striking a balance...
...a partnership with nature
Barwon Water (Barwon Region Water Authority) is Victoria’s largest regional water authority.

An acknowledged industry leader, Barwon Water provides quality water and sewerage services to a permanent population of almost 250,000 people.

The authority’s area of responsibility covers more than 8,100 square kilometres, stretching form Little River and the Bellarine Peninsula in the east to Colac in the west and from Meredith and Cressy in the north to Apollo Bay on the south-west coast.

The service area incorporates the City of Greater Geelong, Borough of Queenscliff, Surf Coast and Colac Otway shires and parts of Golden Plains Shire.

The authority manages 10 major water storages, 10 water treatment plants and nine sewage treatment plants and has a 10-year $260 million Capital Works Investment Plan.

Profile

One of Barwon Water’s primary goals is to protect the precious environment in which we operate. An increasingly environmentally conscious society demands that as well as meeting the needs of our customers, Barwon Water sustains and, where possible, improves the condition of environmental surrounds.

The very nature of the authority’s business requires a high level of interaction with the environment. In particular, our role as a water and sewerage services provider entails an interface with the hydrological cycle – the weather has a direct impact on our ability to harvest water for urban supply and influences our capacity to handle sewage collection and treatment. The authority employs appropriate management practices to ensure that all services are provided in an environmentally acceptable manner in all climatic conditions.

In November, 1998, Barwon Water achieved Environmental Management System (EMS) certification to the international standard ISO 14001. Three years later, following the completion of a major EMS review during 2001 and with a triennial re-certification audit imminent, we are on the verge of entering the second stage of EMS certification to the standard.

Six-month surveillance audits have been conducted by JAS-ANZ accredited body Quality Assurance Services (QAS), since certification began in 1998. This audit process has included inspections of 37 Barwon Water sites. Only two non-conformances have been raised from these audits, both of which have been actioned and referred back to QAS.

Following implementation of the revised EMS from July, 2001, management and employees will broaden their focus on key environmental areas to include energy and office waste management. Development of strategies in these areas will supplement our existing environmental management practices directly linked to water and sewerage services.

Capital investment in 2000/01 exceeded $30 million for the second successive year. Approximately $14 million of the 2000/01 capital investment has direct links to improving our environmental performance, in particular enhancing the management of sewage collection and treatment.

Over the past four years, the region has endured the most severe drought on record. However, through a successful conservation campaign and the co-operation of customers, Barwon Water has emerged a leader in demand management. We will continue to focus on conservation and demand management into the future.

We have a strong commitment to environmental management, including provision within our $260 million, 10-year Capital Works Improvement Plan. Substantial resources have been allocated to employee positions and extensive environmental management training programs. Our employees have a strong appreciation of environmental issues and a commitment to performance improvement via a number of clauses in the current Enterprise Bargaining Agreement.

In progressing through an era of transparency and consistent with a commitment to Triple Bottom Line reporting, we are pleased to present our inaugural Environmental Performance Report. We trust the report will provide a useful insight into the authority’s approaches to environmental management.

While this report is based on a three-year program, future editions will be issued on a truly annual basis.

To improve the quality and scope of our reporting in the future, we encourage you to complete and return the feedback questionnaire at the end of this report.
Achievements

System maintenance
We continue to be an industry leader in reducing sewerage system overflows and blockages and water main bursts and leaks. Our maintenance response to ruptures that do occur also has been exceptional, with industry averages well exceeded.

Communications
Our recently completed telemetry system upgrade and expansion will increase operating standards, deliver benefits to customers and enable further improvements to incident response performance. The new system enables our Communications Centre to monitor and remotely control 300 facilities on a 24-hour, 7-day-a-week basis. Reductions in water system losses and sewerage system overflows will be the key areas of environmental performance improvement.

Treatment plant upgrade
Colac sewage treatment plant’s major upgrade is progressing rapidly. Detailed design is in progress and due for completion by the end of 2001, with commissioning scheduled for mid-2003. Construction of the new facility is set to significantly improve effluent quality to a Class B standard suitable for re-use.

Re-use
The use of reclaimed water from our sewage treatment plants has continued to increase this year with an additional contract secured. Negotiations continue with at least seven other prospective users.

Water conservation
In response to a comprehensive conservation campaign and implementation of our Drought Management Plan, average domestic consumption has been reduced significantly over the past two years. Response from the community to water restrictions has been exemplary. Continued demand management initiatives into the future are being investigated as part of a Water Resources Development Plan. Barwon Water is preparing the Plan to identify actions to be undertaken over the next 20 years and beyond to provide a secure and sustainable water supply for all existing and new customers.

Climatic Influence
Below average rainfall over recent years has meant low surface water flows, diminished levels in the storages and the introduction of restrictions. Heavy rainfall events in October, 2000, and April, 2001, have provided some recent relief, with storages recovering to 64.5% by June 30 (the long term average for this time of year is 67.3%).

The figure below represents the rainfall trends at West Barwon, a Reservoir which services our primary catchment.
In June, 2000, Barwon Water established an Environmental Consultative Committee to provide feedback and advice on environmental issues and policies relevant to the authority's activities. The committee also provides advice on environmental issues associated with new projects and assists in liaising with the wider community on environmental issues when required.

The committee’s membership comprises an independent chairperson and representatives from a number of environmental groups, who have been selected because of their ability to provide broad input on a number of environmental issues. Local community representation is ensured via a charter requirement for members to reside within Barwon Water’s service area.

The committee met nine times throughout 2000/01. Topics discussed included:
- biosolids management at Black Rock sewage treatment plant
- augmentation of the Aireys Inlet sewage treatment plant
- capital works projects, including the Colac and Lorne transfer main upgrades
- environmental impacts associated with the extraction of groundwater from the Barwon Downs borefields
- sewage system odour control
- demand management
- decommissioning of Anakie/Staughton Vale water supply aqueduct and Lower Stony Creek Reservoir
- Bulk Entitlement negotiations
- Environmental Management System triennial review
- Water Resources Development Plan
- Green Industry Probe.

ECC Membership

Environmental Consultative Committee
Ms Susan Howells
Independent Chairperson
Mr Mark Trengove
Mr Dave King
Geelong Field Naturalists
Mr Tony Woolford
Geelong Environment Council
Ms Katrina Hedditch
Environment Victoria
Mr Everett Foster
Angair
Mr Chris Callahan
Victorian Farmers’ Federation
Mr Mike Cosgriff
Upper Barwon Landcare Network
Mr Stephen Vaughan
Barwon Water Board Chairman

Barwon Water Supporting Officers

Mr Joe Adamski
Executive Manager Strategy & Technology
Mr Paul Northey
Senior Planner, Water Resources & Environment

From the Environmental Consultative Committee Chairperson

When asked, just over a year ago, to be Chairperson of Barwon Water’s newly-established Environmental Consultative Committee, my first thoughts included a sense that, while this committee would be groundbreaking for Barwon Water, the effect of its deliberations could be somewhat limited.

The environment is involved in virtually every decision made by Barwon Water. To gather together representatives of the peak environmental groups that work in the area serviced by Barwon Water, with an independent chairperson, to discuss the major environmental problems facing the authority, could be considered a brave move. To aim for two-way communication and so a greater understanding, on both sides, of the issues, to seek input from those with experience in environmental work in the area, and to attempt a combined approach to achieving solutions has not always led to totally harmonious meetings! Nor should it. These are matters vital to our future with no easy answers.

However, Barwon Water’s Board has taken the role of the Environmental Consultative Committee seriously and its single focus has had influence in discussions in key areas. These include the Water Resources Development Plan, enlargement of Aireys Inlet sewage treatment plant, future treatment of biosolids, logging in water catchments, Bulk Water Entitlement and many others.

The year has involved a steep learning curve for committee members and myself, but they and the organisations they represent, have also had significant input. It has sometimes been a frustrating year, but ultimately positive and rewarding.

Susan Howells
Chairperson
We will develop, implement and maintain an EMS to ISO 14001 Standard

Design of an EMS is an ongoing, interactive process that consists of defining, documenting and continually improving the level of environmental performance set by the organisation. An EMS may eventually be integrated into one generic management system, which also includes quality, health and safety.

Several standards have been produced on which Environmental Management Systems can be based. The most recognised is produced by the International Standards Organisation (ISO). The ISO 14000 series on Environmental Management Systems was fully endorsed in November, 1996. The process for obtaining certification to the ISO 14000 series commenced in Australia soon after this date.

An EMS is the organisational driver by which Barwon Water achieves its Environmental Strategy. Barwon Water’s EMS has been developed in accordance with the ISO 14001 Standard on Environmental Management Systems and the Environmental Management Guidelines for the Australian water industry produced by the Water Services Association of Australia (WSAA). The system, where appropriate, links in with Barwon Water’s Quality System which also has recently been developed and acknowledged through certification to ISO 9000. The cyclic nature of the EMS is how continuous improvement is achieved.

Barwon Water established an Environmental Management System (EMS) to build on the many existing environmental protection practices employed throughout its areas of operation. Resources have been suitably allocated to environmental management throughout the system’s development, implementation and operation.

The authority began preparing its EMS soon after the ISO standard was endorsed in November, 1996. Barwon Water’s Board in April, 1998, resolved to seek EMS certification following an audit in November, 1998.

The EMS has been continually updated and a recently completed major review will be tested via a triennial re-certification audit to be conducted by accredited body Quality Assurance Services in December, 2001.

A prelude to EMS Reporting

As an outcome of the recent EMS review, Barwon Water will implement, maintain and monitor an annual Environmental Management Program (EMP). Compared with the three-year program prepared around the time of certification, this is seen as an opportunity to better maintain the actions and targets within the EMP.

However, this document will not be strictly an Annual Environmental Performance Report given that some of the content originates from as far back as mid-1998. From 2002, reporting will be on an annual basis, consistent with the actions and targets in the EMP. The actions and targets in the 2001/02 EMP include more quantifiable performance indicators.

The new EMP will be the first of three based around the Significant Environmental Aspects list prepared during this year’s major EMS review and replaces the SEA list developed in 1998. The new list for 2001 through 2004 is:

- Sludge/biosolids handling
- Sewerage system (mains and pump stations) operation
- Sewerage system odour releases
- Sewage treatment plant operation
- Trade waste discharge management
- Energy management
- Asset site selection
- Groundwater extraction management
- Bulk Entitlement compliance

An Environmental Management System (EMS) is a structured management system for achieving and demonstrating sound environmental performance. It begins with determining an organisation’s environmental policy and develops, implements and maintains procedures and processes to implement that policy. An EMS is required to be in accordance with the overall objectives of the organisation and must take into account the social, financial, economic and competitive pressures to which the organisation is exposed.
Environmental Policy

Barwon Water exists to provide water and sewerage services in an efficient, cost effective and environmentally responsible manner, meeting the needs of our customers in an increasingly competitive business environment.

Our aim is to integrate environmental management principals into all our activities and services. By setting and reviewing environmental objectives and targets, we will strive to continually improve our environmental performance.

We will develop, implement and maintain an Environmental Management System to the ISO 14001 Standard. This commitment is driven by our Board and Management and extends to all employees.

**Barwon Water is committed to:**

**Undertaking to comply with statutory requirements.**

A register of relevant environmental legislation and regulations will be compiled and maintained to ensure awareness of requirements with which Barwon Water is obliged to comply.

**Subscribing to the principles of the 3R’s- Reduce, Re-use and Recycle**

To prevent pollution, procedures will be adopted to minimise the production of waste, promote the efficient use of resources and appropriately dispose of non-recoverable waste.

