**

Contents

SAFETY REVIEW

Melbourne Water Charter	1
Foreword	3
Health and Safety Management policy	4
Occupational health and safety systems and results	8
Major hazard facilities	14
Drain safety	18
Flood protection	20
> Reducing existing floods	21
> Preventing new flood risks	25
Verification	30
Glossary	32

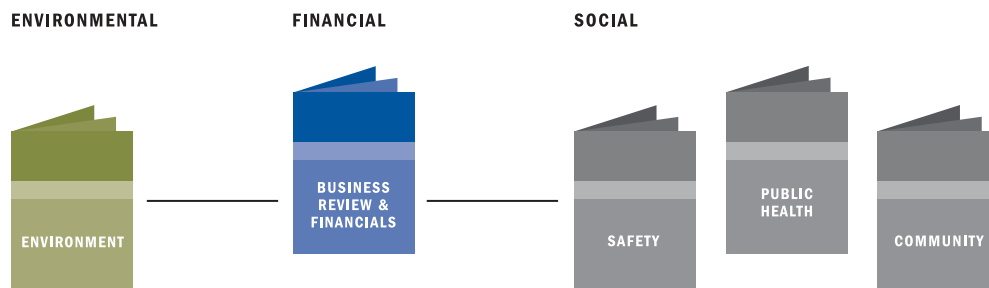
TRIPLE-BOTTOM-LINE-REPORTING

Our triple-bottom-line approach to reporting places equal emphasis on economic, environmental and social reporting. In this document we report on our safety performance. Other aspects of our social performance are addressed in our community and public health reviews.

Our financial performance, our statutory and regulatory reporting and summaries of our environmental and social performance are provided in our Melbourne Water Business Review 2000/01.

Our environmental performance is reported in greater detail in our Melbourne Water Environment Review 2000/01.

Copies of all five reports can be obtained by telephoning 131 722 or may be downloaded from our web site at www.melbournewater.com.au



Melbourne Water Charter

Melbourne Water is owned by the Victorian Government. We manage Melbourne's water resources. Three independent retail water companies provide local water and sewerage services to consumers.

Melburnians enjoy drinking water that we believe is among the world's best—thanks primarily to the foresight more than 100 years ago of Melbourne's city planners, who set aside water catchments protected from human contamination.

The city planners also laid the foundations for a sewerage system that continues to lead in technology and environmental sustainability.

These are legacies few other cities in the world can match and Melbourne Water acknowledges that they provide a sound basis for the way we manage Melbourne's water resources both now and in the future.



In managing Melbourne’s water supply catchments, sewerage system, waterways and drains, we strive to match the foresight and innovation shown by the city’s original planners.

Our aim is to show leadership in water cycle management, through effective, sustainable and forward-looking management of the community resources we oversee.

The business objectives established to realise this aim are to:

- > protect public health
- > operate as a successful commercial business
- > manage Melbourne’s water resources and the environment in a sustainable manner
- > provide excellent service and maintain the trust and respect of the community.

At Melbourne Water we understand that partnerships with stakeholders and the community are the key to achieving our vision—Leadership in water cycle management. We also appreciate that achievements occur through the contribution of our people. At Melbourne Water we are people who:

- > recognise that we achieve more by working with others
- > feel privileged to be the custodians of our water resources
- > behave with integrity
- > attain excellence through creativity and innovation
- > celebrate our achievements and learn from our experiences

Through working successfully with others and operating as an efficient commercial business, we will be able to make Melbourne a better place to live both now and in the future.

Vision

Leadership in water cycle management



Foreword

Welcome to our first public review of our safety performance.

This review, along with our first public community review, completes our goal of publicly reporting our financial, environmental and social performance. It demonstrates the importance we place on increasing our accountability and transparency.

Part of our reason for producing a safety review is to increase our focus on this critical area. After some years of strong performance, our safety performance has declined substantially in recent years—despite our introducing safety programs and systems.

We do not accept the view that some level of workplace injury is inevitable. We believe that safety is a basic right and that an injury-free workplace is essential and achievable.

This fundamental objective applies to those we employ directly and to those who work on our sites under contract. Both groups are part of our workforce—they are our people—and we accept responsibility for their safety. Our responsibility under safety also extends to the community, to those our actions and operations could potentially harm.

The key to our returning to a strong safety performance is building and reinforcing safety awareness among all our people. Part of that task is to reinforce the understanding that every one of us is responsible for our safety and the safety of those around us.

In this review, we outline the targets we had set ourselves for 2000/01, and our performance against those targets which we measure against best-practice benchmarks. We also outline measures against which our future safety performance will be reported.

Achieving and maintaining an injury-free workplace is a priority. We welcome your feedback, comments and suggestions.



Brian Bayley
Managing Director

Health and Safety Management Policy



Purpose

Melbourne Water is committed to:

- > providing a healthy and safe workplace for anyone who may enter our work areas and to achieve our target of zero injuries for our people and contractors
- > ensuring the health and safety of the people, property and environment that are potentially impacted by its operations.

Health and safety is the responsibility of everyone in Melbourne Water.

Objectives

Management accepts accountability for ensuring:

- > leadership and effective action to provide and maintain a healthy and safe workplace
- > effective communication on occupational health and safety matters as a normal component of all aspects of work
- > statutory health and safety responsibilities are identified and allocated to responsible persons within the organisation
- > the development, implementation and auditing of an effective occupational health and safety management system (SafeAS™)
- > integration of occupational health and safety into all aspects of work in a consultative team-based manner
- > people are appropriately trained and informed to undertake their responsibilities in a safe manner.

We all accept responsibility to:

- > comply with approved workplace health and safety procedures and encourage others to do so
- > take care relating to our own health and safety and that of anyone else affected by our actions
- > support and promote improvements in work processes and help reduce or eliminate risks
- > immediately report and, if possible and practicable, rectify any hazardous conditions we observe.

ACHIEVEMENTS

Health and safety

- > We achieved organisation-wide accreditation to SafetyMAP™ Initial Level consistent with the Victorian WorkCover Authority's SafetyMAP™ system that assesses occupational health and safety programs.
- > We held occupational health and safety awareness training for all our people so that they better understood the importance of safety in the workplace and were more familiar with our occupational health and safety management systems.
- > We improved our health and safety training so it better matches job training with the specific tasks.
- > We held an inaugural health and safety workshop to identify areas where we can improve our management of contractor occupational health and safety performance.
- > We reviewed our Health and Safety Management Policy so that any potential impact of our operations on people and the environment is considered. Our previous policy focused mainly on our own worksites.
- > We have improved our analysis of the injuries occurring in the work place.
- > We standardised our permit system for entering hazardous work sites.

Major hazard facilities

- > Acceptance by WorkCover of our “safety case” outlines for the Winneke and Eastern treatment plants. These outlines are the basis for development of full safety case documents that demonstrate the sustainable, safe operation of the major hazard facilities we operate.
- > Agreement with WorkCover that we could take a leadership role for industry by participating in the model safety case program. Under this program we fast-tracked a model safety case for the Winneke Treatment Plant that we submitted in February 2001.

Flood protection

- > We spent \$140,000 formulating another seven stormwater management plans with local councils.
- > We completed four flood-protection projects for 33 properties at a total cost of \$612,000.
- > We undertook detailed design and/or construction work, at a total cost of \$1.25 million, on four projects that will provide protection for an additional 132 vulnerable properties.
- > We undertook floodplain survey work on two projects costing a total of \$340,000.
- > Our total expenditure on flood mitigation projects during the year was \$2.226 million.
- > We achieved Ministerial approval for incorporating special building overlay amendments that provide flood risk information into local planning schemes in six municipalities.
- > We made progress in 11 more municipalities. Another three had adopted the amendments and at 30 June 2001 were waiting for Ministerial approval.

