1994

(No. 29)

1994

PARLIAMENT OF TASMANIA

AUDITOR-GENERAL SPECIAL REPORT No. 8

WASTEWATER MANAGEMENT IN LOCAL GOVERNMENT

No. 8 of 1994 — October 1994

Presented to both Houses of Parliament in accordance with the provisions of Section 57 of the Financial Management and Audit Act 1990

By Authority:
G. C. PRIESTLEY, Government Printer, Tasmania

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13 October 1994

The Honourable J Stopp
President
Legislative Council
HOBART

The Honourable G Page
Speaker
House of Assembly
HOBART

Dear Mr President
Dear Mr Speaker

In accordance with the provisions of Section 57 of the Financial Management and Audit Act 1990, I submit the Auditor-General's Special Report No 8 on Wastewater Management in Local Government.

Yours sincerely

A J McHugh
AUDITOR-GENERAL

CONTENTS

INTRODUCTION

This performance audit into local government wastewater management practices in Tasmania (refer page 18 for definition of wastewater management) has been carried out under the provisions of Section 44(b) of the Financial Management and Audit Act 1990. This section states that the Auditor-General may "carry out examinations of the economy, efficiency and effectiveness of Government departments, public bodies or parts of Government departments or public bodies". The conduct of such audits is a component of a comprehensive audit process adopted by Audit offices within Australia and overseas.

As a result of the relationship between water consumed and its subsequent disposal through council sewerage systems, it was evident that the project should also cover water usage. The project was chosen because of its current public interest and significance in terms of its present and future costs which must be borne by ratepayers and the effect on the environment. The project has also drawn heavily from the Industry Commission reports "Water Resources and Waste Water Disposal", July 1992, "Taxation and Financial Policy Impacts on Urban Settlement", April 1993.

Statewide, wastewater involves in excess of $30 million of recurrent council expenditure (19% of total ordinary services and trading activity expenditure) and in excess of approximately $1 035 million of capital invested in wastewater systems throughout the State. Expenditure on water accounts for a further 17% of recurrent council expenditure (Source: Australian Bureau of Statistics).

The prime source for the information contained in this report was a questionnaire (refer Appendix C) distributed to all councils on 2 April 1994 of which 90% (26/29) were returned.

The review was based upon an analysis of the wastewater management practices and procedures which were in operation at each council at the time the questionnaire was completed. The accuracy of the information provided was tested by a review of council documentation, discussions with council officers and through inspections of a large number of wastewater treatment plants.

The Department of Environment and Land Management (DELM) has been included in the review under the "compliance with licence conditions" and other policy formulation aspects of the audit. Regular discussions have been held between DELM and Audit officers in relation to various aspects of the subject including DELM's role in the process. DELM has also participated in the completion of this review by providing documentary information on aspects of wastewater management, facilitating Audit perusal of files on council wastewater treatment plants and by taking Audit staff to a site inspection by Departmental officers.

Bulk water suppliers - Department of Primary Industry and Fisheries (Rivers and Water Supply Commission), Hobart Regional Water Board and North West Regional Water Authority - have also been included in this review under the "reduction of water usage" criterion.

The review has been performed in accordance with Australian Auditing Standards and included tests and other procedures considered adequate to support the findings reported. The recommendations made in the report are provided by Audit for the information of municipal managers and elected representatives, DELM, the bulk water suppliers, Parliament and the public generally. Consequently, Audit has no responsibility to implement recommendations although it is usual practice to undertake future reviews to assess improvements and developments that may have taken place.

SUMMARY OF KEY FINDINGS

WASTEWATER

In Tasmania there are presently 78 licensed wastewater treatment systems operated by councils of which approximately 3% provide no treatment, 1% provide treatment to a partial primary level, 7% to a primary level, 86% to a secondary level and 3% to a partial tertiary level.

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Twenty three (23 of 26, 88%) councils have experienced problems with regard to stormwater infiltration and inflow (I/I) and fifteen (15/26, 58%) have conducted stormwater I/I studies and/or other testing.

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Councils which have I/I problems should undertake preliminary investigations and then I/I reduction studies or investigations if cost effective. Audit recommends that councils should act to require property owners to rectify illegal connection defects.

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Only ten (10/26, 38%) councils have trade waste agreements in existence, of which only six (6/26, 23%) have a trade waste by-law.

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Eight councils (8/26, 31%) are currently reusing or conducting trials into the reuse of biosolids and eight councils (8/26, 31%) are currently reusing or conducting trials into the reuse of effluent.

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WATER PRICING

Councils in Tasmania should consider the adoption of a user pays pricing system for water consumption.

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The Hobart Regional Water Board should consider whether the charging policy in the Hobart Regional Water Act 1984 requires amendment.

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The extent of supply of free water as a "community service obligation" should be reconsidered.

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Councils should consider requiring that water meters be installed in all new subdivisions.

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Councils that are predominantly metered should consider adopting a user pays approach as soon as is practicable.

(Page 52)

Councils that are predominantly unmetered should consider requiring the installation of meters on those properties that are high water users. These users should be charged under a user pays system.

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INFORMATION FOR WATER CONSUMERS

Audit supports the Tasmanian bulk supply authorities in their efforts to promote National Water Week 1994, and encourages all councils to participate.

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Councils should give consideration to providing consumers with information on how to be more water efficient.

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WASTEWATER TREATMENT COST MANAGEMENT

Audit supports the conclusions of the Industry Commission, that charges for sewerage services should be sufficient to cover operating, maintenance, administration and depreciation costs and to provide a rate of return on assets.

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All Tasmanian councils should participate in the Tasmanian Water Supply and Sewerage Scheme Performance Programme. In addition, the Department of Primary Industry and Fisheries (Rivers and Water Supply Commission) should reconsider the relative priority for this programme *vis a vis* other programmes before abandoning it.

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Audit recommends that councils should take steps towards the development and implementation of appropriate performance measures for waste water and water management for inclusion in reports to Council and in their published annual reports.

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The Government should urgently determine its policy on whether to give unambiguous power to councils and water boards to charge for infrastructure and if approved, provide guidelines for how the charges should be calculated.

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ENVIRONMENTAL ASPECTS

A large proportion of the 78 licensed wastewater treatment plants in Tasmania are not complying with the Environment Protection (Water Pollution) Regulations 1974. The majority of these plants are lagoon systems.

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Audit supports the regulatory agency (DELM) publishing on a regular basis, details of monitoring results of compliance/non-compliance of individual councils with licence conditions of wastewater treatment plants. Audit recommends that councils be required to disclose details of non-compliance in their annual reports.

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WASTEWATER TREATMENT PLANT OPERATOR TRAINING

Survey results indicate that, for the responding councils, in the last twelve months 41% of wastewater treatment plant operators received no training. Audit considers that all wastewater treatment plant operators should be provided with ongoing training.

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RESPONSES FROM DEPARTMENT OF ENVIRONMENT AND LAND MANAGEMENT AND MUNICIPAL ASSOCIATION OF TASMANIA

The body of the Report contains a number of specific references in respect of individual findings made by respective managements whilst the general responses by the Department of Environment and Land Management and Municipal Association of Tasmania (also known as the Local Government Association of Tasmania) are contained below. Responses by councils, government departments/agencies, water boards and other applicable organisations have been included at the relevant section of the Report.

GENERAL RESPONSE provided by the Director of Environmental Management, Department of Environment and Land Management.

"I would like to comment that the Department has been pleased that this report has been initiated and have been more than happy to provide assistance to the Audit Department throughout the project. I consider reports such as this and the report produced last year on municipal solid waste management play a key role in the dissemination of information about these issues and provide clear direction within which those organisations involved can take further action."

GENERAL RESPONSE provided by the Executive Director, Municipal Association of Tasmania (also known as the Local Government Association of Tasmania).

"In general, I have found the Report to be framed in positive terms, seeking to highlight 'best practice' and so offering positive suggestions which can be followed by councils which are performing to lower standards.

There is one general comment that perhaps could be included in the report. This is some explanation of the reasons for the change in basic philosophy that is now evident in public sector accounting. Once it was standard practice for cross subsidisation to occur from one section of the community to another. Currently, it appears as though each section should meet its own costs in full, with sectors which are more costly to service not being cross subsidised from 'additional' receipts earned where services can be provided at lower costs. Many councillors recognise the change in practice that has occurred, but do not understand why. The apparent anomaly is reinforced when it is recalled that personal income tax is still calculated on a sliding scale according to 'ability to pay', which means that in effect the 'rich' subsidise 'the poor'.

In similar vein, an explanation in easily understood terms of why Community Service Obligations should be made explicit and transparent, rather than simply 'accepted' as an uncosted 'public benefit' would be of assistance to many readers of the final report."

GENERAL RESPONSE provided by the Acting Executive Director, Hobart Metropolitan Councils Association (HMCA)

"HMCA member Councils have been consulted and the draft has received generally satisfactory comments ...".

AUDIT OBJECTIVES, SCOPE AND TIMING

AUDIT OBJECTIVES

The audit objectives were to review local government wastewater management practices and policies under three broad classifications, on a statewide basis, and to determine whether procedures and mechanisms exist which ensure efficient, effective and economic wastewater discharge and disposal. Procedures and mechanisms that should be in place include:-

Minimisation Of Inflows And Outflows

Wastewater minimisation strategies to increase the life of components of sewerage systems and result in more efficient and effective use of such systems, including:

- reduction of stormwater infiltration;
- trade waste agreements with industries;
- reuse of effluent and biosolids;

Reduction Of Water Usage

Strategies for the reduction of water usage as the level of water consumption directly impacts on the volume of wastewater entering sewerage systems.

Cost Management

The monitoring of the costs and revenues of wastewater management is necessary to ensure informed management decisions are made. Cost management has been included within the scope of the audit as it is a means through which the economy, efficiency and effectiveness of wastewater management activities can be monitored and controlled. Cost management covers such areas as:-

- charging and pricing for sewerage services;
- providing for future capital programs;
- establishment of performance indicators; and
- headworks developer contributions.

Environmental Aspects

This area focuses on the impact of wastewater management practices upon the environment. Environmental aspects include:-

- compliance with licence conditions; and
- adequate qualifications and training of operators.

SCOPE OF THE AUDIT

The scope of the audit covered all council wastewater treatment systems within the State. The review did not cover industrial waste, stormwater or wastewater treatment systems operated by industry or other authorities, other than to the extent that they enter and are disposed of through council systems.

The review dealt only with the existing position whereby the supply of water to some municipalities is regionalised but wastewater treatment is not. Audit understands that the strategic question of the extent to which these services should be regionalised or delivered by individual councils, will be the subject of enquiry as part of the current review of functions performed by the state and local governments.

Initial discussions were held with officers of a number of councils together with senior staff of DELM.

On 2 April 1994, Audit distributed a detailed questionnaire to each of the twenty-nine councils. Despite numerous requests, those councils whose questionnaire had still not been received at the time of finalisation of this report were:-

Break O'Day Council
Glamorgan-Spring Bay Council
Huon Valley Council

The Tasman Council responded that it did not operate a wastewater treatment plant, limited sewerage scheme or a domestic water supply and that there are no plans to develop this type of infrastructure within the foreseeable future.

Subject to the above exceptions, the information provided by the councils has been processed and included in all analyses and calculations.

All responses were reviewed by Audit for overall reasonableness. Unusual or inconsistent responses were investigated and resolved with the council concerned.

Over the course of the project, discussions on various aspects of the review were held with staff of the following councils.

Burnie City Council
Central Coast Council
Clarence City Council
Devonport City Council
Glamorgan-Spring Bay Council
Glenorchy City Council
Hobart City Council
Kingborough Council
King Island Council
Launceston City Council
Meander Valley Council
New Norfolk Council
Northern Midlands Council
Waratah-Wynyard Council
West Tamar Council

In addition, inspections of wastewater treatment systems of a number of councils were conducted.

Discussions were also held with senior officers of:

Australian Bureau of Statistics
Department of Community and Health Services
Department of Environment and Land Management
Department of Primary Industry and Fisheries (Rivers and Waters Supply Commission)
Hobart Metropolitan Councils Association
Hobart Regional Water Board
Local Government Industry Training Board
Local Government Office
Melbourne Water
Municipal Association of Tasmania (also known as Local Government Association of Tasmania)
North West Regional Councils Association
North West Regional Water Authority
Office of the Ombudsman

AUDIT RESOURCES AND TIMING

The project was selected in November 1993, the preliminary survey was commenced in December 1993 and the project was designated as a performance audit in late January 1994. Surveys were forwarded to councils on 2 April 1994 and the fieldwork was completed in July 1994. A draft report was issued for comment in August 1994.

The cost of the audit was $25 000 which includes salaries and related on-costs, office overhead expenses and the cost of producing the Report.

BACKGROUND

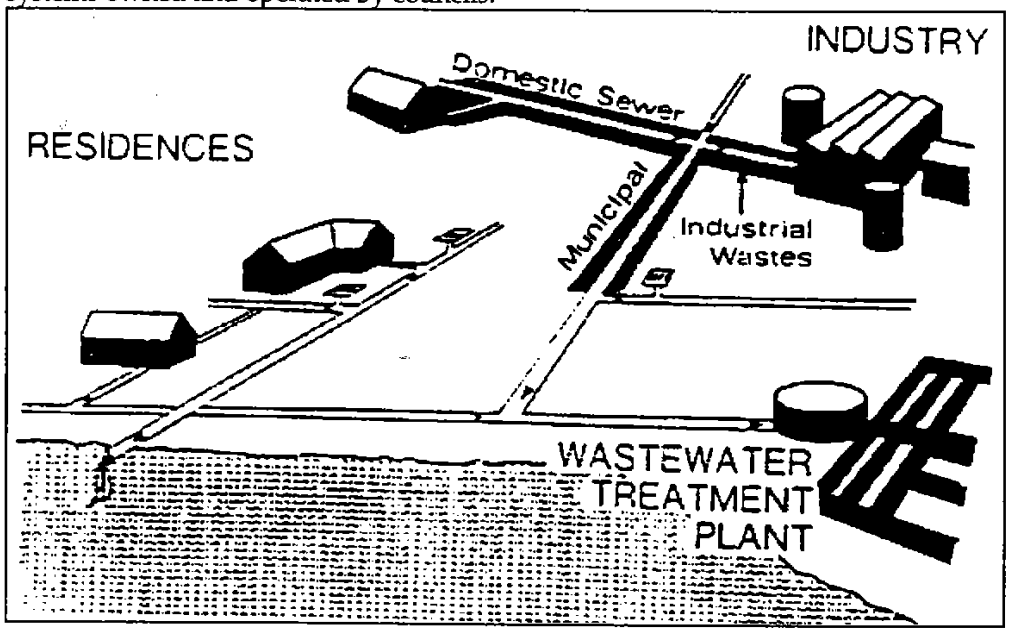
WASTEWATER AND WASTEWATER TREATMENT

The need for a sewerage system and wastewater treatment is directly related to the public health of the community by the prevention of the water-borne transmission of disease and prevention of pollution of the environment.

Natural processes have the capacity to absorb some measure of pollution of waterways by means such as evaporation and transpiration, dilution, turbulence and wave action, which repurify and restore the desirable conditions of clean water. If there is too much waste entering a receiving water, the natural purification process will not be able to take care of it all, which has effects including:-

- Oxygen depletion of natural waters, with adverse effects on the fish and other aquatic life.
- Eutrophication of the waters from excessive nutrient levels leading to the excessive growth of aquatic plants.
- Bacterial contamination of the food chain and recreational waters.
- Unsightly and smelly material floating on, or washed up on the edge of, rivers, lakes, estuaries and the sea.

Sewerage systems are networks and facilities for wastewater collection and conveyance, treatment and disposal. This study was concerned with sewerage systems owned and operated by councils.



TYPES OF WASTEWATER
SOURCE: WATER VICTORIA - CERTIFICATE IN WATER OPERATIONS -WASTEWATER INTEGRATED PACKAGE

The liquid contents within the sewerage system are known as wastewater or sewage. Sources of wastewater are primarily domestic (human and household wastes) and industrial (wastes from industrial processes). The term wastewater is used in this report in preference to the alternative term of sewage.

Wastewater is a grey liquid that contains a small quantity of solid material carried along in the flow or dissolved in it. It is generally composed of 99.9% water and only 0.1% solids. Its smell and appearance has been likened to that of used soapy dishwater. The undissolved solid material includes faeces, paper, rubbish, rags and other materials.

The solids in wastewater can be divided into two general groups:

- **Organic Solids** - from animals and plants. These will usually decay or decompose, and
- **Inorganic Solids** - that will not decay or decompose.

Wastewater also contains small and varying amounts of dissolved gases. Dissolved oxygen is the most important in terms of wastewater treatment.

Both organic and inorganic solids can be either suspended or dissolved in wastewater.

- Suspended solids are those that can be seen in suspension in the wastewater and can be removed by physical and mechanical processes such as settling, screening or filtering. Examples are faecal solids, paper, food, grit etc. **Non-Filterable Residue (NFR)** is a measure which records the quantity of solid material carried in suspension in the wastewater flow. Raw domestic wastewater contains between 150 and 300 grams in each cubic metre (g/m^3).
- **Dissolved organic solids** are those that are actually in the liquid and can only be removed by chemical and biological processes. Examples are the urea from urine, sugar, synthetic detergents etc.
- **Dissolved inorganic solids** generally pass through the treatment processes unaffected e.g. common salt.

Organic solids in wastewater are a major food source for microscopic living organisms including bacteria. There are three main types of bacteria that can be found in wastewater or a watercourse:

- **Aerobic bacteria** - need dissolved oxygen or air to reproduce and grow.
- **Anaerobic bacteria** - can live only when there is no dissolved oxygen present.
- **Facultative bacteria** - can live either with or without dissolved oxygen present.

The kind of bacteria that will be present in a stream or in wastewater will depend on the amount of dissolved oxygen available. The number of bacteria will depend on the amount of food (organics) available, as well as other environmental conditions.

When dissolved oxygen is used up anaerobic bacteria become active, while facultative bacteria continue to work. This kind of situation is not desirable in a receiving water or conventional treatment plant because it produces septic conditions with associated foul odours. Anaerobic conditions are prevented by re-aeration through processes like wave action and turbulence.

The removal of organics to prevent overloading problems and oxygen depletion in the receiving waters is the main purpose of wastewater treatment. In biological treatment processes, natural sequences are compressed in time and space, in an environment that favours areobic rather than anaerobic decomposition.

Biochemical oxygen demand (BOD) is a measure of the biological consumption of oxygen in water, especially as a result of the breakdown of organic matter by bacteria. It is measured as a **Biochemical Oxygen Demand (BOD_5)** over a five day period under controlled conditions on a sample of wastewater. The oxygen demand for raw domestic wastewater ranges from 150 to 300 grams for each cubic metre (g/m^3).

The bacteriological content of wastewater from bodily wastes consists of a range of micro-organisms including bacteria, viruses and protozoa. The main indicator organism, however, to identify human faecal pollution is ***Excherichia coli*** often referred to as faecal coliforms. Raw wastewater contains between 10 million and 100 million faecal coliforms in each 100ml. It is important to prevent these organisms entering waters used for drinking, food production and recreation by treating wastewaters before they are discharged. Chlorination is one treatment method commonly used for killing these organisms. Another common method is to keep the effluents contained in a large pond or lagoon for a long period (greater than 30 days) so that the organisms may die off naturally.

Councils construct wastewater treatment systems designed to meet the needs of the area they serve. These requirements are determined by the size of the population, the amount and type of commercial and industrial activity in the area, community preferences and environmental requirements.

Treatment plants use processes that progressively reduce the effect of the discharged wastewater flow on the environment. The treatment process can be generally categorised into the following stages:

- **Pre-Treatment** involves the removal of larger materials coming in with the wastewater. This protects pumping equipment and helps out in later treatment processes.

- **Primary** treatment is the process in which wastewater is settled so that solids can sink to the bottom and oil, fats and grease can float to the surface for removal.

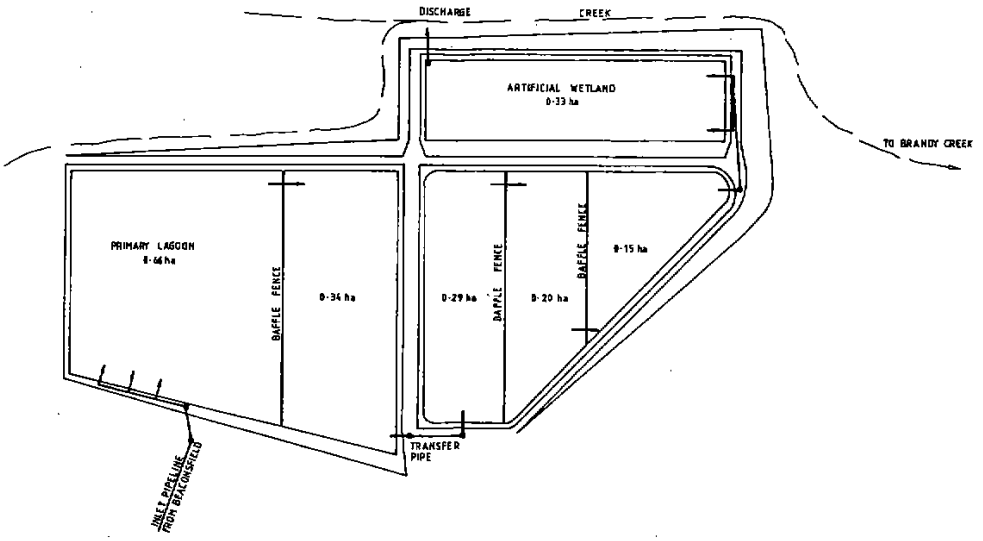
- **Secondary** treatment consists of two processes. The first process biologically decomposes dissolved or suspended organic materials into a more settleable

form. The second process separates the solids from the liquid. Chlorine or some other disinfectant is usually added to the effluent before it is put into receiving waters.

- **Tertiary/Nutrient Removal** involves chemical and biological treatment and the removal of nitrogen and phosphorous.

There are a variety of different types of wastewater treatment systems in operation in Tasmania, the more common types of which are:

- **Lagoon systems** - a system of shallow manmade ponds in a series which utilize natural biological processes for the reduction of organic matter and long detention times to allow the natural die off of pathogenic organisms in wastewater.