**Requiring similar standards of third parties**

Contractors, where appropriate, will be required to demonstrate effective environmental performance, and potential environmental effects will be considered in the procurement of products.

**Encouraging and sponsoring environmental education of employees**

Appropriate training programs will be developed to educate and motivate all employees to assist in the implementation of the environmental policy.

**Clearly defining the roles of Environmental Management within Barwon Water**

- The Board will develop and endorse broad policies on Barwon Water’s environmental direction.
- Management will be responsible for developing plans and programs to implement the policy and provide feedback for future revisions.
- Staff will use the skills they have obtained in their training to perform their activities in accordance with the environmental policies and plans.

**Communicating with the community**

Our customers, community and regulatory authorities will be consulted throughout the performance of our various environmental activities and will be made aware of our policy.

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**Environmental management training**
Our employees are trained to improve the management of our significant environmental impacts.

**Trade waste monitoring**
Our policy includes a commitment to preventing pollution.
Basis of EMS

Barwon Water has identified the areas of its operations with the greatest potential for environmental impact(s). These key environmental areas, termed the Significant Environmental Aspects (SEAs) in accordance with the standard ISO 14001, form the basis for monitoring and measuring environmental management performance. The Significant Environmental Aspects for the organisation are reviewed at three-yearly intervals but more frequently if required. Barwon Water’s SEA list for 1998-2001 is:

- Sewage collection and treatment
  - sewage reticulation main spills and overflows
  - sewage rising main and pump station spills and overflows
  - sewage trunk main spills and overflows
  - sewage treatment plant performance
  - sludge/biosolids management

- Addressing pollution at the source
  - industrial trade waste management

- Management of the natural environment
  - catchment land management
  - bulk entitlement compliance
  - conducting environmental site assessments for new projects
  - groundwater aquifer cross-contamination prevention
  - chemical spill prevention

- Water harvesting and distribution
  - reservoir, channel and basin seepage and leakage
  - water reticulation main failure prevention
  - water transfer main failure prevention

- Managing atmospheric emissions
  - sewerage system odour management
  - gas storage leakage prevention

- Conservation
  - water conservation encouragement

From this list, a set of broad objectives was developed together with more specific performance targets for meeting the objectives. The Environmental Management Program (EMP) is based around the SEAs and objectives and targets of the organisation. The EMP documents actions for achieving the targets and also assigns responsibility for ensuring the actions are carried out. Reporting on the EMP actions is conducted quarterly and communicated internally via the Quarterly Environmental Performance Report.

The following pages contain the reporting against actions set out in the Environmental Management Program ending June 30, 2001. In addition to indicating adherence to targets, we also gauge our ‘continual improvement’ by comparing the performance of the reporting year (2000/01) with the previous year.

Legend

- Target Met
- Performance Improvement
- Target Revised
- Target in Progress
1. Ensuring safe collection and treatment of our waste
Objective
To improve Barwon Water’s environmental performance by:
• reducing the number of spills and blockages from sewage reticulation mains
• minimising the effects of spills and blockages that do occur from sewage reticulation mains.

Barwon Water has more than 2,000 kilometres of reticulation mains in its sewerage system to operate and maintain. These reticulation mains can become blocked by tree roots, solid matter etc. often resulting in spills. To reduce these, we undertake a Preventative Maintenance Program on our reticulation mains involving tree root foaming, hydro jetting and Closed Circuit Television (CCTV) surveillance.

Performance targets have been set to contain sewage spills within 5 hours. Procedures have been prepared and extensive training conducted to ensure maintenance employees conduct spill and overflow containment correctly.

Tree roots searching for alternate sources of water can penetrate ageing sewerage pipes and cause increased blockages, particularly during prolonged dry conditions. Reactive maintenance of sewerage pipe repairs and replacements increases considerably due to drying out of soil and consequent subsurface movement. Rapid response to pipe ruptures ensures reduced leakage to the environment.

Barwon Water has an ongoing replacement and rehabilitation program for its reticulation sewer system to further minimise blockages and spills.

ACTION
Carry out preventative maintenance program.

TARGET
To achieve less than 50 sewer overflows per 100km of main per year.
Target met? Yes

PERFORMANCE
The sewerage reticulation main Preventative Maintenance Program involves the inspection and unblocking of mains to limit blockages and overflows. Inspection is carried out using a closed-circuit television (CCTV) unit which travels along the inside of the pipe. Techniques used to unblock sewers include root foaming, hydraulic cutting and jetting. In 2000/01, 30,127 metres of sewer was inspected by CCTV, 35,154 metres was treated by foaming and 108,904 metres was treated by hydraulic cutting (including jetting). Despite these efforts, 778 sewer overflows were recorded for 2000/01. This equates to 38.1 sewer overflows per 100km of sewer main, thus meeting our target.

Better than last year? Yes

ACTION
Repair blockages and contain sewage spills from the reticulation system in accordance with maintenance procedures (ongoing).

TARGET
95 per cent of blockages to be repaired within 5 hours.
Target met? Yes

PERFORMANCE
The target was easily achieved, with almost 99 per cent being repaired within 5 hours for 2000/01.
Better than last year? Yes
Sewage collection - rising mains and sewerage pumping stations

Managing spills and overflows

Objective
To improve Barwon Water’s environmental performance by:

- reducing the number of spills from sewerage rising mains and pumping stations
- minimising the effects of spills from sewerage rising mains and pumping stations that do occur.

As part of the Barwon Water Sewer Asset Management Strategy, the condition and criticality of sewerage pumping stations and rising (pressure) mains is being assessed. Barwon Water’s pumping stations are monitored continuously by a state-of-the-art telemetry system for possible breakdowns and power failure that potentially can lead to sewer overflows. The telemetry system utilises the latest communications and telemetry equipment coupled with advanced software.

The system allows Communications Centre employees to monitor facilities 24 hours a day, 365 days a year.

The recent telemetry system upgrade will increase operating standards and deliver benefits to customers and the environment. Sewer overflows are minimised through closer monitoring of sewerage pumping stations and critical sewer levels by alerting maintenance crews to problems with adequate warning before overflows occur. There are 164 sewerage facilities connected to the system.

In addition to monitoring, Barwon Water continues to refurbish pump stations as part of the Capital Works Investment Plan and conducts station maintenance as required.

Communications Centre
To ensure rapid and efficient response to maintenance demands, our Communications Centre is staffed 24 hours, 365 days per year.

Telemetry
The telemetry system utilises the latest communications and telemetry equipment coupled with advanced software.

ACTION
Contain spills from sewerage rising mains and pumping stations in accordance with set procedures.

TARGET
All reportable spills to be notified to the appropriate authorities.

PERFORMANCE
Throughout 2000/01, nine spills from pumping stations and rising mains occurred. The EPA was consulted where these spills reached water bodies. The causes of the spills varied from internal corrosion, air valve failure, damage caused by contractors and wet weather overflows. Response to the spills was in accordance with Barwon Water’s Incident Management System and all spills were cleaned up to the satisfaction of the EPA. Where spills were the result of failed infrastructure, the infrastructure was either replaced or scheduled to be replaced as part of the next CWIP. Same or better than last year? Yes

ACTION
Assess condition and criticality of sewerage rising mains and pumping stations as part of the Sewer Asset Management Strategy (ongoing).

PERFORMANCE
The criticality review of most pumping stations was undertaken in 1999 as part of Y2K contingency planning. Criticality assessment of most rising mains also has been completed. The assessment will progress to the condition of rising mains and pumping stations.

ACTION
Prepare appropriate management strategies for sewerage rising mains and pumping stations based on the findings of the condition and criticality assessments (ongoing).

PERFORMANCE
A generic response plan has been developed for spills that occur from any rising main. However, more specific contingency plans have been prepared for the Queenscliff, Portarlington and Leopold rising mains. Further management strategies will be prepared on the completion of the condition and criticality assessments. These strategies will improve the operation of the rising mains and improve response to any spills that do occur.

ACTION
Maintain sewerage pumping stations in accordance with set procedures (ongoing).

TARGET
90 per cent of pumping stations to be maintained within the timeframe set by Sewerage Operations branch.

PERFORMANCE
Barwon Water’s sewerage pumping stations are maintained by the Systems Maintenance branch, in accordance with the program set by the Sewerage Operations branch. Routine maintenance includes flushing and cleaning the stations, checking valves and pipework, inspecting switchboards and checking the telemetry system and alarms. Performance of the pumping station maintenance is reviewed at monthly meetings between the two branches and by random audits by Sewerage Operations staff. All targets for pumping station maintenance have exceeded the 90 per cent target since reporting began. Same or better than last year? Yes
ACTION
Monitor pumping stations by the telemetry system in accordance with set procedures (ongoing).

PERFORMANCE
Barwon Water’s sewerage pumping stations are monitored via a telemetry system at a 24-hour Communications Centre. This enables immediate response to any alarm. The Sewerage Operations branch sets internal performance targets for Systems Maintenance branch employees monitoring the telemetry system at the Communications Centre. These targets have been met on all occasions.

ACTION
Upgrade the telemetry system, including pumping stations not currently connected to the telemetry system.

TARGET
Telemetry system upgrade to be completed by June, 2001. Target met? Yes

PERFORMANCE
The telemetry upgrade was a three-year project completed according to schedule. In 1998/99, non-Y2K compliant software was upgraded, radio frequencies were transferred from 800MHz to 900MHz and new radios were installed in the existing network to facilitate the upgrade. Throughout 1999/00 and 2000/01, sewerage pumping stations were progressively connected to the system, with commissioning conducted during May and June, 2001. The communications network has been developed to allow future expansion. Better than last year? Yes

ACTION
Include additional sewerage pumping stations in the telemetry system.

TARGET
Telemetry system upgrade to be completed by June, 2001. Target met? Yes

PERFORMANCE
Sewerage pumping stations in the Otway district were previously monitored by a call-out alarm system and were not connected to the telemetry system. Establishment of telemetry communications to these pumping stations begun in 1999 and was completed in 2001. Better than last year? Yes

ACTION
Carry out refurbishments of sewerage pumping stations.

TARGET
Scheduled project completion dates shown. All targets met? Action in progress

PERFORMANCE
Refurbishments at a number of sewerage pumping stations were included in previous Capital Works Investment Plans and were detailed in the 1998 EMP.

Colac No1 sewerage pumping station (September, 2000): Design is completed, with investigations into suitable pumps continuing. A planning permit has been granted by Colac Otway Shire.

Refurbishments at Colac No1 and Corio Bay pumping stations are scheduled for completion by June, 2002. Better than last year? Yes

ACTION
Complete investigations into the Torquay to Black Rock rising main replacement.

TARGET
Investigations into the Torquay to Black Rock rising main replacement to be completed by September, 2001. Target met? Action deferred

PERFORMANCE
An overall review of Torquay’s sewerage system was carried out in early 2000, with investigations deferred until 2003/04. Better than last year? No
Sewage collection – trunk mains

Managing spills and overflows

Barwon Water’s trunk sewer mains are those sized 600mm diameter or greater, which receive inflow from reticulation and rising mains. They are commonly referred to as the arteries of the sewerage system. A condition and criticality assessment of our trunk mains, utilising techniques such as closed circuit television (CCTV) inspections, has been undertaken as part of our Sewer Asset Management Strategy. An ongoing inspection program is part of this strategy.