DISAPPOINTMENTS

Health and safety

- > Our employees had six lost-time injuries. A lost-time injury is where the person injured is absent from work for all of the next day. There were also six such injuries among our major contractors.
- > An unacceptable number of “at fault” motor vehicle accidents.

Major hazard facilities

- > A serious chemical incident at our Winneke Treatment Plant following the release of chlorine gas to the atmosphere.

Flood protection

- > We deferred nine flood-mitigation projects until 2001/02 because of the need for further investigation to resolve issues associated with the proposed options.
- > We failed to reach our planned expenditure for the year of \$3.94 million. This would have reduced flood risks to the 1-in-100-year standard for a total of 34 vulnerable properties.



KEY CHALLENGES

Health and safety

- > Gaining acceptance that it is possible and then achieving our objective of no lost time injuries for our employees and contracts.
- > Determining why injuries keep happening despite our improved systems and procedures.

Major hazard facilities

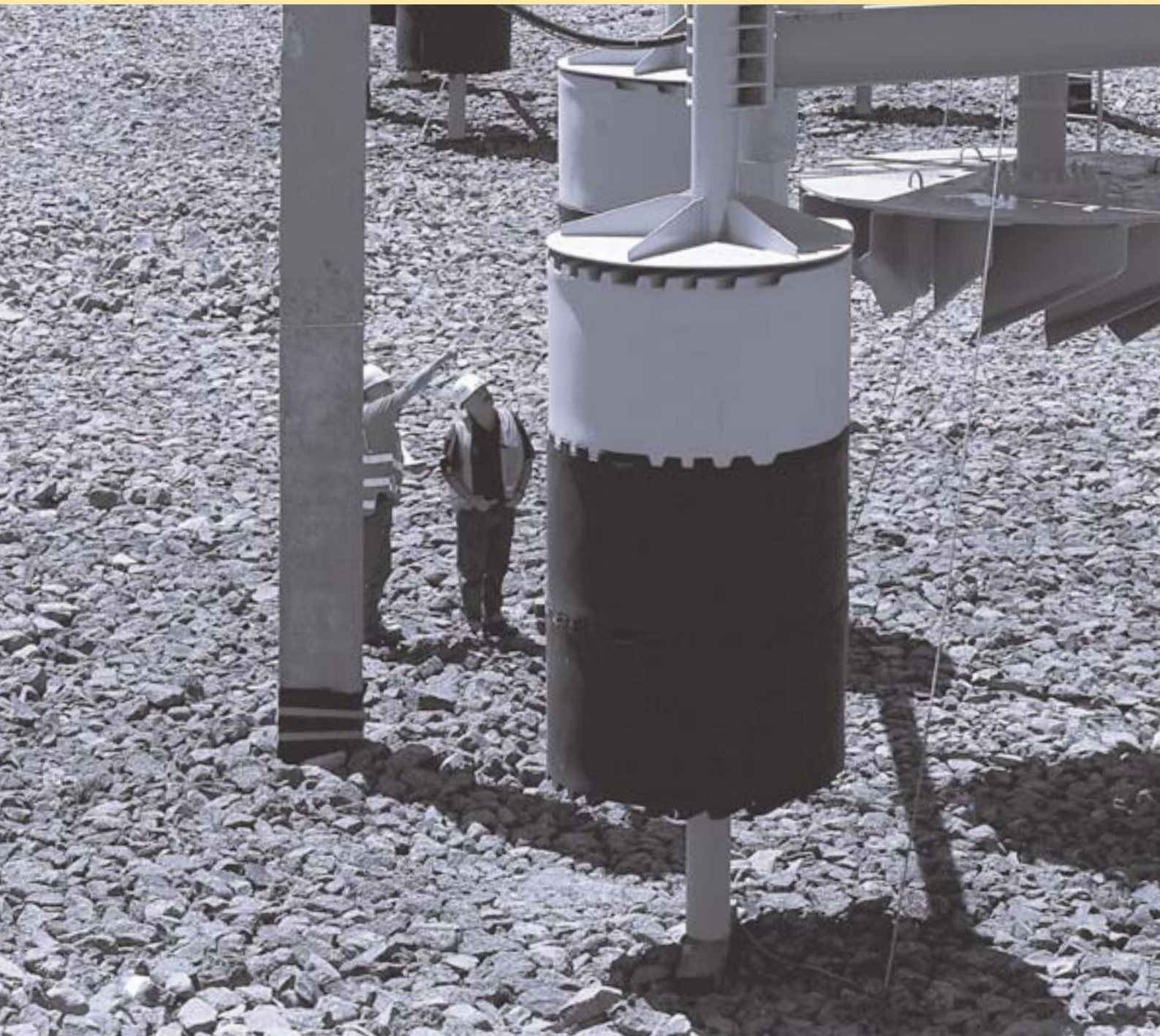
- > Meeting Victorian WorkCover Authority requirements to implement safety systems and site improvements at our major hazard facilities located at Silvan, Winneke and the Eastern treatment plants.

Flood protection

- > Project delays and financial constraints that prevent us reaching our target.
- > The need to inform property owners and developers about flood risks.
- > The need to increase our annual expenditure on flood mitigation works to between \$6 to \$8 million a year if we are to meet the 10-year target in our Waterways and Drainage Operating Charter.
- > The need to involve the community in the special building overlay process.

Occupational health and safety systems and results

Melbourne Water has an over-riding moral responsibility for the safety of its people. This is a responsibility also enshrined in law. The *Occupational Health and Safety Act 1985* (Vic.) requires us to provide a safe working environment and safe systems of work at all our sites.



We have set a target of zero injuries for our people and we aim to achieve it.

We have a comprehensive approach to safety management based on an occupational health and safety system known as SafeAS™, which includes:

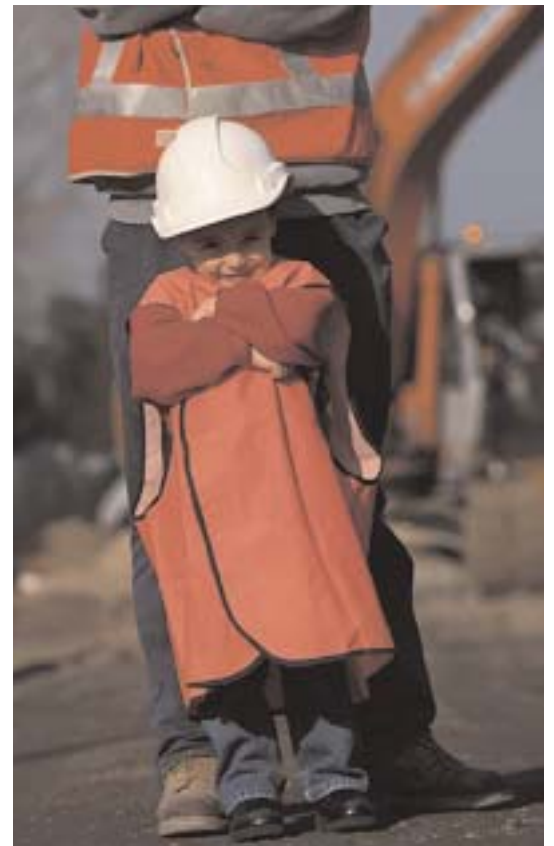
- > a management framework including detailed guides and a checklist covering all aspects of occupational health and safety management
- > an incident management system with documented procedures for managing occupational health and safety incidents.