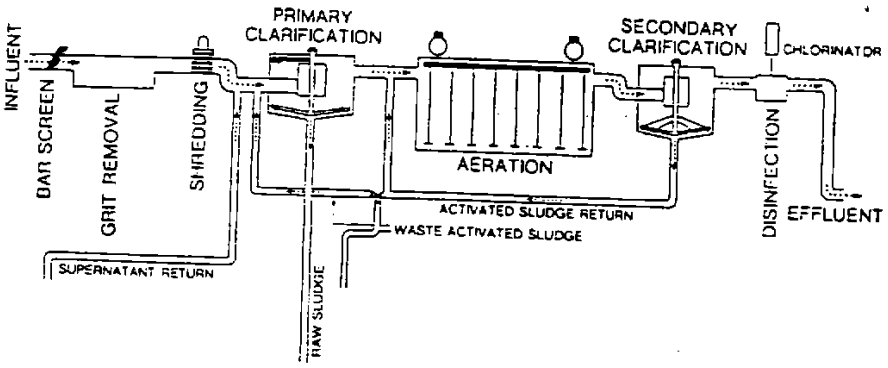


LAGOON SYSTEM

SOURCE: WEST TAMAR COUNCIL

- **Mechanical/Biological systems** - consist of the application of artificially created and controlled biological processes in which large numbers of micro-organisms, within a relatively small container, remove organic material from wastewater. Such treatment plants are designed to maintain a large active mass of bacteria within the system confines.

Aerator -Ti-Tree Bend - Launceston City Council



Steps to End of Secondary Treatment

ACTIVATED SLUDGE TYPE TREATMENT PLANT
SOURCE: WATER VICTORIA - CERTIFICATE IN WATER OPERATIONS, WASTEWATER INTEGRATED PACKAGE

Based on information provided by DELM, as at August 1994 there are 78 licensed wastewater treatment systems operated by councils in Tasmania of which approximately 3% provide no treatment, 1% provide treatment to a partial primary level, 7% to a primary level, 86% to a secondary level and 3% to a partial tertiary level.

Details of plants which provide treatment to a level less than secondary are as follows:

No Treatment:

Council	Plant Location	Outfall Point
Hobart	Long Point	Blinking Billy
King Island	Currie	Bass Strait

Partial Primary:

Council	Plant Location	Outfall Point
Devonport	Pardoe Downs	Bass Strait

Primary Treatment:

Council	Plant Location	Outfall Point
Burnie	Round Hill	Bass Strait
Burnie	Cooee Point	Bass Strait
Central Coast	Dial Point	Bass Strait
Central Highlands	Wayatinah	Nil
Kingborough	Snug	North West Bay
Sorell	Sorell	Pittwater

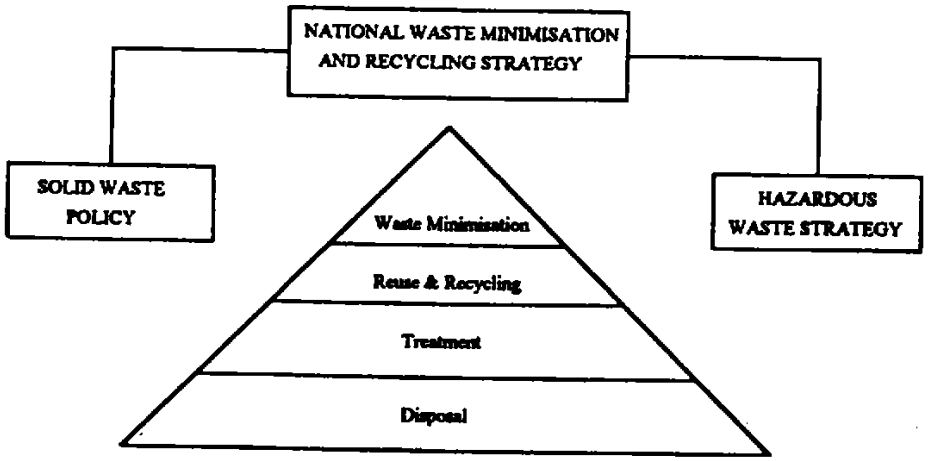
What Is Wastewater Management?

Council wastewater management encompasses the practices by which councils provide for the collection, transfer, treatment and disposal of wastewater.

The Tasmanian Hazardous Waste Management Strategy issued in May 1994 suggests a hierarchy of waste management priorities which can also be applied to wastewater management. It states that:

> "... In order of preference, options selected should be:
>
> - waste minimisation - practices which prevent or reduce the generation of waste altogether;
> - waste reuse and recycling - direct reuse of the same material or the incorporation of that waste into other processes;
> - waste treatment to reduce hazard or nuisance - preferably at the site of generation; and
> - waste disposal.
>
> In the above hierarchy, the first two stages should always be the preferred approach, being selected instead of waste treatment or disposal options. ..."

TOTAL WASTE MANAGEMENT STRATEGY OUTLINE



SOURCE: DELM TASMANIAN HAZARDOUS WASTE MANAGEMENT STRATEGY

The performance of sewerage systems is dependent upon three issues of management:

> **"...Waste minimisation:** ... to reduce the quantity of wastes generated.
>
> **Source control:** To achieve a high quality of effluents, wastes which enter the sewer must be controlled. It is important that the treatment processes used, and the wastes treated are compatible.
>
> **Operation:** The competence of the operation of sewerage systems is the factor which will most influence the performance of the schemes...."
>
> (WASTE MANAGEMENT AND ENVIRONMENTAL JOURNAL - MARCH 1993 "PROCESSING OF SEWAGE WASTES")

Legislation Governing Wastewater Management

Wastewater management in Tasmania is mainly regulated by the following:-

- Local Government Act 1993
- Environment Protection Act 1973
- Environment Protection (Water Pollution) Regulations 1974
- Sewers and Drains Act 1954
- Building Regulations (Tasmania) 1978
- Water Act 1957

Local Government Act 1993

The Local Government Act 1993 requires councils to provide appropriate services to meet the needs of the community. This Act also requires councils to efficiently and

effectively manage the resources of the municipal area and to contribute to the community's health, safety and welfare requirements.

This Act gives councils the authority to make a service rate and/or a service charge on rateable land for any services provided, including water supply and wastewater removal.

Sewers and Drains Act 1954

Under the Sewers and Drains Act 1954 councils are required to provide common sewers to drain the municipal area and to effectively deal with the contents of those sewers through wastewater disposal works with the objective of preserving the health of the community.

Environment Protection Act 1973

DELM is responsible for the administration of the Environment Protection Act 1973 (EPA 1973). Under this Act, DELM is responsible for the issue of licences for wastewater treatment plants and the monitoring of the conditions specified in the licence.

Section 12 (5) requires councils to use their powers to prevent or mitigate pollution of the environment (land, water and atmosphere of the earth) within their municipal districts.

In accordance with Section 22A of the EPA 1973, wastewater treatment plants, including sewer outfalls, having a normal dry weather flow greater than 25 kilolitres (100 kilolitres prior to 1990) per day are defined as "scheduled premises". Scheduled premises are not permitted to operate unless they are licensed to do so by DELM. Plants not requiring a licence under the EPA 1973 are required to be approved by the Division of Public Health of the Department of Community and Health Services.

Under Section 25(1) of the EPA 1973 DELM may attach certain conditions, limitations and restrictions to a licence. Licence conditions imposed by DELM include both standard and specific conditions. Standard conditions include the following:

- premises to be operated in accordance with the EPA 1973;
- a record of all odour complaints against premises shall be kept in a bound volume;
- sample procedures and testing to be in accordance with the EPA 1973 and
- approval for the treatment and disposal of sludge.

Specific conditions of licences include the following:

- maximum normal dry weather flow of wastewater to be treated per day, and
- approved discharge points for wastewater effluent.

DELM is responsible for the monitoring of compliance with the licence conditions. This is done through a process of self monitoring whereby councils are required to submit the results of samples of the plant's final effluent on a monthly basis.

The effluent which is discharged from a treatment plant is required to comply with quality standards as set out in the Environment Protection (Water Pollution) Regulations 1974.

Section 29 of the EPA 1973 requires the approval of DELM for changes by a licensee to any process used, nature or quantity of materials dealt with or used, that might substantially increase the emission of pollution on the scheduled premises.

Ministerial exemptions

Under the EPA 1973 operators can be exempted from compliance with these conditions by the Minister for Environment and Planning. It was Government policy that the need for such exemptions be removed by 30 June 1994. However, this was subject to the introduction of new environmental legislation (Environmental Management and Protection Bill) by 1 July 1994. As the Bill had only passed the Lower House at that time, it was necessary for those Ministerial exemptions that were still current at 30 June 1994 to be renewed until such time as the new legislation came into effect.

Building Regulations (Tasmania) 1978

These provide regulations in relation to "Discharges into Sewers"

Recent Developments

In 1993 the government undertook a program of legislative reform in relation to environmental management and planning. The program aimed to establish an integrated resource management system for Tasmania. The system included the Land Use Planning and Approvals Package and the Environmental Management and Pollution and Control Act 1994.

The Land Use Planning and Approvals Package includes five pieces of legislation.

- The State Policies and Projects Act 1993, provides for "state of the Environment Reporting", the assessment of projects of State significance and establishes an Advisory Council to advise the Minister on any such issues.

- The Resource Management and Planning Appeal Tribunal Act 1993 establishes the Resource Management and Planning Appeal Tribunal and provides for related matters.

- Land Use Planning and Approvals Act 1993 makes provision for land use planning and approvals.

- The Land Use Planning and Approvals (Consequential and Miscellaneous Amendments) Act 1993 provides for amendments as a result of the enactment of the three previously mentioned Acts.

- The Approvals (Deadlines) Act 1993 aims to establish a framework for expeditious Government approvals.

Environmental Management and Pollution Control Act 1994

The Environmental Management and Pollution Control Act 1994 will no longer provide for Ministerial Exemptions. Instead, premises not meeting specific standards will be required to prepare an Environmental Improvement Program (EIP). The EIP is a publicly available document which details the program of environmental improvement to be undertaken within a specific timeframe (maximum of three years). The EIP is approved by the Board of Environmental Management whose decision is appealable. The transitional provisions of the new legislation provide that a program approved by the Minister for Environment and Land Management under the Environment Protection Act 1973 is deemed to be an EIP under the new Act.

Government policy initiatives

DELM is presently working on a State Water Policy based on the "Australian Water Quality Guidelines for Fresh and Marine Waters" released in November 1992 by the Australian and New Zealand Environment and Conservation Council (ANZECC). This policy will replace the current Environment Protection (Water Pollution) Regulations 1974 and will move the emphasis towards the collective impact of discharges on the receiving environment rather than the present standards which assess each discharge point separately.

Discharge levels are to be based on the assimilative capacity of the receiving medium, consistent with no environmental harm. In certain areas where the quality of the environment has degraded below the quality objectives, improved treatment procedures by those premises responsible for the degradation would be required and landcare/rehabilitation programs would be necessary for diffuse sources of pollution. In addition to "end of pipe" regulations, DELM is emphasising the need for all scheduled premises to have environmental objectives of pollution prevention through improved clean (treatment) technologies and waste minimisation.

In September 1994 a discussion paper "A Proposed Tasmanian Sustainable Development Policy on Water Quality Management" was released by DELM to Government Agencies for comment.

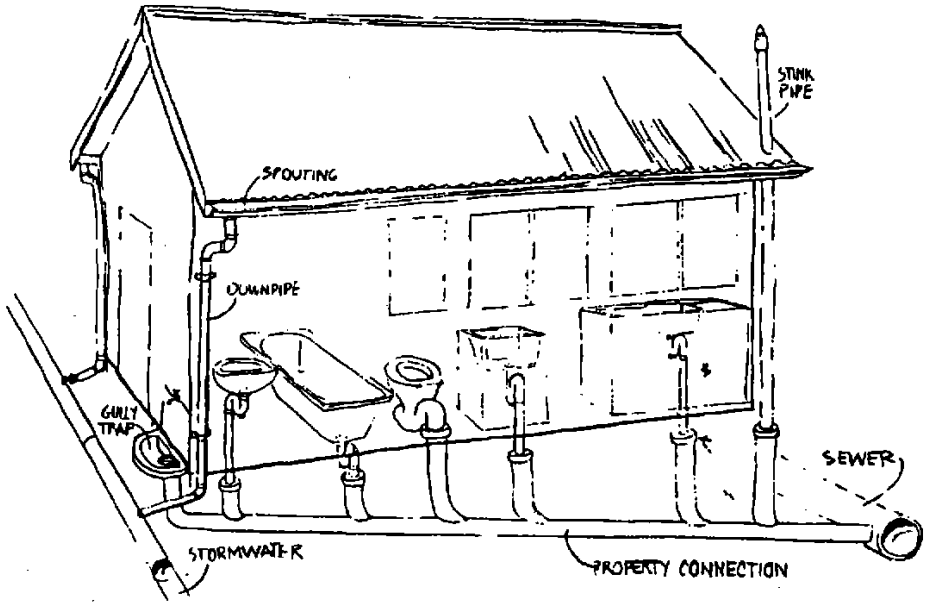
PART 1 - MINIMISATION OF INFLOWS AND OUTFLOWS

Audit examined the mechanisms employed by councils to minimise the amount of wastewater entering the system and being disposed of after treatment. The principal methods used are to control the amount of wastewater entering the system and to reuse rather than dispose of, the by-products of wastewater treatment.

REDUCTION OF STORMWATER INFILTRATION

Introduction

Stormwater is the rainwater that falls on house roofs, driveways, paths and roads. It is carried away in a system of stormwater drains that are separate from the sewerage system. Under Section 40(3)(d) of the Sewers and Drains Act 1954, the discharge of concentrated natural water into a restricted sewerage system, declared under Sections 4 to 6 of the Act, is not permitted.



DOMESTIC STORMWATER AND WASTEWATER CONNECTIONS
SOURCE: URBAN WATER RESEARCH ASSOCIATION OF AUSTRALIA

Faulty connections and the illegal connection of stormwater drains to sewerage systems are problems faced by councils all over Australia. The NSW Government's "Water Supply and Sewerage Management Guidelines" published in April 1991 mentions problems caused by:

- "...Flow due to illegal and faulty connections to the sewer system such as roof downpipes and patio drains connected to the sewer and surface fittings which allow entry of surface

water such as cracked yard gullies, inspection openings and low and unsealed manhole lids.

- Flow due to rainwater and surface runoff flowing down through uncompacted sewer and house line trenches and flowing into the system through cracks and faults in the sewer and house line pipes. "

The degree of the problem of stormwater infiltration and inflow (I/I) is directly related to the amount of rainfall.

Problems Caused By Stormwater

Stormwater I/I into a sewerage system can cause the following problems:

- Bring forward the need for treatment plant, pump station and main upgrading works
- Increase the size and cost of wastewater treatment plants to cope with the increased flows during storm periods
- Increase the operating and maintenance costs for pumping stations and treatment plants
- Increase in operating time resulting in reduced life of pumps
- Sewer overflows during storm periods
- Increased likelihood of interruptions to the treatment processes

Wastewater treatment is an expensive process and the cost of the facilities is closely associated with the amount of the flow. It is therefore, important to assess the performance of a sewerage system before planning a major upgrade or extension to an existing sewerage system. An investigation of I/I should be conducted when planning the upgrade or extension, to identify the extent of problems and to enable a cost-effective solution to be found. I/I investigations should also be undertaken where there are problems with pollution from sewerage systems with serious sewer overflows. It is for these reasons that efforts to reduce I/I are generally economically justified. Surveys involving flow measurement at night (to assess infiltration), flow measurement during storms and smoke testing to identify sources of inflow are often undertaken.

The Tasmanian Situation

Councils were asked by Audit to give details of any problems experienced with stormwater I/I and whether they had conducted any stormwater I/I studies and/or other forms of testing in an attempt to identify the sources and to reduce I/I. Twenty three (23/26, 88%) councils replied that they have experienced problems with regard to stormwater I/I. Of those councils six (6/26, 23%) have conducted stormwater I/I studies and nine (9/26, 35%) have conducted other forms of testing. Other forms of testing conducted include smoke testing, dye testing, manhole inspections and spot checks. Recent stormwater infiltration and inflow studies

undertaken by the West Tamar and Devonport City Councils illustrate the potential savings that can be achieved through reductions in I/I.

Experience At West Tamar Council

As early as 1982 the West Tamar Council was aware of increases in flows to the Riverside sewerage treatment plant after storm events. A report to council by consulting engineers in May 1982 revealed that peak wet weather flows were up to six times the average dry weather flows and indicated that the major cause was the illegal direct connection of stormwater drains to sewers. This problem, together with the growth in the Riverside area meant that the level of I/I entering the system exceeded the capacity of the sewers. In 1989 the consulting engineers were commissioned by Council to undertake a stormwater infiltration and inflow study of the Riverside sewerage system.

According to their report dated January 1990, the purpose of the investigation was to:

- quantify the amount of I/I entering the Riverside sewerage system;
- determine the predominant type of I/I;
- isolate areas with excessive I/I; and
- develop a long-term I/I reduction program for the Riverside sewerage scheme based on the amount of I/I that can be cost effectively reduced.

The study area was divided into 5 subcatchments to allow isolation of areas with excessive stormwater I/I and a flow monitoring program was undertaken to determine the sources of I/I. A cost effectiveness analysis was then undertaken to determine the extent of testing and consequential rehabilitation works to locate and correct all illegal connections and major faults that should be undertaken. Three levels of I/I testing and rehabilitation works were considered in the cost effectiveness analysis as follows:

Type of Testing Undertaken	Level of Rehabilitation Works		
	Level 1	Level 2	Level 3
Smoke testing	YES	YES	YES
Manhole inspections	YES	YES	YES
Flow isolation	YES	YES	YES
Internal inspection of council sewers using closed circuit television (up to private property line)	NO	YES	YES
Inspection of all system defects including private property house connections	NO	NO	YES

SOURCE: CONSULTING ENGINEER'S REPORT 1990

Smoke testing is used to identify faulty and illegal connections etc. It involves the forcing of smoke into the sewer, which then escapes through illegal connections, leaks, breaks and other defects. Manhole inspections are performed to enable the condition of each manhole to be recorded and to locate sources of infiltration and inflow. Flow isolation is the monitoring of rainfall and wastewater flows in order to identify areas with excessive I/I.

According to the consulting engineer's report, rehabilitation works in Sydney (Level 1 and 2) and the US (Level 3) have achieved the following reductions in stormwater I/I:

Level of testing undertaken	Reductions in stormwater I/I that can be achieved
Level 1	Between 20% to 50%
Level 2	Up to 60%
Level 3	Between 70 to 90%

SOURCE: CONSULTING ENGINEER'S REPORT 1990

For the West Tamar Council an estimate of savings through I/I reduction was made which identified possible savings of $2 265 000. All costs were based on a 20 year planning period assuming a 4% discount rate. The estimated savings will be affected by the extent of sewers to be upgraded and the reduction in the amount of I/I entering the system. The level of rehabilitation works undertaken will depend upon the amount of reductions required by the Council, balanced against the cost of performing those works. It is economical to undertake I/I reduction measures up to a certain level beyond which the cost of such measures is greater than the benefits.

The final step is to determine cost effectiveness ratios, that is, compare the savings and costs for each level of rehabilitation. After determining the cost effectiveness of I/I reduction, the consulting engineers concluded:

> "... if level 1 rehabilitation measures are successful in reducing I/I sufficiently (i.e. by about 50%) then Council stands to achieve significant cost savings in all subcatchments by minimising or eliminating the need to increase the size of its trunk sewers, pump stations, rising mains - treatment plant facilities. It is therefore recommended that Council proceed with the source detection program for the entire Riverside Catchment... On the basis of these preliminary estimates only sub-catchment P1 would be worth proceeding to Level 2 rehabilitation. ..."

They also noted that:

> "... the above cost effective analysis does not take into account the benefits resulting from extended asset life and improved structural performance. ..."

Council accepted the recommendations in the report and allocated funds to commence level 1 testing, the source detection program. Between 1989-90 and 1993-94, $166 637 was expended on such areas as smoke testing, drainage works etc, as a direct result of the study, in addition to $25 000 for the study in 1989-90. Expenditure on asset maintenance, eg upgrading pipes etc, has not been included as it was not directly related to the study, that is, the works probably would have been undertaken anyway, regardless of the study results. Smoke testing and manhole inspections began in late 1991 and are continuing. It is estimated that to date, approximately 40% of properties in the study area have been tested. As a result of smoke testing conducted between 1991 and 1993, 108 defect notices have been issued to property owners and to date 82 faults have been corrected. So far a saving of $500 000 has been achieved by the indefinite deferral of the need for a storm flow by-pass tank at the wastewater treatment plant. Other savings achieved cannot be quantified as yet due to the program being incomplete.

Devonport City Council

In 1990 the Devonport City Council undertook the same type of study as West Tamar in relation to the Devonport sewerage system, which was divided into nine subcatchments. In their report dated June 1990, the consulting engineers identified total estimated savings through I/I reduction of $6 753 000, based on a 20 year planning period and assuming a 4% discount rate, and concluded:

> "... Council stands to achieve significant cost savings in seven sub-catchments ... It is recommended that Council proceed with the source detection program for these catchments...only three catchments would be worth proceeding to Level 2 rehabilitation. ..."

In 1991 a pilot source detection program for one sub-catchment, consisting of smoke testing and manhole inspections, was implemented following the 1990 I/I Reduction Study. The results of the smoke testing program were as follows:

Results of Testing	Number of Inspections	% of Total Defects	% of Total Inspections
Illegal Connection Defects	156	53.4	16.4
Private Property Defects	128	43.8	13.4
Council Sewer Defects	8	2.8	0.8
Inconclusive Results	59		6.2
Satisfactory Properties	603		63.2
Total	**954**	**100**	**100**

SOURCE: CONSULTING ENGINEER'S REPORT 1991

Defect notices have not been sent to property owners as yet due to lack of resources, however, the information is being used to assist with forward works planning by identifying areas with no stormwater drains.

