

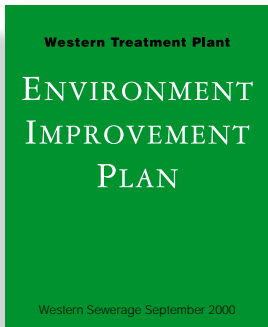
Western Treatment Plant

ENVIRONMENT
IMPROVEMENT
PLAN

Western Sewerage September 2000



Melbourne
Water



Melbourne Water Corporation hereby acknowledges the Western Treatment Plant's first Environmental Improvement Plan developed in consultation with the community of Werribee, the Environmental Protection Authority, and local council. Melbourne Water pledges to commit to the plan, including ongoing review and development, in consultation with those groups.

For Melbourne Water

Brian Bayley

The following signatories acknowledge, endorse and support the Melbourne Water Western Treatment Plant Environmental Improvement Plan.

For Environmental Protection Authority

Dr Brian Robinson

Community Liason Commitee Chairman

John McElvaney

Community Liaison Committee Members



Greg Aplin



Alex Christo



Dorothy Davies



Carney Doyle



Angela Muscat



Clare Atkins



Simon White



Michael Sleight

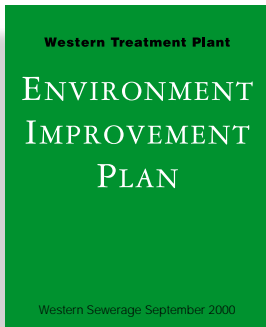


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Summary

The Western Treatment Plant treats about 180,000 megalitres of domestic sewage and industrial wastewater annually from Melbourne's central, northern and western suburbs.

It uses three treatment systems:

- Lagoons all year round;
- Land filtration in summer when evaporation rates are high, and
- Grass filtration in winter when evaporation rates are low.

This Environment Improvement Plan (EIP) describes how Melbourne Water intends to contribute to further enhancing the local environment and meet the obligations of the future performance standards imposed on the Western Treatment Plant by the Environment Protection Authority. The EIP will be implemented by Melbourne Water and reviewed every two years.

This Plan has been developed in consultation with a Community Liaison Committee made up of local residents, the City of Wyndham and the EPA. It has incorporated a number of amendments derived from the comments received from the general public and other interest groups regarding the draft EIP which was published in October 1999. The EIP is currently being implemented by Melbourne Water in accordance with the Action Plan Summary outlined in Section 11 of this document.

Melbourne Water Policies

The EIP is based on relevant Melbourne Water policies. They are the:

- Risk Management Policy;
- Environmental Policy;
- Public Health Policy;
- Environment/Public Health Impact Assessment and Management Policy; and,
- No Sewage Spills Policy.

The Healthy Bay Initiative

Melbourne Water has adopted the Healthy Bay Initiative to improve the quality of water discharged into Port Phillip Bay. By 2005 the plant will be an all-lagoon system concentrating on production of a high quality effluent with reduced nitrogen levels.

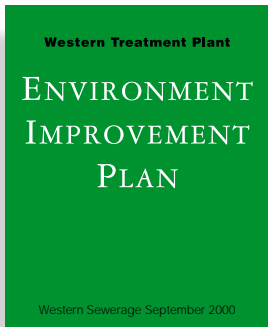
Environmental Legislation and Regulations

State and Federal legislation govern the operation of the Western Treatment Plant, EPA licences, government policy and various memoranda of understanding with government agencies. It is also subject to five international wildlife treaties.

The principal law governing its operations is the Environment Protection Act 1970.

Environmental Aspects and Impacts

All the activities at the plant have been assessed for their impact on the environment. The level of risk associated with each impact was determined, using a risk assessment model which rates exposure against three criteria – frequency, severity and sensitivity. A total of 42 activities were recognised as having significant risk.



Environmental Objectives, Targets and Programs

The environmental objectives, targets and programs at the plant are outlined under the following sub-headings:

- Discharges to air, water, land and groundwater;
- Waste minimisation;
- Land disposal;
- Conservation and land management;
- Reuse, and,
- Noise.

Within each section, Melbourne Water has identified actions and programs for improvement. These include reducing odour, reducing effluent flows to Port Phillip Bay, and monitoring salt content in sewage to prevent ensure soil stability.

Monitoring and Review

The plant's environmental performance is monitored continuously. The results are sent to the EPA annually for review and are reported internally each month and quarter. Progress towards the EIP will be publicly reported as part of Melbourne Water's Annual Environmental Performance Report.

The Community Liaison Committee will also meet quarterly to review progress. An overall review will be conducted every two years.

1. Western Treatment Plant Community Liaison Committee

A Community Liaison Committee supported the development of the Western Treatment Plant Environment Improvement Plan. Committee members included:

- Mr. J McElvaney Chairperson
- Mr. Greg Aplin City of Wyndham
- Mr. Greg Wood City of Wyndham
- Mr. Peter Ferrett Environment Protection Authority
- Ms. Natalie Saunders Environment Protection Authority
- Richard and Dorothy Davies Werribee River Association
- Ms. Angela Muscat Earth Encounters
- Mr. Ranald McCowan Mussel Growers Association
- Mr. Simon White Community Representative
- Mr. Carney Doyle Community Representative
- Ms. Clare Atkins Community Representative
- Mr. Michael Sleigh Community Representative
- Kim and Annette Monk Community Representative
- Mr. Alex Christo Community Representative

The following Melbourne Water staff supported the Committee:

- Tony Crapper Manager Operations Western Sewerage
- Andrew Dunn Environment Coordinator
- Elke Bobenhausen WTP Conservation Officer
- Victoria Nicholson Environmental Officer

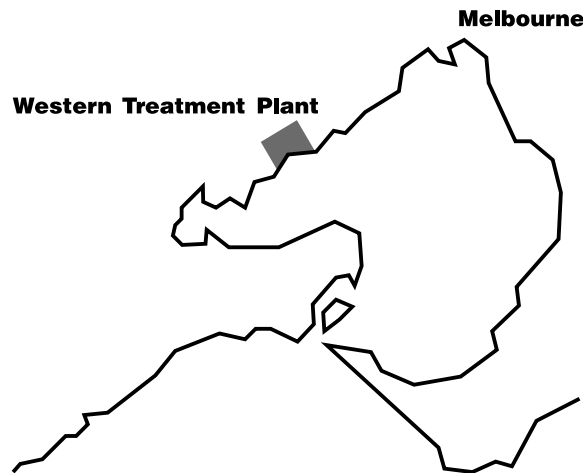
Melbourne Water acknowledges and appreciates the contribution and time given by the Committee members.

2. Overview of the Western Treatment Plant

The Western Treatment Plant serves the central, northern and western suburbs of Melbourne, which house about 1.6 million people, or 55% of the city's population. These suburbs also contain most of the city's industrial activity, so the plant receives domestic sewage and industrial wastewater.

In area, the Western Treatment Plant is the largest sewage treatment facility in Australia.

It occupies 10,851 Ha on the western side of Port Phillip Bay. The average daily flow to the plant is approximately 500 megalitres. Its maximum short-term wet weather hydraulic flow capacity is approximately 1,700 megalitres per day.



It uses three systems of sewage treatment.

- **Lagoon Treatment**

Sewage passes slowly through the lagoon systems, allowing naturally occurring bacteria to consume biodegradable matter. As the flow moves through a lagoon system, the amount of biodegradable matter decreases and the amount of oxygen increases due to natural aeration and the growth of photosynthesising algae. Bacterial biomass and fixed (inorganic) suspended solids settle to the bottom, forming sludge.

There are modern lagoons and old lagoons at the plant.

The modern lagoons have been built over the past decade. They are larger than the old lagoons, consisting of 10 individual ponds about two metres deep. They include the 115 East, 55 East and 25 West lagoons.

The upstream end of the first receiving pond of each modern lagoon is an anaerobic zone (pot) which reduces the incoming pollutant load by about 60 per cent. The pots are covered to control biogas and contain odour. On the first pond downstream of the anaerobic zone, mechanical aerators are used to increase the amount of oxygen in the water and control odour.

In the old lagoons (85W, 145W, Walsh's, Lake Borrie, Western Section, T-Section), there are no covered anaerobic pots and mechanical aeration is not used. In these lagoons the initial ponds are anaerobic with effluent gradually becoming aerobic in the later ponds.

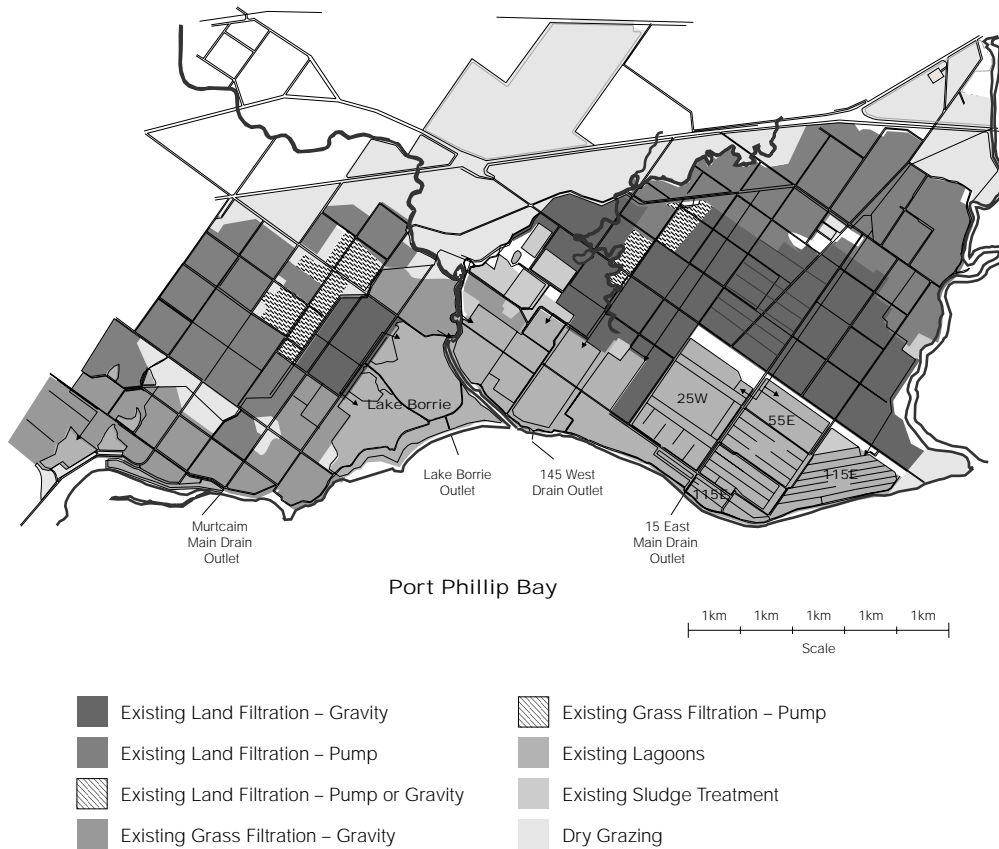
• **Land Filtration**

Land filtration removes organic matter from sewage by filtration through, and absorption by, the soil. Micro-organisms in the soil break down the organic matter to form minerals. In land filtration, about half the water content of the sewage evaporates, and the rest filters through the soil into the groundwater. The groundwater collects in sub-drains connected to the drainage system.

Land filtration is generally used in the warmer months (October to April) when evaporation and evapo-transpiration rates are high.

• **Grass Filtration**

Figure 1. Location of Sewage Treatment Processes at WTP



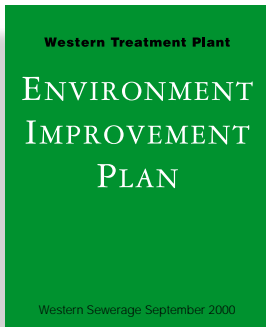
Grass filtration removes biodegradable matter from sewage by two methods – consumption by bacteria in the grass, and sedimentation. Sewage is allowed to run continuously into paddocks which are thickly planted with Italian Rye grass (a winter-growing species). The sewage trickles through the grass and the treated effluent runs off into a drain at the bottom of the paddock.

Grass filtration is used in winter when the evaporation rate is too low for land filtration to be effective.

Grass filtration influent is first treated to remove gross solids in sedimentation tanks (West Tanks). These solids are then digested and the remaining sludge dried and stockpiled on site.

Land Management

Agricultural land management is carried out by Werribee Agriculture Group (WAG), a separate business unit of Melbourne Water. WAG coordinates stock grazing on the land treatment areas so that treatment efficiency and agricultural production are maximised. However, sewage treatment remains the primary purpose of the site.



3. Melbourne Water Policies

Melbourne Water's Strategic Plan sets out the overall vision, purpose and objectives for the organisation. These are:

Vision:

To be leaders in urban water cycle management.

Purpose:

Melbourne Water exists to add value for its customers and the community by operating a successful commercial business, which supplies safe water, treats sewage and removes stormwater at an acceptable cost and in an environmentally sensitive manner.

Objectives:

- Achieve excellent customer service
- Be a leader in environmental management
- Maximise shareholder value
- Fulfil our community obligations.

Melbourne Water develops policies which are consistent with these statements.

The policies relevant to this Environmental Improvement Plan are those dealing with:

- Risk Management;
- Environment;
- Public Health;

Community, Environmental and Public Health Impact Assessment, and Management and External Policy.

In addition, each group within Melbourne Water is permitted to develop site specific policies consistent with the corporate policies. For example, the Sewerage Group has a No Spills Policy.

3.1. Risk Management Policy

Purpose

To enable risk to be managed across Melbourne Water Corporation in a consistent and cost effective manner.

Objectives

- To identify and minimise adverse impacts on the Corporation and its staff from the risks associated with operating the business.
- To adopt a balanced approach to risk management that recognises Melbourne Water's commercial, legal and ethical responsibilities without developing a risk averse culture leading to an unduly conservative or excessively costly approach.
- To apply a risk management framework based around AS/NZS 4360:1995.

Policy Statement

Risk is the probability of something happening that will have an impact on Melbourne Water's success as a commercial business. It is measured in terms of consequences and likelihood. The policy focuses attention on risk in Melbourne Water and establishes ways to manage it consistently and cost effectively. Risk management does not mean Melbourne Water will avoid all risks; that is not realistic. It means understanding the risks and managing them in a way calculated to minimise them.

Melbourne Water will use elements of a generic risk-management system in designated Risk Focus Areas (RFA). An accountable senior manager will be allocated to oversee the use of the system in each RFA. Elements of the generic system need be applied only to the level appropriate for the RFA.

In the process of applying the generic management system, a set of management questions relevant to the RFA will be asked on a regular basis through the Risk Audit Procedure (RAP). Areas of non-compliance need to be addressed by an action plan. A half-yearly report covering the outcomes from this process will be presented to the Board Audit Committee.