SafeAS™ is complemented by:

- > confined-space entry procedures, which are used by our employees and contractors working on our sites and infrastructure, particularly in underground pipes, drains and sewers
- > a permit system that controls entry by our employees and contractors to sewers, pipes and drains.

We support our systems with standard operating procedures and maintenance instructions, operations and maintenance manuals, contingency plans, and emergency procedures.

Overall responsibility for occupational health and safety and the SafeAS™ system within Melbourne Water is an individual requirement of all of our people. Each of our workplaces has an occupational health and safety committee.



A student from the local kindergarten visits the Esplanade West Main Drain site works in Port Melbourne.

Lost-time injuries during 2000/01

Our occupational health and safety record during 2000/01 was unacceptable. Our people sustained 12 lost-time injuries.

	2000/01	1999/2000
Lost-time injuries		
Melbourne Water employees	6	8
Major contractors	6	8

The most common injuries were sprains and strains.

Poor results lead to strategic initiatives

In order to improve our focus on occupational health and safety in the organisation and in response to our poor occupational health and safety performance we:

- > improved training
- > improved analysis of trends in incidents and injuries
- > gave our executive occupational health and safety committee a more strategic policy role with a formalised charter
- > delegated greater responsibility for operational issues to workplace committees.

We developed plans for each of our new operating groups to ensure that we have a structured process in place for ongoing management and improvement in our occupational health and safety performance.

Improving contractor occupational health and safety

We standardised and improved the “permit to work” system for our employees and contractors. This system details occupational health and safety requirements that all our people have to meet before they can start work. Standardisation means people working at more than one site have a single, clear, set of guidelines.

We held a workshop involving all our major contractors to focus their attention on occupational health and safety issues. (See case study on page 13)

During the year, our occupational health and safety consultants began providing the executive committee with a monthly trend analysis of the cause and nature of injuries and incidents. This will help us to identify incidents and trends earlier and better.

Analysis of these incidents has not identified, at this stage, specific factors that explain why injuries and incidents still occur at unacceptable levels.

In an attempt to better understand why incidents continue to occur, we are considering further training programs in accident investigation, job safety analysis and reinforcing safe work practices into our organisation’s culture.

SafetyMAP™ accreditation

SafetyMAP™ is an occupational health and safety audit tool used by the Victorian WorkCover Authority, the organisation that administers Victoria’s workers’ compensation insurance scheme. SafetyMAP™ accreditation measures an organisation’s occupational health and safety program’s effectiveness and comprehensiveness.

Prior to 2000/01, we had achieved SafetyMAP™ Level 1 certification at all our worksites. During the year, we achieved certification at an organisational level. This will help ensure we are more consistent in applying the SafeAS™ management system.

WorkCover

Under Victoria’s WorkCover scheme, most employers are required to insure against workers’ compensation claims through insurance companies that act as WorkCover agents.

However, some companies—with approved safety procedures and financial status—are licensed to “self insure”, meaning they pay the cost of any successful claims from their own resources. During 2000/01, our self-insurance licence was renewed for a further four years.

SafetyMAP™ certification was an important factor in this, as WorkCover uses it to audit the safety performance of self-insurers.



Motor vehicle driver training

As a result of a 1997 review into motor vehicle accidents, Melbourne Water decided to introduce a driver training program for all our people. The program first covered our people who have full-time use of Melbourne Water vehicles, then focused on those who occasionally use our vehicles and those who drive outside of working hours.

The course was run by a professional driver training organisation recommended to us by other organisations that had achieved improved results from similar programs.

Our people are required to undergo an updated training program every two years. At first the training was skills-based and aimed at improving our people's ability to control a motor vehicle. Subsequent training courses allocated equal time between upgrading their behind-the-wheel skills and improving attitudes to driving through classroom-based training.

Further research into the motor vehicle training programs of other large organisations showed that attitudinal-based training was the most effective way to reduce "at-fault" traffic accidents. The research showed that emphasis on skills-based training tended to increase the risks drivers were prepared to take while behind the wheel. For this reason, we now only conduct classroom-based attitudinal training. This approach is expected to lead to further reductions in motor vehicle accidents.

There has been a reduction in the crash-to-vehicle ratio from 38 per cent of our fleet involved in accidents in 1995/96 to 27 per cent in 2000/01.

We will continue to work to improve our motor vehicle accident rate and reduce our "at fault" accidents through classroom attitudinal training for all our people who use a Melbourne Water vehicle.

Above: We aim to make sure our drivers are aware of the importance of safe driving particularly those who have to drive in difficult terrain.



Training

We are redesigning our occupational health and safety-related training so it is based on specific job requirements and therefore more relevant to those taking part. Our aim is to make task-related occupational health and safety training more practical, specific to our needs, and competency based. Our people who undertake this training will have to demonstrate what they have learned.

We have already applied this approach to training our operations group people at our Western Treatment Plant and Werribee Agriculture.

During the year, we provided safety awareness training to all our people. Our aim was to further develop a safety conscious culture and to build awareness of:

- > our occupational health and safety management system – SafeAS™
- > the relationship between SafeAS™ and the Victorian WorkCover Authority’s SafetyMAP™ System
- > the implications of SafeAS™/SafetyMAP™ for our WorkCover self-insurance licence.

Target for 2000/01	Progress			Performance Target for 2001/02
	Little or none	Some	Achieved	
Injury reports Reduce injuries and lost time injuries.	✓			<i>Zero injuries (ongoing target).</i>
Strategic initiative Review Health and Safety Management Policy.			✓	
Formalise executive occupational health and safety committee charter.			✓	
Develop plans for each operating group.			✓	
Supporting contractors Standardise permit-to-work system for contractors.			✓	
Trend analysis Improve cause and nature analysis of lost time injuries.			✓	<i>Produce monthly reports on trend analysis.</i>
Chlorine safety Achieve zero chlorine leaks		✓		<i>Zero chlorine leaks (ongoing target).</i>
SafetyMAP™ Achieve organisation-wide accreditation.			✓	<i>Maintain accreditation.</i>
WorkCover Renew our self-insurance licence.			✓	<i>Maintain licence.</i>
Training Redesign our occupational health and safety training.			✓	
Provide safety awareness training for everyone in the organisation.			✓	<i>Training for 300 people during March 2001.</i>
Provide driver training for full time and occasional drivers of our vehicles.			✓	<i>Training for 163 people during the year.</i>



Contractor performance

During November 2000, we brought together some of our major contractors for a one-day workshop on occupational health and safety performance—our first such workshop.

Our aim was to share our approach to managing occupational health and safety performance with our contractors, along with the experiences of other organisations that outsource many of their operational responsibilities. Our aim was an improved occupational health and safety performance by our contractors.

Those attending the workshop included our employees responsible for managing contractor safety, employees and managers from our occupational health and safety committees, our external advisers, representatives of our major operation and construction contractors, WorkCover and our external project managers.

Workshop issues included:

- > the need for improved communication of our ideals, goals and experience along with an emphasis on reporting of all incidents and near misses, not just lost-time injuries
- > specific training requirements within our organisation, and our service providers, required to support outsourced arrangements
- > improve consistency of occupational health and safety systems across Melbourne Water.

We are implementing action plans to address these issues.

Major hazard facilities

In many parts of the world, governments and industry are moving to a safety case approach to managing the risk of disaster at major hazard facilities. This is a response to official inquiries into several disasters.