Barwon Water also has developed a more specific Trunk Sewer Strategy to ensure assets are fully utilised and new assets are constructed under a planned program to meet future growth. Measures to delay trunk sewer works are included in the strategy. Embraced in this is construction of a flow retarding facility in northern Geelong to contain peak sewage flows during wet weather (now completed). An additional flow retarding facility in the southern part of the system also will be investigated, together with an additional cross-connection between Geelong’s two major trunk sewers.

Rainfall events cause flooding and considerable impact on sewage collection and treatment. Storm events contribute additional flows in the sewerage system via infiltration. Flows can occasionally strain the system to the point where overflows occur. Spill volumes are heavily diluted by infiltration volumes, significantly reducing any environmental impact. As overflows are an environmental impact that the organisation plans for and expects, a set of procedures by which spills to water bodies are to be handled has been included in the Environmental Management System. The authority has a good working relationship with the EPA in relation to handling sewage spills.

Barwon Water is continually working to reduce infiltration and sewage overflows through improved management practices and capital investment. Surge flow data is a consideration in setting sewerage system design capacities.

**ACTION**
React to sewer overflows from trunk sewers in accordance with set procedures.

**TARGET**
All spills to water bodies to be reported to appropriate authorities.

**PERFORMANCE**
Spills from trunk mains normally coincide with storm events that cause flows which exceed design capacities. Overflows to water bodies were recorded at the Barwon River (Maccintyre Bridge main outfall sewer) on three occasions during significant rainfall events: October 24, 2000 (1-in-5 year event) and March 22, 2001 (1-in-28) and April 22-24, 2001 (1-in-100). These spills were handled in accordance with specific procedures set by the Sewerage Operations branch, including full communication with the EPA.

Same or better than last year? Yes

**ACTION**
Assess condition and criticality of sewer trunk mains as part of the Sewer Asset Management Strategy (ongoing).

**PERFORMANCE**
The condition assessment of Barwon Water’s trunk sewers involves core sampling and inspections using the authority’s closed circuit television (CCTV) unit. This particularly relates to Barwon Water’s two main trunk sewers and the ovoid and outfall sewers where sampling has occurred to assess the extent of internal corrosion.

**ACTION**
Prepare an appropriate management strategy for sewer trunk mains (ongoing).

**PERFORMANCE**
The trunk main management strategy undergoes continual review pending outcomes of the condition and criticality assessments. Trunk main section replacements and relining are included in the Capital Works Investment Plan. The authority recently engaged a sewerage system engineering specialist to assist in reviewing the asset management system. As a result, maintenance and inspection programs will be updated to better reflect the needs of the system.

Same or better than last year? Yes
Construct the Northern Flow Retarding Facility (Stage 1) in accordance with the Trunk Sewer Strategy.

**TARGET**
Project to be completed by September, 1999. Target met? **No**

**PERFORMANCE**
Barwon Water has developed a Trunk Sewer Strategy, which aims to establish a dynamic and innovative approach to providing the core infrastructure required for the next 20 years. A key component of the strategy is the installation of a six-megalitre flow retarding tank connected to the outfall sewer in North Geelong. This tank will store excess sewage flow during periods of wet weather, when volumes are greatest. As a result, overflows from the outfall sewer during periods of wet weather will be reduced.

Construction of the flow retarding facility and connecting pipe work began during 1999 and was completed and in operation by June, 2000. Better than last year? **Yes**

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**ACTION**
Construct the Northern Flow Retarding Facility (Stage 2) in accordance with the Trunk Sewer Strategy.

**TARGET**
Project to be completed by September, 2000. Target met? **Action reviewed**

**PERFORMANCE**
Originally, involved a three-megalitre capacity and Stage 2 an additional six-megalitre storage. This was altered during design so that Stage 1 was enlarged to six megalitres. Accordingly, the need for Stage 2 is under review. Better than last year? **Yes**

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**ACTION**
Investigate ovoid sewer replacements in accordance with the Trunk Sewer Strategy.

**TARGET**
Investigations into replacing the ovoid sewer to be completed by September, 1999. Target met? **No**

**PERFORMANCE**
Investigations were carried out in 1999 into the replacement of the southern section of the 85-year-old ovoid sewer between the Geelong Racecourse and Reserve Road, Marshall. The reasons for replacement include providing for future growth on the Bellarine Peninsula (Leopold, Drysdale and Clifton Springs), relieving the upstream section of the ovoid sewer (through the CBD) and potential overflow points, and to connect into the northern and southern ends of the pump-boosted syphon across the Barwon River (constructed in 1992) to make full use of the hydraulic capacity of that asset. In addition, the decommissioned section of the ovoid sewer could be used as a one-megalitre supplementary wet weather detention tank. This was investigated in conjunction with the design of the new pipeline during 2000/01. Stage 1 of the ovoid sewer replacement is due to be constructed in 2001/02. Better than last year? **Yes**

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**ACTION**
Investigate the cross-connection of the ovoid and outfall sewers in accordance with the Trunk Sewer Strategy.

**TARGET**
Investigations into constructing a cross-connection between the ovoid and outfall sewers to be completed by September, 1999. Target met? **Yes**

**PERFORMANCE**
The Trunk Sewer Strategy provides for connecting the outfall sewer to the ovoid sewer. This will provide flexibility in controlling flows in the trunk sewer system by enabling some wet weather flow to be diverted from the Barwon River crossing at Macintyre Bridge to the alternative crossing of the pump-boosted syphon, which has a larger hydraulic capacity. It also will relieve potential sewer overflow points into the Barwon River and Waurn Ponds Creek. A preliminary design of the cross-connection was carried out in 2000, with final design in progress. Better than last year? **Yes**

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**ACTION**
Complete construction of Stage 1 of the ovoid sewer replacement.

**TARGET**
Project to be completed by September, 2001. Target met? **Action in progress**

**PERFORMANCE**
Construction is set to commence. Accordingly, the target completion date for this action has been revised to 2002. Better than last year? **Yes**

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**ACTION**
Complete the investigation into the Southern Flow Retarding Facility in accordance with the Trunk Sewer Strategy.

**TARGET**
Investigations into the facility to be completed by September, 1999. Target met? **No**

**PERFORMANCE**
After analysis of further trunk sewer system modelling, this project has been deferred until at least 2002/03. Better than last year? **No**

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Macintyre Bridge
The sewage system’s outfall sewer crosses the Barwon River via the Macintyre Bridge.

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*one megalitre = one million litres*
striking a balance
Ensuring safe collection and treatment of our waste

Barwon Water currently operates nine sewage treatment plants. Four discharge to the ocean and are required to comply with the requirements of the State Environment Protection Policy – Waters of Victoria. The Black Rock and Anglesea plants were upgraded in the mid-1990s to achieve this and the Lorne and Apollo Bay plants upgraded recently.

The Aireys Inlet, Portarlington and Winchelsea sewage treatment plants utilise land-based discharge to tree plantations. Bannockburn sewage treatment plant also is a lagoon-based plant, but due to its recent construction is not yet irrigating to tree plantations. Following extensive investigations into addressing future options for the Colac sewage treatment plant, a substantial upgrade has been adopted in favour of implementing a major reclaimed water use scheme in the area. Design of the state-of-the-art facility is in progress. The new plant will feature an IDEA process already in use at Black Rock, Lorne and Apollo Bay.

In addition, the plant will use advanced nutrient removal processes to treat sewage to a quality commensurate with more stringent Environment Protection Authority (EPA) licence requirements. Design of the new Colac plant has had to consider the EPA Guidelines for managing sewage discharge to inland waters and State Environment Protection policy specifically developed for the waters of Lake Colac, where treated effluent is discharged.

All treatment plants have detailed operation and maintenance manuals and procedures to ensure they achieve peak performance. Barwon Water regularly reports performance of all plants against their licence requirements to the EPA.

Barwon Water adopts a co-ordinated approach to improve treated effluent quality and reduce influent volumes to sewage treatment plants. It is imperative to reduce contaminant loads at the source rather than being burdened with difficult treatment prospects at the ‘sink’.

Similarly, Barwon Water aims to reduce the inflow to treatment plants by identifying and rectifying infiltration points within the sewerage system.

Substantial rainfall events contribute additional flows to the system via infiltration. For example, the three day deluge in April, 2001, had a magnitude of at least a 1-in-50 year event and caused increased flows at Black Rock of 300 per cent. Barwon Water is continually working to reduce infiltration through management and capital investment. Surge flow data is a consideration in setting treatment plant design capacities. The figure below left clearly indicates increases to inflows at Black Rock following significant storm events.

Objective
To improve Barwon Water’s environmental performance by:
• upgrading all sewage treatment plants to meet State Environment Protection Policy requirements
• operating all sewage treatment plants in accordance with their EPA Waste Discharge Licences.

Operational control
Results from regular process monitoring at our sewage treatment plants are used to prompt operational and process modifications to ensure the highest quality of effluent is produced.

Sewage treatment plants
Achieving optimum results for receiving environments

ACTION
Operate sewage treatment plants to meet EPA licence requirements.

TARGET
100% Licence Compliance.
Target met? No

PERFORMANCE
In an excellent year for Barwon Water’s sewage treatment plants, only two of the nine plants failed to meet the 100 per cent target, with Black Rock achieving 99.68 per cent and Colac 96.97 per cent. This was another improvement from the overall performance of previous years. Like spills from sewer mains and pumping stations, a licence breach is communicated fully to the EPA.

The Colac sewage treatment plant operating at its peak. However, due to high variations in influent quality there are occasions where licence limits can be exceeded. Barwon Water’s $6.5 million upgrade of the treatment facility, currently in design phase, will ameliorate these problems. Median licence limits were exceeded on two occasions at Black Rock, for cadmium in July and lead in November.

Black Rock sewage treatment plant - daily influent flow

* the sharp increases in inflow volumes coincide with significant rainfall events
These results narrowly breached the median limits but did not contravene the maximum licence limit. To regain compliance with discharge licences, trained plant operators regularly implement process changes to successfully improve final effluent quality. Better than last year? Yes

**ACTION**
Develop operation procedures for Aireys Inlet, Apollo Bay, Bannockburn and Lorne sewage treatment plants.

**TARGET:**
Completion of operations and maintenance manuals for Aireys Inlet, Apollo Bay, Lorne and Bannockburn sewage treatment plants by June, 1999.