3.2. Environment Policy

Melbourne Water will:

- Work towards achieving a sustainable balance between environmental protection and economic development that is in the interests of future generations;
- Implement environmental policies and procedures within the framework of environmental management systems consistent with the Australian water industry environmental management guidelines;
- Comply with statutory and corporate requirements and, through a continual improvement process, develop strategies to meet expected medium to long term regulatory trends;

Minimise the environmental impact of the organisation's activities and ensure that management, employees and contractors:

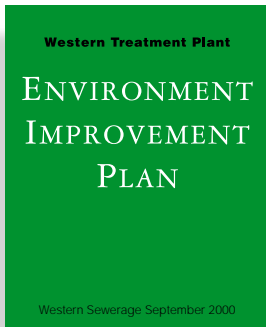
- are equipped to anticipate and manage the environmental risks and responsibilities in their day-to-day work, and
- take all reasonable care to address the environmental aspects of business activities;
- Involve customers, stakeholders and the community in current activities, new projects and strategies through appropriate consultation and education programs;
- Integrate environmental management with business planning, decision-making and economic evaluation processes.

Melbourne Water will fulfil this policy by:

- Conducting regular environmental audits and assessments of its compliance with statutory and corporate requirements and periodically providing appropriate information to the Board, shareholders, employees and the public;
- Undertaking research and development and contributing to the transfer of environmentally sound technology and management methods throughout the water industry;
- Identifying and implementing waste minimisation strategies (including the recycling and reuse of products) to minimise risk and add value to the business; and

Minimising the environmental impacts of Melbourne Water through:

- using a risk management approach appropriate to the potential for damage;
- carefully evaluating decisions to avoid, wherever practicable, serious and irreversible environmental damage;
- identifying and critically assessing options for proposed projects and strategies;
- sound environmental management of the construction phase;
- developing and implementing environment improvement plans for current operations; and
- developing emergency preparedness plans where potential hazards exist.



3.3. Public Health Policy

Melbourne Water will:

- Provide a low cost, reliable supply of safe, high quality drinking water that consistently meets 1987 National Health and Medical Research Council (NHMRC) health requirements as defined in retail water company operating licences;
- Transfer and treat sewage, and ensure appropriate disposal or storage of by-products in a way that safeguards the health of the community;
- Minimise the impacts of stormwater on receiving waters and thereby contribute to the improvement of waterway water quality and safe recreational opportunities for the community, and
- Ensure that the benefits of achieving high drinking water quality, treated effluent quality and waterway water quality, relative to the costs, can be demonstrated.

Melbourne Water will fulfil this policy by:

- Restricting public access to catchments and thereby minimising the potential for contamination and the necessity for treatment of water supplies.
- Ensuring reliable water and wastewater treatment using processes tailored to Melbourne's unique conditions.
- Managing the reuse of treated sewage effluent and sludge to minimise public health risks and to conform to statutory requirements while optimising business opportunities.

Providing safe and efficient stormwater services including:

- flood warning and mitigation;
- emergency response to pollutant spills to waterways; and
- monitoring for blue-green algae in water bodies used for recreation.

Improving performance and optimising public health outcomes through:

- remaining abreast of relevant international trends in public health policy, epidemiology studies,
- treatment technology and system management and operation; and
- undertaking research on the relationship between water quality and public health.

Developing an understanding of the public health impacts and implications of the business through:

- regular monitoring of the quality of drinking water, treated sewage effluent, stormwater and receiving water; and
- assessing performance against corporate commitments and stakeholder expectations.
- Establishing a good working relationship with public health agencies to ensure Melbourne Water contributes to and influences the debate on the setting of statutory requirements, industry standards and guidelines, and other standards relevant to public health and the water cycle.
- Ensuring that management and employees are equipped to anticipate and manage public health risks and responsibilities in their day to day work through appropriate contingency planning and incident response capability.
- Providing relevant and timely information to customers, stakeholders and the community about public health issues.

3.4. Community/Environmental/Public Health Impact Assessment and Management Policy

Purpose

This policy defines the procedure for assessing and managing the community, environmental and public health (C, E & PH) aspects of capital project planning and delivery, asset operation and maintenance and policy/strategy development.

Objectives

To ensure Melbourne Water Corporation complies with legislation and demonstrates due diligence in protecting the environment and public health, and in addressing community concerns related to projects.

Procedures

The client representative should consult the relevant C, E & PH Contact about when and how to use the C, E & PH Assessment Checklist as early as possible in a project. If a C, E & PH impact is envisaged, the Checklist must be completed to identify the C, E & PH impacts associated with capital works, operational activities and policy/strategy development and to determine how to manage these impacts.

The Office of Planning in the Department of Infrastructure should be contacted to determine the need for a statutory Environmental Effects Statement.

All project options should be compared in terms of their C, E & PH impacts using the checklist as a guide. For capital works a completed checklist should be submitted when applying for preliminary project approval and then revised when applying for project approval. Expenditure applications for operational activities should also have a completed checklist attached. If a contractor is being used for project planning then the checklist should be completed by the contractor.

The checklist shall be signed off by the relevant client representative, the original filed in the project file and a copy forwarded to the product group C, E & PH contact.

If the proposed activity has the potential to result in significant C, E & PH impacts (including in an emergency), the checklist must detail:

- a list of the significant impacts;
- how these impacts will be, or have been, investigated, and
- any actions proposed to be taken to avoid or mitigate impacts.

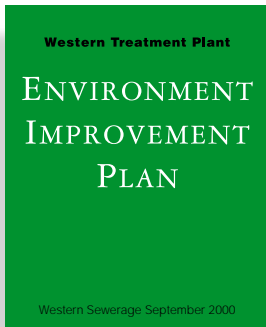
Provisions to mitigate these impacts must either be incorporated into tender and contract documents (including those relating to property transactions) or into an environmental management plan. These should include, where appropriate, the need to undertake risk assessment, prepare contingency plans and establish environmental performance indicators. Environmental construction guidelines exist to help manage major works.

The client representative is accountable for monitoring and reporting on the implementation of actions to mitigate C, E & PH impacts. Prior to project hand-over and return of retention money, the client representative must be satisfied that these requirements have been met.

Where the checklist process has identified potential C, E & PH impacts after construction (during a project's operating life), managers shall ensure that mitigation actions are incorporated into operating procedures.

When a post-implementation review or post-contract review is undertaken, the checklist should be used to help assess how effective the C, E & PH mitigation actions were.

Product groups are required to undertake C, E & PH impact assessment as part of their Environmental and Public Health Management Systems. Implementing these systems will provide the means to manage the significant impacts of day to day activities. The checklist can be used to establish general C, E & PH impacts for regular activities and mitigation actions can be built into standard operating and work procedures. This would remove the need to use the checklist every time a regular activity is conducted. The checklist is indicative of the minimum



assessment required for new projects, policies and operational activities. If desired, a product group can develop its own checklist to better suit its needs, so long as the minimum requirements of this checklist are met.

In cases where there are no Environmental and Public Health Management Systems for operational activities, the checklist should be used to identify the environmental issues.

3.5. No Sewage Spills Policy

Purpose

To achieve no sewage spills to the environment by a process of continuous improvement.

Objectives

- Have an agreed improvement process.
- Have everyone work together to make the improvement process happen.
- Include spill reduction measures and targets in business plans and environmental management plans.
- Regularly communicate spill reduction measures, targets and performance.
- Have a rigorous management process to monitor the agreed spill reduction procedures (including monitoring spills).
- Provide all necessary training to employees.
- Ensure thorough investigation and reporting of all spills.

General Manager – Sewerage is responsible for:

- ensuring spill prevention measures and targets are included in business plans and performance plans, and
- leading investigations of all spill incidents and near misses, and auditing that corrective actions have been completed.

Managers are responsible for:

- clearly communicating the no spills policy, and spill measures, targets and performance to every team in their area;
- ensuring that training in awareness of spill impacts, causes and control actions occurs, and
- recognising achievement of targets (in their areas).

Teams are responsible for:

- being aware of causes and effects of spills that could occur as part of the teams activities;
- auditing team and individual performance regularly, evaluating potential of activities to cause spills, and taking corrective action;
- ensuring that procedures for preventing sewage spills caused by team activities are in place and adhered to;
- ensuring that specific actions required by the team as part of the management process are completed;
- immediately reporting all sewage spills to their manager and the relevant person(s) as set out by the reporting procedures, and
- ensuring that all contractors work to the same standards as Melbourne Water employees.

4. The Healthy Bay Initiative & EPA Licensing

4.1 The Port Phillip Bay Environmental Study

Melbourne Water's 'Healthy Bay Initiative' is a coordinated strategy to improve the quality of water discharged into Port Phillip Bay from all sources. It is based on the Port Phillip Bay Environmental Study, conducted by CSIRO and funded by Melbourne Water and Melbourne Parks and Waterways.

The final report from this study was released in June 1996.

One of the main aims of the study was to determine the impact of the Western Treatment Plant on Port Phillip Bay and find out whether effluent discharges are sustainable in the long term.

In general the study found the Bay to be surprisingly healthy and the water quality to be "good by world standards".

While the study placed considerable emphasis on nutrient and toxicant loads, it found conservation of biodiversity in the Bay to be equally important. In particular the spread of introduced flora and fauna was seen as a major threat to the Bay's long-term future.

The principal recommendations from the study included:

- Although toxicants are at low levels in the Bay at present, inputs should continue to be managed and, ideally, reduced.
- The possibility of long-term chronic effects of low-level toxicants on the biota of the Bay should be investigated.
- To ensure the sustainable health of the Bay for future generations (and to allow for climate variability) a target reduction of 1,000 tonnes nitrogen per year from all sources should be adopted.
- Control of storm loads from rivers and drains is more critical than control of nutrient loads during base flow conditions. The impact of storm loads and urban run-off in the Yarra River and the major creeks and drains must be reduced. Wherever possible suspended solids and nitrogen loads to the Bay from these sources should be reduced by catchment management and reduction in storm flows.
- The denitrification efficiency of the Western Treatment Plant should be improved where practicable. This is especially important in winter when denitrification efficiencies in the plant are low. If winter denitrification efficiencies could be increased to summer levels, ammonia loads from the plant could be decreased significantly.
- A bay-wide ongoing monitoring program should be established. This is the responsibility of the Government.

4.2 Environment Protection Authority Licensing

In March 1997 the Environment Protection Authority (EPA) issued an amended wastewater discharge licence for the Western Treatment Plant which included future performance standards that must be met by 1 January 2005. The EPA stipulates that on and from 1 January 2005 treated wastewater discharges must comply with the future performance indicators specified in Table 1. In particular:

- Melbourne Water is required to upgrade the wastewater treatment works to achieve the Future Performance Limits specified in Table 1
- Melbourne Water is required to ensure that the installation of all new wastewater treatment works or upgrading of existing wastewater treatment works on the premises contributes to the achievement of the Future Performance Limits specified in Table 1
- Upgrading of the treatment works shall optimise the reduction of ammonia concentrations in wastewater discharged to Port Phillip Bay
- Ammonia Performance Limits may be lowered if trials predict a lower ammonia limit is achievable.

Table 1: Current and Future Performance Limits for WTP

Waste Indicator*	Median		90th %il		Maximum	
	Current	Future	Current	Future	Current	Future
Biochemical Oxygen Demand	25	20	–	40	–	–
Suspended Solids	100	30	130	60	–	–
Total Phosphorus (as P)	–	10	15	15	–	–
Colour (Pt-Co Units)	–	200	600	400	–	–
Ammonia (as N)	25	10	–	–	40	30
Anionic Surfactants†	0.50	–	–	0.80	1	1.0
Cadmium	0.005	–	–	0.002	0.01	0.01
Chromium	0.05	–	–	0.05	0.15	0.10
Copper	0.05	–	–	0.05	0.10	0.10
Lead	0.05	–	–	0.025	0.10	0.10
Mercury	0.0005	–	–	0.0005	0.001	0.001
Nickel	0.05	–	–	0.05	0.15	0.10
Zinc	0.10	–	–	0.10	0.25	0.20
Benzene	N/A	–	N/A	–	N/A	0.60
Toluene	N/A	–	N/A	–	N/A	0.60
Phenols	N/A	–	N/A	–	N/A	0.10
Total PAHs‡	N/A	–	N/A	–	N/A	0.006

* Unless otherwise specified all units expressed in milligrams per litre.

† The limits specified are interim only. The licence holder must determine the acceptable discharge limit for surfactants which is based on 0.05 times the LC50 value determined in the receiving water using the most sensitive important species.

‡ Includes all alkyl derivatives.

Meeting the new licence requirements poses a challenge to Melbourne Water, because:

- the future limits for ammonia concentration may not be met by the modern lagoons or grass filtration;
- the nitrogen limits cannot be met with the existing processes, and
- the anaerobic zones of uncovered lagoons, grass filtration systems and primary sedimentation would not comply with the requirement to contain offensive odours within the plant boundary by 2005.

4.3 Melbourne Water's Response

In 1998, the Board of Melbourne Water approved the Environment Improvement Project for the Western Treatment Plant. Its objectives are to:

- meet future EPA performance standards for effluent quality by 1 January 2005;
- reduce the annual total nitrogen load to Port Phillip Bay to 3,500 tonnes by 30 December 2001;
- meet future EPA conditions which state that on and from 1 January 2005 odours offensive to the sense of human beings must not be discharged beyond the boundaries of the premises;
- maximise effluent reuse;
- comply with international wildlife treaties;
- maximise treatment system robustness and flexibility, and
- position the plant to meet future issues and to ensure it is environmentally sustainable in the medium to long term.

The proposed works which will deliver these improvements are:

- progressively installing enhanced lagoon technology in 55 East and 25 West modern lagoons;
- covering anaerobic sections at the head of the existing modern lagoons and aerating the facultative ponds;
- ceasing grass and land filtration using raw and sedimented sewage;
- constructing a lagoon effluent delivery and reuse system;
- undertaking a major strategic review by 2003 before any decision on whether to build additional lagoons or carry out major works on old lagoons, and
- augmenting raw sewage carrier flow capacity as appropriate.

4.3.1 Lagoon enhancements

Enhanced lagoon technology will reduce nutrient discharges to Port Phillip Bay, ensure EPA licence requirements are met and free up land treatment systems for effluent reuse.

In February 1999 a workshop was held with international experts to select an enhancement process. The one chosen uses a standard activated sludge process part-way down the lagoon system to remove algae and nitrogen. The process incorporates aeration tanks and clarifiers.

The 10-pond 55 East lagoon is the first to be enhanced. It is proposed to place the activated sludge plant in Pond 5 and feed it with effluent from Pond 4, supplemented by raw sewage to sustain the micro-organism content and so nitrify and subsequently denitrify part of the nitrogen load.