Recurring themes in the reports of these inquiries are:

- > failure of a plant operator to identify and fully understand all the potential hazards it faced
- > failure to implement and maintain sufficient controls over potential hazards
- > failure of prescriptive regulations to prevent a disaster.

The Victorian Government introduced the Occupational Health and Safety (Major Hazard Facilities) Regulations in July 2000.

Under these regulations, Melbourne Water is required to seek operating licences for its major hazard facilities from the Victorian WorkCover Authority. Such facilities are defined as any workplace that stores, handles or processes large quantities of dangerous goods that have the potential to cause a major incident, the consequence of which may be loss of life, injury and property damage rivalling those of natural disasters.

To be awarded operating licences, we must demonstrate that we have reduced, as far as is practicable, the risk of a major accident and its potential consequences.

In August 2000, we notified WorkCover that two of our sites require registration as major hazard facilities:

- > Eastern Treatment Plant at Carrum
- > Winneke Treatment Plant at Christmas Hills.

We store large quantities of liquid chlorine at our Winneke Treatment Plant. We use the chlorine to protect public health by disinfecting water supplies. We also store liquid chlorine, for use in sewage treatment, at our Eastern Treatment Plant. This plant also produces and stores sewage-sludge gas and has a large store of distillate.

Under the regulations, we are required to develop and submit a safety case to WorkCover for each of these plants. Once WorkCover has approved a safety case, it issues a major hazard facility operating licence. A comprehensive document, the safety case demonstrates to all stakeholders the plant's sustainable safe operation. The document is also a detailed written submission to WorkCover for an operating licence.

Basic elements of a safety case are:

- > a hazard identification process and safety assessment
- > a "demonstration of adequacy"—which explains how the risk of a major incident has been reduced as far as is practicable
- > a safety management system tailored to the plant's operations
- > an emergency response plan
- > a community consultation program.

The safety case and the operating licence have to be renewed every five years or earlier if instructed by WorkCover.

WorkCover has formally accepted our safety case outlines for our Eastern Treatment Plant and Winneke Treatment Plant. The outlines defined components of our safety case submission including the tasks to be undertaken, internal and external resources required, methods to be used and a project time-line indicating when the major tasks will be carried out.

We are due to submit the full safety case for our Winneke Treatment Plant by the end of September 2001. The full safety case for our Eastern Treatment Plant is scheduled for completion by February 2002.

Target for 2000/01	Progress			Performance Target for 2001/02
	Little or none	Some	Achieved	
Safety case progress				
Submit Winneke exemplar safety case.			✓	Submit full safety case to WorkCover by end of September 2001.
Have WorkCover accept Winneke outline safety case.			✓	Submit full safety case to WorkCover by end of September 2001.
Have WorkCover accept Eastern Treatment Plant outline safety case.			✓	Project on schedule. Submit full safety case to WorkCover by end of January 2002.

Chlorine gas incident

In March, a high-level chlorine alarm sensor alerted our people to a potential incident at the Winneke Treatment Plant. Rostered emergency staff reached the plant within 20 minutes of the early morning call out. A chlorine leak was suspected but no details of the incident were known.

Our duty operator and his team began to investigate. Wearing breathing apparatus and carrying a portable chlorine detection unit, two team members entered the leak area. Based on their previous experience, the two controllers first checked the chlorinator and then a stock tank. The leak was discovered coming from a pressure gauge on a stock tank where maintenance had been carried out the previous day.

The team began emergency procedures to isolate the leak, and to vent chlorine fumes from the equipment and building.

The high-level chlorine alarm halted indicating that venting was lowering the chlorine concentration inside the building. The low-level alarm continued for about 20 minutes before it also cleared, although both sensors still indicated low levels of chlorine. This was due to the sensors becoming saturated during the leak.

Our incident controller remained on site and continued to monitor the venting process. Technicians were called to replace the pressure gauge and to check both chlorine sensors. A diaphragm in the gauge was found to be partially corroded allowing the chlorine to leak.

Following checking of the sensors and replacing of the pressure gauge, the final incident report was given and the situation was declared back to normal, about six hours after the high-level alarm was first recorded.

We estimated five to six kilograms of chlorine gas was released to the atmosphere. It was the first leak at the plant since 1995. No one was affected by the chlorine gas leak.

Incident debrief

An external debrief involving the Country Fire Authority, WorkCover's major hazards group and Melbourne Water took place shortly after the incident. Procedural and equipment issues were identified and WorkCover issued us with three improvement notices.

We had developed procedures if a chlorine leak occurred at Winneke, but these procedures were not strictly adhered to. In particular, we did not notify all the required people and authorities. It appears that at no stage did anyone check their actions against the procedures. We also discovered that the emergency procedures on our Intranet contained incorrect information and that no up-to-date hard copy versions were available to our people.

Although the current emergency procedure clearly states that the Country Fire Authority must be notified in the event of a high-level chlorine alarm, this was not done. We are preparing new draft procedures for CFA involvement in a chlorine leak at Winneke as part of work relating to the Major Hazard Site Safety Case.

It also was discovered that we did not have the correct contacts for the CFA. Our contact procedures will be updated so that direct contact between the CFA and Melbourne Water can be achieved.

Chlorine gas incident

Work practices relating to chlorine leaks

The team who entered the chlorine area wore breathing apparatus, normal overalls and carried a chlorine meter. The meter malfunctioned and did not provide any data on the chlorine concentrations in and around the leak area.

It was later discovered that the meter had not been serviced or recalibrated for more than two years. The meter is now scheduled for six-monthly services, which is the manufacturer's recommended schedule.

Our controllers had entered a leak area while unsure of the actual concentration of the escaping chlorine.

Suitability of the pressure gauge

Evidently, cleaning and testing the day before the incident had been too much for the corroded pressure gauge. On other occasions, failed gauges were picked up during testing and did not result in chlorine leaks.

The debrief was told that this particular type of gauge had caused reservations at Winneke and they were gradually being replaced as they failed. We will check the type of gauges in use at our Eastern Treatment Plant.

Location of breathing apparatus sets

Concerns were noted that the Winneke controllers entered the control room to collect their breathing apparatus before approaching the leak area. This was within the calculated "worst case" chlorine plume. The debrief questioned why the breathing apparatus sets were not kept elsewhere.

We will consider sealing the Winneke control room from any possible chlorine contamination. At present the only way of knowing if chlorine has entered other parts of the plant is by smell, which may be too late for the safety of personnel.

Ringling of alarms

A chlorine alarm automatically triggers flashing warning lights and an audible siren. These alarms continued for about one hour until our controllers isolated the leak. It was noted that no local residents contacted Winneke with concerns about the noise coming from the plant.

Venting chlorine fumes to the atmosphere

We follow the Australian standard for chlorine leaks and vent fumes to the atmosphere. It was questioned whether this was still an acceptable practice and whether we should pass the vented air through a scrubber system.

In future, we will be required to notify the National Pollution Index of the quantity of any chlorine in an uncontrolled leak. We also shall inform the Environment Protection Authority Victoria as soon as possible.

Drain safety

It is illegal to enter stormwater drains as it may be very dangerous. Melbourne Water is working to improve community awareness of the dangers that drains pose.



People entering drains face the threat of a sudden rise in water levels, lack of oxygen and the presence of dangerous fumes. Water levels can rise even in sunny, dry conditions when rainwater falling many kilometres away flows downstream, arriving suddenly and unexpectedly. Slow moving flows can quickly become raging torrents.