Target met? Yes

**PERFORMANCE**
Operations and maintenance procedure manuals have been developed for these plants in accordance with Barwon Water’s Quality and Environmental Management Systems requirements. Manuals already have been produced for existing plants. Better than last year? Yes

**ACTION**
Investigate upgrade options for the Colac sewage treatment plant.

**TARGET:**
Complete investigations into upgrading the Colac plant by September, 1999.

Target met? No

**PERFORMANCE**
Two consultancies were commissioned for the upgrade of the plant. The first examined upgrading the plant to include biological nutrient removal and the other investigated treated effluent re-use and land disposal, rather than continuing with current discharge to Lake Colac. After extensive investigation and evaluation, the land disposal option was found to be impracticable and uneconomic. The preferred option of a nutrient removal plant was therefore adopted. The completed project evaluation was submitted to the Department of Natural Resources and Environment in early 1999, with approval received in mid-2000. Investigations are now complete and detailed design is in progress. Better than last year? No

**ACTION**
Negotiate EPA discharge licences for Aireys Inlet, Apollo Bay, Colac and Lorne sewage treatment plants.

**TARGET:**
Discharge licences to be negotiated, completed and approved by June, 1999.

Target met? Yes

**PERFORMANCE**
In accordance with the Victorian Environment Protection Act 1970, Barwon Water is required to obtain a Waste Discharge Licence from the EPA for each of its sewage treatment plants. EPA discharge licences were obtained for Aireys Inlet, Apollo Bay, Colac and Lorne plants before the commencement of their operation. Better than last year? Yes

**ACTION**
Complete upgrade of the Colac sewage treatment plant to include nutrient removal or land disposal.

**TARGET:**
Project to be completed by December, 2001.

Target met? Action in progress

**PERFORMANCE**
Due to unforeseen delays, the target completion date for this action has been extended. Discussions are progressing with the EPA regarding works approval. Following the detailed design, an 18-month tendering and construction period will commence, with completion scheduled in June, 2003. Better than last year? No

**ACTION**
Negotiate EPA discharge licences for Aireys Inlet, Apollo Bay, Colac and Lorne sewage treatment plants.

**TARGET:**
Discharge licences to be negotiated, completed and approved by June, 1999.

Target met? Yes

**PERFORMANCE**
In accordance with the Victorian Environment Protection Act 1970, Barwon Water is required to obtain a Waste Discharge Licence from the EPA for each of its sewage treatment plants. EPA discharge licences were obtained for Aireys Inlet, Apollo Bay, Colac and Lorne plants before the commencement of their operation. Better than last year? Yes

**ACTION**
Investigate upgrade options for the Colac sewage treatment plant.

**TARGET:**
Complete investigations into upgrading the Colac plant by September, 1999.

Target met? No

**PERFORMANCE**
Two consultancies were commissioned for the upgrade of the plant. The first examined upgrading the plant to include biological nutrient removal and the other investigated treated effluent re-use and land disposal, rather than continuing with current discharge to Lake Colac. After extensive investigation and evaluation, the land disposal option was found to be impracticable and uneconomic. The preferred option of a nutrient removal plant was therefore adopted. The completed project evaluation was submitted to the Department of Natural Resources and Environment in early 1999, with approval received in mid-2000. Investigations are now complete and detailed design is in progress. Better than last year? No

**ACTION**
Complete improvements to Winchelsea sewage treatment plant drainage and irrigation system.

**TARGET**
Tree lot irrigation area improvements to be completed by September, 1999.

Target met? Yes

**PERFORMANCE**
A major drain has been constructed through the Winchelsea plant to separate stormwater from effluent runoff. Additional sprinklers were installed and 5,000 trees were replanted to ensure the plant could operate with maximum efficiency. Better than last year? Yes
Coastal surfactant survey - a case study

A dramatic drop in surfactant and salt levels on vegetation along the coast has been attributed to the multi-million dollar upgrade of Black Rock sewage treatment plant.

A six-year community-based study has found that levels have fallen up to 60 per cent following the $46 million upgrade in 1996.

Barwon Water initiated the study in 1993 after community concerns about the impact of surfactants on coastal vegetation.

Surfactants are a mixture of complex chemicals. They are found in household products, such as laundry and dishwashing detergents, and are used extensively by industry in food emulsifiers and leather additives.

A team of community volunteers collected weekly aerosol samples from sites between Point Lonsdale and Torquay and at Lake Connewarre and Drysdale.

The data – including prevailing weather conditions and sample information from discharges at Black Rock – was submitted to CSIRO Mathematical and Information Services last year for analysis and statistical evaluation.

The CSIRO evaluation scientifically demonstrated a significant environmental improvement as a result of the upgrade.

The six-year study represents a successful consultative partnership between coastal management committees, the community and Barwon Water.

### Objective

To improve Barwon Water’s environmental performance by:

- continuing to store biosolids in an environmentally sound manner
- developing a strategy for the long-term management of biosolids produced at Barwon Water’s sewage treatment plants.

### Sludge/biosolids management

Biosolids produced at Barwon Water’s sewage treatment plants have been stored at the Black Rock and Colac sites. At Black Rock, biosolids are de-watered by belt-filter presses and then stored in clay-lined impermeable lagoons. At Colac, biosolids pass through anaerobic digesters and a belt-filter press before being stored on-site. Groundwater monitoring is carried out at both sites to ensure no leachate from the stored biosolids enters the groundwater table.

### ACTION

Monitor local groundwater at sludge storage sites in accordance with the set sampling program.

### TARGET

No adverse effects on groundwater quality

### PERFORMANCE

Groundwater sampling was carried out at Black Rock and Colac in accordance with the program. No adverse effects were found.

### Sludge/biosolids management - Coastal surfactant survey - a case study

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The CSIRO evaluation scientifically demonstrated a significant environmental improvement as a result of the upgrade.

The six-year study represents a successful consultative partnership between coastal management committees, the community and Barwon Water.

### ACTION

Develop a future strategy for the long-term management of sludge at Black Rock.

### TARGET

Sludge Management Strategy to be completed by September, 2001.

### PERFORMANCE

Expressions of interest for development of any long-term strategy closed on January 24, 2001. A reference group has been established to discuss available options and negotiations with the State Government (re: Partnerships Victoria) continued throughout 2001. Discussions with Agriculture Victoria in relation to conducting a trial of agricultural and horticultural biosolids applications commenced (with involvement from Central Highlands and Western Water authorities). Environmental and engineering consultants also are examining this issue.

Better than last year? Yes
ACTION
Allocate sufficient funding for biosolids management at Black Rock sewage treatment plant.

TARGET
$300,000 annually. Target met? No

PERFORMANCE
Approximately $240,000 was spent on biosolids management in the financial year 1998/99, chiefly associated with the construction of new storage lagoons at Black Rock. Expenditure of $593,000 in 1999/00 and $443,000 in 2000/01 has involved biosolids management investigations, sludge storage and transportation. A further $800,000 has been committed for 2001/02. Better than last year? No

ACTION
Consider biosolids management at other sewage treatment plants and develop a long-term strategy.

TARGET
Sludge Management Strategy to be completed by September, 2001. Target met? Action in progress

PERFORMANCE
Sludge management at regional sewage treatment plants is being addressed as a combined issue with the Black Rock plant. Better than last year? N/A

ACTION
Investigate the potential for re-use of water treatment plant sludge and develop a long-term strategy.

TARGET
Recommendations for water treatment plant sludge re-use to be reported by December, 2001. Target met? Action in progress

PERFORMANCE
Barwon Water has sponsored a Deakin University Masters Degree student to carry out this investigation. Sludge produced at all water treatment plants has been categorised in terms of quality and trials have been conducted on different chemicals used in the water treatment processes to reduce sludge volumes produced. The study includes investigation of sludge re-use options, accompanied by researching the value of sludge as a resource. The research student is expected to complete the study by the end of 2001. Better than last year? N/A

Sludge management
We are developing a strategy for the long-term management and/or re-use of biosolids produced at our treatment plants.

striking a balance
Ensuring safe collection and treatment of our waste
2. Improving our discharge quality by controlling source inputs
Objective
To improve Barwon Water’s environmental performance by:

- licensing known unlicensed trade waste customers
- continuing to encourage trade waste reduction through the trade waste monitoring and quality charges programs.

Trade waste customers are routinely monitored to ensure compliance with trade waste agreements and the protection of infrastructure and the environment. The trade waste quality charges program encourages trade waste customers to reduce their discharges through waste minimisation and cleaner production principles. Barwon Water has an inventory of known unlicensed trade waste customers and is working with them to have all industrial trade waste generators licenced. Barwon Water has become increasingly stringent on discharge limits and has, in most cases, required that pre-treatment devices be installed.

ACTION
Monitor existing trade waste customers in accordance with set operating procedures.

TARGET
To achieve 90 per cent customer compliance with trade waste agreements. Target met? Yes

PERFORMANCE
Customer compliance with trade waste agreements was measured at 97 per cent for 2000/01, again easily meeting the target. Better than last year? Yes

ACTION
Create agreements for existing known unlicensed trade waste dischargers.

TARGET
License all known unlicensed trade waste dischargers. Target met? No

PERFORMANCE
A committed team of trade waste officers has driven a gradual reduction in the number of unlicensed trade waste dischargers over recent years. As at June, 2001, only two from a total of 1419 dischargers remained unlicensed (less than 0.2 per cent). Barwon Water’s aims to have all of dischargers committed to a trade waste agreement. Better than last year? Yes

Trade waste team
Our industrial trade waste officers ensure regional commercial enterprises comply with Trade Waste By-Laws and Acceptance Standards.
Nurturing our broader natural environment
Catchment land management
Protecting riparian and in-stream ecosystems

Objective
To improve Barwon Water’s environmental performance by:
• minimising environmental impacts on Barwon Water - managed land in Barwon Water catchments
• encouraging best land management practices by private landowners in Barwon Water catchments.

Barwon Water has an interest in the adoption of best land management practices in its catchments to ensure the harvesting of quality water. In this way, the level of water treatment required to supply customers with a safe water supply is minimised. Catchment surveys for all headworks systems throughout the region are being prepared. These surveys allow Barwon Water to become aware of any concerns within the catchment, including monitoring the results of practices of other land managers such as logging, mining and sand extraction.

To encourage landowners to improve land management practices, Barwon Water co-funds a program for fencing and re-vegetation of waterways through private land in Barwon Water catchments and provides landholders access to its Community Tree Propagation Centre. Water quality in catchments is monitored to determine the effectiveness of catchment management practices. Environmental benefits of these programs include erosion control, conservation of native vegetation, improved stream ecology and water quality, an eventual lowering of the groundwater table and easing of salinity problems.

The primary objective is to prevent access of livestock to waterways which can have a significant impact on water quality and bank stability.

Twenty four hectares of pine plantation have been clearfelled and replaced with native vegetation near Forrest. The project began in 1997 and was completed during 2000/01. In addition, a small area of pines at Stony Creek was clearfelled and reseeded with native species. Re seeding occurred toward the end of the financial year.

ACTION
Carry out catchment land use surveys for all Barwon Water catchments.

TARGET
Catchment land use surveys to be completed by December, 1999. Target met? No

PERFORMANCE
By identifying the different land uses in catchment activities, Barwon Water can more effectively monitor activities in catchments which can impact on water quality. Catchment land use surveys, a requirement of the Health Act 1958, were completed for the Barwon and Moorabool catchments by December, 1999. Focus then moved to the Otway catchments, with Painkalac (Aireys Inlet), St. George/Erskine (Lorne), Lardner’s Creek (Gellibrand) and West Barham (Apollo Bay) surveys completed. The Barwon Downs borefield survey is in progress and Glangolah and West Gellibrand (Colac system) surveys are scheduled for late 2001. Better than last year? Yes

ACTION
Prepare management plans for Barwon Water land in water catchments as part of catchment management strategies.

TARGET
Management plans to be completed by December, 1999. Target met? No

PERFORMANCE
A fire protection plan for land around West Barwon Reservoir began in early 2000. The plan has been developed over time, but documentation has not been completed. Better than last year? Yes

ACTION
Provide landholders and community groups with access to Barwon Water’s Community Tree Propagation Centre to produce indigenous plants for use in environmental projects within the Corangamite catchment.

TARGETS
Production of more than 50,000 tube stock per year benefiting at least 12 community groups and to enlist more than 500 community hours in the centre. Target met? Yes

PERFORMANCE
Barwon Water’s Community Tree Propagation Centre (supported by the Corangamite Catchment Management Authority) provides materials, facilities and advice to landholders and community groups on growing indigenous trees and plants. In this way, the authority is providing practical assistance in reducing environmental degradation in water catchments.