Effluent from Pond 4 may be recycled to Pond 1, improving the performance of the upstream ponds and reducing the amount of aeration required in Pond 1, providing it can be established that this would save power. Waste activated sludge will also be discharged into Pond 1 to increase the denitrifying performance of the lagoon.

The design has been kept flexible as the 55 East upgrade will be the first of its type in Australia and will make 55 East the largest enhanced lagoon in the world.

Figure 2A Current Process Configuration at WTP

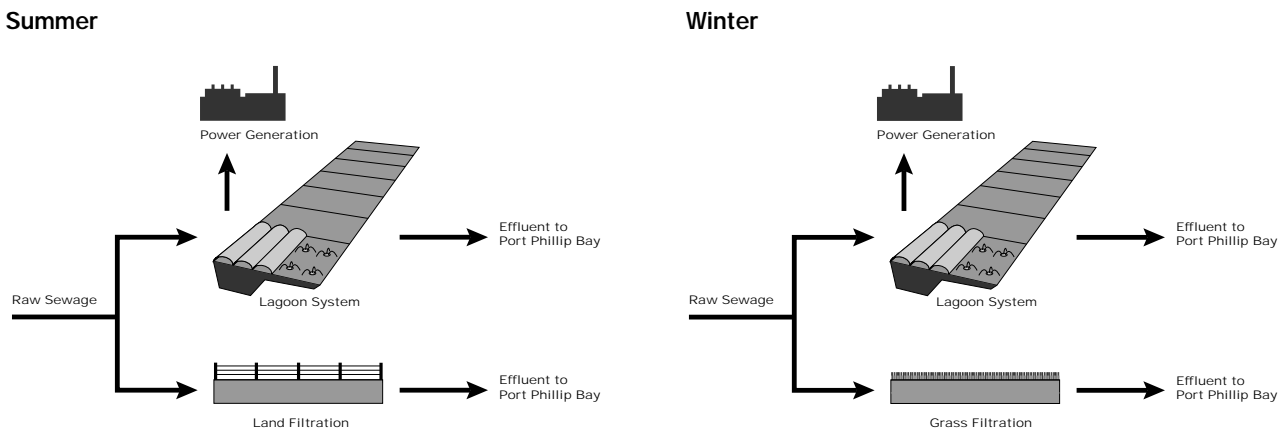
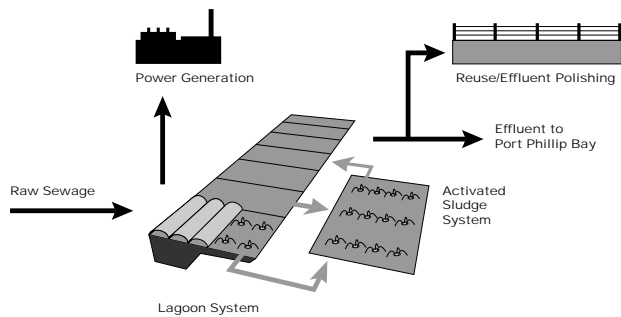
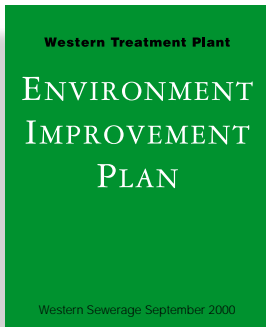


Figure 2B Proposed Process Configuration following implementation of EIP works





5. Environmental Legislation and Regulations

The Western Treatment Plant is subject to international treaties, Federal and State legislation and regulations, operating licences, guidelines, government policies and memoranda of understandings with government agencies.

There are five international wildlife treaties which either cover or affect the Western Treatment Plant. These are:

1. Ramsar Convention (Convention on Wetlands of International Importance, especially as waterfowl habitat.) The Convention on Wetlands, signed in the town of Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Western Treatment Plant is included in the Port Phillip Bay (Western Shoreline) and Bellarine Peninsular Ramsar site, which was nominated as a Wetland of International Importance under the Ramsar Convention in 1982. In 1984, the entire Western Treatment Plant and the adjacent Spit State Nature Reserve were placed on the list of Wetlands of International Importance under the Convention.

2. The Japan – Australia Migratory Birds Agreement (JAMBA) is a treaty between Australia and Japan to protect migratory birds and birds in danger of extinction, and their habitats. Several of the species listed under this agreement frequent WTP.

3. The China – Australia Migratory Birds Agreement (CAMBA) is a similar agreement to JAMBA. Several of the species listed under this agreement also frequent WTP.

4. The Bonn Convention is a multilateral treaty for the protection of migratory wildlife, obliging member countries to generally protect migratory species. It was signed by Australia in 1991.

5. The International Convention on Biological Diversity was signed by Australia in 1994. This treaty obliges Australia to conserve its biodiversity (ecological, species and genetic).

In July 1999 the Commonwealth Government passed the Environment Protection and Biodiversity Conservation Act. The Act requires Federal Government approval for any action that has, will have, or is likely to have a significant impact on matters of national environmental significance.

These include Ramsar wetlands, migratory species protected under international treaty, and nationally threatened species. The implications for the Western Treatment Plant will become clearer when the Act is proclaimed and various regulations developed.

From a Federal policy perspective, the National Water Quality Management Strategy, being developed by the Australian and New Zealand Environment and Conservation Council, may impact on the Western Treatment Plant. Similarly for the National Environment Protection Measures being developed by the National Environment Protection Council. National Environment Protection Measures produced to date include:

- National Pollutant Inventory;
- National Ambient Air Quality Measure, and
- Assessment of Site Contamination (draft).

5.1 National Water Quality Management Strategy (NWQMS)

The Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resource Council of Australia and New Zealand (NWQMS) are working together to develop the National Water Quality Management Strategy. The National Health and Medical Research Council is also involved where the strategy affects public health.

The NWQMS provides a policy process for water quality management and national guidelines.

It is expected that in time the strategy will be reflected in State policies and guidelines.

Elements of the NWQMS, which may affect on the Western Treatment Plant, include:

- Policies and Principles
- Australian Water Quality Guidelines for Fresh & Marine Waters
- Guidelines for Groundwater Protection
- Guidelines for Sewage Systems – Acceptance of Trade Wastes
- Guidelines for Sewage Systems – Effluent Management
- Guidelines for Sewage Systems – Sludge (Biosolids) Management (Draft)
- Guidelines for Sewage Systems – Use of Reclaimed Water (Draft)
- Guidelines for Sewage Systems – Sewerage System Overflows

At the State level, the following Acts include environmental obligations that apply to the Western Treatment Plant:

- Environment Protection Act 1970
- Environment Effects Act 1978
- Planning and Environment Act 1987
- Heritage Act 1995
- Catchment and Land Protection Act 1994
- Conservation Forests and lands Act 1987
- Environmental Conservation Council Act 1997
- Flora and Fauna Guarantee Act 1988
- Commonwealth Aboriginal & Torres Straits Islander Protection Act 1984
- Health Act 1958
- Dangerous Goods Act 1985
- Occupational Health & Safety Act 1985
- Agricultural & Veterinary Chemicals (Control of Use) Act 1992

The principal environmental legislation influencing the management of the Western Treatment Plant is the Environment Protection Act 1970. The Environment Protection Authority administers this.

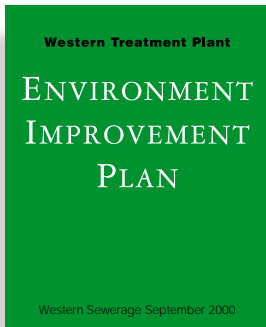
The key regulatory functions of the EPA are to:

- Establish standards for environmental quality through State Environment Protection Policies and Industrial Waste Minimisation Policies;
- License discharges to air, water and land, and
- Administer a works approval system.

State Environment Protection Polices (SEPP's) are declared under clause 16(1) of the Environment Protection Act 1970. They identify:

- beneficial uses of the environment to be protected;
- environmental quality objectives to protect beneficial uses
- environmental indicators to define environmental quality, and
- a program to enable the attainment of the quality objectives.

These policies provide a context for environmental decision-making, granting of works approvals, licensing, issuing of pollution abatement and infringement notices, and for making regulations under the Act.



The State Environmental Protection Policies and Industrial Waste Management Policy, which affect the Western Treatment Plant include:

- Waters of Victoria (Including Schedule F6 – Waters of Port Phillip Bay)
- Ambient Air Quality
- Air Quality Management
- Groundwaters of Victoria
- Control of Noise from Commerce, Industry and Trade (N-1)
- Waste Minimisation

The Western Treatment Plant has a single waste discharge licence. It covers all four licensed outlets into the Bay, and discharges to the air.

In addition to licensing, the EPA also requires adherence to Best Practice Management Guidelines.

The Guidelines for Wastewater Reuse specify potential reuse options, roles and responsibilities, wastewater quality, wastewater treatment, site and system controls, performance monitoring and reporting and notification. No licence or works approval is required where suppliers and users of wastewater accept responsibility for its reuse in accordance with the guidelines.

A number of other State government policies affect the operation of the Western Treatment Plant, including the Victorian Coastal Strategy and Port Phillip and Western Port Regional Catchment Strategy.

6. Environmental Aspects and Impacts

To set objectives and targets for environmental protection, it is necessary to identify and analyse all the activities, products and services of the Western Treatment Plant that have the potential to affect the environment. The relevant definitions of Environment, Environmental Aspect and Environmental impact are set out below as contained in AS/NZS ISO 14001, Environment Management Systems – Specification with guidance for use.

Further definitions can be found in Section 12 of this document.

Environment

Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interaction. Surroundings in this context extend from within an organisation to the global system.

Environmental Aspect

Element of an organisation's activities, products or services which can interact with the environment.

Environmental Impact

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

6.1 Assessment Process

The process used to identify and assess aspects and impacts was based on the framework documented in the Environmental Management Guidelines for the Australian Water Industry produced by the Water Services Association of Australia in 1995. In turn, these are based on the framework provided in ISO 14004 Environmental Management Systems – General guidelines on principles, systems and supporting techniques.

A three-step process was used:

Step 1

Defining the scope of the business by listing activities, products and services.

Step 2

Defining where and how the activities, products and services interact with the environment by identifying the environmental aspects of each.

Step 3

Identifying the potential environmental impacts associated with these environmental aspects.

To accomplish Step 3, two mechanisms were used:

- Previous material including environmental audits, environment performance reports, former Western Treatment Plant Environmental Management Plan, Port Phillip Bay Environment Study and internal reviews were revisited.
- Brainstorming was done in workshops held with Western Treatment Plant staff and the Community Liaison Committee.

The workshops were also used to assess the level of risk associated with each environmental impact. A semi-quantitative method was used. The details are set out as Risk Assessment Model 2 in the Environmental Management Guidelines for the Australian Water Industry.

This model rates each exposure against three criteria – frequency, severity and sensitivity.

Each criterion is assigned a rating between 1 and 5, with 5 being the highest. Where issues are judged as not posing an environmental risk, frequency is assigned a value of 0. The maximum rating a risk exposure can be allocated is 50 based on the simple formula shown in Figure 3:

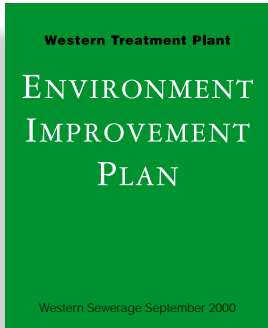
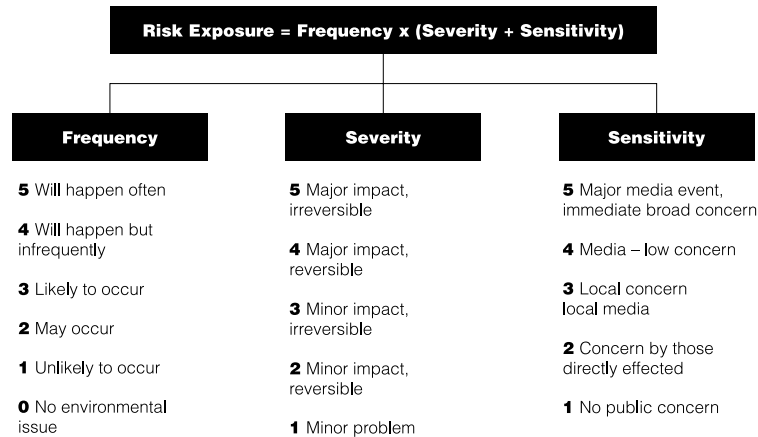


Figure 3. Risk Assessment Model



Workshop participants did the impact assessment. Open and informed discussion was encouraged, and efforts made to reach a consensus. Where consensus was not possible each participant was asked to nominate a value and the average value was adopted.

6.2 Assessment Outcomes

The results were compiled into a full list of activities, products and services, environmental aspects and impacts for the Western Treatment Plant. The full list is given in Appendix 1.

As a starting point, those activities, products and services with a risk analysis rating greater than 18 were considered to have a “significant” environmental impact. A total of 42 activities, products and services had a rating greater than 18. These are listed in Table 2. They were grouped under headings which indicate their impact on the environment:

1. Discharges to Air
Includes odour emissions and greenhouse gas emissions
2. Discharges to Water
Includes effluent quality, effluent disposal, nutrients and spills
3. Discharges to Land
Includes land contamination, salinisation of land, and sludge management
4. Discharges to Groundwater
Includes groundwater contamination and elevated water table
5. Waste Minimisation
Includes sewage quality
6. Land Disposal
Includes land redevelopment
7. Conservation and Land Management
Includes nature conservation, vermin and weed control
8. Reuse
Includes effluent reuse, sludge reuse and lagoon gas reuse
9. Noise
Includes noise from aerators.

This grouping system formed the basis for compiling the following environmental objectives, actions and programs.