It is not possible to cover all drains with grills to prevent illegal entry as debris building up behind such barriers can quickly restrict water flows and cause local flooding. In addition, placing grills on the drain outlets increases the likelihood of drowning if anyone becomes trapped within the drain during a flood event.

In 2000/01, we completed installing international signage at possible entry points to our drains. The signs communicate in visual symbols so a good grasp of English is not necessary to understand the warning.

We also distributed 5,000 brochures outlining the dangers of entering our drains to schools. Brochures in community languages are also available.



Along with police, we have had discussions with people who regularly enter drains despite the dangers. These groups are warned that they face prosecution under the law if they are caught.

Despite our measures, two 14-year-old boys who had been playing in the Preston main drain were swept from the drain and into the Merri Creek during a sudden storm. While one of the boys managed to escape from the creek, the other boy drowned. Warning signs explaining the dangers were in place at the entrance to the drain.

Flood protection

Melbourne Water is responsible for drainage and flood protection across the metropolitan area. Our target is to reduce the impact on people and buildings from flooding due to one-in-100-year storm events. These are defined as storms of such intensity that, based on weather records, they could occur once in 100 years or have a one per cent chance of occurring in any given year.



Reducing existing flood risks

We have two report cards on flood protection. The first, see page 23, covers our program to reduce flood risks created by property development carried out before the one-in-100-year standard was adopted. The other, see page 27, covers work to prevent development and redevelopment that would create new flood risks in such a storm event.

We manage Melbourne's waterways and major stormwater drains, and carry out works to reduce the risk of flooding in priority areas. Councils operate local drains that carry stormwater into our major drainage system.

Although there is no statutory requirement, we have set ourselves a spending target for flood mitigation works.

Flood protection program targets

800 properties over 10 years

In 1975, the then Victorian Government adopted the one-in-100-year storm event standard for flood protection. As a result, all new property development or redevelopment in Melbourne has to be designed not to flood in the worst storm event Melbourne could expect in 100 years. Developers are required to provide sufficient capacity in drains and overland flow paths such as roads, easements and drainage reserves so a one-in-100-year storm event has no significant impact on dwellings or buildings they develop. Before 1975, Melbourne generally had a one-in-five-year standard of protection in its piped drainage network.

We completed a drainage survey mapping the path that floodwaters overflowing from our drains would follow in a one-in-100-year storm event. Our aim was to identify vulnerable properties that would be subject to flooding in such extreme rainfall.

Floors in new developments or redevelopments must be beyond the reach of flood risks identified in our drainage survey.

Redevelopment, particularly in the inner suburbs, addresses some of the flood risks that were created by development before the one-in-100-year standard was adopted.

However, we estimate that there are up to 115,000 vulnerable properties across Melbourne that could be flooded by flows from our waterways and drainage systems in a one-in-100-year storm event.

Our aim is to reduce this figure by 800 vulnerable properties over the 10 years from July 1999.

We estimate an annual expenditure of \$6 to \$8 million is required to achieve this target.

2000/01 flood protection program hits major delays

The limited resources available for flood protection work mean that we can tackle only a small number of projects in any year. Each financial year we draw up a list of projects based on:

- > consideration of the cost of each project
- > the number of vulnerable properties it would protect
- > the reduction of floodwater depth and velocity.

Most projects involve building retarding basins for temporarily storing floodwaters until the waterways and drains can handle them, or constructing new or bigger pipes, or a combination. Typically, it takes six to nine months to design, undertake community consultation and gain planning approval for a project. Once approved, construction of many projects is spread over more than one year.

During 2000/01, we planned to spend a total of \$3.94 million on detailed design work or construction for 14 major projects. This total included \$100,000 for our overhead costs associated with the projects.

During the year we:

- > began four projects which we will carry forward into 2001/02
- > deferred nine projects until 2001/02
- > deleted one project as it was no longer viable
- > brought forward and competed eight other projects.



At year-end, we had spent \$2.23 million of our \$3.94 million budget. The shortfall in our flood protection spending was largely due to delays on our largest planned project, the Palmer Street Main Drain in Murphy Street, Richmond. This project, to cost \$8.5 million over three years, involves constructing 1.5 kilometres of 1.35 to 1.95 metre diameter pipe drain along Murphy Street to the Yarra River. It will relieve flood risks for 105 vulnerable properties.

We had planned to spend \$1.3 million on the Palmer Street Main Drain during 2000/01. However, unexpected design issues delayed construction until the later part of 2001/02.

We attempted to redirect funds allocated to the delayed Palmer Street project by bringing forward work on eight other projects. This was only partially successful. Our ability to bring projects forward is limited, as construction cannot begin until design work is completed and we obtain the necessary approvals.

Our current three-year business plan reflects our previous under-expenditure in flood mitigation. Under the plan, we will increase expenditure to around \$8.5 million by 2003/04. This will ensure we achieve our operating charter commitment.

Target for 2000/01	Progress			Performance Target for 2001/02
	Little or none	Some	Achieved*	
Flood protection program projects				
Fulton Road Drain—retarding basin		✓		Twelve new or ongoing projects planned—see table on page 24.
Ferny Creek—retarding basin		✓		
Elsternwick Main Drain		✓		
Humes Main Drain—culvert at Geelong Road	✓			
Steele Creek—culvert at Rosehill Road		✓		
Palmer Street Main Drain		✓		
Fairfield Main Drain	✓			
Sandgate Avenue Drain	✓			
Blind Creek	✓			
Five Way Drain—Mooroolbark (design)	✓			
Bundoora Main Drain	✓			
Severn Street Drain	✓			
Saint Helena West Drain	✓			
Clarinda Main Drain	✓			
Data consistency project			✓	
George Street Drain—stage 2			✓	
Mooroolbark Drain—Green Street retarding basin			✓	
Tyabb Flood Protection—George Avenue			✓	
Wylies Drain—stage 2			✓	
Tooronga Road Main Drain			✓	
Kororoit Creek Floodplain Survey			✓	
Minor miscellaneous projects			✓	

* In the above table, “achieved” means scheduled progress was achieved. This does not mean the project was completed. Many projects are scheduled to run over more than one year. See tables on page 23 for expenditure on each project.