Central Coast Council

Central Coast Council commenced an Asset Assessment and Rehabilitation Programme for the Ulverstone Sewerage Scheme in 1989. The program consists of ten stages to be implemented between 1989/90 and 1996/97. Stages 1 to 3 have been completed to date with the following results:

- Stage 1, a Visual Inspection Survey, involved the inspection of manholes and pipes in the Ulverstone township (including Gawler) to identify the characteristics, defects and age of the assets. The survey found that almost one third of manholes were defective in some way.

- Stage 2, the Smoke Testing Survey was conducted in early 1991 and involved the pumping of smoke into the sewerage system to identify illegal connections within private properties. With regard to private properties, the survey found that approximately 7.8% of properties had at least one sewer/stormwater irregularity. A total of 43 defects were found in Council controlled pipelines and connections.

- The next stage was the Dye Testing Program, which involved the introduction of dye coloured water into a system through the suspected illegal connection. The flow is then checked in a nearby manhole. If the water is coloured then the suspected illegal connection is confirmed. This program was used to confirm the results of the smoke testing in relation to approximately 10% of the properties.

- A total of 68 notices were served to ratepayers under the Sewers and Drains Act 1954 and 36 illegal connections, (36/68, 53%) have been corrected to date (14 July 1994). 190 requests for correction of defective drainage works have been issued with 113 (113/190, 59%) corrected to date.

A similar program is planned in the immediate future covering the Penguin area.

Other Councils

Hobart City Council is presently conducting a stormwater I/I study for the Sandy Bay treatment plant. Other councils have conducted regular programs of smoke testing or manhole inspections to identify illegal connections and other sources of infiltration and inflow.

Audit found that twenty three (23/26, 88%) councils have experienced problems with regard to stormwater I/I and fifteen (15/26, 58%) have conducted stormwater I/I studies and/or other testing.

Councils which have I/I problems should undertake preliminary investigations and then I/I reduction studies or investigations if cost effective.

Audit recommends that councils should act to require property owners to rectify illegal connection defects.

RESPONSE provided by the Director of Environmental Management, Department of Environment Land Management

"The Department of Environment and Land Management considers stormwater infiltration to be a major issue for effective sewage treatment plant operation. It concurs with Audit's recommendations and stresses the need for monitoring inflows and corrective actions where appropriate".

TRADE WASTE AGREEMENT WITH INDUSTRIES

Introduction

Originally sewerage systems were designed to handle and treat predominantly domestic wastes. The number and type of trade wastes produced by industries have increased over time and have been accepted into the sewerage system. Trade waste can be much stronger organically than domestic waste and may contain toxic

substances not present in domestic waste. Accordingly, its acceptance into a sewerage system can cause the following problems:

- operational problems at wastewater treatment plants
- pose health and safety risks to council personnel
- block, damage or corrode the sewerage system
- impede the treatment processes
- generate environmentally hazardous gases or substances
- production of odours
- accumulate in sludge and thus create limited disposal options
- potential for accumulation of heavy metals
- create environmental problems if discharged into oceans and waterways
- increased treatment and transport costs

In many instances the additional waste handling costs incurred by Councils have not been recovered from the industrial sector and have resulted in the domestic sector subsidising the industrial or non-domestic sector.

Impact Of Industrial Users And Need For Trade Waste Agreements

Industrial users can have a significant impact on a sewerage system and it is therefore important to control trade waste discharge into a system through a trade waste agreement (or permit). If no trade waste agreement exists, industries will pay for sewerage services according to their property value, as for domestic users and not according to the amount of waste that they discharge into the sewerage system. The following examples and studies illustrate this point and highlight the need for formal trade waste agreements between councils and industrial users.

Industrial Waste Survey 1991

DELM commissioned Consulting Environmental Engineers to undertake the "Industrial Waste Survey" in 1991 which found that the total industrial waste discharged to sewers in Tasmania in 1990 was approximately 1 566 469 m^3 and that the industrial wastes causing the most problems were abattoir, strong organic wastes and Orange Roughy wastes. Abattoir wastes comprise offal, bone, skin and blood etc and organic wastes include starch, dairy and cheese factory wastes.

The Survey concluded:

> "... Trade waste By-Laws and/or signed agreements with industry are considered a cornerstone in the management of industrial wastes...the By-Laws and agreement should require comprehensive and regular

> monitoring of industrial wastes to ensure compliance and to enable charging on a user pays basis. ..."

The Survey also found that one of the problems identified in existing waste management practices is:

> "... Insufficient trade waste acceptance By-Laws and agreements for discharge to municipal sewers. ..."

Derwent Sewerage Strategy 1990

The "Derwent Sewerage Strategy 1990", prepared by consultants on behalf of DELM, included the following councils in its review:

- City of Hobart
- City of Clarence
- Municipality of Brighton
- City of Glenorchy
- Municipality of Kingborough
- Municipality of New Norfolk.

The review estimated the BOD and NFR concentrations of the major industries on the Derwent Estuary as follows:

Source	NFR		BOD	
	kg/d	%	kg/d	%
Other Sources	4 455	8	9 057	24
Industrial Waste Component	48 400	92	29 200	76
Total	**52 855**	**100**	**38 257**	**100**

SOURCE: DERWENT SEWERAGE STRATEGY 1990

It can be seen from this table that the industrial waste component is significant in respect of the total amount from both BOD (76%) and NFR (92%).

The Strategy recommended that:

> "... a user-pay system be developed for each municipality using a formula reflecting quantity and quality ... The primary objective of introducing a reasonable system of charging for industrial wastes is to gain more revenue from those that use the system and to reduce the dependence on Government grants. ..."

Environmental Improvement Program (EIP)

An EIP submitted by a council for one of its sewerage treatment plants revealed that the majority of NFR and BOD concentrations resulted from industrial sources, as illustrated in the following table:

Source	NFR	BOD	Effluent Flow
Industrial Sources	66%	75%	38%
Domestic Sources	34%	25%	62%
Total	**100%**	**100%**	**100%**

SOURCE: EIP 1994

This table shows that industrial sources contribute only about 38% of the total flow for this treatment plant but are responsible for the majority of the "strength" of the flow. Over recent years there has been a significant decline in the flow and strength of the effluent to this plant due to improved waste minimisation practices by industry, as illustrated by the following table:

Year	NFR (mg/L)	BOD (mg/L)	Flow (ML/d)
1990	644	908	12.9
1992/93	480	750	11.1

SOURCE: EIP 1994

Industry Commission

The Industry Commission (IC) recommended in its report, "Water Resources and Waste Water Disposal", Report No. 26, 17 July 1992, that:

> "... WSD (Water, Sewerage, Drainage) authorities which are faced with significant trade waste discharges should have in place charges based on the quantity and strength of the waste discharged. ..."

Water Supply and Sewerage Management Guidelines 1991

The NSW Government's 1991 Guidelines state:

> "... It is important that trade waste dischargers share an equitable portion of the cost of the sewerage system. There should generally be no cross subsidy between various users of the system. ..."

The Guidelines suggest that the 'Unit Rate Formula' is the most suitable method to use for assessing the annual charge for trade waste dischargers. The reasons given are that it is simple, charges are based on actual strengths and it is used in Perth and Melbourne and widely used in the USA and UK. To minimise the costs of administration, sampling and analysis, the guidelines suggest four categories of users, based on the volume of waste discharged and the strength of the pollutants discharged. Details of the formula are provided in Appendix D.

Present Situation In Tasmania

Part of Audit's survey requested details of each of council's trade waste agreements. The results are as follows:

Number of Councils with trade waste agreements	Total number of trade waste agreements	Total estimated contributions to council under trade waste agreements for year ending 30 June 1994 $
1 with 13 agreements	13	672 429
1 with 7 agreements	7	40 000
2 with 2 agreements	4	270 242
6 with 1 agreement each	6	1 360 681
Total	**30**	**$2 343 352**

Review of survey responses disclosed that ten councils (10/26, 38%) have either a trade waste by-law or a trade waste agreement with an industry whilst six councils (6/26, 23%) have both a by-law and trade waste agreements. The amounts paid by industries under trade waste agreements vary between councils and between industries within a council. The contributions or charges paid by industries under trade waste agreements are in addition to the normal rates they are charged for sewerage and water services.

As will be discussed later in this section, smaller type industries will normally be issued with a trade waste permit to discharge into the sewerage system whilst larger industries will be subject to a formal trade waste agreement.

Recent Developments In Tasmania

Recent undertakings by DELM individually and in conjunction with councils have attempted to address the trade waste issue. The Guidelines for EIPs require the waste minimisation issue to be addressed, including information on proposed waste minimisation measures, user pays for industry and the investigation of waste minimisation programs of industrial and commercial users.

In November 1992 a working group was created under the auspices of the Institute of Municipal Engineering Australia (Tasmania Division) to deal with the acceptance of liquid waste to sewer. The group contained one member from DELM, Wastewater Operator's Association and the Hobart, Launceston and Devonport City Councils. The working group was established on a statewide basis to ensure a uniform approach by all Tasmanian Councils. The working group produced the "Guidelines for Acceptance of Liquid Wastes to Sewer", dated June 1994. These were written:

> "... in such a way as to be adopted by a Council resolution as the Council's Sewerage Management Program - Acceptance of Liquid Waste to Sewer. ..."

The Guidelines provide instructions on:

- the acceptance of waste to sewer
- pricing principles
- tariff structure
- trade waste categories

Pricing is structured in such a way as to encourage industry to make economically realistic investment decisions. Charges are based on the current cost to Council of complying with the legislative requirements in relation to the discharge of effluent, including the maintenance and operating costs and current cost depreciation. The guidelines advocate a tariff which includes the following elements:

- An annual lump-sum service charge (currently the annual sewerage rate)
- Unit charges, dependent on waste quality and technology used, for the following components:
  - Volume
  - Non filterable residue
  - Biochemical oxygen demand
- Unit charges for elements that have acceptable limit levels or that are potentially damaging to the system:
  - Oil and Grease
  - pH
  - Sulphate, Sulphite and Thiosulphate
  - Heavy metals and some organics
- Management fees which may include all or some of the costs in relation to implementation and maintenance of the trade waste policy, such as
  - Establishment costs
  - Annual licence administration costs
  - Sampling costs
  - Inspection costs
  - Environmental monitoring costs
  - Maintenance costs.
- Financial incentives to encourage waste minimisation, water conservation and compliance with discharge conditions. Examples of incentives are performance bonds and non compliance charges.

  Refer to Appendix E for the Tariff Structure Guidelines.

The Tasmanian Guidelines do not provide a formula for the determination of user pay charges. To provide consistency in charging, councils could use a formula, such as the Unit Rate Formula suggested by the NSW Guidelines as previously discussed.

There are four proposed categories of users. The categories and types of charges applicable to each will be as follows:

Category	Liquid Waste Measurement	Water Supply Measurement	Charging System Basis
Domestic	NO	NO	Property Value
Trade Waste Exempt	NO	YES	Property Value
Trade Waste 1	NO	YES	User Pay
Trade Waste 2	YES	YES	User Pay

SOURCE: GUIDELINES FOR ACCEPTANCE OF LIQUID WASTES TO SEWER

The charging system basis described in the above table relates to the provision of sewerage services only. Trade waste exempt properties will be determined by Council and will be subject to discharge controls but not user-pays charges. Trade waste category 1 and 2 properties will be determined by their previous year sewer flow as follows:

Trade Waste Category	Average Previous Year Sewer Flow Per Day
Trade Waste 1	Less than 200 kilolitres (and more than a yearly flow, determined by council, usually 500 kilolitres)
Trade Waste 2	200 kilolitres or more

SOURCE: GUIDELINES FOR ACCEPTANCE OF LIQUID WASTES TO SEWER

Category 1 industries will be issued with a trade waste permit by Council which will allow it to discharge to the sewerage system as determined by the conditions of the permit. Examples of such industries include small food and drink processing industries, laundries and tanneries. Category 2 industries will be subject to a formal trade waste agreement which will be formulated in conjunction with Council. Examples of such industries include large factory food and drinks processing.

Implications For Councils

The Tasmanian Guidelines may have a significant impact on councils. One council in Tasmania, which has no trade waste agreements at present, but is currently preparing a trade waste by-law, estimates that it has approximately 1769 commercial and industrial premises that may be discharging trade waste to council's sewerage system. This example illustrates the large number of industries that will be requiring either a trade waste permit or agreement under the new guidelines.

These Guidelines have been endorsed by the Minister for Environment and Land Management and Minister for Local Government. The Guidelines are a part of the Tasmanian Hazardous Waste Management Strategy, May 1994, which proposed that Local Government Authorities should introduce uniform Trade Waste Policies by the year 1996.

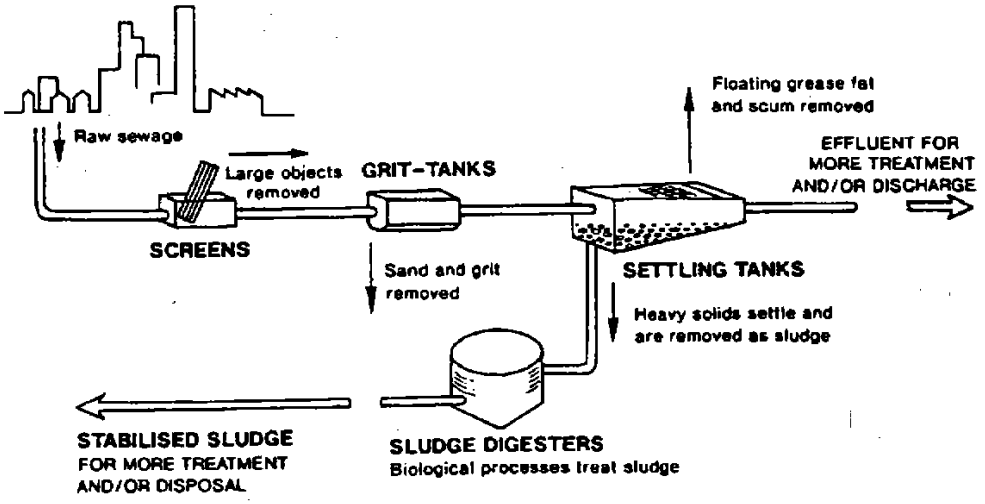
Audit understands that the Plumbing Regulations 1994 are intended to provide the mechanism for the implementation of the Sewerage Management Program.

Audit found that only ten (10/26, 38%) councils have trade waste agreements in existence, of which only six (6/26, 23%) have a trade waste by-law.

REUSE OF BIOSOLIDS AND EFFLUENT

Introduction

Two by-products of wastewater treatment, namely sludge (now commonly referred to as biosolids) and effluent, have the potential to be reused for beneficial purposes. Reuse is the employment of a resource that would otherwise be disposed of or wasted. The reuse of each of these by-products will be discussed separately.



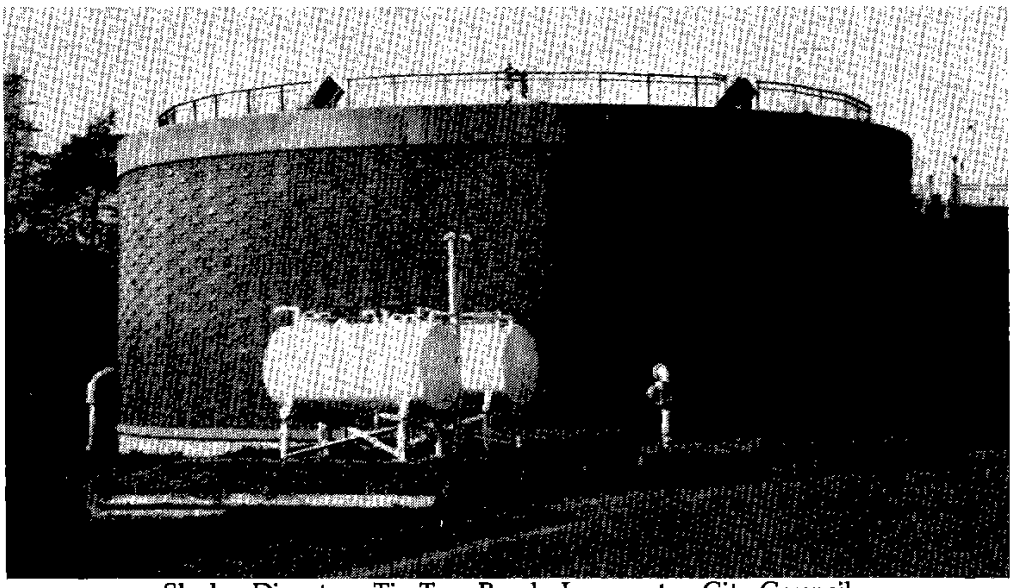
Primary Wastewater Treatment Process
SOURCE: SYDNEY WATER BOARD

Biosolids

Raw wastewater is approximately 99.9% water. The remaining 0.1% comprises grit, grease, human faeces, paper and plastics etc. When wastewater is treated the grit, plastics etc are removed and the greases and scum are skimmed off the top. The heavier-than-water solids settle on the bottom as sludge (biosolids). The biosolids comprises about 95 to 97% water.

To produce a more acceptable material for disposal to landfill and to reduce transport costs, biosolids are commonly subjected to further treatment and dewatered. Biosolids should not however, be regarded as a waste product to be disposed of, but as a valuable resource capable of being reused. An article in the February 1994 issue of Waste Management and Environment promoted biosolids as a potential source of fertiliser and soil conditioner and estimated that in New South Wales each year the biosolids discarded have a market value estimated at $7.3 million a year. It should be noted that some biosolids do however, contain unacceptable levels of contaminants such as heavy metals and toxic substances which, unless there is appropriate control and management, will limit its beneficial use.

Increasing public pressure against ocean discharge, decreasing availability of land and the move towards increasing secondary treatment has highlighted the need to find alternative methods of disposal for biosolids worldwide.



Sludge Digester - Ti - Tree Bend - Launceston City Council

Biosolids Reuse In Australia

The Sydney Water Board has developed a strategy for the beneficial use or disposal of biosolids. According to the Public Discussion Document, "Sludge Management for the Sydney Region", issued by the Board in 1991, the long term strategy is to change the major method of disposal of biosolids from discharge to the ocean (1990) to reuse on land as a fertiliser and soil conditioner (beyond 2000). In its "Clean Waterways Programme Report 1992/93", the Board reported that it was recycling 74% of its biosolids. During 1992/93 approximately 105 600 tonnes of biosolids were used for composting, agriculture, forestry, mine site and land rehabilitation.

Biosolids Reuse In Tasmania

The disposal of biosolids is currently administered by DELM whilst the sale or reuse of composted biosolids is administered by DCHS. This arrangement is not provided for in legislation but has evolved over time, due to DCHS's broad range of powers in relation to public health issues. Presently there are no Tasmanian guidelines on the reuse of biosolids, however, the experiences of other states are referred to when assessing council's proposals. It is anticipated that NHMRC will release guidelines on the use of biosolids soon.

According to the "Industrial Waste Survey" dated December 1991, commissioned by DELM, the total volume of biosolids produced by Council wastewater treatment plants in Tasmania in 1990 was approximately 48 408m^3, of which 85% was disposed to landfill. A small quantity of biosolids is either composted or reused onto parks. Audit's survey results disclosed that three councils (3/26, 12%) are currently reusing biosolids and five (5/26, 19%) are currently conducting trials into the reuse of biosolids. One current reuser of biosolids is the Central Coast Council (at the former Municipality of Ulverstone).

Central Coast Council

In October 1984 Council began experimenting with biosolids composting. The composting process was fully developed by 1987. Council is presently composting all of the biosolids produced by the Ulverstone treatment plant, 1500m^3 per year, on a break even basis. Council has used the composted biosolids as topdressing for the reclaimed Ulverstone refuse disposal site, reinstatement of sewer trenches at Turners Beach, on nature strips, gardens and parks and sold to the public for use on lawns etc. It is noted that some restrictions exist on the use of the biosolids and these include:

- a two-year holding period as the minimum safety factor before its use.
- where the composted biosolids are sold to members of the public, Council shall deliver the composted biosolids to the approved location and maintain accurate records of the sale.

Hobart City Council

In December 1993 the Hobart City Council conducted a trial at its recycling facility into the use of worms in the recycling of organic waste. The trial was undertaken in conjunction with Australian Newsprint Mills which paid for the trials and Waste Organic Recycling Management Systems Pty Ltd (W.O.R.M.S Pty Ltd) which maintained the site, monitored the worms and produced the final report. The aim of the trial was to reuse Council's wastewater biosolids, green waste, cardboard and newspaper by mixing them together and feeding them to millions of earthworms in windrows which convert the waste into its end product, vermicast, an organic fertiliser similar to garden loam. Various mixes of the waste were trialled with the most successful being a mixture of green waste, newspaper, cardboard and biosolids in the proportions 1:1:1:2 which is almost identical to the composition of the waste generated each week by the Council. The conversion was anticipated to take 3 months but over half of the mixes were fully converted to vermicast in just 9 weeks.

On 27 June 1994, Council approved the setting up of a worm farm. The farm will initially be set up as a pilot installation and will process 50 tonnes of waste per week. The capital and operating costs of the farm are approximately $80 000, with a pay back period of 18 months. The process will use just under half of the total biosolids produced by council. Once the effectiveness of the system has been evaluated, the second stage will be implemented. Stage two of the system will increase consumption of waste to 170 tonnes per week at an additional cost of $144 000. The ultimate goal is to reuse all of the biosolids produced by Council. Savings in tip costs will be realised immediately and income from the sale of the vermicast will be generated after the three month installation stage is complete. Council expects a return of $160 000 per annum when the farm is fully operational.

Trial Worm Farm - Hobart City Council

Other Councils

Other councils re-using biosolids include:

- Burnie City Council - trials into the mixing of green waste and biosolids to produce mulch suitable for rehabilitation of a refuse disposal site.
- Launceston City Council - has been used for landscaping purposes; investigation underway on reuse of biosolids mixed with river silt and on use in worm farming.
- Dorset - preliminary trials into composting with sawdust being undertaken.
- Kentish - may be used as fertiliser on surrounding farmland.
- Latrobe - pasture improvement for local farmer.

Desludging of lagoons usually results in the material being deposited on farm land with DELM approval. Also, disposal of septage from septic tank pump outs are sometimes disposed to land, again with DELM approval.