Table 2. Significant Activities, Products and Services at Western Treatment Plant – Assessment by WTP Community Liaison Committee

Activities, Products & Services	Environmental Aspect	Environmental Impact	Impact Rating
Sewage Treatment – General	Odour Emissions	Public perception of Werribee	35
Influent Mgt – Carrier cleaning	Land Contamination	Restrictions on land use & clean up	35
Sedimentation – West Tanks	Odour Emissions	Public perception of Werribee	35
Sedimentation – West Tanks	Greenhouse Gas Emissions	Global warming	35
Sale of surplus land	Land Redevelopment	Perceived loss of community amenity	31
Commissioning new lagoons	Odour Emissions	Offensive odours at Werribee Sth	28
Power Generation	Greenhouse Gas Emissions/Reuse	Reduce greenhouse emissions	27
Discharge effluent to Port Phillip Bay	Effluent Quality	Public concern regarding water quality	26
Future Planning – R & D	Effluent Reuse	Vegetation to better utilise sludge/water than grass	25
Carrier Cleaning & disposal of sediments	Land Contamination	Clean up required	25
Sale of surplus land	Nature Conservation	Loss of Ramsar land	24
Future Planning	Effluent Quality	Impact of effluent on PPB	24
Contract with WAG – Livestock management	Land Management	Sustainable use of WTP land	23
Sewage Treatment by Land Filtration	Groundwater Contamination	Elevated water table	23
Future Planning	Effluent Reuse/ Effluent Disposal	Reduction of water to the Bay	23
Future Planning – R & D	Effluent Quality	Ensure appropriate treatment methods used	23
Control system monitoring	Effluent Quality	Non-compliant effluent due to spill to PPB	23
Sewage Treatment by Land Filtration	Land Contamination	Livestock contamination	22
Discharge effluent to Port Phillip Bay	Nutrients	Odour from rotting seaweed	22
Vermin control	Land Management	Loss of native species	22
Discharge effluent to Port Phillip Bay	Effluent Quality/ Effluent Disposal	Changes to species and community structure	22
Weed Control	Vermin and Weed Control	Loss of foreshore and riparian habitats	22
Discharge effluent to Port Phillip Bay	Effluent Quality/ Effluent Disposal	Need a mixing zone	22
Planting of trees	Greenhouse Gas Emissions	Air (O ₂ produced)	22
Accept trade waste variations	Sewage Quality	Increased toxicant discharge to PPB	22
Noxious weed control	Land Management	Weeds spreading to surrounding properties	21
Discharge effluent to Port Phillip Bay	Nutrients	Bay algae blooms	21
Toxicant inputs	Sludge Reuse/Sewage Quality	Restrictions on reuse of sludge	20
Sewage Treatment by Land Filtration	Salinisation of Land	Soil structure decline from Salinisation	20
Future Planning – Lake Borrie	Nature Conservation	Potential loss of habitat values. Compliance with International treaties	20
Drain cleaning	Effluent Quality/ Effluent Disposal	Increased suspended solids to PPB	20
Loss of treatment systems from toxic discharge	Effluent Quality/ Effluent Disposal	Discharge of non-compliant effluent	19
Sale of surplus land	Odour Emissions	Reduction on buffer zones for odours	19
Habitat planting	Nature Conservation	Improved amenity & habitat	19
Treat sewage – West Tanks Digesters	Odour Emissions	Odour along Freeway/Little River	19
Contingency Planning – major flood	Spills	Loss of sewage containment	18
Sewage Treatment – Lagoon aeration	Noise	Loss of amenity at Werribee Sth	18
Future Planning – New lagoons	Nature Conservation	Impact on wildlife	18
Old Black Liquor ponds	Sludge Management	Restrictions on groundwater use & clean up	18
Sewage Treatment by Grass filtration	Odour Emissions	Loss of amenity at Geelong/Lara	18
Sewage Treatment by Grass filtration	Land Contamination	Restricted future uses/Livestock contamination	18
Old sheep dip sites	Land Contamination	Restricted future uses/Livestock contamination	18

7. Environmental Objectives, Targets & Programs

7.1 Discharges to Air

Background

Discharges to air at the Western Treatment Plant occur through the breakdown of sewage, which results in the discharge of odorous substances. As part of its day-to-day operations, Melbourne Water keeps a record of all complaints received concerning odours alleged to have originated from the premises. The records detail all consequent investigations of such complaints and any action taken as a result of any complaint and investigation.

Uncovered anaerobic reactors in lagoons, West Tanks, digesters and grass filtration areas are potential sources of odour. Anaerobic processes also produce methane, a greenhouse gas. However, if the methane captured under lagoon covers can be harnessed, greenhouse gas emissions can be minimised and the gas used to generate electricity.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Treat sewage generally	Potential poor perception of Werribee	35
Sediment sewage at West Tanks	Potential poor perception of Werribee	35
Sediment sewage at West Tanks	Global warming from gases emitted	35
Commission new lagoons	Offensive odour	28
Power generation	Reduced Greenhouse gas emissions	27
Planting of trees	Increase oxygen production	22
Digest sludge at West Tank digesters	Offensive odour along Geelong Road	19
Treat sewage by Grass filtration	Offensive odour at Geelong/Ballarine Peninsula	18
Treat sewage in older style lagoons	Local odours	N/A

Objective 1

Western Treatment Plant will:

- Ensure that no odours offensive to people are detectable beyond the boundary of Melbourne Water's land; and
- Minimise greenhouse gas emissions.

Action 1.1

- Odours and methane gas will be captured by the installation of floating covers over the 25 West and 55 East lagoon anaerobic reactors. This was completed in March 1999. Any new lagoon(s) will have a floating cover installed over its anaerobic reactor within four months of first receiving sewage.

Program

During 1998 Melbourne Water issued a contract to construct and install lagoon covers for the 25 West and 55 East modern lagoons. Installation was completed in March 1999. No additional odour is anticipated as a result of the introduction of enhanced lagoon technology in these modern lagoons. Any new lagoons will have a cover over the anaerobic reactor installed within four months of first receiving sewage.

Action 1.2

- Odours from grass and land filtration will be reduced when the treatment of raw sewage is confined to lagoons, and treated effluent is reused on the grass and land filtration areas.

Program

Grass filtration has been identified as a source of odour to the west and south of the plant during winter. By December 2004, all raw sewage will be treated by enhanced lagoon systems. The changeover will be achieved progressively, as the following indicative table shows:

Winter	1999	2000	2001	2002	2003	2004	2005
Sedimented Sewage Flow to Grass Filtration Areas (ML/day)	200	200	150	150	100	100	0

Action 1.3

- Odours from the West Tanks sedimentation tanks and sludge digesters will be eliminated by the decommissioning of these processes by 2005.

Program

All sewage treated west of Little River is first sedimented at the West Tanks and the sludge digested in open cold digesters. The tanks and digesters are significant sources of odour along the Geelong Road and in the Little River area. As part of the Healthy Bay Initiative, the West Tanks and sludge digesters will be phased out by December 2004.

Action 1.4

- Ensure odour reduction is achieved through the completion of the Healthy Bay Initiative works.

Program

Western Treatment Plant will undertake odour modelling to identify the likely extent of odour dispersion during and after completion of the Healthy Bay Initiative works. The project is to be reviewed by December 2001, and any significant odour sources not remedied will be targeted for additional work.

Action 1.5

- Western Treatment Plant will work with local government and the EPA to identify and monitor sources of odour in the Werribee, Little River, Geelong and Bellarine districts.

Program

A community odour survey was established in September 1999 and in April 2000 to monitor odour emissions. This will be repeated every second year, as the Healthy Bay Initiative works are progressively implemented. A report will be published on the community odour survey and odour panel findings.

Action 1.6

- Melbourne Water will work with industry to establish a power generation scheme to utilise methane gas captured by the 25 West and 55 East lagoon covers.

Program

Melbourne Water has awarded a contract to AGL to supply, install and operate electricity generating equipment using the methane gas collected under the 25 West and 55 East lagoon covers. AGL will also assume ownership and operation of the existing 115E electricity generating equipment

Action 1.7

- Western Treatment Plant will work with Werribee Agriculture and the Western Treatment Plant Wildlife Consultative Committee to establish appropriate tree plantations.

Program

Melbourne Water is currently working with the Western Treatment Plant Wildlife Conservation Committee and plantations for habitat purposes are being established in areas such as Ryans Swamp and the Werribee River.

7.2 Discharges to Water

Background

The Western Treatment Plant discharges treated effluent into Port Phillip Bay. This is regulated by EPA Waste Discharge Licence EW844. Impacts potentially arising from this include EPA licence non-compliance, discharge of toxic substances, nutrient enrichment resulting in seaweed and algae blooms, odour from rotting seaweed, changes to species or communities within the Bay, displeasing aesthetics arising from visible plumes and loss of beneficial uses such as swimming and shellfish harvesting.

Spills of untreated or partially treated sewage can also affect water quality in Port Phillip Bay, Werribee River and Little River.

Relevant Significant Environment Activities, Products and Services

Activity, Product or Service	Impact	Rating
Discharge effluent to Port Phillip Bay	High degree of public concern	26
Discharge effluent to Port Phillip Bay	Nutrient enrichment, seaweed blooms and odour from rotting seaweed.	22
Discharge effluent to Port Phillip Bay	Changes to marine species and community structure	22
Discharge effluent to Port Phillip Bay	Need for a mixing zone as effluent quality does not meet SEPP objectives	22
Discharge effluent to Port Phillip Bay	Risk of toxic algae blooms in Bay	21
Future planning – Process Improvements	Long term compliance	24
Future planning – Reuse	Reduction in water discharged to the Bay	23
Control system monitoring	Ensure compliant effluent only discharged	23
Accept trade waste variations	Increase toxicants in Port Phillip Bay	23
Drain cleaning	Increased turbidity in Bay	20
Contingency planning – Failure of treatment	Discharge of non-compliant effluent systems	19
Contingency planning – Major flood	Discharge of untreated sewage	18

Objective 2

Melbourne Water will:

- Upgrade and operate the sewage treatment systems at the Western Treatment Plant to protect beneficial uses of Port Phillip Bay.

Action 2.1

- Melbourne Water will meet EPA licence future performance obligations by completing the Healthy Bay Initiative works by 2005.

Program

By 2005, all incoming sewage flows will be treated by lagoons. Lagoons will be progressively upgraded with enhanced lagoon technology.

Action 2.2

- Melbourne Water will reduce the risks to nutrient cycling at Bay wide and regional scales and the risks of nuisance algal and seaweed blooms by reducing the average total nitrogen load to Port Phillip Bay to less than 3,500 tonnes a year by 2001 with a target of 3,200 tonnes per annum by 2005. The denitrification efficiency of the Western Treatment Plant will be maximised as far as practicable by implementing a advance lagoon technologies.

Program

Western Treatment Plant discharged on average 3,602 tonnes of total nitrogen a year during the five year baseline period from 1993 to 1998. Modelling by the CSIRO during the Port Phillip Bay Environment Study indicated that a reduction of 500 tonnes a year from Western Treatment Plant would benefit Port Phillip Bay by further reducing the risk of dinoflagellate and unattached macro-algae blooms and promoting sea grass productivity, which provides habitat for commercial fish species. Full implementation of the Healthy Bay Initiative is expected to achieve this reduction by 2005.

Action 2.3

- Melbourne Water will assist in protecting Port Phillip Bay water quality by treating all incoming raw sewage by lagoons to remove heavy metals and other toxicants by 2005.

Program

Monitoring by the Marine and Freshwater Resources Institute of designated mixing zones off-shore from the plant's discharge points indicates that levels of zinc, copper and nickel marginally exceed water quality criteria at Lake Borrie, 145 West and Murtcaim Outlets.

By treating all incoming flows in lagoons with anaerobic pots and by enhancing lagoons so that further suspended solids are removed it is expected that all toxicant objectives will be met. Most copper and zinc in the sewerage system is believed to come from domestic plumbing materials.

Action 2.4

- Melbourne Water will ensure that untreated sewage is contained within the Western Treatment Plant by implementing the No Spills Policy and having in place appropriate contingency plans.

Program

Western Treatment Plant is vulnerable to spills of raw sewage because it is so big and has an extensive open carrier system. All spills are reported and there is a full debriefing process to ensure lessons are learned. Action is then taken to ensure that there is no recurrence.

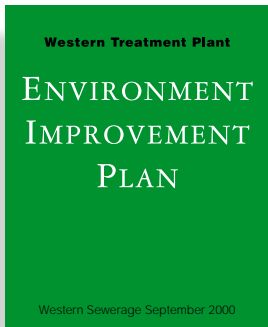
Spills are classified as contained or uncontained. Contained spills are confined to treatment areas and are not a risk to the environment. Uncontained spills can enter the waterways or surrounding land either directly or through EPA outlets. Uncontained spills can potentially result in a breach of EPA licence conditions, damage aquatic ecosystems or interfere with primary-contact recreation. All uncontained spills are reported immediately to the EPA.

Melbourne Water has contingency plans for all major emergencies. These plans are scheduled to be reviewed every two years. They cover major floods and breakdown of treatment systems caused by toxic inflow.

Major floods on Little River and Cherry Tree Creek pose a threat to Lake Borrie and older lagoon systems. Modern lagoons are located above the 100-year flood line of the Werribee River and risk of failure is considered minimal.

With the implementation of the Healthy Bay Initiative the risk of an uncontained spill of raw sewage from the older lagoons will be minimised, as the primary treatment facilities will be located outside flood-prone areas.

The risk of a breakdown of the treatment process caused by toxic influent is considered minimal because of the buffering capacity provided by the long detention times in the lagoons. However, Melbourne Water is investigating the installation of on-line monitoring systems to provide early warning of potential problems. If feasible, a system will be in place by June 2001.



7.3 Discharges to Land

Background

The draft State Environment Protection Policy (Prevention and Management of Contamination of Land) lists a variety of types of land use, three of which are likely to apply at the Western Treatment Plant. They are:

- agriculture;
- recreation/open space, and
- industrial.

Beneficial uses of such land are:

- maintenance of the ecosystem (including modified and highly modified ecosystems);
- human health;
- buildings and structures;
- aesthetics, and
- production of food and flora.

The draft State policy adopts the national ANZECC/NHMRC Guidelines for the Assessment and Management of Contaminated Sites, Australian National Food Standards Codes and draft National Framework for Ecological Risk Assessment as quality objectives.

At the Western Treatment Plant, the soil has been affected by sewage treatment and agricultural activities. Soil, sludge and herbage samples from all over the plant have been analysed for heavy metals since 1976.

A comprehensive survey of heavy metals and organic toxicants was conducted by RMIT in 1993. In general the results show where land or grass filtration has taken place the ANZECC/NHMRC guideline values are exceeded.

Grass filtration soils generally show higher levels of contaminants than land filtration soils. However, contaminant levels are not increasing with time. Herbage monitoring shows most heavy metals to be below detection limits, except for zinc and copper, the readings for which are highly variable.

The soil might also be contaminated by past activities including rubbish tipping, sheep dipping, the dumping of anthrax-contaminated soil and construction refuse. The degree of this kind of contamination has yet to be determined.

From a stock grazing view point, dieldrin in soils and stock are a potential issue. However, dieldrin use has been banned in Victoria and levels should fall in time. The beef measles parasite, which is present in sewage, is a major issue for cattle grazing but a successful vaccine has been developed and a large-scale trial may be undertaken over the next 18 months.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Carrier cleaning & disposal of sediments	Contamination of land resulting in land use restrictions	35
Sewage treatment by land filtration	Livestock contamination and restrictions on sales	22
Sewage treatment by land filtration	Soil structure decline by salt input	20
Old sheep dip sites	Restricted future uses	18
Sewage treatment by grass filtration	Restricted future uses	18
Sewage treatment by grass filtration	Livestock contamination and restrictions on sales	18

Objective 3

Melbourne Water will:

- Manage existing contaminated areas and reduce the contaminant load in grass and land filtration to ensure that future beneficial uses are protected.