FLOOD PROTECTION PROGRAM 2000/01

Project	Vulnerable properties protected	Planned expenditure \$000	Actual expenditure \$000	Planned end date	Actual end date	Comment
Fulton Road Drain—retarding basin	22	700	590	Mar 01	Ongoing	Construction commenced. To be completed during 2001/02.
Ferry Creek—retarding basin	0	450	450	Feb 01	Ongoing	Construction commenced. To be completed during 2001/02.
Elsternwick Main Drain	7	450	0	Dec 00	–	Deferred until 2001/02.
Humes Main Drain-culvert at Geelong Road	0	100	0	Jun 01	–	Deferred until 2001/02.
Steele Creek-culvert at Rosehill Road	5	250	60	Sept 00	Ongoing	Construction commenced. To be completed during 2001/02.
Palmer Street Main Drain (design and part construction)	105	1,300	151	Jun 01	Ongoing	Design completed. Construction to commence 2001/02.
Fairfield Main Drain (design only)	85	100	0	Apr 01	–	Deferred until 2001/02.
Sandgate Avenue Drain (design only)	–	100	0	May 01	–	Deferred pending further studies.
Blind Creek	–	15	0	Sept 00	–	Project deleted, not viable.
Five Way Drain—Mooroolbark (design only)	23	50	0	Mar 01	–	Design commenced. To be completed in 2001/02.
Bundoora Main Drain (design only)	79	100	0	Jun 01	–	Deferred until 2001/02.
Severn Street Drain (design only)	23	50	0	Dec 00	–	Deferred until 2001/02.
Saint Helena West Drain (design only)	11	85	0	Jun 01	–	Deferred until 2001/02.
Clarinda Main Drain (design only)	29	50	0	Jun 01	–	Deferred until 2001/02.
George Street Drain—stage 2	10	0	170		Jun 01	Carried over from 1999/2000.
Mooroolbark Drain— Green Street retarding basin	11	0	92		Jun 01	Carried over from 1999/2000.
Tyabb Flood Protection—George Avenue	0	0	5		Jun 01	Carried over from 1999/2000.
Wylies Drain—stage 2	4	0	90		Jun 01	Carried over from 1999/2000.
Toorong Road Main Drain	8	0	260		Jun 01	New project for 2000/01.
Kororoit Creek Floodplain Survey	–	0	110		Jun 01	New project for 2000/01.
Data consistency project	–	0	230		Jun 01	Carried over from 1999/2000.
Melbourne Water Corporation overhead costs	–	140	0	–	–	Allocated directly to projects.
Minor miscellaneous projects	–	0	18		Jun 01	New project(s) for 2000/01.
Total	422	3,940	2,226			

FLOOD PROTECTION PROGRAM 2001/02

Project	Vulnerable properties protected	Planned expenditure \$000	Actual expenditure \$000	Planned end date
Bundoora Main Drain –flood mitigation project (design)	79	155		Jun 02
Clarinda Main Drain –flood mitigation project	29	300		Jun 02
Fairfield Main Drain –flood mitigation project (design)	85	165		Jun 02
Five Ways Drain –flood mitigation project	23	925		Jun 02
Flood Plain Development Guidelines	–	20		Feb 02
Heatherton Drain	12	295		Apr 02
Koo Wee Rup –location survey and hydraulic analysis	–	400		Jun 02
Palmer Street Main Drain –flood mitigation project	105	2,985		Mar 02
Rural Areas Flood Mapping	–	300		Apr 02
Severn Street Drain Box Hill Gardens –retarding basin (design)	23	50		Jun 02
Shelton Drain Diversion –levee bank and fencing	–	30		Apr 02
Saint Helena West Drain –flood mitigation project (design)	11	75		Jun 02
Melbourne Water Corporation overhead costs	–	92		Jun 02
Total	367	5,792		

Fulton Road Drain

During the year we experienced delays with the \$900,000 Fulton Road Drain project to protect 22 properties and improve stormwater run-off quality.

The project involves constructing a retarding basin and a 5,500 square metre wetland, within the Fulton Reserve on Fulton Road, in the City of Whitehorse. The reserve forms part of the Wurundjeri Walk Trail. The trail advisory committee was involved in planning landscape aspects of the project.

We spent \$590,000 on this project out of our planned budget of \$700,000 for 2000/01. Construction started later than we planned due to delays in finalising the detailed design. Resolving issues raised by the local council and community took longer than we expected.

Preventing new flood risks



Flood protection is a critical undertaking for members of our Catchment Planning Team (from left) Nicola Allcock, Mugette Stevenson-Marelic, Gordon McFarlane and Tennille Savage.

Melbourne Water's responsibility for flood protection includes preventing new flood risks as the metropolitan area grows through new development, and as older areas are redeveloped.

Our target is to protect newly developed and redeveloped properties and people from flooding in a one-in-100-year storm event. This event is defined as a storm of such intensity that, based on weather records, has a probability of occurring once in 100 years or has a one per cent chance of occurring in any given year.

This second report card on flood protection covers our program to prevent inappropriate development or redevelopment that would create new flood risks in such storm events.

We work with local councils to prevent development that would create flood-prone homes and other buildings. Councils refer subdivision proposals to us for advice on potential flood risks. Building regulations require that the floor of any building on land liable to flooding must be constructed at least 300 millimetres above what we determine as the flood level.

We also work with councils to ensure flood risk information is available in local planning schemes. We provide the information through "special building overlays" which are incorporated in the planning schemes as amendments. These overlays ensure that development proposals in areas affected by overland flows are also referred to us for advice.

Providing property owners and developers with flood-risk data

We have completed a survey of our underground drainage system and prepared maps to identify areas that would be affected by overland stormwater flows as a result of a one-in-100-year storm event.

Data from this survey is included on property information statements issued by Melbourne's retail water companies and advises owners and developers if a property would be at risk.

"Since 1997, we have been working with councils to incorporate our drainage survey maps into local planning schemes. Incorporation ensures a developer can access information on flood risks in the early design stages of any new project. It also ensures flood risk information appears on planning certificates and becomes a compulsory component of transfer-of-land documentation.

During the year, councils referred planning approval applications for 12,593 new subdivisions to us. We objected to 27 of these on the basis of unacceptable flood risks. We also received 243 property development referrals and objected to five.

In most cases, proposals can be redesigned to overcome the flood risks, but this adds to development costs and time. The "special building overlays" ensure developers have the information they need to deal with any flood risks at the initial design stage before they seek planning approval.

Approval process

Councils have a statutory requirement to notify people if a “special building overlay” amendment to a local planning scheme affects their property. The law provides that property owners can make submissions regarding the amendment. If issues raised in submissions cannot be resolved, the Minister for Planning can appoint an independent panel to report and make recommendations on the submissions.

We decided to go beyond statutory requirements for involving the community in the “special building overlay” process.

We work closely with local councils to ensure people are fully informed and can have their say. Our commitment to community consultation has proved beneficial. In most cases, property owners who initially object to the amendment withdraw their objection after they make contact with us. In every case, independent panels have accepted the accuracy of our flood risk data.

Targets

Our aim is to complete the special building overlay process during 2001/02. (See status summary table on page 30).

Target for 2000/01	Progress			Performance Target for 2001/02
	Little or none	Some	Achieved	
Special building overlay progress				
Melbourne			✓	Complete program, bringing total of planning scheme amendments to 31—one in each municipality within our area of responsibility. Completion requires: > Ministerial approval for planning scheme amendments already adopted by Whittlesea, Darebin and Moreland. Bayside expected to adopt scheme in July 2001. > Have proposed amendment adopted by council and gain Ministerial approval in cities where the process has started—Whitehorse, Glen Eira, Monash, Mornington, Manningham, and Yarra Ranges. Frankston and Knox due to start in July 2001. > Complete process in cities where it has not yet started—Stonnington, Cardinia, Casey, Kingston, Banyule, Boroondara and Melton. (See status report on page 28) Cardinia and Stonnington granted approval to proceed with preparation and exhibition of an amendment by 2 July 2001.
Greater Dandenong			✓	
Maroondah			✓	
Hume			✓	
Yarra			✓	
Hobson's Bay			✓	
Whittlesea			✓	
Moreland		✓		
Whitehorse		✓		
Monash		✓		
Manningham		✓		
Frankston		✓		
Darebin		✓		
Bayside		✓		
Glen Eira		✓		
Mornington		✓		
Yarra Ranges		✓		
Knox		✓		
Casey		✓		
Cardinia	✓			
Stonnington		✓		
Kingston		✓		
Banyule	✓			
Boroondara	✓			
Melton	✓			