Effluent

Effluent is the water which is discharged from a sewerage treatment plant after the wastewater treatment process. The historical method of disposing of treated effluent is by discharge to the nearest waterway. On 24 February 1993, the Minister for Environment and Land Management released details of a strategy prepared by DELM which included the following statement:

> "... By December 1997 there will be no discharge of effluent from sewage lagoons into inland waters unless Councils have demonstrated that land disposal is not feasible. ..."

With the community becoming more concerned about the detrimental impact of discharging effluent to rivers and waterways there is increasing pressure to minimise the amount of wastes being produced and to increase land disposal and reuse. As with biosolids, effluent should not be considered as a waste product but as a valuable resource capable of being reused. In June 1994, DELM released the "Guidelines for Re-Use of Wastewater in Tasmania". The Guidelines include a principle that:

> "The reuse of wastewaters by application to land is preferred to discharge to receiving waters, PROVIDED THAT it can be demonstrated that the scheme is sustainable in the long term, and will not adversely effect the subject land, the amenity of the surrounding land, surrounding waterways or underlying groundwater, AND PROVIDED THAT the public health can be adequately protected. ..."

Existing Reuse Of Effluent In Australia And Overseas

Effluent reuse has been an important element of water management for many years in countries such as the USA, South Africa, Israel, Japan, Singapore and numerous European countries. In 1987 the Australian Water Resources Council (AWRC) and the National Health and Medical Research Council (NHMRC) in "Guidelines for Use of Reclaimed Water in Australia" estimated that the use of treated reclaimed wastewater in Australia at present totalled approximately 4 to 5 per cent of total annual wastewater, excluding the untreated wastewater used on the Werribee sewage farm in Victoria.

Treatment plant licence conditions specifying the quality of effluent to be disposed of are likely to become more stringent. If nutrient removal (eg nitrogen and phosphorous) becomes a licence condition, it may be cheaper to implement an effluent disposal system, i.e, reuse or land irrigation, rather than a nutrient removal system. In Australia because of this reason, effluent is increasingly being reused for non-domestic purposes, in particular industrial reuse and irrigation, especially during summer months when the demand is high. Examples of effluent reuse in Australia include irrigation, road construction and street cleaning, artificial wetlands and ornamental lakes, industrial purposes, eg cooling water; and when treated to a high standard, to replace fully treated potable water.

Treatment Requirements

The disposal of effluent to land is not always the best option. The inappropriate disposal of effluent to land can cause waterlogging, erosion, salinity problems and the contamination of groundwater and surface waters. To be disposed to land, effluent should be treated to an appropriate standard. The cost of treatment increases as the quality or standard of effluent increases.

The guidelines issued by AWRC and NHMRC state:

> "... Secondary treated wastewater is recommended for wider use.

> However, it should be further purified by ponding, chlorination or other approved means of disinfection. ..."

This level of treatment is required to ensure the environment is not harmed, public health is protected and the resource value of the effluent is maintained. The quality required for reuse of effluent will vary depending upon the end use of the effluent. DELM's Guidelines for reuse based on AWRC and NHMRC guidelines include minimum disinfection requirements for various application methods of effluent. DELM Guidelines also cover the approval process, site selection, monitoring etc. The Guidelines are administered by a Coordinating Group involving the relevant departments.

Effluent Reuse In Tasmania

Audit's survey results revealed that four councils (4/26, 15%) are currently reusing effluent and four (4/26, 15%) are conducting trials into the reuse of effluent. Current reusers of effluent include Clarence City, New Norfolk and West Tamar Councils.

Clarence City Council

In May 1994 the Clarence City Council commenced reusing treated effluent for backwashing of screens at its Rosny Wastewater Treatment Plant. A cost analysis of using the reused effluent has disclosed potential savings of approximately $503 000 over four years. The reused effluent system would pay for itself after the second year of operation and it is estimated that the yearly saving thereafter would be $184 000. The amount being reused is 1.4ML/day and the plant's total effluent production is approximately 7 ML/day.

New Norfolk Council

In December 1993, New Norfolk Council commenced the construction of an artificial wetland. The wetland is a naturally appearing pond designed to remove residues and contaminants so that effluent is acceptable for discharge into the Derwent River. Effluent from the Turiff Lodge treatment plant is treated by allowing it to pass through the pond and various aquatic plants. It should be noted that the treatment plant is already treating the effluent according to the standards required by DELM. In addition to being a form of wastewater treatment, one of the objectives of the project is to create a recreational area for the public.

Artificial Wetlands - New Norfolk

West Tamar Council

West Tamar Council is currently supplying treated effluent to the Riverside Golf Club. Irrigation took place between February and April 1994 during which 18,000KL was supplied to the Club. Previously the Club obtained its water from the tailrace at the Trevallyn power station and paid for its operational costs. At present the Council is not charging the golf club for the use of the treated effluent as no further treatment of the effluent is required, it is still in the experimental stage and is regarded as a community service.

In early 1993 West Tamar Council constructed a trial artificial wetland at its Beaconsfield Wastewater Treatment Plant. The treatment plant consists of two oxidation lagoons plus the wetland. Effluent flows from the first lagoon, to the second lagoon, then to the wetland for final treatment, from where it eventually discharges into a creek. The process operates in the same manner as that described for New Norfolk Council. The performance of the wetland is being assessed by DELM as part of its Sewage Lagoon Performance Study as discussed on page 84.

Other Councils

Launceston City Council is reusing effluent for process water and lawn watering at Ti-Tree Bend and Hoblers Bridge treatment plants.

Other councils trialling the reuse of effluent include:

- Hobart - irrigation trial on nursery plants at Selfs Point treatment plant.
- Northern Midlands - trial in January 1994 on land disposal with surrounding land owners.

- Meander Valley - reuse at Deloraine, Carrick and Prospect under investigation.

Future Direction Of Reuse In Tasmania

DELM's guidelines for EIPs require details of the proposed management of effluent and biosolids by council and the feasibility of land disposal as opposed to discharge to receiving waters.

In May 1994, DELM released its "Tasmanian Hazardous Waste Management Strategy". The Strategy proposed the following specific actions in relation to recycling and reuse:

> "... The State Government, in co-operation with Local Government Authorities, will encourage and materially support further research into the technical and economic potential for productive utilisation of effluents and sludges.
>
> The Department of Environment and Land Management will prepare recommendations and guidelines for the safe utilisation of effluents and sludges, in co-operation with Local Government Authorities. ..."

Following on from this Strategy, in June 1994 DELM released its "Guidelines for Re-Use of Wastewater in Tasmania" as previously discussed. It is anticipated that similar guidelines will be prepared in the future in relation to the reuse of biosolids.

Audit found that eight councils (8/26, 31%) are currently reusing or conducting trials into the reuse of biosolids and eight councils (8/26, 31%) are currently reusing or conducting trials into the reuse of effluent.

Audit considers that the remaining councils should investigate the potential for the productive utilisation of effluents and biosolids.

RESPONSE provided by Director Environmental Management, Department of Environment and Land Management

"DELM concurs with Audit's recommendations and further add that all Councils should not only investigate the potential for the productive utilisation of effluent and biosolids, but examine the feasibility of effluent re-use especially where discharges occur to inland waters. Proposals should be developed and implemented. There is clearly an opportunity for nutrient recycling through irrigation, ideally on an annual crop. Biosolid re-use through soil injection or composting should be implemented following initial investigation".

PART 2 - REDUCTION OF WATER USAGE

INTRODUCTION

While Tasmania has a natural water supply that is generally more abundant than that of the other Australian States, there remains a need to conserve water and eliminate unnecessary wastage of this resource. Any wastage equates to increased costs for water authorities and councils, particularly in the form of premature investment in system augmentation. Water inefficiency also results in additional operational costs for councils associated with the treatment of wastewater. The Engineering and Water Supply Department in South Australia estimated that, on average in that state, 38% of domestic water usage (particularly from the shower, toilet and clothes washing) flows into the sewerage systems of councils and requires treatment. This represents a large component of water that is in the sewerage system.

It is preferable to reduce water usage rather than extend existing storage and supply systems.

Background Of Water Supply In Tasmania

The Rivers & Water Supply Commission (RWSC)(a statutory authority), together with the Land and Water Resources Division of the Department of Primary Industry and Fisheries, have primary responsibility for the management of water services in Tasmania. Their functions include :

- The measurement, assessment and allocation of water resources.
- Supervision of most local government bodies in their management of local water works.
- Authorising the construction of dams (other than HEC and mining dams)

The reticulation and sale of water to urban consumers in Tasmania is essentially the responsibility of the individual councils.

In Southern Tasmania, water is supplied to councils in bulk by the Hobart Regional Water Board (HRWB). The councils that are supplied, wholly or partially, are Brighton, Clarence, Glenorchy, Hobart, Kingborough, New Norfolk, Southern Midlands and Sorell. These councils are responsible for the cost and management of reticulation within their boundaries.

In the Tamar Region, councils purchase water from the RWSC in bulk. The councils that are supplied by the RWSC are Meander Valley (Prospect Vale and Hadspen) and George Town. West Tamar Council however, operates the West Tamar Water Supply scheme as an agent for the RWSC. The Launceston City Council has its own supply and reticulation works which they operate and maintain, which accounts for about 65% of their water supply, the remainder is supplied by the RWSC.

On the North West Coast, water is supplied in bulk to councils (other than Burnie) by the North West Regional Water Authority (NWRWA), with the following

councils being responsible for reticulation:- Devonport, Kentish, Latrobe, Central Coast, Waratah-Wynyard and Circular Head.

Councils which are not serviced by any of the three bulk supply authorities in Tasmania are totally responsible for the supply and treatment of their own water.

WATER PRICING POLICIES

The Pricing Of Water In Tasmania

Generally, the present method of charging for water by all councils in Tasmania is based on property values and base allowances. For those councils that are predominantly metered (which represent a slight majority) consumption in excess of the base allowance is charged for on a user pays basis. This system has been in operation for several years.

It can be argued that the property based rating system is not reflective of the cost of supplying water and provides little incentive for users to be more water efficient. The basis for setting water rates is the assessed annual value of a property. This bears little relationship to actual water usage. For example, a household with a low property value will pay a lower average price per kilolitre for its water than a household with a higher property value that uses exactly the same amount of water.

The system also tends to result in cross subsidisation of the residential sector by the business sector. Businesses located in the highly valued (and rated) central business districts (CBD) pay more per kilolitre for the water they consume than do domestic consumers.

Similarly, the business sector may subsidise the industrial sector in cases where industries are located on the outskirts of cities where the land values are cheaper.

In such cases the property based rating system allows for business to compensate for the insufficient returns being received by councils from the residential sector and to a lesser extent, the industrial sector.

User Pays Pricing Policy

There has been a move in Australia towards a "user pays" system of charging for water which is based on the premise that the more water you use, the more you pay. This system overcomes many of the limitations that exist under the current system.

The concept of user pays pricing is supported by an Industry Commission Report "Water Resources and Wastewater Disposal" (July 1992) which recommended:

> "... Urban Authorities should pursue full cost recovery on the provision of water through a two part tariff, comprising an access charge plus a usage charge for each Kl of water supplied. The usage charge should be set to cover the costs of making additional water available plus a loading to ration supply when capacity in the system is scarce. The access charge should be set so that, in total, the desired revenue yield is achieved over the life of an asset system. ..."

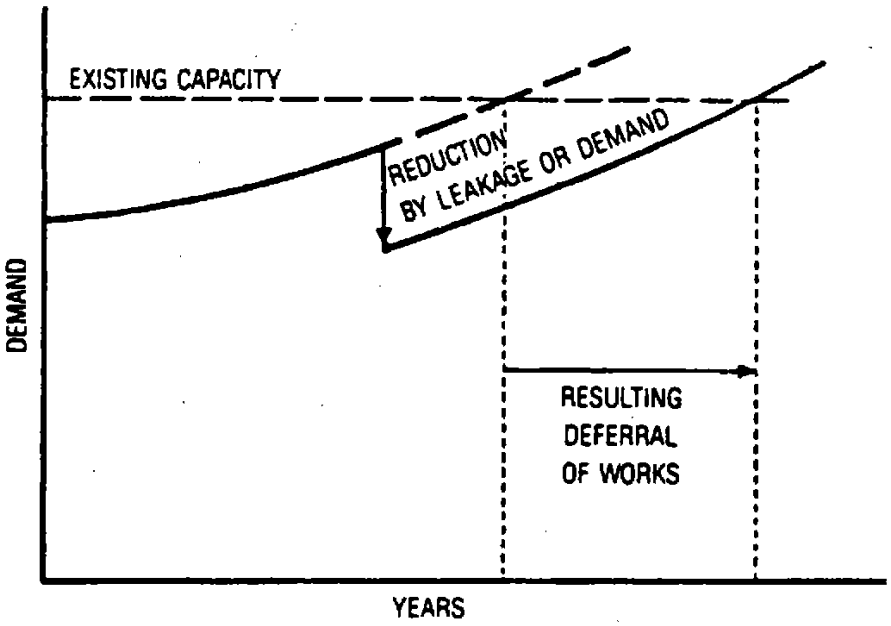
The user pays system would be more easily understood and would help to overcome the anomalies that exist under the current rating system. It encourages consumers to use less water through financial incentives. A side effect of this more conscientious attitude about water from consumers could be to reduce inflows into the sewerage systems. This will place less strain on existing capacities which will reduce operational expenses and defer the need for future system augmentation. The reduced treatment of wastewater will also have a favourable impact on the environment.

The user pays system has proven to be successful in other parts of Australia. In Newcastle, the Hunter District Water Board introduced a two part tariff user pays pricing system in 1982 to replace the previous property based rating system.

In the first year of operation under the new system there was a drop in consumption by approximately 10%, with a further 10% reduction in the second year. Nine years after the introduction of user pays, consumption had reduced by 30% against the trend that existed prior to the imposition of water restrictions. It was estimated that headworks augmentation had been deferred by at least ten years, which resulted in a saving of $15 million in net present value.

In Melbourne, the Board of Works introduced user pays in 1987. This complemented advertising and education campaigns that were introduced in 1983 as part of a long term demand management strategy. "Water Demand Management in Melbourne" (Melbourne Water, June 1991) stated that:

> "... A sustained reduction of 16% of pre-drought annual consumption has been achieved. Winter use has averaged 6% below the expected level. Summer use has averaged 26% below the expected level, and peak day reduction shows a similar reduction. The resulting deferral of headworks and distribution works has a present value of $75 million. The demand management campaign has been highly cost effective. ..."



Deferral of Works Through Demand Management

SOURCE: NSW GOVERNMENT WATER SUPPLY AND SEWERAGE MANAGEMENT GUIDELINES

These examples illustrate the effectiveness of a user pays system to reduce water consumption and therefore defer future augmentation costs.

The Tasmanian Situation

It can be seen from the 1994/95 business plans that expensive augmentation may be looming for two of the three Tasmanian water authorities. For example, the HRWB plan states that:

> "... The majority of the population growth is occurring in areas which will require extension of the Board's infrastructure and the development of new Council headworks (reservoirs) and reticulation pipelines. Continued and regular growth of subdivisions in rural residential areas outside the Hobart Regional Water District is a major concern to the Board as they will stretch the Board's bulk water supply system to its limit which could necessitate expensive augmentation. ..."

The RWSC similarly reports with reference to the West Tamar Scheme:

> "... It is considered highly unlikely that the downward trend in consumption will continue for very much longer. ... A consistent consumption pattern and continued growth in connections would

> see the scheme's capacity reached in the next year or two...Augmentation of the treatment plant is now scheduled for 1994/95, having already been delayed twice. ..."
>
> and, with reference to the North Esk Scheme:
>
> "... It must be concluded that the Chimney Saddle plant requires augmentation in the short term. ... A major dam would be needed if more water was required from this source. ..."

The introduction of a two part tariff under a user pays system by local government would be timely. The change in pricing policy would be likely to alter consumer behaviour and attitudes towards water use and delay augmentation investments. This benefit would be transferred to councils in the form of a deferral of the contribution that they must make to cover the fixed costs of the relevant authority.

The user pays system is supported by the IC (July 1992) which stated:

> "... Usage charges are the key determinant of how much water is demanded and therefore how intensively existing water infrastructure is used. Responses to changes in usage charges are crucial in signalling consumer valuations of additional services and thus guiding the timing of new investment. ..."

There has been some interest shown by local government in adopting the user pays pricing policy in Tasmania. For example, Launceston City Council is considering a move towards user pays. However, in the process it wishes to examine the financial impact on various user groups.

Devonport City Council recommended the introduction of user pays for the 1994/95 financial year, but it was decided that this decision be deferred until the Local Government Act 1993 is amended to legally secure the charge against the land. Assurance has been given by the Local Government Office that this amendment will be sought as soon as possible.

Audit recommends that councils in Tasmania consider the adoption of a user pays pricing system for water consumption.

Pricing Of Supply By Tasmanian Water Authorities

The three regional water authorities in Tasmania charge their constituent councils based on a recovery of the fixed costs of each authority, together with a required rate of return. This represents a minimum payment to each authority.

The method used by each authority to allocate its fixed costs between constituent councils varies slightly.

HRWB is governed by the Hobart Regional Water Act 1984, which uses a formula to determine the basic allowance (and the minimum amount) for each council. The Board's Regulations provides that each council is entitled to receive a basic allowance of water calculated at the rate of 100 kilolitres for each equivalent tenement, and 300 kilolitres for every 2.5 persons residing in its water districts. The method of

calculating each equivalent tenement is specified in the Regulations. The application of this formula results in a total allowance for each constituent council based on the number of properties and the number of people within the boundaries of that council. The amount distributed to each council is totalled to produce a total amount distributed to constituent councils. The proportion that each council is allocated in relation to the total amount distributed represents the proportion of the Board's costs that must be paid. As a result, this means that the more heavily populated councils will pay a higher percentage of the Board's costs. The consumption by a council in excess of its basic allowance will attract a penalty charge of 33%.

This formula has a basic weakness in that it does not encourage a council to be water efficient where its total consumption is less than the basic allowance. As the basic allowance represents a minimum payment to the Board, there is little incentive for a council to reduce its water consumption when it appears that it will not exceed its basic allowance. There is only scope for direct saving through reduced water purchases from the Board where the basic allowance will be exceeded.

Audit has been informed by the HMCA that most member councils favour moving to a supply by volume basis only.

The NWRWA allocates its costs on a simpler basis. Actual consumption is used as the basis for allocation of the Authority's costs. The proportion of consumption for each council relative to the total amount distributed to all constituent councils is the proportion of the Authority's costs that the council must pay.

The RWSC in Launceston estimate its costs together with a required rate of return at the beginning of the year. Total consumption for the following year is also estimated. These figures are used to determine what the price per kilolitre will be for the forthcoming year. Councils then pay for what they consume. This system also provides an incentive for reduced consumption.

In Audit's opinion, the user pays approach adopted by the two regional authorities in Northern Tasmania is a more desirable system. It provides more incentive for councils to encourage and practise water efficiency. If a particular council is able to introduce procedures that assist in reducing consumption (for example, user pays system to ratepayers, education), there will be financial savings in the form of a lower proportion of the relevant authority's fixed costs. The amount of this council's shortfall will have to be met by the other councils, assuming that they have maintained or increased their previous consumption patterns.

It should be recognised that if **all** constituent councils reduce consumption by the same proportion, the only saving for councils would be due to the reduction in variable costs incurred by the bulk supplier. However, as the majority of costs incurred by a bulk supplier are fixed, the actual savings to each council may not be large. The effect would result in an increase in the unit price of water charged by the relevant authority. This point was raised by Kingborough Council in a report that discussed the cost/benefits of meter installation:

> "... If all councils were to reduce their water consumptions, the unit cost of bulk water would have to rise to cover the Water Board's fixed costs. ..."

However, the other benefits associated with reduced consumption (outlined previously) would still apply to councils, and the long term benefits for the bulk water authority would also eventually accrue to them.

It should also be noted that not all councils fall within the regime of one of the three regional water authorities. Audit has observed that councils operating their own schemes are using the property based rating system. The suggestion by Audit for councils to consider the adoption of a user pays pricing policy would apply to these councils as well.

Audit recommends that the Hobart Regional Water Board should consider whether the charging policy in the Hobart Regional Water Act 1984 requires amendment.

Supply Of Free Water by the Hobart Regional Water Board

When a constituent council is required by law to supply water free of cost to the consumer, the HRWB is required, by the Hobart Regional Water Act 1984, to supply the required volume of water to that council free of cost.

As a result of provisions in the Local Government (Building and Miscellaneous Provisions) Act 1993 free water must be supplied to hospitals, child care centres, old age homes and similar community services. The Botanical Gardens and the Kingborough Lawn Cemetery are also supplied with water at no cost. The cost to the Board of supplying free water was $139, 855 for the year ended 30 June 1993.

Audit considers that this supply of free water has two main limitations.

- First there is no direct funding from government to the Water Board to compensate for the supply of this free water, even though it is a type of "community service obligation" (CSO). Other users are therefore subsidising the cost of this free water. As the water authority must recover its costs, it needs to increase the unit price of water to those that are paying for it. The IC Report (July 1992) stated that:-

  > "... Community service obligations imposed on water authorities should be directly funded in full by the government concerned. ... A policy of directly funding CSOs requires agreement between governments and their authorities on how those obligations should be valued. This is a contentious issue and one that is far from resolved...."

  Only certain organisations receive free water. The HRWB stated in "Universal Water Metering" that:-

  > "... While other municipalities have hospitals and other similar institutions, there is no requirement under the Local Government Act to supply them with free water. ..."

- Second, it appears that this system does not promote water efficiency among those services that receive free water, as they are not required to pay for what they consume.

Audit recommends that the extent of supply of free water as a "community service obligation" be reconsidered.

WATER METERS

For a user pays pricing system to operate, there has to be a system in place to measure water consumption. Water meters would provide such a system. Meters would provide the mechanism to collect information on usage and costs for the use of consumers and councils.

Benefits Of Metering

The success in reducing consumption that results from the introduction of full water metering in conjunction with user pays has already been outlined on Page 44 of this report.

In addition to the benefits associated with reduced water consumption such as reduced operating costs of the existing supply and deferral of system augmentation, several other benefits were identified by the HRWB in their 1989 report "Universal Water Metering".