Action 3.1

- Melbourne Water will phase out the discharge of untreated sewage to land at the Western Treatment Plant by December 2004.

Program

The Healthy Bay Initiative will result in the progressive reduction and eventual elimination of raw sewage treatment by land filtration and grass filtration. All raw sewage will be treated in lagoons.

Year/season	LFA Flows ML/day	GFA Flows ML/day
1999/2000 Summer	120	-
2000 Winter	-	200
2000/01 Summer	100	-
2001 Winter	-	150
2001/02 Summer	70	-
2002 Winter	-	150
2002/03 Summer	40	-
2003 Winter	-	100
2003/04 Summer	75	-
2004 Winter	-	100
2004/05 Summer	40	-
Later seasons	0	0

The ultimate flows to the LFA and GFA will depend on seasonal factors and on the performance of the enhanced lagoons.

The toxicant concentrations in soils are not expected to fall immediately, even though raw sewage irrigation will be replaced by effluent irrigation. Heavy metals are expected to remain locked within the soil structure. Organic toxicants are expected to degrade slowly. However, the toxicant load to land is expected to fall, and by 2005 is expected to be at an environmentally sustainable and acceptable level.

The raw sewage toxicant load is expected to become concentrated in lagoon sludges which will be dried and stockpiled in designated sludge holding areas. The main benefit from an agricultural viewpoint will be the reduction in risk from beef measles, as the beef measles cysts in raw sewage are expected to settle out in the lagoons before the treated effluent is used for land irrigation.

Land/grass filtration may be used as emergency backup system for lagoon treatment and could be used for effluent polishing.

Action 3.2

- Melbourne Water will develop maintenance procedures to ensure that carrier and sewer debris, wet well wastes and sediments from general maintenance operations are deposited in appropriately constructed sludge disposal areas.

Program

Debris from carrier/sewer maintenance, including rags, plastics, rubble and sediment, is usually deposited beside the carrier or stockpiled at the West Tanks. Debris from wet well and sewer maintenance from the transfer and retail water system is usually deposited at the former East Tanks site adjacent to the Werribee River. Although the potential to contaminate land is considered low, it is proposed to create a central depository for this material. The site for this will be identified as part of a Western Treatment Plant Sludge Management Strategy to be completed by March 2000.

Action 3.3

- Melbourne Water will work with retail water companies to ensure the incoming salt load does not damage soil structure at WTP.

Program

The Western Treatment Plant is fed by raw sewage which is high in Total Dissolved Salts (TDS) with a high sodium adsorption ratio (SAR). The plant is also under pressure to receive increased TDS loads from industry. Soil water with a high proportion of exchangeable sodium will reduce permeability. This causes soil crumbs to swell, clay particles to disperse and drainage pores to block, resulting in water logging. Excessive salt can also cause crop damage, particularly during dry weather.

The impact of TDS in raw sewage and lagoon effluent on Western Treatment Plant soils was investigated in January 1997 by Rendell McGuckian, Agricultural and Management Consultants. It was found that the TDS of raw sewage coming into the plant was around 1,150 mg/L with an average SAR value of 8.7. This level is sustainable because of the present level of leaching from the constructed drainage system. The consultants found that following lagoon treatment the TDS level will increase to between 1300 and 1400 mg/L because of evaporation but the SAR does not increase. It was found that at this level, salts will require a high level of management and adequate drainage if salinity and crop problems are to be avoided.

As a result the plant has a capacity to receive sewage with a TDS up to 1,200 mg/L and a SAR value of 8.7. Melbourne Water will work with retail water companies to ensure that this level is not exceeded.

Action 3.4

- Melbourne Water will, by 31 December 2001, identify and prepare ecological and human health risk assessment of tip sites, sheep dip sites and other areas which may have been subject to contamination.

Program

A risk assessment of contaminated sites was carried out at Western Treatment Plant in 1993. This found 25 sites where activities had taken place which could result in soil contamination. However, soil sampling has not taken place to quantify the degree of contamination or risk present. It is proposed to sample the sites by June 2001. The National Environment Protection Measure (NEPM) Assessment of Contaminated Sites, released by the National Environment Protection Council, include guidelines for the preparation of risk assessments.

7.4 Discharges to Groundwater

Background

The levels of totally dissolved salts (TDS) as set out in the State Environment Protection Policy – Groundwaters of Victoria, determines the beneficial uses to which groundwater may be put.

The groundwater at the Western Treatment Plant generally falls into Segment C of the policy and beneficial uses include stock watering, industrial water, primary contact recreation and buildings and structures.

There are two aquifers at the plant – a sedimentary aquifer in beach and estuarine sediments, and a confined newer volcanic basalt aquifer. The sedimentary aquifer discharges into Port Phillip Bay, Little River and Werribee River. Land filtration has created a seasonal groundwater mound in the sedimentary aquifer. The basalt aquifer discharges directly to Port Phillip Bay.

Consultants assessed metal loads leaving the plant via groundwater in October 1998. Average concentrations are below water quality criteria specified for ecosystem protection for all metals except zinc and copper, which were found to exceed State policy limits. However, calculations do not incorporate any analysis for the mixing of groundwater with the waters of the Bay, and groundwater loads to the Bay are substantially smaller than effluent loads from the plant's four licensed outlets.

Land filtration is believed to be a source of groundwater to Werribee River, and lagoon ponds in beach sediments are a source of groundwater to coastal saltmarsh habitats and Port Phillip Bay. However, sludge drying and holding areas are believed to be self-sealing and appear to be a minor source of contamination. Exactly how much, if any, each source contributes to contamination is not yet known.

Black liquor ponds, which look ugly and can trap animals, have been found by groundwater monitoring programs not to be a source of groundwater contamination at present.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Sewage treatment by land filtration	Elevated water table	23
Old black liquor ponds	Future liabilities & clean up	18

Objective 4

Melbourne Water will:

- Seek to reduce discharges of toxicants from sewage treatment operation to groundwater to ensure that groundwater from the Western Treatment Plant can be used for appropriate beneficial purposes.

Action 4.1

- The quality of water reaching groundwater systems below the plant will be improved by implementing the Healthy Bay Initiative and switching from raw sewage irrigation to lagoon effluent irrigation.

Program

Melbourne Water will construct an effluent reuse channel to carry lagoon effluent inland from the 15 East outlet. As lagoon effluent contains lower concentrations of contaminants than does raw sewage, the quality of groundwater is expected to improve. However, this will need to be confirmed by monitoring.

Melbourne Water and EPA have agreed that an Irrigation Management Plan will be prepared before the first stage of the reuse scheme is commissioned. A primary objective of the irrigation management plan will be the protection of groundwater systems. This plan is to be in place before any area is declared suitable for effluent irrigation.

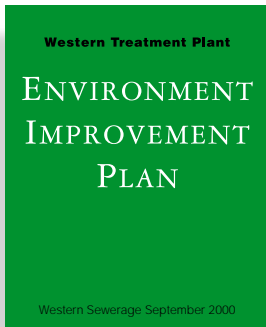
Action 4.2

- Melbourne Water will ensure any new lagoons have appropriate protection systems installed, where necessary, to minimise groundwater pollution and the transfer of pollutants off-site.

Program

The number of enhanced lagoons ultimately required at the Western Treatment Plant will not be finalised until the performance of the first and second enhanced lagoon systems is confirmed. This will determine the capacity of existing lagoons, with enhancements, and their capabilities to treat the expected future flows. However, if a further enhanced lagoon is required, the need for, and benefit of, lining and compaction will be addressed as part of the EPA works approval process.

While it is recognised that freshwater seepage from lagoons changes salt marsh habitats into freshwater marshes and affect the plants on which the Orange-bellied Parrot feeds, the draining of lagoons and installation of impermeable bases is considered expensive and inappropriate given the high conservation value of coastal lagoons.



Action 4.3

- Melbourne Water will ensure all new sludge disposal areas have a suitably compacted base and an appropriate leachate collection system to reduce the transfer of contaminants to groundwater.

Program

Sludge management is a recognised issue at the Western Treatment Plant and indeed for the entire sewerage group. At present, sludge from the West Tanks digesters is dried and stored in nearby sludge drying pans. These pans have been constructed with compacted bases, leachate collection systems and supernatant collection systems. They have the capacity to store an additional 70 years' sludge. Lagoon sludge that is fully digested, generally odourless and up to several years old is normally pumped into old decommissioned lagoons or ponds nearby for long-term storage.

It is expected that the volume of sludge generated in lagoons will increase with lagoon enhancements, although the total quantity of sludge to be stored on-site overall is expected to decrease. As the West Tanks drying beds are a considerable distance from the enhanced lagoons, new sludge drying and storage areas closer to these lagoons might be needed. A strategy for desludging and the need for new drying and storage facilities is to be addressed in the Sludge Management Strategy due to be completed in August 2000. Any new sludge drying facilities and storage areas will incorporate appropriate groundwater and surface water protection systems and will require EPA works approval.

7.5 Waste Minimisation

Background

At the Western Treatment Plant, waste minimisation means the management of raw sewage quality and, in particular, industrial or trade waste in the sewage.

Retail water companies administer discharges of trade waste into the sewerage system. Melbourne Water has Bulk Sewerage Services Agreements (BSAs) with each company as a means of operational control. The companies also function under an operating licence issued by Government.

The licences and BSAs stipulate that the retail companies must accept trade waste if it complies with the Trade Waste Standards, which are set out in a schedule to the licences and incorporated in the BSAs. These standards are designed to protect workers, assets, treatment processes and the environment, as well as to ensure that regulatory requirements are met.

In addition, the BSAs oblige the retail companies to maintain effective sewage quality management systems. The BSAs require the companies to make a referral to Melbourne Water if they wish to discharge wastes which do not conform to the standards.

The standards are subject to review by the Trade Waste Acceptance Advisory Committee (TWAAC), which is an independent adviser to Melbourne Water and the retail companies, but any recommendations to change a company's licence conditions can be implemented only through a direction from the Minister for Conservation and Environment.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Accept trade waste variations	Increase toxicants in Port Phillip Bay	23
Toxicant inputs	Restricted uses of sludge	20

Objective 5

Melbourne Water will:

- Manage the quality of sewage accepted from retail water companies to minimise business risk at a commercial price.

Action 5.1

- Melbourne Water will approve variations to trade waste agreements only where the Western Treatment Plant's capacity to treat or remove the substances is not exceeded. The plant's capacity to treat a particular substance is calculated to ensure that the requirements of the plant's EPA licence are met, along with the requirements for effluent and biosolids reuse.

Program

Melbourne Water has undertaken a study at the Western Treatment Plant to provide a scientifically defensible rationale on which to base wholesale system capacity limits for various pollutants. Permissible concentrations and parameters for loads of pollutants in the influent were calculated based on current and future effluent and biosolids quality limits, given the existing treatment capacity of the plant.

Twenty five "parameters of concern" have been identified which consist of a combination of priority wastes (listed in the State Industrial Waste Management Policy) and those which pose a potential threat to the sustainability of the plant's processes. The Plant Capacity Statement lists the parameters of concern and states the existing plant capacity for each parameter.

Copies of the current statement have been provided to the retail companies and TWAAC.

The statement will be reviewed annually and the results of environmental monitoring programs used to define capacity limits.

If retail water companies wish to vary their trade waste agreement in ways which exceed the trade waste standards, they must apply to Melbourne Water for approval. The application must include an impact assessment which covers the impact on workers, assets, treatment processes and the environment.

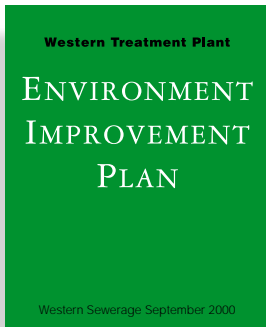
However, Melbourne Water cannot unreasonably withhold consent, and if a discharge is within the plant's capacity limits, it is normally approved. If the discharge could result in the plant's capacity limits being exceeded the company might be asked to demonstrate reductions in loads elsewhere before the variation is approved.

Action 5.2

Melbourne Water will approve an application for a trade waste variation only if the company applying for the variation is complying, or has a specific plan to comply, with the requirements of the Industrial Waste Management (Waste Minimisation) Policy (1990).

Program

This policy requires retail water companies to ensure, where practicable, that new Trade Waste Agreements include a requirement to prepare a waste management plan and require commonly available and appropriate waste minimisation technology to be used. Best available technology is required if wastes contain priority wastes. Melbourne Water requires evidence of a waste management plan prior to approval of a trade waste variation.



7.6 Land Disposal

Background

The new City of Wyndham planning scheme zones the Western Treatment Plant as Public Utilities Zone – Services and Utilities, with significant landscape overlays along the Werribee River.

The City of Wyndham municipal strategic statement, which is a long-term land zoning plan, designates the majority of the Western Treatment Plant as rural, with the triangle formed by the Maltby By-pass, Old Geelong Road and the Werribee River as future residential land.

Both the planning scheme and the municipal strategic statement include a freeway services centre on the Maltby By-pass near the new Geelong Road interchange.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Sale of surplus land	Perceived loss of community amenity	31
Sale of surplus land	Perceived loss of Ramsar land	24
Sale of surplus land	Reduction of buffer zones for odour	19

Objective 6

Melbourne Water will:

- Ensure that land ownership within sewage treatment areas of the Western Treatment Plant is consistent with the primary function of sewage treatment, and recognise the considerable reuse potential and environmental values of the site.

Action 6.1

- Melbourne Water will retain ownership of land south of the Maltby By-pass/Princes Freeway.

Program

Melbourne Water has determined to retain ownership of all land south of the Maltby By-pass. Proposals to develop Western Treatment Plant land for effluent reuse and other purposes could be dealt with through lease agreements.

Action 6.2

- Land north of the Little River – Princes Freeway interchange will not be sold until reuse opportunities have been identified and assessed.

Program

A large block of land to the north of the Little River and Princes Freeway interchange, presently used for dry grazing, has been identified as a potential site for effluent reuse. However, the Healthy Bay Initiative will have to be fully implemented, and land and grass filtration eliminated, before effluent can be supplied to this area. The Main Western Carrier will then be freed up and could be used to carry lagoon effluent to the northern and western areas of the site.

Action 6.3

- Melbourne Water will abide by the statutory planning requirements before the future sale of any further Western Treatment Plant land in the Maltby By-pass, Old Geelong Road and Werribee River triangle.