SPECIAL BUILDING OVERLAY - PROGRESS REPORT

Councils	Status	Issues
Port Phillip	Approval gazetted on 29 October 1999.	<ul style="list-style-type: none"> > Exhibition from 23 April 1998. > Approximately 5,000 properties affected. > Monitoring referrals to review current arrangements.
Moonee Valley	Approval gazetted on 8 July 1999.	<ul style="list-style-type: none"> > Exhibition from 15 October 1998. > Approximately 1,500 properties affected. > Received two submissions, both withdrawn.
Nillumbik	Approval gazetted on 11 November 1999.	<ul style="list-style-type: none"> > Exhibition from 24 June 1999. > Approximately 200 properties affected. > No submissions received.
Brimbank	Approval gazetted on 18 November 1999.	<ul style="list-style-type: none"> > Exhibition from 6 May 1999. > Approximately 5,000 properties affected. > Received two submissions, both withdrawn.
Maribyrnong	Approval gazetted on 9 December 1999.	<ul style="list-style-type: none"> > Exhibition from 17 June 1999. > Approximately 2,500 properties affected. > No submissions received.
Wyndham	Approval gazetted on 17 February 2000.	<ul style="list-style-type: none"> > Exhibition from 15 April 1999. > Approximately 400 properties affected. > Received two submissions, both withdrawn.
Greater Dandenong	Approval gazetted on 13 July 2000.	<ul style="list-style-type: none"> > Exhibition from 3 February 2000. > Approximately 1,500 properties affected. > Received one submission that was later withdrawn.
Maroondah	Approval gazetted on 24 August 2000.	<ul style="list-style-type: none"> > Exhibition from 17 June 1999. > Approximately 800 properties affected. > Amendment lapsed with approval of new scheme on 16 December 1999. > Incorporated in new scheme on its approval.
Yarra	Approval gazetted on 12 October 2000.	<ul style="list-style-type: none"> > Exhibition from 14 October 1999. > Approximately 2,000 properties affected. > Received three submissions. > Panel heard submissions and recommended adopting amendment as exhibited.
Hobson's Bay	Approval gazetted on 30 November 2000.	<ul style="list-style-type: none"> > Exhibition from 17 June 1999. > Approximately 1,300 properties affected. > Received four submissions. > Ministerial advisory committee hearing considered submissions on amendment and recommended adopting amendment as exhibited.
Hume	Approval gazetted on 15 February 2001.	<ul style="list-style-type: none"> > Exhibition from 13 May 1999. > Approximately 1,000 properties affected. > Received four submissions, all were withdrawn. > Amendment lapsed with approval of new scheme > Incorporated in new scheme
Melbourne	Approval gazetted on 31 May 2001.	<ul style="list-style-type: none"> > Exhibition from 1 June 2000. > Approximately 1,800 properties affected. > Received 30 telephone enquiries on submissions. > Submissions withdrawn.

SPECIAL BUILDING OVERLAY - PROGRESS REPORT

Councils	Status	Issues
Bayside	Panel hearing held on 13 and 14 February 2001. Panel recommended amendment be adopted as exhibited subject to changes made by Melbourne Water. Planning committee recommended adopting panel report 18 June 2001. Council to consider panel report in July 2001.	<ul style="list-style-type: none"> > Exhibition from 24 February to 27 April 2000. > Further exhibition from 3 July to 14 July 2000. > Update letter to all affected properties 28 November 2000. > Update letter to all affected properties 14 June 2001. > Approximately 4,500 properties affected. > Received 147 submissions. > Council and Melbourne Water responded to to submissions. > Council accepted independent assessment of Melbourne Water modelling. > Submitter has lodged an appeal at the Victorian Civil and Administrative Appeals Tribunal against alleged defect in procedure regarding panel report. Directions hearing scheduled for 27 July to consider request by City of Bayside to join Melbourne Water as a party.
Whittlesea	Panel recommended amendment be adopted as exhibited. Council adopted amendment.	<ul style="list-style-type: none"> > Exhibition from 20 April 2000. > Approximately 2,000 properties affected. > Received two submissions. > One request to be heard.
Darebin	Panel recommended amendment be adopted subject to change made by Melbourne Water. Council adopted amendment.	<ul style="list-style-type: none"> > Exhibition from 11 May 2000. > Approximately 5,000 properties affected. > Received 130 telephone enquiries. > Received two written submissions. > Received one request to be heard.
Moreland	Panel recommended amendment be adopted subject to amendment made by Melbourne Water. Council adopted amendment.	<ul style="list-style-type: none"> > Exhibition from 6 July 2000. > Approximately 4,900 properties affected. > Received 12 submissions and petition of 35 signatures.
Whitehorse	Council resolved to request panel. Directions hearing on 8 March 2001. Panel hearing scheduled for August 2001.	<ul style="list-style-type: none"> > Exhibition from 22 June 2000. > Approximately 3,000 properties affected, 3,579 letters sent. > Received 14 submissions. > Melbourne Water expert witness report circulated on 25 June. > Received eight requests to be heard at panel hearing.
Glen Eira	Exhibition completed on 15 January 2001. Amendment to be considered by Council.	<ul style="list-style-type: none"> > Exhibition from 23 November 2000. > Approximately 9,500 properties affected. Letters sent to some 13,000 owner-occupiers. > Received 160 telephone calls. > Received 31 submissions. > Public meeting held 6 February 2001.
Mornington	Exhibition completed on 30 April 2001.	<ul style="list-style-type: none"> > Exhibition from 29 March 2001. > Approximately 1,000 properties affected. > Received eight telephone calls. > Received seven submissions, which included four objections.

SPECIAL BUILDING OVERLAY - PROGRESS REPORT

Councils	Status	Issues
Manningham	Exhibition completed on 11 June 2001.	<ul style="list-style-type: none"> > Exhibition from 10 May 2001. > Approximately 1,000 properties affected. > Received 20 phone calls and 10 submissions.
Monash	Exhibition completed on 25 June 2001.	<ul style="list-style-type: none"> > Exhibition from 24 May 2001. > Approximately 1,600 properties affected. > Received 40 phone calls and 8 submissions.
Yarra Ranges	Exhibition completed on 28 June 2001.	<ul style="list-style-type: none"> > Exhibition from 31 May 2001. > Meeting held with council officers on 13 December 2000. > Received 35 phone calls and one written submission.
Frankston	Mailout on 28 June 2001. Exhibition scheduled for July 2001.	<ul style="list-style-type: none"> > Exhibition scheduled for July 2001. > Approximately 8,000 properties affected.
Knox	Exhibition scheduled for July 2001	<ul style="list-style-type: none"> > Exhibition scheduled from 28 June 2001. > Exhibition delayed due to council priorities and resourcing issues. > Approximately 2,000 properties affected.
Casey	Councillor briefing scheduled for August 2001.	<ul style="list-style-type: none"> > Likely to proceed once all data is available.
Cardinia	Approval expected in July 2001.	<ul style="list-style-type: none"> > Meeting councillors and staff to discuss accuracy of existing information on 7 June 2001.
Stonnington	Council completed drainage survey. Council briefing on 25 June 2001. Approval to proceed on 2 July 2001.	<ul style="list-style-type: none"> > Written/met Director City Development 25 May 2001. > Need to develop communications strategy with council. > Likely to exhibit two-part joint amendment. > Exhibition scheduled for September 2001.
Kingston	Council awaiting completion of its drainage survey program.	<ul style="list-style-type: none"> > Council will undertake an amendment with both Melbourne Water and council drainage survey information. > Council has indicated amendment likely in October following completion of their survey.
Banyule	Council seeking resolution of issues associated with amendment referrals. Discussions are ongoing.	<ul style="list-style-type: none"> > Met with council officers in January and May 2001.
Boroondara	Negotiations are ongoing.	<ul style="list-style-type: none"> > Met with Strategic Planning Coordinator.
Melton	Meeting scheduled for July 2001 to request amendment.	<ul style="list-style-type: none"> > Flooding information available recently.
Baw Baw	No amendments proposed.	<ul style="list-style-type: none"> > No flooding information. > Available information was included in new format planning scheme.
Bass Coast	No amendments proposed.	<ul style="list-style-type: none"> > No flooding information available.
South Gippsland	No amendments proposed.	<ul style="list-style-type: none"> > No flooding information available.