Throughout 2000/01, more than 95,000 indigenous plants were produced by Barwon Water employees and 50 environmental and community groups and schools. Some 820 community hours were spent at the centre (CTPC) in 2000/01.

The nursery is a valuable educational resource for local institutions. The facility is utilised by students, from primary through to tertiary levels.

In addition to producing indigenous tubestock and plants for revegetation projects throughout catchments, Barwon Water’s Waterways section provides waterway management services under contract to the Corangamite Catchment Management Authority for a 20-kilometre section of the Barwon River through Geelong. This role involves water quality monitoring, additional revegetation projects, litter removal, recreational management and minor project construction. Better than last year? Yes

ACTION
Review waterways fencing program for future years (ongoing).

PERFORMANCE
Approx. $100,000 has been allocated in each of the past two years for fencing and tree planting programs in the Barwon and Moorabool catchments. Some $70,000 has been included in the 2001/02 budget for additional works. The funding, which is augmented by the balance of unspent funds previously granted by the Corangamite Catchment Management Authority for administration by Barwon Water, is used to assist landholders in undertaking these environmental improvement projects.

Other catchment rehabilitation works include gully rehabilitation, track upgrades, establishing off-stream stock watering points, extensive tree planting for windbreaks and windrow establishment. Better than last year? Yes
ACTION
Carry out the monitoring program for the Moorabool catchment (ongoing).

TARGET
Conduct monitoring in accordance with program. Target met? Yes

PERFORMANCE
Monitoring has been carried out in accordance with a set program. This will continue to gauge on water quality in the Moorabool catchment. Eleven sites within the system have been the subject of a monthly program since 1997. From this data, an analysis of catchment management practices in the Moorabool catchment can be conducted.

Five additional monitoring points are scheduled to be established during 2001/02 to observe turbidity and electrical conductivity (EC) trends. Better than last year? Yes

Bannockburn, a developing rural township 20 kilometres north-west of Geelong, suffered sewage problems for more than a decade before commissioning of a $2.9 million sewage scheme in 1998. The provision of reticulated sewage services has eliminated pollution, odour problems and health risks associated with the former septic tank disposal system and paves the way for future development.

Planning
After announcing plans for the scheme in 1993, Barwon Water launched a comprehensive consultative program involving the Bannockburn community, local government and relevant authorities, including the Department of Natural Resources and Environment. Selection of the site in 1995 and the subsequent approval processes involved input from key stakeholders and considered environmental, community and engineering impacts.

Adherence to extensive planning and environmental requirements surrounded development of the treatment plant site, in particular construction of the sewage lagoons which occupy 8.5 hectares of an 80-hectare wooded allotment.

Covenant
An environmental covenant has been placed on remnant woodland surrounding the treatment lagoons to ensure ongoing protection of flora and fauna. The covenant was initiated by Barwon Water and the independent conservation body, Trust for Nature, and incorporates an extensive management plan.

Site management
In early 2000, Barwon Water engaged a consultant to prepare and direct the implementation of the management plan. Directives of the plan included removal of widespread dead wattle, eradication of vermin and replacement of barbed wire with plain wire strands. These works have been undertaken during 2001.

A bird and marsupial nestbox monitoring program was established in 1998, with an ongoing monitoring program. Barwon Water is working with local environmental groups, the Geelong Field Naturalists Club and Friends of Bannockburn Bush, to continue this program.

An extensive Fire Management Plan was prepared in consultation with the CFA, local fire brigades and ecological experts. The recommendations of the October, 2000, report are being implemented, beginning with removal and burning-off of debris and the re-seeding of native species in specified areas of the bushland.

The future
The plant has been designed to cope with anticipated population growth to the year 2020.

The high quality treated effluent can be re-used for a variety of purposes and, in line with Barwon Water’s commitment to investigate re-use options at all sewage treatment plants, discussions have been conducted with potential future users of reclaimed water from the STP.

Approximately $100,000 has been allocated in each of the past two years for fencing and tree-planting programs in the Barwon and Moorabool catchments.

Community Tree Propagation Centre
Throughout 2000/01, more than 95,000 indigenous plants were produced by Barwon Water employees and 50 environmental and community groups and schools. Some 820 community hours were spent at the centre in 2000/01.

Bannockburn sewage treatment plant - a case study

Moorabool catchment
Minimising environmental impacts on Barwon Water managed land in catchments.
Objective:
To improve Barwon Water’s environmental performance by:
• complying with the environmental requirements of Barwon Water’s existing Bulk Entitlements
• finalising the Bulk Entitlements for the Barwon system.

A Bulk Entitlement Order is a legal document provided under the Water Act 1989 setting out the water rights and obligations of the holder. Barwon Water has set Bulk Entitlement Orders which detail the conditions under which water can be harvested from the environment to supply customers. These orders have a number of conditions, including volumes of water that can be harvested under different conditions, passing flows to be discharged to the environment and the management of various environmental effects. Barwon Water currently has Bulk Entitlement Orders for its Moorabool and Otway systems, against which compliance is regularly monitored. Barwon Water applied for a Bulk Entitlement Conversion Order for the Barwon system in January, 1997.

A major upgrade to Barwon Water’s hydrographic system is scheduled for 2001/02. These works involve telemetering a large number of weirs and reservoirs so that employees can remotely monitor and control channel flows, reservoir levels, passing flows and spillway flows. This will enable faster and more accurate interpretation of compliance with Conversion Orders.

**Bulk Entitlement compliance**

*Ensuring environmental flow requirements are met*

- **ACTION**
  - To comply with the requirements of the existing Bulk Entitlement Orders.

- **TARGET**
  - 100% per cent compliance.
  - Target met? Yes

- **PERFORMANCE**
  - Barwon Water achieved 100 per cent compliance with daily passing (environmental) flow requirements of all Bulk Entitlement Orders in place. Furthermore, the upper limit on annual volume taken from each system was conforming in all instances.
  - Same or better than last year? Yes

- **ACTION**
  - To submit a management program for environmental impacts and a metering program as required by Barwon Water’s Bulk Entitlement Orders (no target set).

- **PERFORMANCE**
  - Proposals relating to the Moorabool Orders were submitted to the Department of Natural Resources and Environment (DNRE) in 1996/97.
  - Discussions were held and site inspections undertaken with representatives of Barwon Water and the department in 1999, to review the proposed management and metering programs for the Moorabool Orders. DNRE has accepted Barwon Water’s programs for these Orders.
  - Proposals for the Otway Orders will be prepared following acceptance of Barwon Water’s application for a Bulk Entitlement for the Barwon system.
  - Better than last year? Yes

- **ACTION**
  - Finalise Bulk Entitlements for the Barwon system.

- **TARGET**
  - Bulk Entitlement negotiations to be completed by December, 1999.
  - Target met? No

- **PERFORMANCE**
  - A Bulk Entitlement Project Group, including representatives from government and environmental groups, was formed in 1999 to review a Bulk Entitlement for the Barwon system. Draft orders have been prepared for the Bulk Entitlement. The major elements of the Bulk Entitlement are now close to resolution with the project group completing a review of the draft Order. The Order is expected to be finalised during the 2001/02 financial year.
  - Better than last year? No
Environmental assessment of new projects

Minimising impacts to flora and fauna

When designing and constructing new projects or rehabilitating existing assets, there are potential environmental issues. Effects on flora and fauna, archeological relics and heritage structures are just some of the potential issues that need to be considered when carrying out capital works. Barwon Water has developed environmental audit checklists to be completed by design and construction supervision staff. For major projects, consultants are engaged to carry out a range of surveys where necessary.

Contractors constructing projects for Barwon Water are required to submit an environmental management plan. This must detail how they will manage identified environmental impacts.

**ACTION**
Revise environmental assessment procedures for new projects and develop new procedures as required (ongoing).

**PERFORMANCE**
As part of the development of the Environmental Management System, Asset Development branch procedures were reviewed to ensure environmental considerations were integrated into the design and construction of new projects. This included the development of environmental design and construction audit checklists which are completed for all new projects. The procedures will be reviewed continually and improved as required.

Of projects initiated in 2000/01, environmental audits were conducted as required – i.e. where the project had progressed to a specified stage.

In an Environmental Management System surveillance audit conducted in May, 2001, the auditor reported that “the system of assessment of environmental and other requirements of proposed and confirmed projects leaves little risk of unexpected environmental liabilities arising”.

Better than last year? Yes

**ACTION**
Revise the environmental management requirements in contract documentation and develop new documentation as required.

**TARGET**
Contract documentation to be revised by July, 1999.
Target met? Yes

**PERFORMANCE**
Tender documentation for new projects now includes a requirement for contractors to prepare an Environmental Management Plan for each project. The documentation was completed in line with the target.

Better than last year? Yes

**ACTION**
Carry out environmental studies/surveys as required to ensure compliance with relevant legislation.

**PERFORMANCE**
Project officers have the discretion to assess the need for environmental (biological and/or flora and fauna), archeological and/or heritage studies. For a number of reasons, a particular project may not require one or more of these studies. Because heritage studies generally relate to European infrastructure and relics, few are required. However, a significant proportion of projects were subject to environmental and archeological surveys.

Same or better than last year? Yes

### Groundwater aquifer cross...

#### Objective:
To improve Barwon Water’s environmental performance by:
- re-lining the groundwater production bores as required to prevent the potential for cross-aquifer contamination.

Barwon Water’s headworks system includes a substantial groundwater borefield located in the Barwon Downs area. Groundwater extracted from depths up to 600 metres has been used to supplement Geelong’s water supply. The borefield includes individual bores that pass through separate groundwater aquifers of different water quality and soil composition. To prevent cross-contamination between aquifers the bores have been re-lined.

Water authorities are primarily reliant on surface water and, therefore, welcome rainfall events to replenish reservoirs. Groundwater usage is in integral component of Barwon Water’s Drought Management Plan and this resource has been used extensively during the recent prolonged drought. As well as increasing stream flows, rainfall events help to achieve sustainable groundwater usage by provide recharge to aquifers.

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The pristine Otway catchment
Potential environmental impacts are considered during the investigative phase of all construction projects.
Barwon Water’s licence to extract groundwater is due for renewal in August, 2002. To ensure sustainable use of the resource, extensive investigations, including a community consultation campaign, have begun into issues associated with the licence’s operations. Stage 2 investigations will consider the extent (if any) of impacts on surface water flows, the yields of domestic and stock bores and ecological condition.

The initial investigations (Stage 1) have been completed and found that groundwater extraction, in accordance with the current licence, is rechargeable. Investigations into sustainable groundwater usage, including aquifer recharge rates, are continuing.

**Objective**

To improve Barwon Water’s environmental performance by:

- preventing any major external chemical spills at Barwon Water sites under normal operating conditions
- minimising the effects of any spills.

**Chemical spill prevention**

Chemicals are stored in bulk at a number of water treatment plants. A review has been carried out on the storage arrangements for these chemicals and new facilities have been installed where required. All chemical suppliers have included in their contracts a set of responsibilities for delivering chemicals in a manner to avoid spills. Actions to be carried out if a spill does occur also are detailed. Operational procedures at Wurdee Boluc water treatment plant have been updated to reflect improvements in minor chemical spill handling techniques and emergency response procedures (for potential major spills).

Barwon Water has a commendable record regarding preventing major chemical spills.

**ACTION**

Operate Barwon Water’s sewage and water treatment plants in accordance with set procedures to prevent any major chemical spills (ongoing).