- A more equitable allocation of costs to consumers which overcome weaknesses in the present rating system.
- Metering induces more water use discipline through regular billing.
- Metering may enable lower income consumers to reduce their costs by conserving water.
- Metering provides valuable operational information so that demand trends can be established that identify high waste areas.

Costs Of Metering

While the benefits of metering have been identified, the costs associated with their introduction should also be acknowledged. Potential costs to councils, and ultimately ratepayers, include:

- The purchase and installation costs of meters.
- Additional repair and maintenance expenses.
- Additional wages due to meter readings being required on a regular basis in conjunction with user pays.
- Additional administration costs associated with a regular billing system.

The major expense associated with the introduction of full water metering is the initial investment to purchase and install water meters. The HRWB, in "Universal Water Metering", estimated that the cost of installation of a meter in 1989 (including

the meter itself) in a straight forward urban situation would be approximately $230 per connection . It was noted that in some of the older areas, this cost may be higher due to a greater difficulty in connecting meters.

HRWB also estimated that it would take three years for a workforce of 48 to install 65,000 meters in Hobart. It was also reported that some of the larger councils would require a full-time crew of 10 to 12 for that purpose over a three year period. These estimations were based on an average installation time of four hours per meter and a working week of 38 hours. The HRWB concluded that universal water metering should not take place because the costs of introducing water meters exceeded the benefits.

It is understood that the Hobart Regional Water Board is currently seeking consultants to undertake a study into universal metering.

There are three situations that need to be considered by councils in relation to the introduction of water meters:

- New subdivisions.
- Existing properties that are metered
- Existing properties that are not metered.

New Subdivisions

In order for new subdivisions to be metered, councils would need to introduce by-laws that require new subdivisions to have water meters installed. This, in conjunction with charging for dwellings based on volume of water supplied, would ensure that for residences constructed in the future, ratepayers would be able to assess water usage and pay what would more closely resemble the true cost of their water.

Audit's survey results indicate that 77% of respondents have policies that require meters to be installed in (at least) new subdivisions. Some councils require meters to be installed on **all** new connections within their boundaries. Therefore, the majority of local government already have the foundation for readily changing to a user pays system.

Audit recommends that councils should consider requiring meters to be installed in all new subdivisions.

Existing Properties that are Metered

Audit believes that for councils that are predominantly metered, the costs associated with changing to a user pays system would be minimal. The initial costs associated with installing meters have already been made. From a financial point of view, without taking into account environmental benefits, the benefits for councils associated with reduced consumption include a reduced purchase from the regional bulk suppliers (assuming they previously used in excess of their basic allowance), together with an extension of the life of the existing capacity of the infrastructure. (This is particularly important with regard to peak day consumption, where the

existing infrastructure is performing to meet maximum demand.) This has the potential to defer future investment, and reduce wastewater treatment and augmentation costs. The need for water restrictions may also be reduced in the future.

Audit recommends that councils that are predominantly metered should consider the adoption of a user pays approach as soon as is practicable.

Unmetered Properties

Audit acknowledges that for the 13 councils known to be predominantly unmetered, the initial costs associated with introducing water meters could exceed the potential benefits, at least in the short term.

However, at a minimum, councils should consider requiring the installation of meters on all properties that are high water users (e.g some commercial and industrial users). These users comprise a small percentage of the overall population, and the costs associated with installation of meters on these premises would be minor compared to the additional revenue obtained from charging for the water they use. In addition, this would ensure that those that place the most demand on the existing infrastructure (through their usage patterns), pay for it.

It is noted that this policy has already been introduced in some areas. For example, Hobart City Council (which is residentially unmetered) introduced a by-law in 1973 that all non residential properties that were expected to exceed their 'free allowance' "...shall be supplied with water through meters and not otherwise. ..." High water consumers such as hotels, market gardens, slipyards, premises where vegetables are washed, cleaning premises, pools for commercial or semi commercial purposes, parks, gardens and sporting facilities are examples of the type of properties that have been metered.

Audit considers that councils that are predominantly unmetered should consider requiring the installation of meters on those properties that are high water users. These users should be charged under a user pays system.

While this policy ensures that the minority of users consuming the majority of water are metered, consideration should also be given to controlling water wastage within the residential sector.

A government policy regarding the gradual introduction of meters on currently unmetered residential properties could be considered in Tasmania. It is noted that in NSW the government apparently provides financial assistance to councils of up to 50% for the cost of the purchase of meters for existing unmetered domestic customers.

EDUCATION OF THE PUBLIC REGARDING WATER CONSERVATION

Introduction

Educational and promotional campaigns regarding water minimisation may not be very effective because of the current property based water pricing structure. As

previously stated the present system does not encourage water efficiency. In order for educational and promotional campaigns to be most effective, they would need to be done in accordance with a consumption based pricing policy such as the user pays system that encourages reduced consumption through financial incentives. If consumers know that they will pay less for their water if they use less, they would be more likely to respond to educational campaigns promoting water efficiency.

Educating The Public

A detailed survey by Melbourne Water in 1992 found that education was one of the most preferable methods in assisting with water conservation. In addition to educating people about water conservation, people wanted more information on **how** they could save water.

The study by the Urban Water Research Association, "Improving Communication with the Public on Water Industry Policy Issues" was performed with the aim of establishing future directions for education and public involvement for domestic water consumers in major Australian cities. The study determined that the public require **factual information** rather than jingles and slogans. It was thought that this information should be supplied all year round rather than on a seasonal (summer) basis only. It was concluded that this study would be applicable to any major city in Australia.

Consumption decreases ranging from 10 to 15% have been estimated as attributable to such campaigns in Adelaide and Melbourne ("Monitoring Urban Water Demand", 1991) -Melbourne Water.

While it is conceded that these examples involve different climates and conditions to that of Tasmania, they illustrate that a well executed education campaign can have a beneficial effect in reducing water consumption.

Education By Tasmanian Councils

A comparison of water consumption in Tasmania with major Australian cities was performed by the Hobart City Council in 1992. Results indicated that Hobart and Launceston were the second and third highest water consuming cities per capita in Australia, with only Brisbane having a higher per capita consumption. Hobart was found to be 44% higher than the National average, with Launceston being 20% above the National average.

Since these results were obtained, Queensland has developed and introduced an extensive "Water Wise" ongoing campaign with the intention of making their citizens more aware of the value of water. This project was initiated by the Queensland Government, together with the local authorities. Results provided to audit by Queensland Water Wise in June 1994 indicate that this campaign has been very successful and cited water consumption reductions of 25% and 33% in Maroochy Shire Council and Hervey Bay Shire Council respectively.

Responses to Audit's survey have indicated that the extent of education programs undertaken by councils has been very minimal. Apart from an involvement in National Water Week by two of the city councils, there has been no ongoing education campaign conducted by any of the Tasmanian councils.

Audit's survey results indicate that only 11% of responding councils have undertaken public education programs regarding water minimisation. The Tasmanian public need to be made more aware of the need to conserve water.

Education By Tasmanian Water Authorities

The three regional water authorities in Tasmania consider public education regarding water minimisation to be an important issue, as evidenced by their annual reports and business plans. The objectives of each authority included:-

Hobart Regional Water Board

> "... Promoting an awareness of water as a limited resource and encouraging its conservation..."

North West Regional Water Authority

> "... Foster the awareness of water issues in the Community. ..."

Rivers & Water Supply Commission

> "... To develop a community understanding that water is a limited resource. ..."

However these objectives do not appear to have been strongly pursued in the northern half of the State. The education procedures undertaken by each bulk supplier in Tasmania are as follows:-

The HRWB has conducted an ongoing television campaign in Southern Tasmania since 1977/78. Advertisements have been screened approximately once a day in the summer months, with the basic theme of these commercials being not to waste water. The HRWB does not have any direct evidence on whether or not this campaign has been successful. However, Melbourne Water in their 1992 report indicated that a 10% drop in summer water use in Hobart since 1979 was attributed to a summer television and radio campaign.

The promotional efforts of the other bulk suppliers in Tasmania (the NWRWA and the RWSC in Launceston) has been more moderate. Their main involvement (along with HRWB) in the promotion of water minimisation has been to participate in National Water Week (see below). The contribution of the Tasmanian bulk suppliers included distributing schools resource kits to all Tasmanian schools. Information in the kits included stickers, facts for teachers, a poster, brochures and general information on what could be done to support National Water Week.

Audit recommends that once the effectiveness of the television campaign being used by the Hobart Regional Water Board is evaluated, then all water boards should consider cooperating in a joint advertising campaign with consideration being given to advertising throughout the year.

Figures from the 1992-1993 annual reports of the three Tasmanian bulk suppliers indicate that the amount expended on advertising/publicity relating to public education was approximately as follows :

Water Authority	$
Hobart Regional Water Board	36 593
North West Regional Water Authority	2 812
Rivers and Water Supply Commission (Launceston)	2 500

These figures are indicative of expenditure on education by each Water Board over a number of years. The higher Hobart figure can be attributed to the television campaign over the summer months. The expenditure of the two northern bulk suppliers relates to expenses associated with their participation in National Water Week.

Figures have been obtained from each of the bulk suppliers regarding the population that they serve. These have been divided into the expenditure of each bulk supplier to determine the expenditure per capita on public education. These figures are outlined below:

	$ Spent on Education	Population Served	Per Capita Expenditure ($)
HRWB	36 593	176 637	**0.207**
NWRWA	2 812	60 720	**0.046**
RWSC (Launceston)	2 500	42 313	**0.059**

These calculations suggest that the amount being expended on education in Northern Tasmania is minimal. In order to gain a perspective as to whether this assumption is valid, a comparison has been made with figures relating to Toowoomba City Council for the same period.

Toowoomba City Council

Population served	25 000
Expenditure	$35 000
Per Capita Expenditure on Education	**$1.40**

SOURCE: QUEENSLAND WATER WISE

There has been a **saving of $130,000** in wastewater treatment costs as a result of this campaign. This equates to a saving of $3.71 to Toowoomba City Council for every dollar spent on public education.

It is conceded that this illustration relates to a location that has a different climate and conditions to that of Tasmania. However, the effectiveness of a well executed educational campaign has been clearly demonstrated.

The above analysis indicates that there is scope to further educate Tasmanians on the issue of water minimisation.

National Water Week 1993

National Water Week is an annual event throughout Australia with the theme that water is our most precious resource that needs to be protected and conserved. It is an initiative of all major Australian water agencies. It began in 1993 for the week 21-27

November 1993. As part of National Water Week, a competition inviting Tasmanians from all over the State to think of ways in which water could be saved was conducted by ABC radio in conjunction with all three bulk suppliers and radio stations 7NT and 7ZR. This culminated in a booklet titled "Be Water Wise - It's Worth It", that suggested water conservation tips in various areas in and around the home. These booklets are made available at ABC bookshops, the HRWB, NWRWA and the RWSC. Copies have also been made available to councils that are serviced by the bulk suppliers. There is no cost associated with obtaining this booklet. Audit observation indicates that this booklet is being made available to the public at councils that are being serviced by the bulk suppliers. However, this only represents 62% of councils in Tasmania.

Audit considers that councils not served by bulk water supply authorities should consider obtaining copies of the booklet for distribution to the public.

National Water Week 1994

National Water Week is to be conducted for the second time from 23-29 October 1994. It is being coordinated by the HRWB in Tasmania and overseen by the national coordinator at the NSW Department of Water Resources. A letter was sent by the HRWB to all Tasmanian councils seeking their involvement in National Water Week. Thirteen have agreed to participate. It is intended that each council conduct a poster competition for primary school children in their area. The winning entries from each council would be submitted to the State National Water Week Committee, with prizes for the top entries. Some funding is being provided by the three bulk supply authorities as well as the participating councils. It is understood that Water Week 1994 will include promotion of the water efficient appliance labelling scheme discussed later in this report.

Audit supports the Tasmanian bulk supply authorities in their efforts to promote National Water Week 1994, and encourages all councils to participate.

Further Educational Procedures

The report "A Guide to Improving Communication with the Public on Water Industry Policy Issues" (Nov 1989), by the Urban Water Research Association of Australia, includes several suggestions that could be implemented in Tasmania to educate the public.

In particular, the report suggested that when consumers receive their water bills, they should also receive information as to how they could be more water efficient.

Audit recommends that councils give consideration to providing consumers with information on how to be more water efficient.

WATER EFFICIENT APPLIANCES

Closely associated with a public education program is the need to make consumers aware of the availability of water efficient appliances. Water efficient appliances are appliances that have been designed with a focus on water conservation such as dual flush toilets, reduced flow shower heads, certain types of dishwashers and taps. These appliances should conform to the "Guidelines for the Provision of Water

Efficient Appliances and Plumbing", published by the Australian Water Resources Council ('AWRC') (April 1993).

One of the main advantages of water efficient appliances is that once they are in operation, they generally rely less on the behaviour and attitudes of users. Their design reduces the need for complex education programs, although education is still required to make users aware of the overall need to be water conscious as well as informing potential purchasers of the benefits associated with water efficient appliances.

The AWRC claims that

> "... It is now clear that modern, extremely efficient water saving fittings provide service equal or superior to their inefficient ancestors. New products and techniques allow today's households to use a third less water than those of a decade ago, without sacrificing comfort or changing lifestyles. ..."

The detailed survey by Melbourne Water in 1992 concluded that there was strong support for the public to substantially increase its use of water saving appliances but there needed to be an increased promotion and education about them. The survey found that:-

- Most customers expected their water supplier to show leadership in conservation and provide conservation solutions for customers.

- Customers wanted trouble free service and no surprises about the price or quality of the change over job.

In response to these results, Melbourne Water decided to offer a fixed price change-over to a new 6L/3L dual flush toilet. Customers had to only call a 008 number and the work was arranged, including disposal of the old cistern. A consultant from the Master Plumbers Association was appointed to provide independent liaison between the parties involved. A very favourable response was reported from the liaison officer, who reported that:-

> "... This program has the opportunity over a time horizon of perhaps ten years, to reduce the water use of every home by about 30,000 litres which would be sufficient to delay the need for the massive investment in new dams and supporting transfer systems until well into the 21st century. ..."

The Tasmanian Situation

The Tasmanian Government has taken steps toward the use of more water efficient appliances with the insertion of Regulation 414A in the *Building Amendment Regulations* which makes it compulsory to install 6L/3L dual flush toilets (or a single flush operation of not more than four litres) from September 1993 in new homes. Given that the above legislation has only been recently introduced, this suggests that the majority of residences will still be using water inefficient single flush toilets. As a result, there is potential to reduce water inefficiencies through the adoption of a fixed price changeover scheme similar to that initiated by Melbourne Water.

Audit recommends an increase in the education, promotion and similar approaches concerning the benefits associated with water efficient appliances.

Water Efficient Appliance Labelling Scheme

In 1989, Melbourne Water launched an appliance labelling and rating scheme that assessed products on the basis of their water efficiency. This was adopted as a basis for a national water efficient appliance labelling program in 1990 by the Australian Water Resources Council. This program has not proven to be successful to date. This has resulted in the decision to relaunch the scheme in 1994 with the intention of giving the program a higher national profile.

The scheme is voluntary and is intended to provide consumers with a reliable and comparable scheme to evaluate and select appliances on the basis of their water efficiency. Manufacturers submit their application form, fee and required product details to the administrator of the scheme, Standards Australia Quality Assurance Services (SAQAS). The product is then tested and if found to be water efficient, a certificate is issued to the manufacturer and the product is included in the list of certified products. It is labelled with an A, AA or AAA rating, depending on its water efficiency. (AAA is the most water efficient rating). The range of products that are currently certified are dual flush toilets, shower heads, dishwashing machines, clothes washing machines, urinals and taps.

The estimated cost to establish the programme is $125,000. This is to be funded from water authorities that indicate a willingness to participate. In return, each authority would receive information to launch the programme within their specified areas.

Adoption of this programme, which is to be provided on a nationwide basis, would demonstrate that:-

> "... the water authorities (around Australia) confirm their intent to support this area of water use efficiency ..." (Guidelines For the Provision of Water Efficient Appliances and Plumbing).

In return for their initial outlay water authorities would receive information to launch the scheme in Tasmania. The promotional information provided could be used to approach local retailers and manufacturers with a view to explaining the potential marketing opportunities available by being associated with the scheme.

Audit recommends the water authorities in Tasmania consider participating in the appliance labelling scheme.

PART 3 - COST MANAGEMENT

Audit examined the mechanisms by which councils account for sewerage management. The main focus of the review was to establish whether councils were managing sewerage activities in an economic, efficient and effective manner.

CHARGING AND PRICING FOR SEWERAGE SERVICES

Rating Procedure

A Council has the power under Sections 93 and 94 of the Local Government Act 1993, to make a service rate and/or charge on rateable land in respect of sewerage removal and other services. In determining their annual rates for sewerage services, councils estimate the annual operating costs of providing that service for the year and then charge either a single rate across the council or a separate service rate to cover these costs. This concept is known as full cost recovery, that is, the raising of revenue to meet all of the expenses attributable to a service. Full cost recovery is important because a shortfall will have to be funded from other sources such as government grants or higher rates and charges in subsequent years. Alternatively the replacement of substandard assets may be delayed. The concept of full cost recovery is widely accepted. For example, the IC concluded:

> "...Prices for urban WSD (Water, Sewerage, Drainage) services should be sufficient to cover operating, maintenance, administration and depreciation costs and to provide the designated rate of return on the adjusted asset base..."
>
> SOURCE: INDUSTRY COMMISSION, JULY 1992

Depreciation

Up until the financial year ending 30 June 1993 most councils were using a modified cash basis of accounting. Under this system, revenues and expenses were recorded in the period in which the cash was received or paid, not when it was earned or incurred. The only assets of council that were reported were cash, investments and debtors. The non-current assets controlled by council, for example sewerage related assets, were not recorded in the accounts. As a result, depreciation was not charged on non-current assets and the expense was not included in the annual operating costs for sewerage rating purposes. Instead, interest and principal repayments on loans taken out for financing capital works were taken as a charge to expenses. As a result, the cost attributed could be either under or over recovered during the economic life of the works.

Rate Of Return

The IC (July 1992) stated that the price for sewerage services should provide for a designated rate of return on the adjusted asset base. A rate of return on assets or infrastructure is designed to provide a council with sufficient revenue to service its debts, to maintain existing assets and to provide for future capital programs. In accordance with this approach, councils should determine what their future sewerage capital requirements are and include a component for this when determining their annual rates for sewerage. As will be discussed further under the

section, 'Providing for Capital Programs', only ten (10/26, 38%) of the responding councils surveyed by Audit have determined their future capital requirements in relation to sewerage works (two are only partly completed). The majority of councils have not been including a rate of return in determining sewerage rates. Furthermore under the modified cash basis of accounting, councils as previously noted, were not including depreciation expense and a rate of return in their annual costs for rating purposes and as a result, may not have been achieving full cost recovery.

For the reporting period ending 30 June 1994 and onwards, all councils are required to comply with Australian Accounting Standard AAS 27, "Financial Reporting by Local Governments" and all other relevant standards. All non-current assets with limited useful lives must be depreciated in accordance with Australian Accounting Standard AAS 4 "Depreciation of Non-Current Assets". The requirement to recognise assets and to depreciate non-current assets will assist councils in overcoming the deficiencies in the current rating procedures and in achieving full cost recovery for sewerage services.

Charging For Domestic Sewerage Services

Unlike water usage it is not possible to measure sewerage flows for domestic users so charges for sewerage services cannot be based on actual flows. How then, should charges be determined for sewerage services ? One suggestion has been to estimate sewerage flow on the basis of the measured water consumption during winter. However, most authorities consider that a per connection charge for sewerage is normally adequate.

In its draft report the IC concluded that fixed charges for sewerage services were compatible with the efficient pursuit of cost recovery. A number of authorities challenged this as disclosed in the IC's final report (July 1992). As a result the IC recommended that:

> "... WSD authorities should consider charging for sewerage services according to the percentage of water returned to the sewerage system. ..."

The majority of authorities in Australia, including Tasmanian councils, are charging for residential sewerage services based upon the property value combined with a minimum charge. This is consistent with the "Guidelines for Acceptance of Liquid Waste to Sewer" as discussed on page 32, which suggests that the charging system basis for domestic users should be property value.

Charging for industrial users is dealt with on page 29.

Audit supports the conclusions of the Industry Commission, that charges for sewerage services should be sufficient to cover operating, maintenance, administration and depreciation costs and to provide a rate of return on assets.

PROVIDING FOR FUTURE CAPITAL PROGRAMS

Introduction

Under the Section titled, 'Charging and Pricing for Sewerage Services', it was noted that councils should include a component for the rate of return on assets in its annual operating costs for rating purposes. Under this approach the revenue received is intended to cover debt servicing, maintenance of assets and future capital works. Thus a council needs to have sufficient information on its assets, particularly on the age of its assets and their estimated replacement schedules. As previously mentioned up until the financial year ending 30 June 1993 most councils did not record their non-current infrastructure assets in their financial statements. This contributed to produce a situation where, in most instances, there was an absence of information regarding the existence of assets and their valuation and condition. As a result the majority of councils had incomplete or no asset management systems in place.

Asset Management

Asset management is an important issue for councils in the 1990's and beyond. The objective of asset management is to assist councils to manage water supply and sewerage assets on a whole of life-cycle basis so that the benefiting community receives the level of service it requires at minimum cost.

Asset management should examine:

- Options for providing a service, including use of non-traditional methods to provide the service in a more economical or less capital intensive manner

- Means of avoiding or deferring the need for capital expenditure through getting the most out of existing assets.

Proper asset management can potentially extend the effective lives of assets and improve asset monitoring and maintenance practices. Extending the effective lives of the assets beyond those estimated could substantially reduce the financial burden on ratepayers to be faced in the future. According to the IC, capital represents about two thirds of the cost of providing water, sewerage and drainage services. Increased productivity in the construction, operation and maintenance areas can therefore have a major impact on the overall cost of providing these services. In the IC's report (July 1992), information supplied by the AWRC identified the potential cost savings from reducing sewerage asset replacement costs of up to 30% for various components (mains, pumping stations and treatment plants).

According to the IC the differences in the estimated cost savings reflect:-

> "... the varying extent to which project management and control is already applied in different types of construction activity; the extent to which competitive tendering for asset replacement is already used; and whether emerging technologies, such as trenchless main laying and replacement, are applicable..."