SPECIAL BUILDING OVERLAY - STATUS SUMMARY

Amendments approved	
Port Phillip, October 1998	Greater Dandenong, July 2000
Moonee Valley, July 1999	Maroondah, August 2000
Nillumbik, November 1999	Yarra, October 2000
Brimbank, November 1999	Hobson's Bay, November 2000
Maribyrnong, December 1999	Hume, February 2001
Wyndham, February 2000	Melbourne, May 2001
Amendments in progress	
Whittlesea (adopted)	Monash (exhibition complete)
Darebin (adopted)	Mornington (exhibition complete)
Moreland (adopted)	Manningham (exhibition complete)
Bayside (panel recommended adoption)	Yarra Ranges (exhibition complete)
Whitehorse (panel hearing scheduled for July 2001)	Frankston (exhibition scheduled for July 2001)
Glen Eira (council requested panel)	
Council approval to proceed	
Knox (exhibition scheduled for July 2001)	
Stonnington	
Cardinia	
Under negotiation with council	
Casey (Council briefing scheduled for August)	Boroondara
Kingston (exhibition likely October/November 2001)	Melton
Banyule	

Amendments approved are those in operation after being approved by the Minister for Planning.

Amendments in progress are those on exhibition or those awaiting a panel hearing, council adoption or Ministerial approval.

Council approval to proceed are those amendments council have resolved to place on exhibition.

Verification statement



Melbourne Water commissioned jointly the Sustainable Investment Research Institute (SIRIS) and the Snowy Mountains Engineering Corporation Victoria (SMEC Victoria) to verify the data and content of this Annual Safety Review 2000/01 (the 'report'). This is Melbourne Water's first separate safety report. Melbourne Water has the responsibility for the preparation of the report and this statement represents the auditor's independent opinion. Neither SIRIS nor SMEC Victoria was responsible for preparation of any part of this report.

Our Opinion

Each of the data trails selected was easily identifiable and traceable and the personnel responsible were able to reliably demonstrate the origin(s) and interpretation of data.

Majority of the data and information presented are accurate. However, some level of data inaccuracy was found with anomalies attributable to human transcription and interpretation errors.

Overall the auditor is satisfied that:

- > the report is a fair and honest representation of the organisation's policies, management systems and performance;
- > the report is a good reflection of management commitment towards safety and a fair description of outcomes achieved during 2000/01;
- > the systems and processes in place to generate the numerical data presented in the report are sound but further improvement is achievable; and
- > the written statements made in the report accurately reflect the results and progress achieved during the reporting period.

General Findings and Recommendations

The following observations and recommendations are made as a result of the verification process to assist in further improving the standard of reporting:

A separate review of safety demonstrates Melbourne Water's commitment to treat workplace and community safety issues as integral components of sustainability.

A review of the data collection and reporting procedures is recommended. Emphasis should be placed on allocating responsibilities in reporting and in internal report review.

Improved communication between corporate and Business Management Health Services is needed to ensure Melbourne Water's reporting objectives are met.

Melbourne Water's stakeholder reporting process has evolved over the past five years and this year is moving towards a triple bottom line reporting framework.

Further analysis of key business issues from a triple bottom line perspective is recommended. This is necessary to continue developing a relevant and responsive performance measurement and reporting mechanism that comprehensively addresses Melbourne Water's triple bottom line aspects and impacts.

The above findings represent a summary of a more detailed assessment report presented to Melbourne Water.

On behalf of the audit team, 4th September 2001, Melbourne, Australia

Terence Jeyaretnam
Accredited Environmental Auditor (EPA Victoria)
Senior Environmental Auditor (QSA)
Principal, SIRIS

Glossary

Catchments (or water supply catchments)

Areas of land, which collect rainfall and contribute to streams, rivers, wetlands or groundwater.

Melbourne's water supply catchments are in the Yarra Ranges from where water flows to streams and then to reservoirs for distribution to the community.

Chlorination Adding chlorine to water for purification.

Drainage The system of local and regional drains, floodways, retarding basins, wetlands, pollution traps and other facilities designed to contain, convey and manage stormwater to prevent flooding and protect environmental values.

Effluent Water discharged by a process, treated or untreated.

Extreme wet weather Rainfall events that exceed the heaviest rain that could be expected to occur in a five-year period.

Lost-time injuries Reported occurrences that result in one or more days of lost time.

Major hazard facility Any workplace that stores, handles or processes large quantities of dangerous goods with the potential to cause a major incident that could lead to loss of life, injury and property damage rivaling that of a natural disaster.

Megalitre One million litres.

Retail water companies The metropolitan retail water companies providing water and sewerage services to Melbourne consumers – City West Water, South East Water and Yarra Valley Water.

Runoff Water that flows over the surface from a catchment area, including streams.

SafeAS™ An occupational health and safety management system used by Melbourne Water.

SafetyMAP™ An occupational health and safety audit tool used by the Victorian WorkCover Authority.

Self insure Where an organisation—with approved safety procedures and financial status—pays the cost of any successful claims from its own resources.

Sewage sludge Solid material separated from sewage during processing; remains as a semi-liquid product until further dewatering/drying is undertaken.

Sewage treatment plant A place where human and industrial wastes are treated before disposal to land or water.

Sewage Strictly speaking household waste but loosely applied to any waste sent to a treatment plant.

Sewerage System of mains, pipes and sewers to transport sewage.

Stormwater Technically, all runoff is stormwater, however the term is generally used for urban runoff in constructed stormwater drainage systems.

Stream A general term for a body of flowing water; a natural watercourse containing water at least part of the year.

Treated effluent Water discharged after processing of sewage at a treatment plant.

Treatment Application of techniques such as settlement, filtration and chlorination to render water suitable for specific purposes including drinking and discharge to the environment.

Victorian WorkCover Authority Victorian Government organisation that administers Victoria's workers compensation insurance scheme.

Water cycle The circulation of water on Earth as it evaporates from the sea and lakes, condenses into clouds and falls again as precipitation (rain, hail, sleet, snow).

Water quality The physical, chemical and biological measures of water.

Water supply system All aspects of the system from the water collection point to consumers, including catchments, storage reservoirs, treatment and distribution systems, and consumption.

Waterways All streams, creeks, rivers, estuaries, coastal lagoons, inlets and harbours.

Wetland Natural or artificial area of seasonal, intermittent or permanent waterlogged soils or inundated land.

© Copyright 2001 Melbourne Water Corporation.
All rights reserved. No part of this document may be reproduced,
stored in a retrieval system, photocopied or otherwise dealt with without
the prior written permission of Melbourne Water Corporation.

Design: Cruise Design Partnership
Photography: Noel Butcher and Rohan Young.



Melbourne Water Corporation
607 Bourke Street Melbourne
PO Box 4342 Melbourne Victoria 3001
Telephone 131 722 Facsimile 03 9235 7200
www.melbournewater.com.au
ISSN 1324-7905