Program

Although Melbourne Water has not determined when the Maltby By-pass, Old Geelong Road and Werribee River triangle will be sold, a development plan will have to be prepared for the City of Wyndham before any re-zoning can take place. The plan will set out the overall land use of the site and will include the allocation of open space and supporting infrastructure. The timing for the preparation of the development plan has not been determined and will depend on market forces.

Flora and fauna and other environmental issues are not normally taken into account in preparing a development plan but in this case they will be, since the site is part of a much larger Ramsar area. Negotiations will be held with relevant parties during the development phase.

7.7 Conservation and Land Management

Background

The Western Treatment Plant has a major livestock business, running cattle and sheep. The livestock are mainly used to manage pasture growth on land and grass filtration areas and are a source of income. Recently the livestock business was separated from the Sewerage Group into a “ring fenced” business called Werribee Agriculture Group(WAG). This was done to ensure both businesses focused on their respective core responsibilities.

WAG and the Sewerage Group operate under an agreement which allocates various tasks to each party. Werribee Agriculture is responsible for the management of pasture areas including vermin and weed control in these areas. The Sewerage Group is responsible for sewage treatment and management of sewage treatment assets and vermin and weed control in the sewage treatment and conservation areas. This work may be undertaken on behalf of Sewerage Group by WAG on a fee-for-service basis.

Western Treatment Plant is internationally recognised for its conservation values, particularly for water birds and waders. Five international treaties are relevant to the management of the Western Treatment Plant.

These are:

- The Ramsar Convention
- The Japan – Australia Migratory Birds Agreement (JAMBA)
- The China – Australia Migratory Birds Agreement (CAMBA)
- Bonn Convention Agreement for the Conservation of Migratory Waterfowl in Asia and Australasia
- International Convention on Biological Diversity

In terms of impacts on the sewage treatment business, the Ramsar Convention is the most significant. The original documentation in support of the 1982 nomination of Port Phillip Bay (Western Shoreline) and the Bellarine Peninsula, covered Western Treatment Plant lagoons including Lake Borrie. Recent mapping by the Department of Natural Resources and Environment shows all of the Western Treatment Plant (including areas with housing recently sold to the public) as nominated under the Convention on Wetlands.

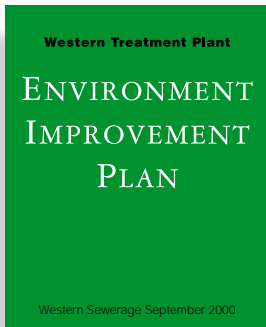
Environment Australia is proposing a project to review the site and boundary definitions at the Port Phillip Bay and Bellarine Peninsula Ramsar site, as outlined in Resolution VII.23 at the seventh Ramsar Conference in 1999. This could result in changes to the definition of the Ramsar site.

The Federal Parliament recently passed the Environment Protection and Biodiversity Conservation Act 1999, and it is due to come into effect in July 2000. It requires Federal Government approval for any action that has, will have, or is likely to have a significant impact on matters of national environmental significance. This includes Ramsar wetlands, migratory species protected under international treaty and nationally threatened species. The implications for the Western Treatment Plant will become clearer once the Act is proclaimed and various regulations are developed. However, provision has been made for the establishment of conservation agreements between landowners and the Federal Government.

The conservation aspects of the Western Treatment Plant benefit from the advice of the Western Treatment Plant Wildlife Consultative Committee. The Committee is made up of representatives from conservation and bird groups and government agencies.

The Committee also utilises specialist advice from Melbourne Water's Waterways and Drainage Division.

A specific funding allocation exists for designated improvement initiatives.



Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Contract with WAG for livestock management	Sustainable use of Western Treatment Plant land	23
Vermin control	Loss of native flora and fauna	22
Noxious weed control	Weeds spreading to surrounding properties	22
Future planning – Lake Borrie	Potential loss of habitat	20
Habitat planting	Improved amenity and habitat values	19
Lagoon enhancements and new lagoons	Impact on wildlife habitat values	18

Objective 7

Western Treatment Plant will:

- work with Werribee Agriculture to ensure that the vermin and weed control requirements of the Catchment and Land Protection Act 1994 are met.
- maintain the ecological character, productivity and diversity of the Western Treatment Plant within a framework of 'wise use'.

Action 7.1

- Western Treatment Plant staff will monitor vermin and noxious weeds across all Western Treatment Plant land and through WAG Co-ordinate and implement a vermin and weed control program.

Program

Melbourne Water has recently engaged consultants to assess the extent of weed infestations at the Western Treatment Plant and to see if there are any species that Melbourne Water is required to control under the Catchment and Land Protection Act 1994. Melbourne Water will work with WAG to ensure the Act is complied with. As vermin are considered a wildlife issue, recommendations on vermin control, particularly rabbits, foxes and feral cats, will be covered by the Conservation Management Action Plan. See Action 7.2 below.

Action 7.2

- Melbourne Water will continue working with the Western Treatment Plant Wildlife Consultative Committee and develop a Conservation Management Action Plan to address matters raised in the Western Treatment Plant Conservation and Ramsar Management Report for WTP, the Spit Nature Reserve and Adjacent Habitats.

Program

Melbourne Water in consultation with the Western Treatment Plant Wildlife Consultative Committee has prepared a Conservation and Ramsar Management Report for WTP, the Spit Nature Conservation Reserve and Adjacent Habitats. Recommendations of the Report have been consolidated into a joint Conservation Management Action Plan between Melbourne Water, Parks Victoria and the Department of Natural Resources and Environment, which was published in July 2000. The Action Plan will be included in future updates of this Environment Improvement Plan.

Copies of the Action Plan will be available to the public.

7.8 Reuse

Background

Effluent reuse is attracting increasing interest in the community, and sewage treatment creates substantial quantities of effluent, as well as sludge or biosolids.

How this effluent can be reused is determined by guidelines in the EPA's Guidelines for Wastewater Reuse (EPA publication 464). Lagoon effluent is classed as suitable for pasture irrigation (not pigs or milking animals), silviculture, fibre or fodder crops, horticulture and non-human food crops, municipal irrigation (ie. parks and ovals) where there is controlled public access, ornamental water (restricted access) and construction or mining industries. For reuse where there is a closer degree of human contact, further treatment such as dissolved air flotation and/or micro filtration are required.

The Western Treatment Plant's Community Liaison Committee has suggested that crops other than pasture may be better able to maximise reuse of wastewater and biosolids. Research by Melbourne Water indicates that presently pasture irrigation is the most profitable enterprise at Western Treatment Plant. However, other reuse initiatives, such as the planting of tree lots, are currently under investigation by Melbourne Water.

Reuse of sludge is a separate matter. At present, sludge is stored at the West Tanks area where raw sewage is sedimented prior to further treatment.

Onsite disposal of sludge and solid wastes is by means of landfilling or burial unless written approval has been obtained from EPA for any other means of disposal or uses. If required, offsite disposal of sludge and solid wastes would be to a premises licensed or approved by EPA to accept such wastes.

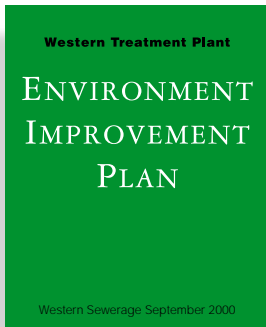
Melbourne Water maintains records for the locations within the premises where sludge wastes are disposed, the volume disposed, and the date when it was disposed.

An annual program monitoring heavy metals in sludge commenced in 1976, and organic toxicants were monitored in 1993. Western Treatment Plant sludges meet EPA (1997) draft Environmental Guidelines for the Management of Biosolids Class B standards for use in urban landscaping, agriculture and forestry.

Energy generation from methane trapped under lagoon covers is another form of reuse. At the 115 East lagoon this gas is used to generate electricity for on-site consumption. Melbourne Water is working with private industry to utilise the methane trapped by the new 55 East and 25 West lagoon covers for electricity generation. This is discussed further in section 7.1 above.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Future planning – Research and development	Vegetation to better utilise sludge and water than grass	25
Future planning	Reduction of water to the Bay	23



Objective 8

Melbourne Water will:

- Maximise recycling of treated effluent, biosolids and biogas where this meets statutory regulations, minimises risk and optimises business opportunities.

Action 8.1

- Melbourne Water will seek to achieve a 10 per cent reduction in annual effluent flow to Port Phillip Bay through reuse by 2008-9;

Program

The following program is required to meet the objective:

- Implement the Healthy Bay Initiative.
- Establish effluent reuse infrastructure and on-site reuse of effluent suitable for pasture irrigation (Class C as specified in EPA's Best Practice Guidelines for the Reuse of Reclaimed Wastewater) with a target average daily on-site use of 144 ML per day by 2004-5.
- Evaluate commercial market opportunities for use of Western Treatment Plant land and reclaimed water. This will include a variety of crops and uses.
- Secure commercial deals for one large and three small on-site reuse schemes for use of Western Treatment Plant land and reclaimed water by 2005-6.
- Develop one off-site reuse scheme using Western Treatment Plant effluent, eg. municipal, by 2003-4.
- Secure a commercial deal for one large scale off-site reuse scheme by 2005-6 (eg. a market garden type of scheme similar to the one in Virginia, South Australia.)
- Explore opportunities for a domestic third pipe water recycling scheme adjacent to the Western Treatment Plant.

These are long-term goals given the existing weak economic drivers for market gardeners and others to use reclaimed wastewater. Melbourne Water believes it will not be able to achieve these goals alone. Their achievement will depend on establishing a collective government and industry approach to create the environment and markets for reclaimed water. The beneficiaries, including users, private sector investors, government and/or Melbourne Water Corporation through appropriate cost-sharing arrangements, would jointly fund any reuse schemes.

Action 8.2

- Melbourne Water will maximise the opportunities for future biosolid reuse.

Program

A three-point strategy to maximise the future reuse of Western Treatment Plant sludges is proposed. This includes:

1. The preparation of a cost/risk/benefit analysis for on-site reuse of existing sludges for agricultural, landscaping and forestry purposes at the plant, including subsequent impact on land use, to be completed by July 2001 as part of the Sludge Management Strategy.
2. Encouragement and support for third parties wishing to treat and remove contaminants from Western Treatment Plant sludges, provided that:
 - the treated or residual biosolids or blended products meet EPA criteria for unrestricted reuse of the material;
 - the treated biosolids are reused in accordance with EPA Environmental Guidelines for the Management of Biosolids; and
 - the organisation undertaking the treatment or removal of contaminants enters into an agreement with Melbourne Water that ensures there is no risk to Melbourne Water or consumers.

3. Investigation of any opportunities to utilise surplus aerobic or waste activated sludge resulting from the implementation of enhanced lagoon systems. Aerobic sludges are considered to be cleaner than anaerobic sludges as heavy metals and other toxicants first settle out in the anaerobic reactor. However, some waste activated sludge is required to be pumped into the first ponds to promote nitrogen removal.

Western Treatment Plant does not propose setting any sludge reuse targets until at least the completion of the Sludge Management Strategy.

7.9 Noise

Background

Noise from the Western Treatment Plant is controlled by the State Environment Protection Policy (N-1 Control of Noise from Commerce, Industry and Trade).

The issue of noise from aerators being heard at Werribee South was first raised in the early 1990s after the 115 East lagoon aerators were installed. Extensive monitoring showed noise levels at Werribee South boat ramp were within State policy limits. Furthermore, there was only a slight reduction in readings when the aerators were turned off.

However, Melbourne Water acknowledges that the existing lagoon aerators emit a low level 'hum' and that this can be heard by some Werribee South residents on still nights.

Relevant Significant Environmental Activities, Products and Services

Activity, Product or Service	Impact	Rating
Lagoon aeration	Loss of amenity at Werribee South	18

Objective 9

Melbourne Water will:

- Work with the local community to ensure there is no additional loss of amenity due to noise from enhanced lagoons.

Action 9.1

- Melbourne Water will ensure that enhanced lagoon aeration systems will comply with State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) requirements and will review existing aeration requirements when designing the enhancement of lagoons.

Program

The enhanced lagoon process will provide an opportunity to review the existing aerator locations and number of aerators installed. Although the primary objective of lagoon enhancements is to improve water quality and contain odour, noise will also be considered.

If additional noise attributed to the enhanced lagoons is detected in Werribee South residential areas, Melbourne Water will investigate the use of vegetation barriers and other means to reduce noise levels.

7.10 Monitoring Programs

The Western Treatment Plant's environmental performance is monitored continuously through a number of internally and externally coordinated monitoring programs

Internally coordinated monitoring programs

- **Untreated wastewater quality**

Melbourne Water monitors incoming raw sewerage quality at Manhole 2 of the Western Trunk Sewer which is located within the boundaries of WTP. Hourly samples are taken for each 24-hour period monitoring for a suite of analytes.

• **Flow monitoring**

Melbourne Water shall only discharge wastes from WTP to Port Phillip Bay from the discharge points referred to in Table 3. Melbourne Water has installed and will maintain sampling points for each discharge point, which are as near as practicable to the discharge points listed in Table 3. The sampling points are easily accessible at all times to officers of EPA and are located to ensure that the samples taken are representative of treated wastewater discharged from the discharge point. Samples are labelled to clearly identify their location, licence number and the discharge point to which they relate.

Table 3: Location of Discharge Points

Discharge Point	Northing	Easting
15 East	579100	292100
145 West	5790700	289100
Lake Borrie *	5789900	287600
Murtcaim Outlet	5786700	284200

* The Lake Borrie outlet may vary with time due to onshore drift.

Melbourne Water will also record the daily volume of treated wastewater discharged from each discharge point; and determine for each month of the year; the average daily volume; and the maximum daily volume of treated wastewater discharged on or from the premises.

WTP will only discharge treated wastewater to Port Phillip Bay at the discharge points referred to in Table 3 at a rate not exceeding a total of 700 megalitres per day from all four discharge points combined and averaged over any one year.

• **Treated effluent discharge quality monitoring**

The composition of any treated wastewater at any discharge point must not exceed the performance limits specified in Table 1.

The wastes discharged from the four licenced discharge points will be tested at frequencies as specified in Table 4 below.

Table 4: Sampling and Analysis of Treated Wastewater

Indicator	Frequency	Indicator	Frequency
Biochemical Oxygen Demand	Weekly	Suspended Solids	Weekly
Eschericia coli	Weekly	PH	Weekly
Electrical Conductivity	Weekly	Dissolved Oxygen	Weekly
Ammonia as Nitrogen	Weekly	Total Nitrogen	Weekly
Total Phosphoru	Weekly	Anionic Surfactants	Monthly
Colour	Monthly	Silicate	Monthly
Cadmium	Monthly	Chromium	Monthly
Copper	Monthly	Lead	Monthly
Mercury	Monthly	Nickel	Monthly
Zinc	Monthly	Benzene	Monthly
Toluene	Monthly	Phenols	Monthly
Total PAHs	Monthly	PCDD/F	See note
Acute Toxicity	Monthly	Flow	Daily

Note:

- PCDD/F means Polychlorinated dibenzo dioxins and furans as toxic equivalents of 2,3,7,8 tetrachloro-dibenzo-p-dioxin.
- Sampling for PCDD/F shall be carried out in treated wastewater discharge from 15 East outlet in the month of January, 145 West outlet in April, Lake Borrie outlet in July and Murtcaim outlet in October each year.