It should be noted that the realisation of these savings will only be achieved at the time the assets are replaced. The cost of any major future works or the replacement of major assets should be planned for and the effects smoothed out over as long a period as possible. The creation of a reserve account enables rates and charges to be gradually increased over a period of time before the capital works expenditure is required. The amounts raised by rates would be greater than those required for operating and normal debt servicing costs, with the subsequent surplus being maintained in the reserve account.

Asset Valuation

To achieve full cost recovery as discussed under 'Charging and Pricing for Sewerage Services', the proper valuation of assets is essential. The traditional method of valuing assets is historical cost or purchase cost. Asset values under this method however, may not reflect the true value of those assets to a council.

Because of the shortcomings of the historical cost method, the current cost accounting method is increasingly being used for asset valuation. This method values assets at their current market value. The IC's view (July 1992) is that:

> "... the use of current cost accounting in all water agencies is an essential pre-requisite for setting efficient capital charges. ..."

Although this specifically mentions water agencies, the same principles can be applied to councils providing sewerage services.

Situation In Tasmania

The shortcomings of councils with regard to asset management systems and valuation of assets is being partly addressed by the introduction of AAS 27 and the requirement for the preparation of a strategic plan under the Local Government Act 1993.

AAS 27 "Financial Reporting by Local Governments"

Tasmanian councils are required to comply with Australian Accounting Standard AAS27 "Financial Reporting by Local Governments" for reporting periods ending on or after 30 June 1994. AAS 27 does not specify what method should be used for valuing non-current assets, but paragraph 41 states inter alia that "... an acceptable basis for revaluations of non-current assets is to revalue them to their written-down current cost." Transitional provisions contained in paragraph 91 permit councils to defer recognition of certain assets until the financial period ending 30 June 1997. Such assets may include sewerage assets because of possible problems in determining the existence and valuation of these assets, due to incomplete asset registers etc. Ultimately, the introduction of AAS 27 will lead to all councils determining the existence and condition of all assets and being able to implement asset management systems.

Strategic Planning

Strategic planning is an important element in the successful operation of any council. A strategic plan sets out the broad objectives and directions of a council and establishes a course of action to achieve those objectives. Under Section 66 of the Local Government Act 1993, councils are required to prepare a strategic plan of at least a five year period, reviewable yearly. Section 67 of the Act requires the strategic plan to include a statement of council's policies and programmes for its social, environmental, economic and financial objectives together with the strategies to be used to achieve those objectives.

Councils should include any proposed capital works in the financial plan. DELM has produced Guidelines for Municipal Waste Management Plans (MWMP) which list issues that should be included as part of a strategic corporate planning approach.

The introduction of MWMP's by councils is voluntary and DELM will review the plans and make comments and/or offer suggestions where appropriate. DELM has not had any submitted to it for review to date.

Audit enquired into the existence of strategic plans, particularly in relation to sewerage. Councils were asked whether they had such a plan and, if so, to forward a copy for perusal. Of the twenty six councils responding to the survey, responses were as follows:

Response	Number
Completed - Final/Draft	11
In process of formulation	7
Deferred to 1994/95	2
Not yet commenced	2
EIP prepared	2
No answer	2

Councils were also asked whether a plan specifically for sewerage would be included in the strategic plan. The responses are shown in the following table:

Question	Number of Responses		
	Yes	No	No Answer
Will a plan specifically for sewerage be included in the strategic plan ?	18	6	2

The Audit survey included a question on whether council had determined its future capital requirements in relation to the provision of sewerage services and if so, had it made provision for this expenditure by way of reserves. It is noted that councils may elect to fund capital expenditure by loan funds, grants etc. rather than building up reserves. Of the councils surveyed by Audit only ten (10/26, 38%) have determined their future capital requirements in relation to sewerage works (two are only partially complete) and have reserves in existence to provide for future capital expenditure. The following table gives details of the future capital requirements and proposed increases in sewerage reserves for the ten councils that have determined these details:

1. Provide details of the future capital requirements for the next 5 years for each sewerage system.

2. Provide details of the present level of reserves for sewerage (as at 30 June 1993) and expected levels for the next 5 years.

3. Surplus or shortfall of reserves over capital requirements.

Details	1993/94 $m	1994/95 $m	1995/96 $m	1996/97 $m	1997/98 $m	Total $m
1	13.35	17.61	18.26	15.38	6.03	70.63
2	17.65	14.08	7.45	2.41	2.41	44.00
3	4.30	(3.53)	(10.81)	(12.97)	(3.62)	(26.63)

It should be noted that one council, with capital requirements of $1.33m over the next five years, has yet to determine its policy on reserves and as such did not provide expected levels of reserves for the years 1994/95 to 1997/98 in its survey response.

For the ten councils included in the above table, total future capital requirements total $70 628 823 over 5 years, compared to reserves of $43 998 000, leaving a shortfall of $26 630 823.

In broad terms, the cash flow from the sewerage rate in a particular year will represent a component to cover the depreciation charge, a rate of return element and running costs. The rate of return component roughly equates to the increase in the sewerage reserve. The accumulated cash flow resulting from the depreciation component is also available to fund capital works. The total amount of reserves and depreciation available can also be estimated by deducting the out of pocket running costs and principal repayments from the total sewerage rate.

Any shortfall in a particular year will have to be funded by an increase in rates for the following years, loan financing or government grants if available. This illustrates the importance of determining and preparing for future capital requirements. As previously stated such expenditure should be planned for and the effects smoothed out over as long a period as possible. The introduction of strategic plans and MWMP's should enable all councils to achieve this.

Audit supports the introduction of strategic plans and considers that a sewerage plan, based on the guidelines prepared by DELM for Municipal Waste Management Plans, should be included in the strategic plan.

RESPONSE provided by Director Environmental Management, Department of Environment and Land Management

"The guidelines for municipal waste management plans were prepared as some local councils saw a need to prioritise their work programs so as to overcome ad hoc reactive decision making. Although the municipal waste management plan guidelines were designed to cover the full range of waste management issues dealt with by Councils, DELM supports the relevant sections covering wastewater for inclusion in Council's strategic plans".

PERFORMANCE INDICATORS

Councils need to identify performance measures and accumulate relevant data in order to place themselves in a position where they can assess the adequacy of their wastewater management practices. Management will then be informed as to the level of compliance by the council with externally imposed requirements, financial performance over a number of periods and obtain information for the future strategic direction of wastewater management.

Performance indicators should ideally cover the following areas:-

- financial viability
- effectiveness and efficiency of administration and operations
- level of service to customers
- compliance with statutory requirements

Councils should also monitor their performance against authorities providing similar services.

Performance indicators can be classified into the following categories and include:

- **Financial:**

  Operation and maintenance costs per assessment
  Administration costs per assessment
  Operation and maintenance and administration costs per assessment
  Return on equity
  Debt/equity ratio

- **Level of service:**

  Number of customer complaints (odours etc.)
  Number of sewer blockages for every 100km
  Number of sewer main breaks for every 100km
  Use of human resources (number of employees per rateable property, time lost to industrial action, frequency of injury, absenteeism)

- **Compliance with statutory requirements:**

  Compliance with the conditions of licence agreement

During 1990-91 the then Department of Resources and Energy embarked on what it termed its Municipal Program. This program was established in order to assist councils, particularly those with fewer resources, to improve the technical and financial performance of their water and sewerage schemes. An integral part of this program was the introduction of the Public Works Department of New South Wales' performance reporting system.

The Tasmanian Water Supply and Sewerage Scheme Performance Programme (now operated by the Rivers and Waters Supply Commission) has produced three annual reports comparing the performance of council water and sewerage schemes operated in Tasmania for each financial year from 1989-90 to 1991-92.

Councils were invited to submit financial and technical data for the generation of various performance indicators such as population served, average sewerage account, operating costs, loan repayments, scheme employees, odour complaints, sewerage overflows, service complaints, discharge licence compliance and treatment plant malfunctions.

These reports presented an anonymous statewide distribution of each indicator and can be used by participating councils to compare a scheme's performance with the norm.

The programme has four main objectives:-

- To permit self assessment of each council operated scheme by monitoring trends in performance indicators;
- To enable councils to identify and rectify areas of poor performance by permitting a direct comparison with statewide results;
- To help State and Local Government identify future needs in respect of water supply and sewerage systems in Tasmania; and
- To collate important aspects of council's schemes in a format that will enable Councillors to fully understand the schemes under their control, to monitor the effects of their policy decisions and report to individual ratepayers.

Response from councils since the inception of the program is summarised as follows:

Year	Level of Response (% of Total Schemes Reporting)
1989-90	54%
1990-91	88%
1991-92	84%
1992-93	59%

Audit enquiry indicates that it is unlikely that this report will be produced for 1992-93 due to a lack of resources and limited response from councils.

It is noted that during 1992-93 territorial restructuring occurred with some councils having to prepare two financial reports and cope with other administrative changes arising from their boundary changes. It is possible that these factors may have contributed to a drop in return rates for that year.

Audit recommends that all Tasmanian councils participate in the Tasmanian Water Supply and Sewerage Scheme Performance Programme. In addition, the Department of Primary Industry and Fisheries (Rivers and Water Supply

Commission), should reconsider the relative priority for this program *vis a vis* other programmes before abandoning it.

Audit requested councils to advise of indicators being used to monitor the efficiency or effectiveness of their sewerage systems. The replies show that 2 of the 26 respondents (8%) were using performance indicators but these were limited to daily operational monitoring, monthly budget reports and monthly testing pursuant to licence conditions (which all councils provide to DELM). Of the remaining respondents, a further 2 indicated that they are presently developing performance measures.

For the financial years ended 30 June 1994 onwards, councils in Tasmania are subject to a new accounting standard AAS 27 - "Financial Reporting by Local Governments". Paragraph 82 of the AAS 27 encourages councils to report non-financial performance indicators which assist users in assessing the council's performance in meeting its objectives. Where performance indicators are included they should be understandable, relevant, reliable and comparable.

Audit recommends that councils take steps towards the development and implementation of appropriate performance measures for wastewater and water management for inclusion in reports to Council and in their published annual reports.

HEADWORKS CHARGES

Definition Of Headworks

A summary of the composition of headworks as they relate to water, sewerage and drainage is as follows:

Water
Dams, treatment plants, pumping stations, service reservoirs, trunk mains.

Sewerage
Treatment plants, pumping stations, mains.

Drainage

Culverts, main drains, pipelines and retention basins

To eliminate any misunderstanding in reference to these works, it is probably more appropriate to refer to them collectively as "infrastructure". This definition would include those services for subdivision reticulation provided by local government, and major components provided by water authorities.

Investment In Infrastructure

Water

The Rivers and Water Supply Commission, North West Regional Water Board and Hobart Regional Water Board have substantial capital invested in infrastructure which in turn provides services to local government.

The respective investments in infrastructure for 1993/94 of the above authorities expressed as Replacement Cost and Written Down Replacement Cost as stated in the Boards' respective Business Plans were as follows:

Authority	Replacement Value $m	Written Down Replacement Value $m
North West Regional Water Authority	79	53
Hobart Regional Water Board	271	129
Rivers and Water Supply Commission*	112	72
Totals	**462**	**254**

*Out of 15 Schemes administered by the Rivers and Water Supply Commission, only three Schemes supply water to Local Government. The above amounts represent the three schemes West Tamar Water Supply Scheme, North Esk Regional Water Supply Scheme and Prosser River Water Supply Scheme.

The total population serviced by all of the above schemes is 327 670 (figures supplied by water authorities and crossed referenced to 1991 population census).

Apart from the capital amounts invested in infrastructure by the water authorities as stated above, local government has capital invested in Infrastructure in the form of dams, reservoirs, pumping stations, feeder mains, and subdivision reticulation. The amount was estimated at $647m ("Asset Management for Local Government"- K J Tabart, 1989). Hence the total investment was of the order of $901m (i.e. $254m + $647m).

Sewerage And Drainage

Local government also has large amounts of capital invested in sewerage and drainage in the form of sewerage treatment plants, pumping stations, trunk mains, rising mains, subdivision reticulation and drains. Tabart estimated the investments in these assets in the 1989 paper as:

	$m
Drainage	906
Sewerage	1035
Total	**1941**

It was not possible to confirm the above amounts as at 30 June 1993 due to the majority of councils reporting an accounting format which does not require a balance sheet and therefore the identification and accounting for assets.

Unit cost of infrastructure

A Tasmanian report, "Development Impact Costs & Infrastructure Funding" April 1992, published by the then Department of Environment and Planning contains a study of three local government areas, Kingborough, Latrobe and Westbury. That study found total **public sector** costs of $58.3 m. for water, $15.3m. for sewerage and $4.2m. for drainage for 7 808 new lots. This amounts to an average of approximately $10 000 per lot for only these services in addition to the developers costs.

Responsibility For Providing Infrastructure

Typically, developers provide water and sewerage reticulation within new subdivisions and transfer these assets to the relevant council without charge at the time of land sale. However, new developments will also place greater demands on existing systems, bringing forward the need for and sometimes requiring, expansion or augmentation. A major problem for all councils faced with water and sewerage system augmentation works is the large jump in rates associated with the financing of capital works. Strategies towards minimising the impact of capital works on charges include the levying of developer contributions or headworks charges.

Location Cost Variation

The variation of infrastructure costs within cities (by location or with housing density) is of particular importance to the influence of infrastructure charging on the pattern of urban settlement.

The costs of providing infrastructure and services to new residents in different areas within cities may vary for a range of reasons, including the geographical and topographical features of a district or the individual site, the proximity of developments to existing infrastructure, and the capacity of existing infrastructure. The varying design lives of infrastructure in different locations can also be important.

Several studies have been undertaken in recent years to identify the costs of providing infrastructure and how they vary between locations, including between developments at the fringe and inner areas within capital cities. Comparable information about costs in regional cities is very limited.

The Tasmanian report "Development Impact Costs and Infrastructure Funding" by the Department of Environment and Planning (April 1992) included findings from a study of three local government areas (Kingborough, Latrobe and Westbury) that:

- "... the order of costs of development at the urban fringe do differ from those in both established areas and rural-residential areas.
- most previous research in Australia has focused on Sydney and Melbourne, which findings are not directly transferable to smaller cities in Tasmania.
- the popularity of rural-residential or large lot subdivisions within commuting distance of urban centres usually means higher costs;"

Headworks - the Economic Analysis

The April 1993 IC report indicated that the cost of meeting additional demands on the system created by the provision of services to additional consumers in particular areas (incremental cost) can form the basis of headworks charges. The basis of charges was examined with reference to four types of infrastructure:

- infrastructure specific to a given development
- infrastructure which is shared with other new developments
- infrastructure which is shared between some existing development and new development
- infrastructure which is common to all developments

In the case of development-specific infrastructure the Commission felt that it is sometimes possible to attribute some off-site economic headworks charges to particular large-scale development. In the case of costs that are common to all development they considered that charges could not sensibly be based on anything but an equal per customer basis. For infrastructure that involves shared costs, due to their nature, the Commission was unable to form a definitive point of view.

Charging for the installation and use of water and wastewater infrastructure must ultimately be viewed as both a matter of funding the capital and operating costs over the life of the assets and potentially, a means to differentiate between the costs of development in one area rather than another. The latter consideration requires the supplier of the infrastructure to ascertain the specific costs arising from development within a given locality. The supplier should then determine whether these costs of a new development should be spread across all consumers of the service or charged directly to those who have caused the supplier to incur incremental costs. Obviously the latter could in theory be addressed either by means of a separate rate for the service for a period of time or an up-front headworks charge or a combination of both.

Headworks - the legal position

Prior to the introduction of the Local Government Act 1993 and associated legislation, there was no apparent power in the Local Government Act 1962 for councils to impose headworks charges on developers. Division 2 (Sections 462 to 486) of the 1962 Act permitted councils to approve a scheme of a building estate subject to conditions. The general weight of legal opinion was that this Division did not empower local government to impose headworks charges as part of those conditions. Rather, if the scheme did not meet the conditions outlined in this Division, council's approval should have been withheld under Section 467. The only other option available was that council should reject the application.

However some councils felt compelled by the high cost of extending or developing new reticulation systems to make "Headworks Contributions" a condition of approval of any new developments, particularly new subdivisions.

In November 1986, the then Ombudsman initiated an own motion inquiry into the extent to which councils were charging headworks fees as a condition precedent to subdivisional approval.

His conclusions stated in part "I reiterate my opinion that there was, and is at present, no legal basis enabling councils to levy headworks charges as a condition of subdivisonal approval."

He also concluded that if genuine negotiations between the two parties resulted in a voluntary contribution being made for a specific and necessary headworks project that is was quite reasonable. Voluntary agreements between councils and developers whilst not covered by any legislation, were not considered by the Ombudsman to be unreasonable.

Developments after the Ombudsman's report

It was apparent that some councils accepted that the Ombudsman's recommendations opened the way for them to impose headworks charges if an agreement with the sub developer was in place. Others discontinued this practice altogether and awaited legislation allowing them to legally impose such charges. One Council passed a resolution that it would not approve any new subdivisions unless the developers offered to contribute to headworks, or until the Local Government Act was amended to give councils clear powers to levy such charges. This Council saw its ratepayers contributing to the cost of each new subdivision's infrastructure and roadworks in their rates each year, as Council had to borrow funds to service each new subdivision.

Survey results show that for the responding councils, none received headworks contributions from subdividers in 1992-93.

Legislation

Local Government

Sections 70 - 80 of the Land Use Planning and Approvals Act 1993 allows a planning authority (council or marine board) to enter into an agreement concerning any issues associated with development with an owner of land in an area covered by a planning scheme. These sections of the legislation are intended to be the authority for councils to recover headworks charges from a developer. However, a legal opinion obtained by the Hobart Metropolitan Council's Association from a Senior Counsel has cast some doubt as to whether this legislation will be effective.

Concerns arising from this advice apparently led to the 1994 annual conference of the Municipal Association of Tasmania (also known as LGAT - The Local Government Association of Tasmania) resolving:

> "... That the LGAT make the most vigorous representation to the Government for the introduction of headworks charges...."

This contrasts with the view of the matter expressed by the Secretary of the Department of Justice who stated in a letter dated 8 September 1994.

> "... I do not accept that there is any doubt about the provisions of the Land Use Planning and Approvals Act 1993. I provide the following reasons:-
>
> - The relevant provisions of the Act (Sections 70-80) are based on the Victorian Planning Act 1988. In that jurisdiction, these provisions are frequently used to support infrastructure contributions.
>
> - The Office of the Solicitor-General has provided advice confirming that the planning agreement provision are effective in enabling developer contributions to be included as a part of those agreements. This advice has been provided to the Hobart Metropolitan Councils Association."

Audit has been advised by the former Director of Policy, Department of Environment and Land Management that:-

> "Councils wishing to take advantage of the ability to impose charges on the developer as a condition of approval must first ensure that the relevant Planning Scheme includes the authority to do so."

Depending on the form of the amendment, councils should be able to retain a flexible approach to the amount of the charge if that is desired or to impose a fixed charge or fee derived from a formula.

Audit recommends that each council should consider amending its Planning Scheme to provide the power to impose charges in relation to water or wastewater as a condition of approval of developments.

Rivers and Water Supply Commission

The Rivers and Water Supply Commission passed the following resolution at its monthly meeting on 29 June 1994:

> "... That the Commission formally support the introduction of legislation supporting the application of Headworks charges (developer contributions) for water, sewerage and drainage services. ..."

Hobart Regional Water Board

Under provisions available in the Hobart Regional Water Act 1984, the Board can enter into an agreement with a council for the supply of water to a consumer outside the Hobart Regional Water District. Using this provision, the Board currently levies a connection fee of $1 500 per allotment for a full water supply and $750 per allotment for a restricted water supply for all new services **outside** existing water districts. The Board proposes to progressively increase this connection fee to $2 142 per allotment to ensure that new services make fair contribution to the cost of the Board's existing water supply infrastructure. The Board is currently unable to levy connection fees for new services **within** existing water districts.

The Board stated in its Business Plan for 1994/95 to 1998/99:

> "... The impact of the Capital Works Program on the Board in the future could be substantial as the need for major infrastructure replacement grows closer. Substantial peaks in the level of future capital works programs if assets are to be replaced at the end of their economic lives could impact on the Board. Together with increased competition amongst semi-government and local authorities for reduced State Government borrowing allocations, this could limit the Board's authority to raise necessary loan funds.
>
> Introduction of developer contributions towards headworks charges would reduce the Board's need to borrow funds for infrastructure replacement and extensions. ..."

It further stated in its Financial aims:

> "... Urge for the introduction of developer contributions for headworks by 1 July 1994. ..."

North West Regional Water Authority

It is noted that under the North West Regional Water Act 1976, Section 19 allowed a municipality to recover infrastructure costs wholly or in part for the construction of a scheme for the supply of water to an area of land within the municipality.

The North West Regional Water Act 1987 which repealed the 1976 legislation does not have an equivalent provision.

Audit recommends that the government give urgent consideration to an amendment to permit water boards to impose developer contributions both within and outside an existing water district.

The position in other States

A summary of approaches to urban infrastructure funding in other States is as follows:

State	Physical Services Reticulation	Infrastructure Off-Site Infrastructure
Victoria	Fully developer funded (except gas)	Developer levies are separately charged for sewerage, water supply, electricity, telecom, though not at full cost recovery levels. Charges have recently been reviewed, and will gradually be raised to enable full marginal cost recovery. Additional developer contributions are commonly negotiated for off site roadworks, etc.
New South Wales	Fully developer funded	Developer-levies are firmly established, though not at sufficiently high levels to enable cost recovery. Increased impact fees and privatisation of various services are likely.
ACT	Developer funded except electricity	Headworks charges apply, but cost recovery is not complete. Recent study recommended move to much greater cost recovery.
Queensland	Developer funded	Headworks charges are a local government prerogative. In Brisbane, cost recovery is sought for sewer and water.
South Australia	Developer funded	Headworks charges are not systematic and face legal obstacles. Contributions to off-site infrastructure are generally negotiated. Lack of enabling legislation for Headworks charges is being reviewed.
Western Australia	Fully developer funded (except gas)	Developer levies separately charged for all services, though not at full cost recovery. Cost recovery for sewer and water recently increased from 25% to 40%.