**TARGET**

Zero major external chemical spills at sewage and water treatment plants. Target met? Yes

**PERFORMANCE**

No major chemical spills occurred at Barwon Water’s sewage and water treatment plants from 1999 through 2001. Better than last year? Yes
Managing our water resources
Reservoir, channel and basin seepage/leakage

Minimising the potential for extreme water losses and managing minor system losses

Objective
To improve Barwon Water’s environmental performance by:
• ensuring no major breaches or leakages from reservoirs, channels and basins.

Barwon Water’s reservoirs, channels and basins are routinely monitored for leakage or breaches. Extensive investigations have been conducted to ensure the stability and safety of these structures. Emergency response plans detailing actions to be carried out in the event of a breach have been prepared for the majority of water storages with the remainder in the process of being completed.

An ongoing program of capital works investment in water assets has been set to reduce seepage. These works include the replacement of open channels with pipeline (Angelsea and Anakie), re-lining of some service basins and replacement of others with tanks. In line with Barwon Water’s commitment to a closed system (from treatment to consumer), tanks or lined and covered basins have been installed or are planned for Highton, Pettavel, Ocean Grove, Angelsea, Torquay, Portarlington and Queenscliff. These works address water quality, supply reliability and water loss concerns. The prolonged summer months offer the greatest evaporative losses – a time when significant improvements will be realised in future years as a result of the gradually implemented closed system.

As a water loss management initiative, a number of basins have been operated at lower storage volumes to reduce pressure and, subsequently, seepage rates.

□ ACTION
Monitor reservoirs, channels and basins in accordance with set procedures.
□ TARGET
No breaches or leakages of more than 2ML/day.
Target met? Yes
□ PERFORMANCE
A routine surveillance program to check for leakage or bank instability is in place for reservoirs, channels and basins. No significant breaches occurred from reservoirs or channels during 2000/01. However, provision was made in the Capital Works Investment Plan for repairing two seepage points that were identified in early 2000. These works involved replacing clay lining in sections of the Wurdee Boluc inlet channel.

Maintenance visits to reservoirs, channels and basins include monitoring of piezometers and v-notch weirs (where installed) and visual inspections for seepage and instability. Same or better than last year? Yes

□ ACTION
Develop operating procedures for Barwon Water storages.
□ TARGET
Operations and maintenance manuals and emergency response plans to be completed by September, 2001.
Target met? Action in progress
□ PERFORMANCE
Barwon Water has reservoirs, dams and weirs in its water harvesting system. Operations and maintenance manuals are being prepared for all these storages, together with Dam Safety Emergency Plans for response to significant incidents. As at July 2001, operations and maintenance manuals and emergency response plans had been prepared for 11 of Barwon Water’s 14 headworks systems. Better than last year? Yes

□ ACTION
Replace damaged sections of the Wurdee Boluc inlet channel in accordance with the CWIP.
□ TARGET
$50,000 in 2000/01.
Target met? No
□ PERFORMANCE
The Wurdee Boluc inlet channel transfers water from West Barwon Reservoir to Wurdee Boluc Reservoir. Unfortunately, due to drought conditions and corresponding low storage levels in the reservoirs, the channel remained operational and, hence, concrete re-lining works were delayed. However, some clay re-lining works were carried out downstream of Wormbete syphon. Allowance for these works has been made in the 2001/02 Capital Works Investment Plan. Better than last year? Yes

□ ACTION
Carry out additional technical investigations at the embankment of Upper Stony Creek Reservoir No.2.
□ TARGET
Project to be completed by September, 1999.
Target met? No
□ PERFORMANCE
Two initial investigations into stability and seepage control measures at Upper Stony Creek Reservoir No.2 were carried out in 1998 and 1999. The authority is working with consultants as part of a co-ordinated approach encompassing five reservoirs. Better than last year? Yes

□ ACTION
Carry out refurbishment of King Creek syphon.
□ TARGET
Project to be completed by September, 2001.
Target met? Yes
□ PERFORMANCE
A condition report carried out on the King Creek syphon recommended refurbishment works to treat badly corroded sections of the syphon’s steelwork. This refurbishment was carried out in 2000 together with investigations regarding future replacement of the syphon. Better than last year? Yes

□ ACTION
Carry out dam surveillance works in accordance with the Capital Works Investment Plan.
□ TARGET
$150,000 over three years to June, 2001.
Target met? Yes
□ PERFORMANCE
Barwon Water’s dams and water storages are regularly inspected and monitored to ensure their structural integrity. In addition to annual and five-yearly inspections, work carried out in 1999 on dam surveillance by specialist consultants included seepage/embankment stability investigations, site specific seismic studies, dam break analyses and risk assessments. More than $200,000 has been spent on dam surveillance works over this three-year period. Better than last year? Yes

□ ACTION
Carry out dam surveillance works in accordance with the Capital Works Investment Plan.
Objective
To improve Barwon Water’s environmental performance by:
- reducing the number of water reticulation bursts
- minimising the environmental effects of water reticulation bursts.

Barwon Water owns and manages more than 3,100 kilometres of water reticulation mains throughout its service region.

All water reticulation mains are pressurised, which means leaks are normally quickly detected and repaired. As with the sewerage system, there are set performance targets for maintenance crews to attend and repair water reticulation main bursts. System monitoring is undertaken continually to assess mains in greatest need for replacement. This is usually based on the number of bursts and other criteria. There is an ongoing improvement program to replace those sections of reticulation main that have a history of failure.

Water loss
894 unplanned water interruptions were restored within five hours, returning a performance of 99%. Reduced water losses correspond with increased environmental flows in our catchments.
mains
loss minimisation

- Reactive maintenance of water pipes, including pipe repairs and replacements, increases considerably during hot weather due to the drying out of soil and consequent subsurface movement. Long-term water main burst trends indicate notable increases during prolonged drought periods. The majority of bursts generally occur during the December to March period. Rapid response to such difficulties by maintenance crews ensures minimal leakage (wastage) of potable water.

ACTION
React to water main bursts in accordance with set maintenance procedures.

TARGET
95 per cent of bursts to be repaired with service restored within five hours. Target met? Yes

PERFORMANCE
During 2000/01, a total of 894 unplanned water interruptions occurred. Of these service interruptions, 886 were restored within five hours, returning a performance of 99 per cent. This again exceeded the maintenance target that was increased from 95 per cent to 96 per cent last year. Same or better than last year? Yes

ACTION
Carry out water reticulation system improvements throughout the region as set out in the Capital Works Investment Plan (ongoing).

PERFORMANCE
By continuing to replace water reticulation mains in poor condition, the number of pipe bursts and failures can be reduced. A total of $1.58 million was spent on water reticulation improvements during 2000/01, representing 103 per cent of the Capital Works Improvement Plan allocation. $1.62 million has been allocated for water reticulation main replacements and minor system improvements in the coming year. Better than last year? Yes

Water supply – transfer mains
Failure prevention and water loss minimisation

Objective
To improve Barwon Water’s environmental performance by:
- preventing any water transfer main failures under normal operating conditions
- minimising the effects of any water transfer main failures.

Water transfer mains are the main lines in the water distribution network, conveying large volumes of water from treatment plants to service areas.

The condition and criticality of our water transfer mains is continually assessed, from which appropriate management strategies are developed. Apart from an ageing main in the Otway system, transfer mains are of a very high quality welded steel construction and leaks are extremely rare. The risk of transfer main failure is even lower given the young age of the mains within the system. Monitoring and inspections are conducted regularly to gauge the need for any refurbishments.

Transfer mains are operated in accordance with specifically developed Quality Management System procedures to ensure failures do not occur.

ACTION
Operate the water transfer main system in accordance with set procedures.

TARGET
Zero water transfer main failures. Target met? No

PERFORMANCE
No transfer main failures have occurred throughout the Barwon/Moorabool systems since environmental management reporting began in 1998. Recurring problems have been experienced with the Colac transfer main since early 1999 (inherited in the 1997 merger with Otway Region Water Authority). Sections of the Colac transfer main are characterised by hydraulic and flow capacity problems, with replacements staggered over the next 10 years to rectify leakage problems (approx. $3.5 million capital investment). Better than last year? No

ACTION
Assess condition and criticality of water transfer mains and prepare appropriate management strategies as required.

TARGET
Condition and criticality assessments, and development of management strategies to be completed by March, 2000. Target met? No

PERFORMANCE
Condition assessments of water transfer mains were conducted on an ongoing basis. However, no progress was made to develop documented management strategies for these mains given their extremely high reliability. A higher priority was assigned to preparing Y2K contingency plans for pump stations and disinfection plants. Performance improvement: Yes
5. Protecting air quality
**Objective**

To improve Barwon Water’s environmental performance by:
- reducing the number of sewerage system odour complaints
- responding to all sewerage system odour complaints.

The nature of a sewerage system ensures that odours will occur on occasions. The primary contributors to odour are sulphur-containing compounds. Other contributors to increased odour levels include low oxygen levels, long detention times (e.g. long mains), turbulence, pH levels and high temperature. The nature of the waste also influences the type of odour generated.

Barwon Water responds to every odour complaint, investigates the reasons for occurrence and takes the appropriate steps to rectify. Barwon Water has installed a number of oxygen dissolvers designed to reduce sewer odour levels throughout the system. Other measures to reduce odour include fitting vent filters, sealing manholes and adding chemicals such as calcium nitrate and magnesium hydroxide. A sulphide monitoring program also is carried out, the results of which have led to the manipulation of oxygen dosing rates to reduce odour levels. Additional oxygen dissolvers will be installed in the system as required.

A major odour source has been the sludge storage lagoons at the Black Rock sewage treatment plant. Work has started to upgrade the lagoon drainage system to enhance the removal of water from the sludge. Investigations are being undertaken to establish a method for achieving a more substantial cover of surface vegetation. It seems likely that a mixture of seed and mulch can be distributed to areas of the lagoon surface that could not be covered previously. The improved drainage and vegetative cover will reduce moisture levels in the sludge, increase the ‘cake’ thickness, reduce the volume of sludge, assist with the stabilisation of the sludge and minimise the risk of further odours.

**ACTION**

Respond to all sewer odour complaints.

**TARGET**

100 per cent response to sewerage system odour complaints. Target met? Yes

**PERFORMANCE**

All odour complaints received during the year were addressed. Same or better than last year? Yes

**ACTION**

Carry out sulphide monitoring program as set by Sewerage Operations branch (ongoing).

**TARGET**

Sulphide monitoring to be undertaken in accordance with the set program. Target met? No

**PERFORMANCE**

Hydrogen sulphide gas naturally occurs in sewerage systems and not only causes unpleasant odours but corrodes sewer mains internally. A sulphide monitoring program was carried out in 1999 and 2000 to monitor sulphide levels in Barwon Water’s sewers. The program continued in 2001 but is behind schedule. The program is expected to be back on schedule by February, 2002.

Barwon Water monitors results to produce a mass balance of sulphides present in the sewerage system. This method enables the identification of areas where the potential for odours exists and indicates the best location to confront the problem. Furthermore, dosage rates of oxygen dissolvers, installed in the sewerage system to treat hydrogen sulphide, are adjusted accordingly. Better than last year? Yes
Gas storage management

Prevention of gas leakages

Objective
To improve Barwon Water’s environmental performance by:

- preventing any major gas storage leaks under normal operating conditions
- minimising the effects of any leaks.