- **Bacteriological quality in Port Phillip Bay**

Melbourne Water will monitor the effect of treated wastewater discharged to Port Phillip Bay on the bacteriological quality of receiving waters at Beach Road and 160 South Road, at least once in every seven days. Such monitoring requires taking a sample of sea water in 60 centimeters depth of water off-shore from each sample point referred to in Table 3, record the time and date when each sample is taken and analyse and record the concentration of E.coli in that sample.

- **Odour complaint monitoring**

As a part of its daily operations, Melbourne Water keeps records of all complaints received concerning odours alleged to have originated from WTP. Each odour complaint received is individually investigated and a copy of each investigation report forwarded to the EPA outlining the steps taken to rectify any recurrences.

- **Soil, sludge and vegetation monitoring**

Soil and herbage samples are collected from nominated sites across WTP and analysed for a range of analytes. Liquid sludge samples are also analysed for a suit of analytes and samples are taken from sludge streams pumped from both the West Tanks and the aerated lagoons.

- **Flares**

The licence holder must monitor operation of each flare by way of maintaining a Flare Operating Log recording the time when non-combusted treatment process gases were discharged to the atmosphere; and any breakdown or malfunction of the flaring system.

Externally coordinated monitoring programs

- **Biological indicators within Port Phillip Bay**

A biological monitoring program approved by the EPA 2 December 1999 is being undertaken to analyse the benthic macrofauna around the 15E drain and the Murtcaim drain. The sampling design shall assess the current impact of the treated wastewater discharge on the biological assemblages in Port Phillip Bay. The program is scheduled to run over two years.

- **Bioaccumulation in fish and shellfish**

A bioaccumulation monitoring program is being carried out to evaluate the extent of bioaccumulation in at least one commercially and one recreationally harvested species. The EPA approved the program proposal on 7 July 2000, which investigates the bioaccumulation of analytes in mussels and flathead fish.

- **Groundwater quality**

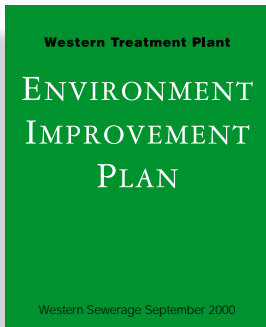
A groundwater monitoring program approved by the EPA 11 July 1997 is being carried out in order to determine the impact of the premises operations on the quality of groundwater and the amounts of nutrients and toxicants entering Port Phillip Bay via this route. The findings of this monitoring program will be utilised to develop an ongoing groundwater monitoring program for WTP.

- **Odour monitoring and modelling**

A quarterly odour sampling program for nominated sites around WTP is being carried out which simultaneously analyses odours by a dynamic olfactometry panel and an electronic analysis device which uses a number of probes to generate an electronic "footprint" which can identify a particular odour.

- **Mixing zones within Port Phillip Bay**

A two-stage investigation into the boundaries of WTP's mixing zones has been completed.



8. Communications

Melbourne Water communicates with the public at a number of different levels. Environmental issues, including water conservation and stormwater litter, are communicated to the general public through media campaigns.

As part of its corporate annual reporting arrangements Melbourne Water produces an environment and public health report which is generally released in October each year.

This includes compliance information for the Western Treatment Plant. People who would like a copy should visit the Melbourne Water web site at: melbwater.com.au

8.1 Western Treatment Plant Tours

Earth Encounters Pty Ltd conducts educational tours of the Western Treatment Plant. The tour includes a two-hour bus trip through some 10,850 hectares. Being a Wetland of International Importance, the site gives visitors the opportunity to view a possible 250 species of birds in a remarkable array of habitats.

School group tours have been designed with links to the Curriculum & Standards Framework Levels 3-7. An information kit is also available for teacher reference.

Tours are conducted Monday - Friday; morning or afternoon sessions are available.

For tour inquiries phone Earth Encounters on 9574 8444.

8.2 Public Complaints

All complaints, especially those regarding WTP odours, received from the public are treated as a priority and investigated. Melbourne Water has contingency plans to deal with system faults.

People wishing to lodge an odour complaint should telephone the Western Control Center on 9316 2826

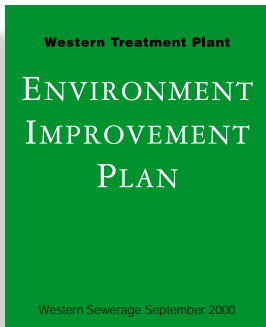
9. Monitoring and Review

Compliance with EPA licence requirements along with odour complaints and sewer spills are key performance indicators and are reported internally each month and quarter. Progress towards meeting Environment Improvement Plan targets and actions will be reported internally each quarter.

The Community Liaison Committee will do the primary monitoring and reviewing of this Environment Improvement Plan. The Committee will meet at least quarterly and review progress.

Aspects and impacts, objectives and targets will be reviewed every two years or earlier if Melbourne Water alters the Healthy Bay Initiative for the Western Treatment Plant.

The next review of the Healthy Bay Initiative is scheduled for December 2001 following the commissioning of the first enhanced lagoon.



10. Reporting

Under the EPA licence Melbourne Water is required to report on a number of operational issues to do with the environmental management of WTP. An annual report is required to be submitted by 30th September each year summarising the following:

- a summary of the progressive findings from each monitoring program described in Section 7.10
- a report on the compliance with, or deviation from, the EIP Action Plan (Summary)
- a summary of any explanation of the reasons, if known, for any failure to comply with Performance Limits, not previously reported in Exception or Emergency Reporting, as described in Licence EW844 and a statement of steps taken to remedy any failure referred to.
- a report summarising the monitoring of the total loads of pollutants listed in Tables 1: Performance Limits discharged to Port Phillip Bay via the discharge points in the previous year
- a report on waste minimisation measures referred to in licence EW 844 clause 1.3 and 1.4 undertaken in the previous year to ensure that the amount of toxicants in sludge is progressively reduced;
- a report on any significant changes (of which the licence holder is aware of) to the nature, characteristics or estimated flow of trade wastes received for treatment at the premises, pursuant to trade waste agreements;
- a report on steps taken to increase the amount of treated wastewater and sludge re-used, either by the licence holder or other consumers;
- a report describing any significant expansion or modification to the premises proposed to be executed in the following financial year; and
- a report on measures taken to monitor and manage blue green algae

11. Action Plan Summary

Objective 1

Melbourne Water will ensure that no odours offensive to humans are detectable beyond the premises boundary and minimise Greenhouse gas emissions.

Action	By when	Status	Responsibility	Comment
Install covers on 55E & 25W lagoons	Mar. 1999	Complete	Mgr. Planning Services	Extent of covers may need review with enhanced lagoons
Replace raw sewage LFA & GFA with lagoon effluent reuse	Jan. 2005	Progressive from Jan. 2000	Mgr. Planning Services	Reuse channel under construction. Requires completion of lagoon enhancements to enable implementation.
Decommission West Tanks and Open Digesters	Jan. 2005		Mgr. Planning Services	Reuse channel under construction. Requires completion of lagoon enhancements to enable implementation
Odour modelling of Healthy Bay Initiative	Dec. 2001		Mgr. Planning Services	
Community Odour Survey	Jun. 2000		Mgr. Operations West	Winter Survey and Summer survey to be carried out every two years.
Establish power generation scheme to use 25W & 55E lagoon gas	Dec. 2000		Mgr. Commercial Services	Contract awarded to AGL

Objective 2

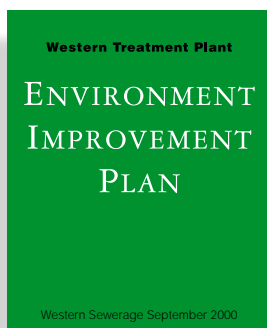
Melbourne Water will upgrade and operate the sewage treatment systems at WTP to protect beneficial uses of Port Phillip Bay.

Action	By when	Status	Responsibility	Comment
Reduce total nitrogen discharges to 3,500 tonnes per annum	Jan. 2001		Mgr. Planning Services	Will be achieved by 55E lagoon enhancement. Begins late 1999.
Reduce total nitrogen discharges to 3,200 tonnes per annum.	Jan. 2005		Mgr. Planning Services	Will be achieved when Healthy Bay Initiative works are implemented.
Achieve a 10% reduction in annual effluent discharge to Port Phillip Bay.	Jun. 2009		Mgr. Western Sewerage	Will require new on-site and off-site reuse schemes post 2005.
Ensure SEPP water quality objectives for are achieved within 200 meters of all licensed outlets.	Jan. 2005		Mgr. Planning Services	Will be achieved when Healthy Bay toxicants Initiative is implemented. (see Objective 7)
Review contingency plans to ensure No Spills policy is implemented	Ongoing - every 2 years	Underway	Mgr. Operations West	Review of WTP contingency plans last undertaken in September 1999

Objective 3

Melbourne Water will manage contaminated sites and reduce contaminant loads to grass and land filtration areas.

Action	By when	Status	Responsibility	Comment
Phase out the discharge of untreated sewage to land.	Jan. 2005	Begins Jan. 2000	Mgr. Planning Services	Will be achieved when Healthy Bay Initiative works are implemented. Progressive phase out possible when effluent delivery works complete.
Develop maintenance procedures so sewer debris is deposited in sludge disposal area.	Mar. 2000		Mgr. Asset Mgt. West	Disposal at West Tanks preferred.
Work with retail water companies to ensure raw sewage salt load does not damage soil structure at WTP.	Ongoing	Underway	Mgr. Operations West	Plant capacity for TDS set at 1,200 mg/l and SAR at 8.7 for influent raw sewage.
Prepare ecological and health risk assessments for contaminated areas.	Dec. 2001		Mgr. Operations West	NEPM for contaminated land will assist.



Objective 4

Melbourne Water will improve the quality of groundwater fed by land filtration by improving the quality of irrigation water and seek to reduce discharges of toxicants from sewage treatment operation to groundwater to ensure appropriate beneficial uses of groundwater are met at the Western Treatment Plant boundary.

Action	By when	Status	Responsibility	Comment
Phase out raw sewage irrigation and implement lagoon effluent reuse.	Jan. 2005	Reuse channel begun	Mgr. Planning Services	Will be achieved when Healthy Bay Initiative works complete.
Any new lagoons constructed will if necessary include appropriate groundwater protection systems.	As required.	Not determined	Mgr. Planning Services	Requirement for new lagoons will not be known before Dec. 2001.
New sludge disposal areas will have a compacted base and leachate collection/treatment systems.	As required.	Not determined	Mgr. Planning Services	Requirement for new sludge drying and storage areas will be determined by WTP Sludge Management Strategy to be completed in March 2000.

Objective 5

Melbourne Water will manage the quality of sewage accepted from retail water companies to maximise returns and minimise business risk.

Action	By when	Status	Responsibility	Comment
Only approve trade waste agreement variations where WTP's capacity to treat the substances is not exceeded.	Ongoing		Mgr. Operations West	Improved measures have been incorporated into new BSA with retail water companies required to improve sewage quality management systems and referral arrangements for variations.
Only approve applications for trade waste variations if the company applying has demonstrated compliance with IWMP	Ongoing		Mgr. Operations West	

Objective 6

Melbourne Water will ensure that land ownership within the present boundary of the Western Treatment Plant is consistent with the primary function of sewage treatment and recognises the reuse and environmental values of the site.

Action	By when	Status	Responsibility	Comment
Retain ownership of land south of Maltby By-pass.	On-going		Mgr. Commercial Services	On-site reuse may involve lease of land.
Assess reuse opportunities for dry land north of Little River interchange prior to any land sales.	As required		Mgr. Commercial Services	Market forces will determine future land sales and timing has yet to be determined.
Abide by statutory planning requirements before future sale of land in the Maltby By-pass, Old Geelong Rd and Werribee River triangle and any other areas released for sale.	As required		Mgr. Commercial Services	Market forces will determine future land sales and timing has yet to be determined.

Objective 7

Western Treatment Plant will work with Werribee Agriculture to ensure that the vermin and weed control requirements of the Catchment and Land Protection Act 1994 are met and maintain the ecological character, productivity and diversity of the Western Treatment Plant within a framework of 'wise use'.

Action	By when	Status	Responsibility	Comment
Monitor vermin and noxious weeds and work with WAG to coordinate control programs.	On-going	Underway	Mgr. Operations West	Survey using consultants has commenced.
Implement Ramsar and Conservation Management Plan recommendations.	On-going	Underway	Mgr. Operations West	WTP Ramsar and Conservation Management Action Plan in preparation.

Objective 8

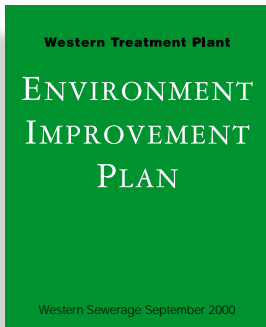
Melbourne Water will maximise reuse of treated effluent, biosolids and biogas where this meets statutory regulations, minimises risk and optimises business opportunities.

Action	By when	Status	Responsibility	Comment
Achieve a 10% reduction in annual effluent discharge to PPB by:	Jun. 2009			
• Implementing Healthy Bay Initiative to achieve daily on-site reuse of 144 ML of lagoon effluent;	Jan. 2005	Underway	Mgr. Planning Services	Reuse channel under construction.
• Securing one off-site reuse scheme;	Jun. 2004		Mgr. Commercial Services	Sewerage Group to assist in ensuring consistency with sewage treatment operations.
• Securing one large and three small scale on-site reuse schemes;	Jun. 2006		Mgr. Commercial Services	As above.
• Entering into commercial agreement for a large off-site reuse scheme.	Jun. 2006		Mgr. Commercial Services	As above.
Maximise the opportunities for sludge reuse by:				
• Preparing cost/risk/benefit analysis for on-site reuse at WTP;	Jul. 2001		Mgr. Operations West	
• Supporting 3rd parties who wish to reuse WTP sludges;	On-going		Mgr. Operations West	
• Investigating opportunities to utilise waste activated sludge from enhanced lagoon processes.	Jan. 2005		Mgr. Planning Services	
Establish power generation scheme to use 25W & 55E lagoon gas.	Dec. 2000		Mgr. Commercial Services	Contract awarded to AGL

Objective 9

Work with the local community to ensure there is no additional loss of amenity due to noise from enhanced lagoons.