SOURCE: PRICING SYSTEMS FOR MAJOR WATER AUTHORITIES IN AUSTRALIA - AUSTRALIAN WATER RESOURCES COUNCIL MAY 1992.

In summary therefore, headworks charges are becoming an established feature of land development in other states although not at full cost recovery.

One approach to levying such a charge is to make it totally discretionary within the limits imposed by costs to the supplier that can be justified. This has considerable benefits. For example, the charge can reflect social priorities as well as purely financial considerations. Disadvantages include the disproportionate administrative cost involved in determining and negotiating the charge for small developments, uncertainties for developers and others, and even the potential for fraud as outlined in ICAC's report on investigation into North Coast Land Development, 1990.

In practice, there appears to be a demand for some form of guidance. The Municipal Association of Tasmania has advised that it is

"... in the process of developing guidelines to assist councils in setting these [headworks charges] and other prices and charges for services."

There have been several methods developed to calculate "contributions" by developers. Two examples involving formulae are:-

The Hunter Water Corporation

"... This model compares capital and operating costs which will be incurred by the Hunter Water Corporation to service new development with benefits from developer provided infrastructure, upfront cash contributions, annual service charges and income from water usage charges. The analysis is undertaken for 20 years and is based on a commercial rate of return reflecting the risks of the venture. The developer charge is then, in effect, set equal to the residual cost - it is a charge of that amount that would equate total charges to total costs. ..." (Taxation and Financial Policy Impacts on Urban Settlement - Industry Commission - 7 April 1993).

One method for establishing drainage contributions per lot is:

$$\frac{D/A \times \{C + (R \times V)\}}{L}$$

where:

D= area of 'developable land' within the subject development site, in square metres

A= total area of 'developable land' within the catchment of the drainage system, in square metres

C= current total (estimated or actual) cost of construction of the trunk drainage work, in $ for the subject catchment area

R= total area of land reserved and/or to be acquired for trunk drainage works within the catchment of the drainage system, in square metres

V= the average current (estimated or actual) value of the land in 'R' above

L= number of lots to be created in the subject development site

SOURCE : PRICING SYSTEMS FOR MAJOR WATER AUTHORITIES IN AUSTRALIA - AWRC, MAY 1992

The NSW Public Works Model

Under this model, the appropriate level of contributions (for either water or sewerage) can be expressed mathematically as shown below. The first line is the portion of the asset value of each component committed to serving the development, the second line is a share of the cost of the capacity for serving future customers and the third line is the deduction of a share of the net outstanding debt:

Developer contribution	=	Asset Value of each component / Capacity of Component	x Fraction of Supply to new development provided by component
	+	Asset Value of each component / Capacity of Component	x Capacity for future ET's
	-	Debt / Present ET's	

* *ET = Equivalent Tenement*

Example:

Dam	Asset value	$10m
	Capacity	15 000 ET
	ET's served	10 000 ET
	Debt	$4m
	Fraction of supply provided	1.0

Note: ET = Equivalent Tenement

$$\text{Contribution} = \frac{\$10m}{15\,000} \times 1 + \frac{\$10m}{15\,000} \times \left(\frac{15\,000 - 10\,000}{10\,000}\right) - \frac{\$4m}{10\,000}$$

$$= \$667 + \$333 - \$400$$

$$= \$600$$

SOURCE : PRICING SYSTEMS FOR MAJOR WATER AUTHORITIES IN AUSTRALIA - AWRC, MAY 1992

Inquiries in Tasmania relating to Headworks

The following is a brief summary of inquiries instigated by Government in recent times to examine this issue:

- It is noted that in 1979, draft bills to amend various acts were circulated for comment. These involved regional Water authorities and the Rivers and Waters Supply Commission in the approval of subdivisions.

- In 1982, an Inter-Departmental Committee proposed legislation to include a discretionary charge to be levied by a municipality on developers. An election saw the new government calling for a detailed report on this proposed legislation.

- During 1983, a draft Cabinet Submission was prepared by the Rivers and Waters Supply Commission to allow water authorities to levy headworks charges on developers to recoup some of the cost of providing infrastructure. Local government opposed this initiative due to their fears that the statutory authorities may levy an amount on subdividers and insist that municipalities levy the same amount.

- In 1987, the Premier appointed an ad hoc committee to consider and report on planning in the Tamar Valley. This committee was convened by the Commission for Town and Country Planning and included the Director of Local Government. One of the purposes of this committee was to consider and report to the Premier on the implications of the development of subdivisions on municipal costs, and the steps needed to provide for Headworks contributions from developers and subdividers.

- A review of legislation governing subdivision of land was commenced during 1988 and a Subdivision Legislation Review Working Party was established and held its first meeting on 1 February 1989. The committee's recommendations are summarised as follows:

    - Definition of "Headworks "to be limited to water, sewerage drainage and roads.
    - No provision for partial or staged charges.
    - No specific or staged charges.
    - No inclusion of Public Open Space as "Headworks "

- These recommendations were submitted for approval.

- A Headworks Charges Working Party was appointed in March 1991 which found in part that human services (community services) should not be included in any submission for infrastructure at this time, but should be considered at a later date.

- A report entitled "Development Impact Costs & Infrastructure Funding" was released by the then Department of Environment and Planning and was prepared for the Project Steering Committee, Housing Development Program - September 1991. The Report recommended headworks charges calculated on a marginal cost basis for both sewerage and water supply.

- In October 1992, a "Development Impact Contributions Working Group" was established to encompass the work of the "Headworks Charges Working Party" and has effectively taken over the functions of that working party. The last formal meeting of this committee was in November 1993, whilst an informal meeting was held with some members of the Industrial Commission in August 1993.

- During 1993, the Hobart Regional Water Board again requested that its Act be amended to include "Headworks Charges".

- January 1994, the Local Government Act 1993 became effective along with companion legislation.

- In 1994, after the proclamation of the new Local Government Act, the Policy Division of the Department of Environment and Land Management appointed a consultant to examine and review the implications of both physical and social infrastructure as an impost on developers and the most appropriate manner to impose this.

Consideration of the general policy has occupied at least 12 years and has been considered by a host of committees. However it must be conceded that the entire matter of funding physical and social infrastructure is more complicated than infrastructure pertaining only to water and wastewater.

Audit recommends that the Government should urgently determine its policy on whether to give unambiguous power to councils and water boards to charge for infrastructure and if approved, provide guidelines for how the charges should be calculated.

RESPONSE provided by the Executive Director, Municipal Association of Tasmania

"The Association strongly supports the introduction of unambiguous powers for councils to impose headworks charges. To this end, the Association is seeking clarification from the Minister of the relevant clauses in the recently enacted Land Use and Planning Act. It is also in the process of developing guidelines to assist Councils in setting these and other prices and charges for services".

PART 4 - ENVIRONMENTAL ASPECTS

Audit examined environmental aspects relating to wastewater management in Local Government. The focus of the review was on the mechanisms that are in place in order to minimise the impact of wastewater on the environment.

The environmental impact of wastewater treatment plants relates to the extent of pollution of waters into which treated effluent is discharged and the resultant effect upon acquatic ecosystems, surrounding flora and fauna and the general public.

A major mechanism by which the environmental impact of wastewater treatment plants is minimised is through the imposition of licence conditions which must be complied with by councils and which are monitored by DELM.

COMPLIANCE WITH LICENCE CONDITIONS

Present Discharge Standards

Under the Environment Protection Act (EPA) 1973 only those wastewater treatment plants (WWTPs) with dry weather flows greater than 25 kL/day require licensing. The discharge requirements for the effluent from council WWTPs are set out in the Environment Protection (Water Pollution) Regulations 1974, as subsequently amended. The outfall point and the nature of the receiving waters dictate the effluent quality which must be achieved by the treatment process. Licences for each treatment plant require that a composite sample of the plant final effluent be obtained once per month and be tested for the following:

- 5 day biochemical oxygen demand (BOD_5)
- non-filtrable residue (NFR)
- faecal coliforms (cfn)

The effluent should also be visually free of oil, grease, solids and unnatural discolouration.

Refer to Appendix F for a summary of the requirements of the Environment Protection (Water Pollution) Regulations 1974.

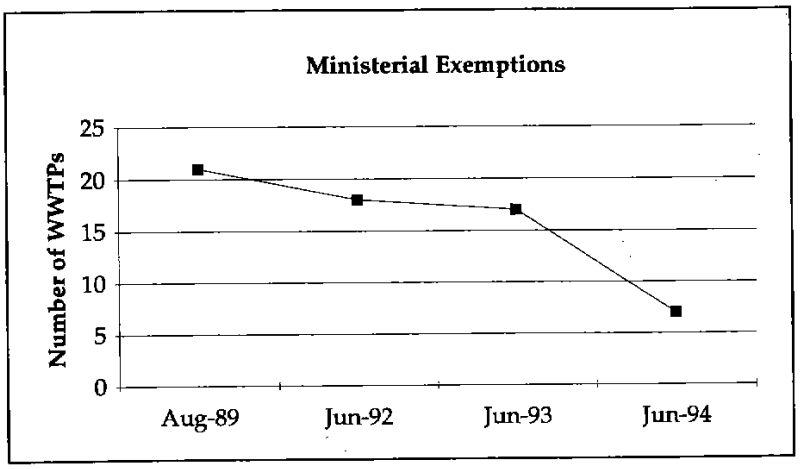
It is noted that the regulations do not provide for virus testing as it is impractical to do so at present. The Australian Water Quality Guidelines for Fresh and Marine Waters (NWQMS, December 1992) state:

> "... Although it is now possible to detect the presence of many pathogens in water, the methods of isolation and enumeration are often time consuming. It is therefore impracticable to monitor water for a wide range of microbial pathogens, and preferable to use indicator systems that can reliably index the presence of pathogens and the related health risk.
>
> Currently, there is no indicator that complies with all the above criteria, although many of them are fulfilled by coliform organisms, ..."

The Guidelines for Re-Use of Wastewater in Tasmania (DELM, June 1994), when considering disinfection levels, state:

> "... Viruses are an important aspect of disinfection which should be tested for as analytical methods and more information becomes available. ..."

The Minister for Environment and Land Management has the power to exempt industrial and council operators from the operation of Sections 15, 16 and 17 of the EPA 1973, that it is to allow a council operating at the time the Regulations were introduced time to come into compliance with the new requirements. It is noted that since exemptions were first issued in 1989, there has been a steady decline in the number required as illustrated by the following graph.



SOURCE: DELM

As at 1 July 1994, the following exemptions were extended until passage of the new legislation:

Central Coast Council
Clarence City Council (Tranmere Sullage Scheme)
Devonport City Council
Hobart City Council (Sandy Bay)
Kingborough (Woodbridge)
Sorell (Sorell)

Performance Of Wastewater Treatment Plants

In February 1993, the following reports detailing the performance of wastewater treatment plants were released by the Minister.

- Performance Assessment of Scheduled Sewage Treatment Plants ("STPSs") in Tasmania (December 1991)

  This report concluded that:

  "... At the time of compilation of the data, September 1991, a total of 83 plants were examined and 6 complied with all the requirements 100% of the time. Only 21 of the plants examined operate under a Ministerial Exemption. ..."

  Note: Any deviation above the limits set out in the Regulations was recorded as non-compliance no matter how minor that deviation may have been.

- A Sewage Treatment Lagoon Study (December 1991)

  This involved a 4 month investigation into the performance and effectiveness of 8 sewage treatment plants and their impact on the receiving waters. It concluded that the lagoon systems were performing below their predicted level, the outfall levels of performance parameters exceeded the required standards and set out some engineering and environmental solutions to the problems.

- Performance Assessment of Scheduled Sewage Treatment Plants in Tasmania (December 1992)

  This review found:

  "The STPs in this survey that do not comply are mainly lagoon systems, except for several mechanical/biological (M/B) plants which have exemptions and presently have PIPs in place to bring them into full compliance.

  As of July 1992 when the compliance assessment was completed 76 treatment plants were included in the survey of which 18 operated under a Ministerial exemption granted by the Minister for Environment and Planning. Of the 39 sewage treatment lagoon systems in the State, 29 do not comply with the effluent quality regulation for the BOD and/or faecal coliform parameters in the EPA 1973.

  This survey has indicated that the magnitude of non-complying lagoon systems (74%) in the State and as result the Department will liaise with those Councils responsible for these STPs and the engineers representing the Councils to assist in the preparation of Environmental Improvement Programs to bring these systems into full compliance by 1994. ..."

  Note: In this report the Division of Environmental Management within DELM utilised primarily the NSW procedures which uses 50th and 90th percentile levels for the BOD and NFR parameters summarised on page 83.

The above reports identified a number of wastewater lagoon systems that were not operating in accordance with the legislative standards and which did not hold ministerial exemptions. A strategy to overcome the problems associated with lagoons was developed by DELM, as follows:

- By December 1997 there will be no discharge of effluent from sewage lagoons into inland waters unless councils have demonstrated that land disposal is not feasible

- Where land disposal is not feasible, no discharge will be permitted unless it can be demonstrated that the discharge will not affect the beneficial uses of the water course

- Councils with non-complying and non-exempt sewage lagoons were required by DELM to submit an EIP to DELM by 31 December 1993. When an EIP has been approved, Councils will enter into an agreement with the Minister for its implementation over an agreed time frame

- Pending implementation of the strategy, council sewage lagoons listed in the December 1992 report will not be required to comply with existing regulations. Instead, a legislative regime outlining the above program will be put in place by regulations. (These have not eventuated due to the development of the Environmental Management and Pollution Control Act which provides for the preparation of environmental improvement plans and as such, the strategy was considered by DELM to fit into this scheme.)

- Establishment of a task force to co-ordinate implementation of the strategy

Draft EIPs have been submitted by all councils concerned, reviewed by DELM and comments sent back to the respective councils to enable their modification.

As far as mechanical/biological (M/B) plants were concerned, those that did not comply had exemptions and Performance Improvement Programs in place to bring them into full compliance. The new Environmental Management and Pollution Control Act will no longer provide for the continuation of Ministerial exemptions. Instead, an operator who cannot comply with an environmental regulation or State Policy will be required to prepare an Environmental Improvement Program (EIP). To assist with this transition councils that held a ministerial exemption were requested to prepare an EIP and submit it by the end of May 1994. Status of EIPs for the councils concerned is as follows:

Council	Status or Date EIP Approved	Expiry Date
Central Coast Council	30 June 1994	30 June 1997
Clarence City Council (Tranmere Sullage Scheme)	Council communicating with DELM	30 June 1997
Devonport City Council	Draft EIP submitted	30 June 1997
Hobart City Council (Sandy Bay)	Development Proposal and Environmental Management Plan (incorporating EIP) prepared.	April 1997
Kingborough (Woodbridge)	Draft EIP submitted	December 1995
Sorell (Sorell)	Council upgrading plant	30 June 1997

NOTE: Expiry Date means the nominated period of time by which the EIP objectives have been forecast to be successfully met by the incumbents. In cases where a final draft has not yet been presented a 3 year period is denoted.

SOURCE: DELM

Present levels of compliance

Monitoring data received from councils is input into a computerised database when received by DELM and is assessed using the 50th and 90th percentile levels for the BOD and NFR parameters. Premises are considered to comply with emission requirements for BOD and NFR if:

- 50% of the time the licence limit is not exceeded, and
- 90% of the time, 1.5 times the licence limit is not exceeded.

For faecal coliform (cfn) data the corresponding regulatory level for effluent from each plant is multiplied by 5 before comparing it to the monitoring data to assess compliance. This is done as it is considered that licence levels pertaining to faecal coliforms are too low considering that at least a 5 in 1 dilution is occurring in most receiving waters. This dilution factor occurring in the stream would be reducing the faecal coliform level to that acceptable for primary recreational waters, ie. <= 150 faecal coliforms per 100ml. Such recreational waters permit full bodily immersions or partial intake to occur.

Due to the algal blooms in lagoons the NFR parameter is not considered. The regulations in the EPA 1973 clearly state that this parameter is not applicable in regard to the appraisal of WWTP performance when algal blooms exist.

A table of monitoring compliance provided by DELM is attached as Appendix G to this report. The table takes into account whether algae is present in effluent or where reuse is occurring and emission levels are not applicable.

The following interpretation of the table was provided by DELM.

"Taking the extreme case of whether 90 percentile compliance has occurred the following interpretation is gained:

BOD non-compliance	33/70 (47%)
NFR non-compliance	40/70 (57%)
CFN non-compliance	45/61 (73%)

Note that although there are 79 treatment plants, the compliance criteria only apply to certain plants dependent on the parameter.

If viewed from a 50 percentile compliance then an entirely different set of figures emerges. For instance the 50 percentile compliance for faecal coliforms is 22 of 61 (36%). As faecal coliforms counts vary enormously depending upon variables such as the time of day of sampling, the amount of sunlight present, the time between sampling and analysis, the 50 percentile assessment may be more appropriate to determine compliance".

A large proportion of the 78 licensed wastewater treatment plants in Tasmania are not complying with the Environment Protection (Water Pollution) Regulations 1974. The majority of these plants are lagoon systems.

Sewage Lagoon Performance Study

In addition to the above, DPIF (Rivers and Waters Supply Commission), DELM, and the Municipal Association of Tasmania sought funding in 1992-93 under the Country Water Supply Improvement Program (COWSIP) to assist with the identification of solutions to the problem of poor lagoon performance (Sewage Lagoon Performance Study).

The objectives of the program are:

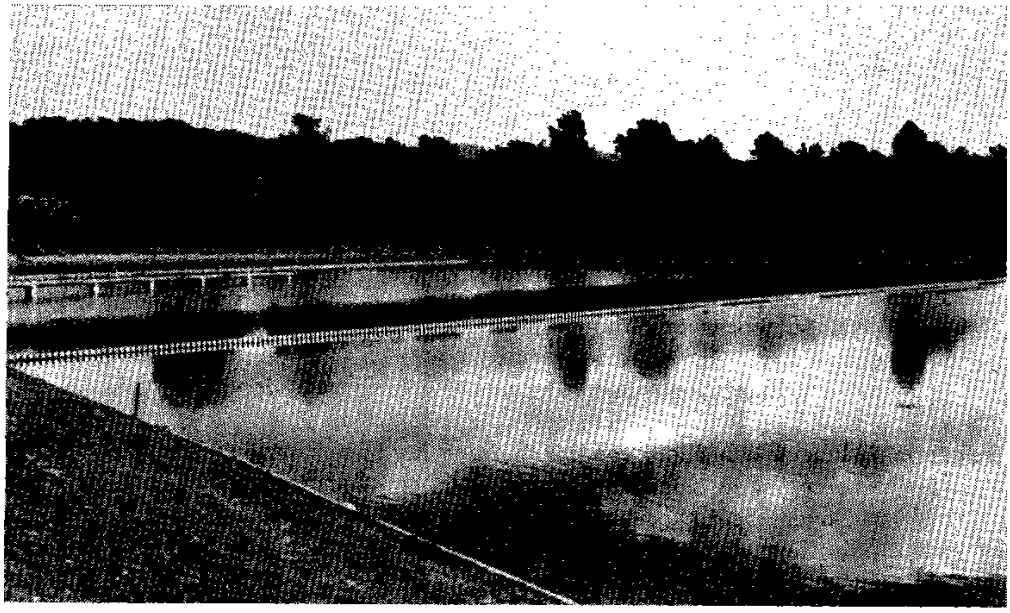
- to research the extent of and reasons for the problem of poor lagoon performance
- to investigate and prove, by trial work, low cost technically viable solutions
- prepare a strategy to assist councils overcome the problem of poor lagoon performance.

The timing of this project is to be over two years where baseline lagoons are to be tested over this period and other lagoons, that will have trial capital work conducted in them over the next financial year, will be tested throughout the project. A manual will be produced at the end of the project.

Funding for the project amounted to $584 500 made up of Commonwealth and State funds. Approximately $200 000 of the budget was allocated to Councils, on a $ for $ basis, for trial works on individual lagoons.

At the date of this report, monitoring of lagoon performance has commenced and capital works have been initiated as follows:

- Fingal and Dover are almost complete.
- Campbell Town and Prospect Vale were to be completed by the end of August 1994.
- Beaconsfield and Turners Beach to be upgraded at a later stage.



Sewage Lagoon - Beaconsfield - West Tamar Council

Other developments

The Derwent Estuary Nutrient Program which began in March 1993 is the first stage of what is hoped to be a 5-year total catchment study, leading to a comprehensive policy and management plan for the Derwent. It has been suspected for some time that nutrient levels in the Derwent are high and this program aims to determine the actual levels. High nutrient levels contribute to algal blooms and while these are not presently a major problem in the Derwent it is possible that if they continue to remain high or even increase they may become a problem. The Program aims to test for nitrogen and phosphorous levels and to determine what percentage of nutrient loads are attributable to wastewater, stormwater, and sediments from rural runoff.

In conjunction with the above, another study is determining the danger zone for nutrient levels in the Derwent.

The results of these studies will determine whether the Derwent Estuary can tolerate current and future loads of nutrients from sources listed above. If necessary, councils may be required to expend substantial sums in upgrading existing plants. It is noted that Hobart City Council are planning for nutrient removal as part of the upgrading of Selfs Point Wastewater Treatment Plant.

While treatment may be necessary, nutrient levels can be reduced by encouraging people , through public education/awareness programs, to reduce nutrients at their source, for example the use of fertilizers and household products. Practices to minimise the amount of wastewater discussed earlier in this report will also be of assistance.

To the date of this report, the Derwent Estuary Nutrients study has been completed and DELM has only just received the draft technical report March 1993 - June 1994.

This report is presently being reviewed by DELM before being finalised and released later this year.

A Community Liaison Officer has been working with DELM since March 1994 to co-ordinate the dissemination of scientific information to the community.

EXTERNAL MONITORING

The IC in its report on Water Resources and Wastewater Disposal stated that:

> "... Without some external monitoring, there would be scope and incentive for authorities to suppress episodes of non-compliance. Most participants ... support external monitoring of performance. ..."

In Tasmania licence conditions require the monthly monitoring of effluent with all samples to be tested in a laboratory approved by the Director of Environmental Control or a Government Laboratory or a N.A.T.A registered laboratory. The results of such monitoring is required to be forwarded to the Director of Environmental Control as soon as the results are available to the licensee.