Chlorine and ammonia are used to disinfect water at the end of treatment. Environmental requirements have been included in all gas supplier contracts, emergency response plans are in place for a potential gas leak and employees are trained in using the appropriate safety equipment.

The methane burner in use at Colac sewage treatment plant returns heat to the anaerobic sludge digestion process and is therefore a self-sufficient process. This results in considerable cost and time savings.

ACTION
Operate methane storage at Colac sewage treatment plant in accordance with set procedures.

TARGET
Zero gas emissions from storage unless burned. Target met? Yes

PERFORMANCE
Methane gas produced during the anaerobic digestion of sludge at Colac sewage treatment plant is used as fuel in the digestion process. An electronic ignition system was installed to ensure any excess gas is burnt by a waste methane burner. Monitoring and maintenance of the burner has been conducted and no unburnt gas has been released. Same or better than last year? Yes

ACTION
Update gas supplier documentation to include environmental requirements.

TARGET
Contract documentation to be updated by December, 1998. Target met? No

PERFORMANCE
As with the chemical delivery contract documentation, gas supply contracts have been updated to include environmental requirements of suppliers regarding leakage prevention and action to be taken in the event of a leak. The documentation update was completed in early 1999. Same or better than last year? Yes

ACTION
Operate gas storages at water treatment plants in accordance with set procedures and emergency response plans.

TARGET
Zero major gas leaks to occur from storages at water treatment plants. Target met? Yes

PERFORMANCE
Ammonia and chlorine in gas form are used at several of our water treatment plants as part of the disinfection process. By operating the gas storages in accordance with set procedures, no major gas leaks occurred since environmental management system reporting began. Same or better than last year? Yes

ACTION
Install an oxygen dissolver at the aqueduct booster syphon.

TARGET
Project to be completed by September, 1999. Target met? No

PERFORMANCE
A new oxygen dissolver at the aqueduct booster syphon was completed slightly behind schedule in February, 2000. Better than last year? Yes

ACTION
Record the number of sewage odour complaints received.

TARGET
To achieve less than 1.5 odour complaints per 1000 connected properties. Target met? No

PERFORMANCE
An average of 2.64 odour complaints per 1000 connected properties were received for 2000/01, exceeding the target of 1.5. This was an increase on previous years. The high result was influenced by sludge odour problems experienced at Black Rock. On several occasions, significant rainfall events caused disturbance of the sludge crust formed at the surface. Following these events, the stored sludge was stabilised due to anaerobic activity. A number of methods have been trialed in response to odours, including addition of lime to lagoons and covering the odorous sludge lagoons with various combinations of lime, soil, zeolite and mulch. Better than last year? No
Continuing our quest for conservation
The continued dry throughout 1998, 1999 and 2000 forced the introduction of staged water restrictions across most of the region. Low storage levels prompted implementation of the Drought Management Plan, including the use of groundwater from the Barwon Downs borefield and an intensified conservation education program.

Barwon Water has emphasised the need for conservation during such conditions, where on hot summer days consumption can increase by as much as 25 per cent more than average. Water supply infrastructure can be stressed by such increases, particularly in tourist centres where the population can swell considerably over the peak season.

Barwon Water has had a positive approach to water conservation for many years and has been a pioneer in this area. Customers are encouraged to conserve water in a number of ways, including:

- **Schools’ education program.** An Education Officer provides information to students, conducts tours and provides lessons designed to increase student awareness of water as a finite resource and assist development of “life-long habits” to conserve water.
- **Public education program.** Barwon Water customers are kept informed about issues through regular information newsletters, brochures, media statements and community service announcements. Posters focusing on water conservation measures are available and displayed at popular events throughout the community to keep the community abreast of measures to help them “be smart” when using water.
- **Rainwater tank sales and installation service.**
- **Sale of water efficient products, such as mulch and soil conditioner.**
- **User-pays pricing system.** Customers are billed for the volume of water they use, which is an incentive to reduce water use and save money.
- **Provision of reclaimed water.** Some customers are able to reduce water use from traditional sources by using reclaimed water from sewage treatment plants.

As part of an investigation into addressing the region’s future water needs, the Water Resources Development Plan review is considering a range of demand management options. These include more regular or permanent restrictions, efficient in-home appliances and fittings, greywater use around the home, water efficient garden products and rainwater tanks.

Barwon Water is a pioneer of user-pays pricing, being the first authority in Victoria to comply with an Industry Commission recommendation to introduce two-part tariff charging for water and sewer. The introduction of user-pays has given customers more control over their water account. The size of each quarterly bill is directly linked to the volume of water consumed by the customer. Householders can save money by conserving water.

Barwon Water promotes the use of reclaimed water as an efficient use of water resources. Since evoking a Reclaimed Water Policy in 1998, Barwon Water has attracted a number of customers who now take reclaimed water on a commercial basis from several sewage treatment plants. The use of reclaimed water has continued to grow. Barwon Water’s commitment to encouraging reclaimed water use is typified by the facilitation of two research trials on food crops to satisfy industry needs and the launch of a re-use display at the Black Rock sewage treatment plant by the Minister for Environment and Conservation, the Hon. Sherryl Garbutt, MLA.

The need to encourage water conservation has created marketing opportunities. Following a recent trend for water authorities to market water conservation products and services and the appointment of a Marketing Coordinator, Barwon Water is using marketing as a strategic tool to achieve environmental corporate objectives. These objectives are to:

- **Play a pivotal role in fostering community water conservation.**
- **Develop the water conservation market.**
- **Assist with developing Barwon Water’s image as an organisation committed to environmental conservation.**
- **Position Barwon Water as an industry leader to drive and influence the water conservation industry.**

To achieve these objectives the authority has introduced a range of water saving products and services, including the supply and installation of rainwater tanks and garden mulch and topsoil. A number of additional strategies will be implemented in the future, including an expanded range of products and services.
**ACTION**
Update the Water Conservation Strategy to include the Otway region.

**TARGET**
Water Conservation Strategy to be updated by April, 1999.
Target met? No

**PERFORMANCE**
A Water Conservation Strategy had previously been prepared for Barwon Water prior to a merger with the former Otway Region Water Authority. The strategy was updated in draft form in 1999 to include actions for the Otway region, and is again under review.

Better than last year? No

**ACTION**
Carry out the actions set in the Water Conservation Strategy (ongoing).

**PERFORMANCE**
As the strategy was continually being reviewed, actions and targets developed under it were not implemented. The Water Conservation Strategy is again under review. Completion of the strategy and implementation of the actions has been included in the Environmental Management Plan for 2001/02.

The strategy focuses on the responsible management of the region’s water resources and encourages consumers to recognise that through wise and efficient use of water, the whole community can help protect the environment and conserve this valuable, finite resource.

Better than last year? No

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**ACTION**
Respond to all re-use enquiries (ongoing).

**TARGET**
To individually respond to 100 per cent of enquiries into reclaimed water use.
Target met? Yes

**PERFORMANCE**
Barwon Water frequently receives enquiries regarding reclaimed water, all of which have been handled by employees in the re-use section. These discussions have led to one new customer during the year and discussions continue with at least seven other prospective users, two of whom are awaiting the outcome of funding applications lodged with the Natural Heritage Trust.

Current re-use customers include a number of golf courses, a winery, tree plantations and turf, flower and produce farming. Reclaimed water consumption has continued to increase since projects were first implemented. As at June 30, six commercial contracts had been signed, with customer demand estimates indicating that re-use will increase to almost 15 per cent of all treated effluent produced once projects are fully developed.

Better than last year? Yes

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**ACTION**
Carry out public education of water conservation principles (ongoing).

**PERFORMANCE**
The authority’s public education program continued throughout the year, with particular emphasis on water restrictions. The community’s response to water restrictions has been extremely favourable. Domestic users answered the call for restrictions with a reduction in consumption of around 15% (1999/00 compared with 1998/99). Although restrictions were lifted during 2000/01, consumption levels have remained low.

Water conservation is the cornerstone of Barwon Water’s public education program. The authority has an Education Officer whose responsibilities include communicating efficient water use, environmental needs, water as a finite resource and reclaimed water use benefits to school children and the community generally.

Better than last year? Yes
System Review

Barwon Water has allocated resources to train some employees in environmental management system internal auditing. A number of members of the internal audit team also have received training in Quality and OH&S auditing and, as such, are 'integrated auditors'. In addition, following completion of more comprehensive five-day auditor training courses, the Senior Planner, Water Resources and Environment and Environmental Officer are qualified Associate Environmental Auditors.

In line with the authority’s certification and its Environmental Management Systems, ISO 14001, Barwon Water is required to facilitate (external) surveillance audits. During 2000/01, 14 Barwon Water sites were audited by ISO 14001 accredited body QAS. Further to this, 15 internal environmental/integrated audits were conducted at various worksites.

The Management Review Committee comprises the executive team, including the Chief Executive, and the environmental, Occupational Health and Safety and risk/quality co-ordinators. The Management Review Committee met quarterly in July, October, January and April.

The role of the committee’s environmental representative is to report the authority’s quarterly environmental performance, outcomes of audits, audit scheduling and system non-conformances. The comprehensive EMS review undertaken throughout 2001 has been fully communicated to the committee. This has included discussion on the Significant Environmental Aspects, objectives and targets and the Environmental Management Program.

To initiate further environmental performance improvement, the Management Review Committee has moved to substantially revise and re-issue the authority’s Environmental Policy during 2001/02.

Future Directions

The Environmental Management System review undertaken throughout 2001 has resulted in a new set of Significant Environmental Aspects, which will remain current until the end of June, 2004. Consequently, an Environmental Management Program for 2001/02 has been developed. This program will be updated annually.

To arrive at a new Significant Environmental Aspect list, Barwon Water’s activities relating to potential environmental impacts have been reviewed. A committee, comprising representatives from a number of branches, has considered these impacts and established a list of key areas that have the highest potential to cause significant impact. The new SEAs are:
- sludge/biosolids handling
- sewage system (mains and pump stations) operation
- sewage system odour releases
- sewage treatment plant operation
- energy management
- asset site selection
- groundwater extraction management
- bulk entitlement compliance
- trade waste discharge management.

The aspect ‘sewerage system (mains and pump stations) operation’ encompasses reticulation, rising and trunk mains, sewerage pumping stations and flow retarding facilities. In the previous list, these were addressed separately.

Gas storage leakage, catchment land management and external chemical spills were previously Significant Environmental Aspects. However, due to implementation of management practices and continued sound environmental performance in these areas, the aspects were no longer considered to have a high potential to cause significant environmental impacts.

Energy usage has been identified as Barwon Water’s new SEA. A number of actions have been developed around performance targets for 2001/02.

Although not deemed to have the potential to cause significant environmental impacts, a number of initiative actions have been included in the EMP, and will be subject to report. These are:
- supervision of contractor’s environmental responsibilities
- water conservation practices
- reservoir/storage embankment collapse, system bursts/leakages
- paper consumption and recycling management.