Action	By when	Status	Responsibility	Comment
Ensure that enhanced lagoon aeration systems comply with SEPP noise requirements and review existing aeration requirements.	Dec. 2000		Mgr. Planning Services	



12. Glossary & Acronyms

Algae A large group of non-flowering plants, many microscopic, containing chlorophyll. Most algae are aquatic.

Aerobic Biological activity that requires the presence of oxygen

Ammonia/Ammonium Compound consisting of a single nitrogen atom and three or four hydrogen atoms. It is a nitrogen source for algae but is toxic to fauna in high concentrations

Anaerobic Biological activity that takes place in the absence of oxygen.

Average Annual Load The mean of any three consecutive yearly loads.

Bacteria A large group of single-cell or filament like microscopic organisms lacking chlorophyll and a well developed and defined cell nuclei.

Beneficial Use A use of the environment or any element or segment of the environment which is conducive to public benefit, welfare, safety, health or aesthetic enjoyment and which requires protection from the effects of waste discharges, emissions or deposits or the emission of noise.

Best Available Technology Techniques, methods or processes which generate the minimum waste per unit of output, equivalent to that which is achievable by proven, viable and commercially available techniques, methods, processes or practices

Biosolids Stabilised organic solids derived from sewage treatment processes which can be managed and used safely for nutrient, soil conditioning, energy or other value.

Contaminant A substance out of place (also pollution).

Continual Improvement Process of enhancing the environment management system to achieve improvements in overall environmental performance.

Denitrification The conversion of bound nitrogen to elemental (gaseous) form.

E. coli *Escherichia coli* O157:H7 is an antibiotic-resistant mutant stain which is pathogenic to humans. It is used as an indicator organism monitored to ascertain the faecal contamination of water bodies.

Effluent Wastewater. Often used to refer to treated wastewater leaving a sewage treatment plant or to wastewater discharged by industry.

Effluent Reuse The application of appropriately treated wastewater for a specific purpose

Environment Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interaction. Surroundings in this context extend from within an organisation to the global system.

Environmental Aspect Element of an organisation's activities, products or services which can interact with the environment.

Environmental Impact Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

Environment Improvement Plan A site or function specific plan for developing and achieving objectives and targets, including timelines and accountabilities. EIPs suitable for an accredited licence will require community input.

Environmental Management System The part of the overall management system which includes organisational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving and maintaining an organisation's environmental policy.

Environmental Policy Statement by the organisation of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets.

Groundwater Water contained in or occurring in geological structures or formations.

Heavy Metals A general term for cadmium, chromium, copper, iron, mercury, nickel, manganese, lead, zinc, arsenic and selenium.

Influent Raw sewage or untreated wastewater entering a treatment system.

Median The median value of the twelve months monitoring data obtained in any financial year.

Mixing Zone An area contiguous to a licensed waste discharge point and specified in that licence, where the receiving water quality objectives otherwise applicable under the State Environment Protection Policy – Waters of Victoria do not apply with respect to certain indicators specified in the licence.

90th percentile The 90th percentile value of the twelve months monitoring data obtained in any financial year.

Nitrification Formation of nitrate from reduced forms of nitrogen including nitrite and ammonia.

Nitrogen Oxides The sum of all oxides of nitrogen expressed as Nitrogen Dioxide.

Nutrients Substances required for the growth of plants includes forms of nitrogen and phosphorous.

Pollutant A substance in excess or not belonging.

Power Station An electricity generating facility fuelled by lagoon gas.

Priority Wastes

Arsenic and its compounds	Mercury and its compounds
Acrylonitrile	Nickel and its compounds
Benzene	Organo Tin and its compounds
Cadmium and its compounds	Ozone depleting substances
Chlorinated Hydrocarbons	Photochemically active organic substances
Chromium and its compounds	Polychlorinated or polybrominated biphenyls or related substances or equipment containing polychlorinated or polybrominated biphenyls or related substances
Copper and its compounds	Polycyclic aromatic hydrocarbons
Lead and its compounds	Vinyl chloride monomer

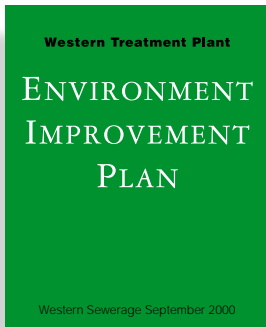
Sewage Strictly speaking, household waste – but loosely applied to any waste sent to a sewage treatment plant.

Sewage Quality Management System A system that manages the risks associated with the delivery, receipt, transfer, treatment or disposal of sewage (including trade wastes).

Solid Waste Includes all solids and sludges generated in the treatment of wastewater.

Toxicant A poison.

Year Twelve months commencing the first day of July.

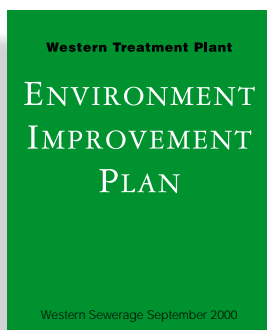


Acronyms

ANZECC	Australian and New Zealand Environment and Conservation Council
AS/NZS	Australian Standards, New Zealand Standards
BSA	Bulk Sewage Agreement
BOD	Biochemical Oxygen Demand
C, E & PH	Community, Environment and Public Health
EIA	Environmental Impact Assessment
EIP	Environment Improvement Plan
EPA	Environment Protection Authority
GFA	Grass Filtration Area
LFA	Land Filtration Area
ISO	International Standards Organisation
IWMP	Industrial Waste Management Policy
mg/L	Milligrams per litre (parts per million)
ML	Megalitre (million litres)
MWC	Melbourne Water Corporation
NWQMS	National Water Quality Management Strategy
PCS	Plant Capacity Statement
RFA	Risk Focus Area
SEPP	State Environment Protection Policy
TSS	Total Suspended Solids
TWAAC	Trade Waste Acceptance Advisory Committee
WAG	Werribee Agriculture Group
WTP	Western Treatment Plant

Appendix 1. List of Aspects and Impacts – as assessed by WTP CLC and WTP Staff.

Activities, Products & Services	Environmental Aspect	Environmental Impact	Impact Rating
Sewage Treatment – General	Odour Emissions	Public perception of Werribee	35
Influent Mgt – Carrier cleaning	Land Contamination	Restrictions on land use & clean up	35
Sedimentation – West Tanks	Odour Emissions	Public perception of Werribee	35
Sedimentation – West Tanks	Greenhouse Gas Emissions	Global warming	35
Sale of surplus land	Land Redevelopment	Perceived loss of community amenity	31
Commissioning new lagoons	Odour Emissions	Offensive odours at Werribee Sth	28
Power Generation	Greenhouse Gas Emissions	Reduce greenhouse emissions	27
Discharge effluent to Port Phillip Bay	Effluent Quality	Public concern regarding water quality	26
Future Planning – R & D	Effluent Reuse	Vegetation to better utilise sludge/water than grass	25
Carrier Cleaning & disposal of sediments	Land Contamination	Clean up required.	25
Sale of surplus land	Nature Conservation	Loss of Ramsar land	24
Future Planning	Effluent Quality	Impact of effluent on PPB	24
Contract with WAG – Livestock management	Land Management	Sustainable use of WTP land	23
Sewage Treatment by Land Filtration	Groundwater Contamination	Elevated water table	23
Future Planning	Effluent Reuse/Effluent Disposal	Reduction of water to the Bay	23
Future Planning – R & D	Effluent Quality	Ensure appropriate treatment methods used.	23
Control system monitoring	Effluent Quality	Non-compliant effluent due to spill to PPB	23
Sewage Treatment by Land Filtration	Land Contamination	Livestock contamination	22
Discharge effluent to Port Phillip Bay	Nutrients	Odour from rotting seaweed	22
Vermin control	Land Management	Loss of native species	22
Discharge effluent to Port Phillip Bay	Effluent Quality/ Effluent Disposal	Changes to species and community structure.	22
Weed Control	Vermin and Weed Control	Loss of foreshore and riparian habitats	22
Discharge effluent to Port Phillip Bay	Effluent Quality/ Effluent Disposal	Need a mixing zone	22
Planting of trees	Greenhouse Gas Emissions	Air (O2 produced)	22
Accept trade waste variations	Sewage Quality	Increased toxicant discharge to PPB	22
Noxious weed control	Land Management	Weeds spreading to surrounding properties	21
Discharge effluent to Port Phillip Bay	Nutrients	Bay algae blooms	21
Toxicant inputs	Sludge Reuse/Sewage Quality	Restrictions on reuse of sludge	20
Sewage Treatment by Land Filtration	Salinisation of Land	Soil structure decline from Salinisation	20
Future Planning – Lake Borrie	Nature Conservation	Potential loss of habitat values. Compliance with International treaties	20
Drain cleaning	Effluent Quality/Effluent Disposal	Increased suspended solids to PPB	20
Loss of treatment systems from toxic discharge	Effluent Quality/Effluent Disposal	Discharge of non-compliant effluent	19
Sale of surplus land	Odour Emissions	Reduction on buffer zones for odours	19
Habitat planting	Nature Conservation	Improved amenity & habitat	19
Treat sewage – West Tanks Digesters	Odour Emissions	Odour along Freeway/Little River	19
Contingency Planning – major flood	Spills	Loss of sewage containment	18
Sewage Treatment – Lagoon aeration	Noise	Loss of amenity at Werribee Sth	18
Future Planning – New lagoons	Nature Conservation	Impact on wildlife	18
Old Black Liquor ponds	Sludge Management	Restrictions on groundwater use & clean up	18
Sewage Treatment by Grass filtration	Odour Emissions	Loss of amenity at Geelong/Lara	18
Sewage Treatment by Grass filtration	Land Contamination	Restricted future uses/Livestock contamination	18
Old sheep dip sites	Land Contamination	Restricted future uses/Livestock contamination	18
Energy consumption	Greenhouse Gas Emissions	Increase discharge of Greenhouse gases	17
Funding of flora & fauna projects	Nature Conservation	Loss of habitat quality	16
Future Planning	Noise	Increased noise from aerators at Werribee Sth	16
Discharge of coloured effluent	Effluent Quality	Increased community concern	16
Anthrax	Land Contamination/Public Health	Risk to livestock and public health	16



Activities, Products & Services	Environmental Aspect	Environmental Impact	Impact Rating
Run-off into Werribee River	Stormwater Management	Reduced water quality. Loss of platypus	16
Neighbours activities	Effluent Quality	Non-compliance at 145 W outlet	16
Future Planning – Lagoon base	Groundwater Contamination	Impact on beneficial uses	16
Flies from livestock	Land Management	Loss of amenity for surrounding residents	15
Disposal of sewage screenings	Land Contamination	Loss of beneficial uses	15
Leakage from carriers	Spills	Land and groundwater contamination	15
Implement Recommendations of	Nature Conservation	Loss of habitat if not implemented	15
Accumulation of plastics around lagoons	Sewage Quality/ Litter	Amenity	14
Tree harvesting	Nature Conservation	Loss of habitat	14
Refuse Disposal – Ryan's Tip	Land Contamination	Impact or loss of future beneficial uses	14
Structural surveillance of carrier5s	Spills	Spills from carriers in poor condition	14
Year 2000 compliance	Spills	Risk of a spill	13
Accumulation of plastics in LFA	Sewage Quality/ Litter	Aesthetic – rubbish blowing to surrounding areas	13
Overloading lagoons	Effluent Management	Discharge of low quality effluent to PPB	13
Fishing, Bird Watching and Study Permits	Nature Conservation	Disturbance of wildlife. Litter	13
Treating and monitoring of viruses	Human Health	Health of seafood consumers and livestock	12
Decommissioning old lagoons	Effluent Quality/Effluent Disposal	Increased suspended solids as lagoons drained.	12
Construction (Lagoons, roads, carriers etc)	Noise/Dust	Loss of amenity	12
Lagoon De-sludging	Sludge Management	Contamination of sludge stockpiles	12
Sludge storage	Sludge Management	Livestock health	11
Build up of scum/sludge under covers	Greenhouse Gas	Increase energy usage to control odour	11
Contractors in sensitive areas	Nature Conservation	Disturbance of wildlife	11
Lease of Land to WAG for Livestock Grazing	Nature Conservation	Wildlife habitat loss	11
Mosquitos	Human Health	Loss of amenity	10
Recycling/reuse of paper	Waste Management	Conservation of natural resources	10
Re-Treatment of Murtcaim run-off	Spills	Risk of spill to PPB	10
Operate R & D Laboratory	Waste Management	Human Health (Chemicals)	10
Asbestos in old buildings	Human Health	Disease in employees	10
Use office products	Waste Management	Consume natural resources	10
Abandoned Tips along Werribee River	Groundwater Contamination	Contamination of Werribee River	10
Accept Tankered Waste of Septic Origin	Sewage Quality	Land & groundwater contamination	10
Air conditioning	Waste Management	Consume energy. Human health	10
Road maintenance	Public Health	Loss of public access due to risk of accidents	9
Lagoon Aeration	Noise	Loss of amenity at Werribee Sth	9
Purchase, Distribute & Store chemicals	Human Health	Disease in workers	9
Flare Operation	Greenhouse Gas	Loss of amenity from smoke and glare at night	9
Grass & Weed Control (by spraying herbicides)	Discharges to Land	Clean up costs if land use changed	9
Operate & Maintain Plant/ Machinery	Noise	Loss of amenity for residents of Werribee Sth	9
Pump Failure leading to Spills	Spills	Impact on future beneficial uses	9
Fuel storage	Land Contamination	Impact on future beneficial uses	8
Disposal to Land/Reuse (Proposed)	Water Table Elevation	Waterlogged soils.	8
Lagoon Gas Collection	Greenhouse Gases	Risk of explosion	8
Biogas Engine Operation	Engine Exhaust	Compliance with EPA licence	7
Cleaning chemicals	Human Health	Exposure of workers	7
Drive vehicles	Greenhouse Gas	Global warming	7
Waste oil disposal	Land Contamination	Clean up required before land use changes	7
Use computers	Human Health	Employee loss of amenity	7
Security	Spills	Sabotage of assets	6
Drain Diversions during lagoon construction	Effluent Quality	Poor water quality	6
Zooplankton Harvesting	Nature Conservation	Wildlife (Competition)	5
Receive Special Trade Waste (eg. Coode Is.)	Human Health	Exposure of employees leading to disease	4

Vision

To be a leader in urban water cycle management

Purpose

Melbourne Water exists to add value for its customers and the community by operating a successful commercial business, which supplies safe water, treats sewage and removes stormwater at an acceptable cost and in an environmentally sensitive manner.

Objectives

- Maximise shareholder value
- Achieve excellent customer service
- Be a leader in environmental management
- Fulfil our community obligations



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