Actions based on these ‘initiative aspects’ represent a significant component of the EMP.
## 2001/02 Environmental Management Program  
### actions & targets

<table>
<thead>
<tr>
<th>Action</th>
<th>Target</th>
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</table>
| **Sludge/Biosolids Handling**  
Monitor local groundwater at STP sludge storage sites in accordance with set sampling program | No adverse effects on groundwater quality |
| Develop a future strategy for the long-term management of sludge produced at Barwon Water STPs | 2001/2 – $0.3 million |
| Monitor sludge transportation to Western Treatment Plant | No spills, or odour/traffic complaints received resulting from sludge transportation |
| Investigate potential reuse of WTP sludge and develop a long-term plan (Deakin Uni. Masters degree research topic sponsored by Barwon Water) | December, 2002 |
| Improve WTP sludge disposal (trial at Aireys Inlet WTP) | June, 2002, $80k |
| **Sewerage System (Mains and Pump Station) Operation**  
Contain spills from the sewerage system in accordance with set procedures | 95% of sewer spills contained within 5 hours |
| Monitor sewerage system spills and blockages | <23 sewer overflows/100km of sewer main/year, <48 sewer blockages/100km of sewer main/year |
| Continue preventative maintenance program | Foaming (40,000m), letting/Hydro-cutting (50,000m), CCTV inspections (30,000m) and smoke testing (1,500 properties) to be conducted annually |
| React to a sewer overflow to a water body in accordance with set procedures | 100% of all reportable spills reported to proper authorities |
| Undertake lining of main sewers | $1.0 million annually |
| Complete construction of ovoid sewer replacement – Stage 1 | June, 2002, $3.67 million |
| Complete design of Stage 2 of ovoid sewer replacement | June, 2002, $90k |
| Complete investigation into Southern Flow Retarding Facility – Stage 1 | June, 2002, $100k |
| Complete investigations into Lorne Flow Retarding Facility (at Lorne No 1 SPS) | June, 2002, $30k |
| Complete refurbishment of Corio Bay, Colac No.1 and Lorne No.1 SPSs | June 2002, $645k (combined) |
| Complete investigations into Skenes Creek sewerage scheme | June, 2002, $140k |
| Carry out sewer main replacement and rehabilitation as set out in the CWIP | June, 2002, $1.68 million |
| Complete investigations into Torquay Strategy – Torquay to BRSTP transfer main replacement | June, 2002, $65k |
| Complete final investigations and design into Southern Bellarine Strategy – Ocean Grove to Black Rock transfer sewer main replacement – Stage 2 | June, 2002, $4.0 million |
| Ensure all design is conducted in accordance with appropriate Codes of Practice and Industry Standards 100% of assets are designed in accordance with appropriate Codes and Standards | |

### Sewerage System Odour Releases
- Respond to all separate sewerage system odour complaints received
- 100% response to separate sewerage system odour complaints received
- Carry out sulphide monitoring program as set by Sewerage Operations in service level agreement with Scientific Services
- Completion of sulphide monitoring program
- Record the number of sewerage system odour complaints received
- <2.2 complaints/1000 connected properties/year

### Installation of dosing equipment
- June, 2002, $75k

### Complete investigations and design of oxygen dissolver at Macintyre Bridge
- June, 2002, $40k

<table>
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<tr>
<th>Action</th>
<th>Target</th>
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</table>
| **Sewage Treatment Plant Operation**  
Continue with Colac STP upgrade (Bio-P IDEA treatment process) | Completion of design, gaining of EPA Works Approvals and finalisation of construction contracts by 2001/2 |
| Operate Aireys Inlet STP in accordance with set procedures | 100% Licence compliance |
| Operate Anglesea STP in accordance with set procedures | 100% Licence compliance |
| Operate Apollo Bay STP in accordance with set procedures | 100% Licence compliance |
| Operate Bannockburn STP in accordance with set procedures | 100% Licence compliance |
| Operate Black Rock STP in accordance with set procedures | 100% Licence compliance |
| Operate Colac STP in accordance with set procedures | 100% Licence compliance |
| Operate Lorne STP in accordance with set procedures | 100% Licence compliance |
| Operate Portarlington STP in accordance with set procedures | 100% Licence compliance |
| Operate Winchelsea STP in accordance with set procedures | 100% Licence compliance |
| Prepare Environmental Improvement Plans (EIPs) for treated effluent reuse at woodlot irrigation sites | December, 2001, $200k |

### Energy Use Management
- Conduct an audit of the organisation’s energy usage | December, 2001 |
- Investigate energy consumption reduction options at plants/worksites (water supply) | June, 2002 |
- Investigate energy consumption reduction options at plants/worksites (sewage operations) | June, 2002 |
- Develop an energy conservation strategy for the organisation | December, 2002 |
2001/02 Environmental Management Program

**actions & targets (continued)**

<table>
<thead>
<tr>
<th>Action</th>
<th>Target</th>
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<tbody>
<tr>
<td><strong>Asset Site Selection</strong></td>
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<tr>
<td>Revise environmental assessment procedures for new projects and develop new procedures as required</td>
<td>Ongoing</td>
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<tr>
<td>Carry out environmental, archeological and heritage studies/surveys as required to ensure compliance with relevant legislation</td>
<td>100% of projects have studies/surveys undertaken where relevant</td>
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<tr>
<td><strong>Groundwater Extraction Management</strong></td>
<td></td>
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<tr>
<td>Ensure groundwater extraction is undertaken in accordance with the licence</td>
<td>100% compliance</td>
</tr>
<tr>
<td>Complete Stage 1 investigations into subsidence and aquifer yield at Barwon Downs</td>
<td>December, 2001</td>
</tr>
<tr>
<td><strong>Bulk Entitlement Compliance</strong></td>
<td></td>
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<tr>
<td>Comply with the requirements of the Conversion Orders</td>
<td>100% compliance</td>
</tr>
<tr>
<td>Finalise Bulk Entitlement Orders for the Barwon system</td>
<td>June, 2002</td>
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<tr>
<td>Purchase and install hydrographic equipment for flow monitoring</td>
<td>June, 2002, $50k</td>
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<tr>
<td><strong>Trade Waste Discharge Management</strong></td>
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<tr>
<td>Monitor existing trade waste customers in accordance with operating procedures</td>
<td>90% customer compliance with trade waste agreements</td>
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<tr>
<td><strong>Supervision of Contractors’ Environmental Responsibilities</strong></td>
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<tr>
<td>Conduct audits of contractors in accordance with set procedures</td>
<td>Audits conducted as required</td>
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<tr>
<td>Ensure contracts are prepared with the appropriate environmental responsibilities of contractors detailed</td>
<td>100% of contracts issued detailed contractors’ environmental responsibilities</td>
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<tr>
<td><strong>Water Conservation Practices</strong></td>
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<tr>
<td>Carry out the actions set out in the Water Conservation Strategy</td>
<td>June, 2002</td>
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<tr>
<td>Respond to all enquiries into reclaimed water use</td>
<td>100% response to enquiries</td>
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<tr>
<td>Investigate opportunities for extended reclaimed water use as part of the Water Resources Development Plan</td>
<td>March, 2002</td>
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<td>Carry out public education of water conservation principles</td>
<td>Ongoing</td>
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<tr>
<td>Investigate demand management opportunities as part of the Water Resources Development Plan</td>
<td>March, 2002</td>
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<tr>
<td><strong>Reservoir/Storage Embankment Collapse, System Bursts/Leakages</strong></td>
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<tr>
<td>Monitor reservoirs, channels and basins in accordance with set procedures</td>
<td>Zero breaches or leakages of more than 2ML/day</td>
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<tr>
<td>Operate reservoirs, carry out investigations and prepare emergency response plans for the remaining reservoirs, channels and basins</td>
<td>December, 2001</td>
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<tr>
<td>Respond to water main bursts in accordance with maintenance procedures</td>
<td>96% of water main bursts restored within 5 hours</td>
</tr>
<tr>
<td>Minimising the number of water main system bursts</td>
<td>&lt;29 bursts/100km main/year</td>
</tr>
<tr>
<td>Complete dam remedial works</td>
<td>June, 2002, $300k</td>
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<tr>
<td>Complete replacement of the ‘Five Ways’ and ‘Wynn’s’ sections of the Colac pipeline</td>
<td>June, 2002, $595k</td>
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<tr>
<td>Undertake ongoing water reticulation main replacements</td>
<td>June, 2002, $1.5 million</td>
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<tr>
<td>Monitor and model water losses from the water supply system(s)</td>
<td>&lt;150ML/100km main/year, &lt;12% system losses/year</td>
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<tr>
<td>Monitor main to meter bursts that occur throughout the system</td>
<td>&lt;5 main to meter bursts /1000 properties/year</td>
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<tr>
<td>Ensure all design is conducted in accordance with appropriate Codes of Practice and Industry Standards</td>
<td>100% of assets are designed in accordance with appropriate Codes and Standards</td>
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<tr>
<td><strong>Intermittent Decant Extended Aeration (IDEA) treatment technology</strong></td>
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<tr>
<td>Intermittent Decant Extended Aeration (IDEA) treatment technology as used at the Apollo Bay and Lorne sewage treatment plants will form the basis of the new treatment process to be introduced as part of the Colac sewage treatment plant upgrade. The Colac treatment plant upgrade will also include nutrient removal processes.</td>
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</table>
We encourage your feedback on this publication. Your comments will assist us to develop our external communication techniques on environmental performance and improve the standard of future reports.

Contact details
Name
Address
Phone
H
W
M
Email

I am interested in receiving future versions of Barwon Water's Annual Environmental Reports

Yes No

1. Overall, what was your opinion of the 2001 Environmental Report?

2. How would you assess this report in terms of:

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Comments

3. What have you identified to be the strengths of this report?

4. Have any comments in this report been addressed in more detail than necessary? Please specify

5. Are there any aspects that we have overlooked or have addressed insufficiently? Please specify

6. In what way(s) could this report be improved?

7. Did this report provide you with an insight into Barwon Water's Environmental Performance?

8. Are you a (tick more than one if appropriate)

   - [ ] BW customer
   - [ ] BW employee
   - [ ] Student
   - [ ] Teacher/university lecturer
   - [ ] Industry peer
   - [ ] Special interest group member (e.g. Environmental organisations)

9. Other comments

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   -
   -
   -
   -
   -
Other environmental publications

- Aireys Inlet Sewage Treatment Plant
- Anglesea Sewage Treatment Plant
- Apollo Bay Sewage Treatment Plant
- Bannockburn Sewage Treatment Plant
- Barwon River Environment Trail
- Barwon River Fauna
- Barwon River Flora
- Black Rock Sewage Treatment Plant
- Bostock Reservoir Fact Sheet
- Chlorination
- Chloramines and Fish
- Environment Strategy
- Geelong and the region’s Water Supply
- Lorne Sewage Treatment Plant
- Nutrient Management Study
- Planting Guide - A guide to the planting of trees and shrubs near drains and sewers
- Primary School Education Kits
  - The Water Cycle
  - The Great Water Cycle CD-Rom
- Recreational Areas
- Risk Management Strategy
- Secondary Education Kits
  - Sewage: What a Great Waste! CD-Rom and Teachers Guide
- Use Water Wisely
- Water Conservation in the Home
- Water Cycle cd-rom
- Water Resources Development Plan - Bulletins
- Water Resources Development Plan - Fact Sheets
- Water Restrictions
- Water Strategy
- Waterwatch Education Kit
- West Barwon Reservoir Fact Sheet
- Winchelsea Sewage Treatment Plant Fact Sheet
- Wurdee Boluc Reservoir Fact Sheet
- Yollinko Park Aboriginal Garden
- 7 Secrets to a Wonderful Garden
- 7 Star Service Series
  - education
  - conservation
  - efficiency
  - environment
  - re-use

Legend
- Area of Responsibility
- Lakes & Non-Barwon Water Reservoirs
- Barwon Water Reservoirs
- Water Treatment Plants
- Sewage Treatment Plants
- Groundwater Production Wells
- Water Channels & Pipelines
- Water Service Basins