Audit considers that the monitoring procedures pursuant to scheduled premises licences could be streamlined if the testing laboratories were required to send results simultaneously to the Department of Environment and Land Management and the council concerned.

RESPONSE provided by Director Environmental Management, Department of Environment and Land Management

"DELM supports this recommendation provided that mutual agreement between Councils and DELM can be reached in simultaneous transfer of data. Also electronic mailing of data is being considered in conjunction with the laboratories."

The IC in its report on Water Resources and Wastewater Disposal (July 1992) stated that:

> "... The results of monitoring are generally published in some form, often in annual reports, but the community does not always have ready access. ... Making public the results of environmental monitoring is likely to improve the community's knowledge of water related issues. Moreover, the bad publicity associated with failure to comply with standards constitutes an important discipline on WSD [Water, Sewerage and Drainage] authorities to perform effectively in this area.
>
> However, where an authority is consistently meeting standards, the frequent publication of test results may be a cost with little associated benefit. A blanket requirement to publish all monitoring results is unlikely to be efficient. ..."

They went on to recommend that:

> "... Environmental monitoring by an agency or authority other than the service provider is necessary to ensure that failures to meet standards are made public. Summary results of monitoring should be released in a form readily accessible to the media. ...."

The Audit Office of New Zealand in its report on "Management of Sewage Treatment Systems", May 1992, when referring to regional councils' actions in the event of non-compliance, stated:

> "... The regional councils need to alert the public by publicly reporting non-compliance. ..."

The Water Supply and Sewerage Management Guidelines of the NSW Government state that the objective of monitoring and review is to:

> "... Monitor and publicly report the inputs to the sewage treatment system and the effects of treatment and disposal on the receiving ecosystems, rivers, ocean environment and beaches. ..."

Part 3 of the Environmental Management and Pollution Control Act 1994 outlines a range of instruments that can be used to minimise adverse impacts on the environment from sources of pollution and encourage good environmental management.

It is intended that the means of achieving compliance with requirements will be through a range of regulatory mechanisms including information and publicity.

A review of the Act indicates that it provides for certain information to be recorded on registers which are open to inspection by the public. These include:

- environmental agreements
- environmental improvement programs
- environment protection notices

The Act also provides for the conduct of environmental audits to establish the current environmental performance of an operation.

There is no specific requirement in the proposed legislation to disclose monitoring results, although the information is available under Freedom of Information legislation. In relation to environmental audits, the Board of Environmental Management will be required to maintain a public register of audits that it requests.

In addition to the above, with the application in Tasmania from 1 July 1993 of a new accounting standard (AAS 27 - "Financial Reporting by Local Governments") councils are required to disclose the nature and probable financial impact of non-compliance with externally imposed requirements. It seems probable that this would include any serious breaches of licence conditions relating to wastewater treatment.

Audit supports the regulatory agency (DELM) publishing, on a regular basis, details of monitoring results of compliance/non-compliance of individual councils with licence conditions of wastewater treatment plants.

Audit recommends that councils be required to disclose details of non-compliance with licence conditions in their annual reports.

RESPONSE provided by Director Environmental Management, Department of Environment and Land Management

"DELM supports in principle this recommendation, however, is concerned with the resource implication. Reporting in the DELM annual report is possibly the appropriate forum although in 1991/92 a report was published separately of all data.

RESPONSE provided by the Executive Director, Municipal Association of Tasmania

"In relation to the recommendations, the Association has no objection to their intent. However, it is concerned that public alarm may be created where such disclosure suggests that a public health or environmental hazard exists, when in fact there is none (at least within the limits of current knowledge). Should therefore such disclosure be limited to instances where known thresholds are being approached, e.g. within 10% of the threshold? Clearly, where the threshold is exceeded and there is a risk to public health and the environment, then this should be reported in the manner suggested."

QUALIFICATIONS AND TRAINING OF WASTEWATER TREATMENT PLANT OPERATORS

Qualifications

Wastewater treatment systems employ biological processes in a variety of purpose-designed equipment. These processes require the establishment and maintenance of optimum conditions to achieve the maximum effect.

Operators have the overall responsibility for the correct functioning of the treatment systems so as to:

- protect the users of water downstream from the plant from disease, and
- preserve the aquatic environment for domestic and recreational use by maintaining desirable ecological conditions in the waterways.

The role of the operator is to competently operate the units and equipment of the plant to achieve a degree of purification to preserve the receiving waters assimilation capacity. The duties involved are a specialised area of work requiring knowledgeable staff and because of this, Audit expected to find qualified staff operating treatment systems.

The Werribee Water Training Centre in Victoria is one of the main training facilities available for wastewater treatment operators. The Centre now provides a Certificate in Water Operations Course which is formally accredited within the TAFE system and brings together a number of the previous courses. The Certificate requires a

minimum of 320 hours of subjects and is completed over a period of 3 to 6 years. Prior to the introduction of the Certificate, the Centre offered courses such as Wastewater (Levels 1 and 2), Water (Level 1) and Chlorination.

The Level 1 Wastewater course provides a total of 66 hours of exemptions towards the full Certificate course. It provides a basic understanding of the sources and characteristics of wastewater; concepts and terminology; important parameters such as BOD; routine operation and features of various wastewater treatment processes; and basic monitoring and use of laboratory equipment. As such it would appear to represent the minimum level of qualifications required for operators.

The Tasmanian Local Government Industry Training Board has organised the Integrated Package, Basic Wastewater Operator Training Course in Tasmania using the services of trainers from the Werribee Centre. In addition, courses in Sewerage Lagoon Operations and Chlorination have also been organised. These courses cover a number of subjects for which credit can be earned towards completion of the full Certificate course.

Survey responses on the question of the qualifications of wastewater treatment employees have been analysed for operators, classified in relation to the Level 1 Certificate as follows and summarised in the table below.

- **More than Level 1** - completed at least the Level 1 subjects but may have undertaken further units
- **Level 1 (or equivalent)** - completed only the Level 1 course or the Integrated Package
- **Less than Level 1** - completed some wastewater related courses only (eg. chlorination, pump maintenance) or who have other non-related qualifications (eg. fitter and turner)
- **No qualifications** - no qualifications of any sort noted in the survey.

Details	Number	Percentage
More than Level 1	18	30%
Level 1 (or equivalent)	28	46%
Less than Level 1	7	11%
No qualifications	8	13%

The present high proportion of wastewater treatment plant operational staff with at least a minimum level of qualifications reflects a commitment by councils to support the acquisition of formal qualifications. Audit considers that the possession of qualifications, together with a general level of experience, will help to contribute positively to the operation of wastewater treatment systems. Accordingly, councils are encouraged to ensure that all operators continue to be appropriately qualified.

Training

The Water Supply and Sewerage Management Guidelines of the NSW Government state that:-

> "... Training should not stop after the operator has gained an operator certificate as the operator will soon forget up to 90% of what was taught at the operator training courses. Continuing and regular training should be provided as refresher courses and to keep up with new technology and products. ..."

Survey results indicate that, for the responding councils, in the last twelve months 41% of wastewater treatment plant operators received no training. Audit considers that all wastewater treatment plant operators should be provided with ongoing training.

RESPONSE provided by Director Environmental Management, Department of Environment and Land Management

"DELM in association with the Australian Water and Wastewater Operators Association, Local Government Industry Training Board, TAFE and private consultants are developing a Tasmanian based recognised training course. This has been necessary due to the move to full cost recovery of the Werribee course. Once established, DELM will move to ensure all water treatment plant operators are trained".

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APPENDIX A
ABBREVIATIONS AND ACRONYMS

Abbreviation	Term
AAS 27	Australian Accounting Standard "Financial Reporting for Local Governments"
AAS 4	Australian Accounting Standard "Depreciation of Non-Current Assets"
ABS	Australian Bureau of Statistics
AER	Ambience Environmental Reports
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AWRC	Australian Water Resources Council
BOD	Biological/Biochemical Oxygen Demand
CBD	Central Business District
cfn	Faecal Coliforms
CSO	Community Service Obligation
DCHS	Department of Community and Health Services
DDR	Department of State Development and Resources
DELM	Department of Environment and Land Management
DPIF	Department of Primary Industry and Fisheries
EIP	Environmental Improvement Programs
EPA	Environmental Protection Authority
EPA 1973	Environment Protection Act 1973
ET	Equivalent Tenement
ha	Hectare

HMCA	Hobart Metropolitan Councils Association
HRWB	Hobart Regional Water Board
I/I	Infiltration/Inflow
IC	Industry Commission
KL	Kilolitres (1000 litres)
LGAT	Local Government Association of Tasmania
M/B	Mechanical/Biological Plant
m^3	Cubic Metre
ML	Megalitres (1 000 000 litres)
MWMP	Municipal Waste Management Plan
NATA	National Analytical Testing Authority
NFR	Non-Filtrable Residue
NHMRC	National Health and Medical Research Council
NWQMS	National Water Quality Management Strategy
NWRWA	North West Regional Water Authority
PIP	Performance Improvement Program
RWSC	Rivers and Water Supply Commission
SAQAS	Standards Australia Quality Assurance Services
SS	Suspended Solids
TSD	Tasmanian Sustainable Development policies
WWTP	Wastewater Treatment Plant (also referred to as Sewage Treatment Plant - STP)

APPENDIX B
GLOSSARY

Term	Definition
Aerobic Bacteria	Bacteria which requires oxygen dissolved in water to achieve degradation of organic matter.
Algal Blooms	A sudden growth of algae, water weed or other primitive plant.
Anaerobic Bacteria	Bacteria which achieves degradation of organic matter without oxygen being present.
Biochemical Oxygen Demand (BOD)	Biochemical Oxygen Demand is a measure of the biological consumption of oxygen in water, especially as a result of the breakdown of organic matter by bacteria.
Biosolids	Sludge which is used beneficially.
Chlorination	The addition of chlorine to effect disinfection.
Developer Contributions	Capital contributions for provision of services in regard to developments which are the subject of a development application or similar.
Domestic waste	Domestic waste is the water borne waste derived from human origin comprising faecal matter, urine and liquid household waste from water closet pans, sinks, baths, basins.
Dry Weather Flow	The flow in a sewer or drain under normal operating conditions when infiltration is at a minimum.
Effluent	Liquid discharged from a wastewater treatment plant after treatment.
Eutrophication	Rapid nutrient enrichment of lakes and rivers etc, caused by nutrient-rich materials in industrial or council wastes and in agricultural or urban run-off.

Facultative Bacteria	Bacteria which can function in both aerobic and anaerobic environments.
Faecal Coliforms	The bacteriological content of wastewater that comes from bodily wastes.
Infiltration/Inflow	Groundwater infiltration and stormwater inflow into a sewerage system.
Inflow	Water which enters sewerage systems from roofs, drains, yard gullys, inspection hole covers, cross connections from storm sewers, street washing and illegal connections.
Influent	Fluid (for example, water, wastewater) which flows into a treatment system.
Marginal Cost	The unit cost for provision of small increment of additional supply.
Nutrients	Compounds required for growth. Nitrogen and phosphorus are the most common nutrients removed in wastewater treatment.
Pathogens	Natural organisms, such as bacteria and viruses, which can cause disease in plants and animals.
Peak Flow	The maximum rate of a fluctuating flow.
pH	Measure of acidity or alkalinity of a liquid.
Potable Water	Water which is suitable for human consumption.
Primary Treatment	The process in which wastewater is settled so that solids can sink to the bottom and oil, fats and grease can float to the surface for removal.
Real Rate of Return	A financial measure of whether an industry is raising sufficient revenue to provide a return on the funds invested, as well as covering operating costs and the cost of assets used up.

Reticulation	A network of pipes to which service pipes of individual properties are connected.
Rising Main	A main through which water or sewage is pumped at pressure.
Secondary Treatment	The conversion of dissolved fine organic solids to particles which are captured and removed.
Sewage	The wastewater from homes, offices, shops and factories.
Sewage Overflow	A relief point in the sewerage system or the actual overflow from the relief point, so that raw sewage is released to avoid back-log flow of sewage into houses.
Sludge	The solid matter that settles to the bottom of a sedimentation tank or lagoon during wastewater treatment.
Stormwater Inflow	The flow in a sewer system due to surface runoff finding its way directly or indirectly into the sewers.
Trade Waste Agreement	Agreements reached between the Council and industry to restrict the amount of toxic substances discharged to the sewerage system. These often involve setting appropriate charges and limits for the discharge of waste.
Wastewater	The spent or used water of a community or industry which contains dissolved and suspended matter.

APPENDIX C
QUESTIONNAIRE TO COUNCILS

WASTEWATER MANAGEMENT IN LOCAL GOVERNMENT SURVEY

Name of Council:

Contact Person: Name:
Position:
Telephone No:

1. General Information

1.1 Provide details of Council's sewerage treatment plants as follows

Location	*Treatment Type (eg, Secondary Primary*
1.	
2.	
3.	
4.	
5.	
6.	

1.2 Please provide a copy of Rivers and Water Supply Commission's annual water supply and sewerage reporting forms for 1992/93, used by the Commission to compile the "Municipal Water Supply and Sewerage Scheme - Performance Comparisons Report".

2. Stormwater Infiltration

2.1 Provide details of Council policy in relation to stormwater infiltration.

2.2 Provide details of any problems Council has in relation to stormwater infiltration and action taken or planned by Council to rectify any such problems.

2.3 Has Council undertaken a stormwater infiltration study?

NO?		*Date of Study* / /19
YES?		

Provide details of most recent study if more than one undertaken

If yes, provide details of the reasons for the study

Provide details of potential savings ($) identified by study

Provide details of action taken following study

Provide details of savings ($) achieved following above action

Please provide a copy of the study

3. Trade Waste

3.1 Is Council aware of the Model Sewerage and Drainage By-Law 1969?

NO?	
YES?	

3.2 Does Council have a By-Law covering wastewater?

NO?	
YES?	

If yes, please provide a copy of the By-Law

3.3 Does Council have any trade waste agreements in existence?

NO?	
YES?	

If yes, provide details for each agreement as follows:-

Name of Ratepayer	*Amounts Contributed $*	*Basis for Determining Contribution*
1.		
2.		
3.		

3.5 Provide the following details for the 5 largest ratepayers which are manufacturers or processors and which are connected to Council's sewerage system.

A	*Name of ratepayer*	
	Property number	
	Number of business	
	Types of waste discharged into sewers	
	Volumes of waste discharged into sewers	
	Is the waste pre-treated?	

3.6 Provide details of other manufacturers or processors connected to councils sewerage system which may have significant volumes or potentially toxic waste, (i.e. discharge waste which presents a potential risk to public health and the environment).

A	*Name of ratepayer*	
	Property number	
	Number of business	
	Types of waste discharged into sewers	
	Volumes of waste discharged into sewers	
	Is the waste pre-treated?	

B	*Name of ratepayer*	
	Property number	
	Number of business	
	Types of waste discharged into sewers	
	Volumes of waste discharged into sewers	
	Is the waste pre-treated?	

4. Reuse of treated effluent and sewage sludge

4.1 Provide details of Council policy with regard to the reuse of effluent or sludge?

4.2 Has Council undertaken any studies in this area?

NO?		*Date of Study / /19*
YES?		

Provide details of most recent study if more than one undertaken

If yes, provide details of the objectives of the study and a summary of the findings.

4.3 Provide details of reuse of effluent and/or sludge as follows:-

Nature of reuse	*Volumes*	*$ Recovered, if any*	*Extra costs incurred*

5. Public Education

5.1 Has Council conducted any public education programs on water minimisation practices?

NO?	
YES?	

If yes, provide details of programs as follows:-

Program name	*Date*	*Type of media used eg, TV, print, radio*	*Cost $*	*Benefits ($'s and volumes)*
1.				
2.				
3.				

5.2 Provide details of Council policy in relation to the installation of more efficient water using appliances, eg, dual flush toilets?

6. Water Meters

6.1 Provide details of Council policy on the installation of water meters in all future subdivisions and on existing unmetered properties.

6.2 Have Council recently undertaken studies into the benefits of metering?

NO?	
YES?	

If yes, please provide copies of the study

6.3 Has Council recently metered any areas?

NO?	
YES?	

If yes, provide the following details

Date	*Area(s) metered*	*Total cost $*

7. Monitoring of inflows

7.1 Does Council monitor the amount of inflows into its sewage treatment plants?

NO?	
YES?	

If yes, provide the following details of each sewerage system as listed under Section 1

Sewerage System	*How often is it done?*	*Nature of information obtained?*	*What is this information used for*	*Types of monitors utilised for measuring flows*
1.				
2.				
3.				

7.2 If no, has Council undertaken a flow monitoring program?

NO?	
YES?	

If yes, provide details and findings of the program

COST MANAGEMENT

8. Management System

8.1 Does Council use performance indicators to monitor the efficiency or effectiveness of its sewerage system/s?

NO?	
YES?	

If yes, provide details, eg what are they, what information do they provide?
If yes, please provide copies

8.2 Provide details of action Council has taken in relation to the preparation of a 5 year strategic plan as required by section 66 of the Local Government Act 1993?

8.3 Is a sewerage plan to be incorporated in the strategic plan?

NO?	
YES?	

If yes, please provide a copy of the draft final plan.

9. Rating

9.1 Has Council determined its future capital requirements in relation to the provision of sewerage services?

NO?	
YES?	

If yes, provide details of the future capital requirements for the next 5 years for each sewerage system as listed under Section 1.

Sewerage system	*1993/94*	*1994/95*	*1995/96*	*1996/97*	*1997/98*
1.					
2.					
3.					
4.					
5.					
6.					

If yes, provide details of the present level of reserves for sewerage (as at 30/6/1993) and expected levels for the next five years.

	Actual	*Estimated*				
Reserve Account	*1992/93*	*1993/94*	*1994/95*	*1995/96*	*1996/97*	*1997/98*
1.						
2.						
3.						

9.2 What was the total amount received in 1992/93 as contributions from subdividers for headworks?

9.3 Provide details on how contributions were determined?

10. Staffing

10.1 For equivalent full-time employees charged to wastewater treatment provide the following details:

A	*Employee name*	
	Classification of employee	
	Duties of employee	
	Details of qualification	
	Details of training undertaken in last 12 months (1992/93), eg, nature, time spent, cost	

11. Environmental

11.1 Provide details of chemical usage for sewerage treatment plants as listed under Section 1 as follows:-

Sewerage system	*Type of chemical used*	*Purpose of chemical*	*Quantity used*	*$ spent in 1992/93*
1.				

APPENDIX D UNIT RATE FORMULA:

$$H = A \times Q + \frac{N \times Q \times X}{1000}$$

where

H = Total charge per year ($)
A = Unit cost related to volume ($/kL)
Q = Annual trade waste volume (kL)
N = Unit cost related to a pollutant ($/kg)
X = The pollutant concentration (mg/L)

N and X relate to any pollutants council wish to charge for, eg, BOD, NFR, oil and grease, nutrients, sulphates, etc.

Apportionment of Charges

The basic procedure for determining the sewerage system annual costs which are attributable to trade waste generators is as follows:

- Estimate annual costs for the sewerage system in the categories of
  - capital costs for debt servicing and depreciation
  - operations and maintenance
- For each category (capital and operation) assess the cost associated with individual system components (ie. wastewater mains, pumping stations, treatment works).
- Apportion these costs to the various parameters such as peak flow, average flow, BOD, SS and grease.
- Using the unit cost above and the total annual quantities of flow, BOD, SS and grease for the domestic and trade waste users, the unit costs for each parameter (BOD, SS etc) and the total annual costs for each category (domestic and trade waste) can be determined.

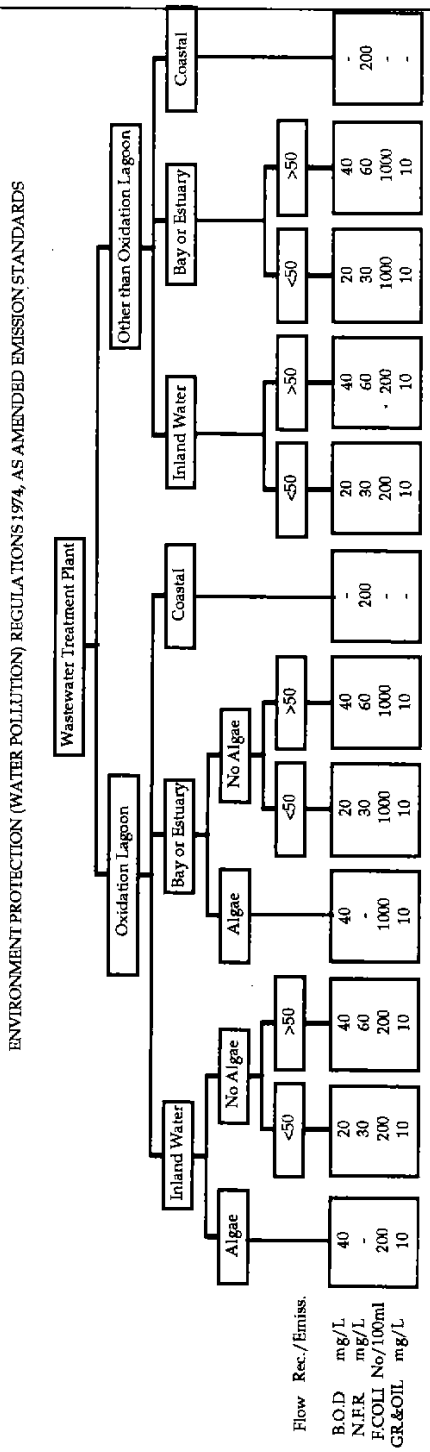
Source: Water Supply and Sewerage Management Guidelines, New South Wales Government, April 1991.

APPENDIX E
TARIFF STRUCTURE GUIDELINES

	FEES CHARGES PENALTIES	CATEGORY 1	CATEGORY 2
1	ADMINISTRATION COSTS		
	1.1 PERMIT FEE	YES	NO
	1.2 AGREEMENT FEE	NO	YES
	1.3 ANNUAL SERVICE CHARGE	YES	NO
2.	TRANSMISSION AND TREATMENT COSTS		
	2.1 USER PAY CHARGES		
	Flow	YES	YES
	BOD	NO	YES
	Suspended Solids	NO	YES
	Grease	As	As Stipulated
	Inorganics	stipulated	in
	Metals	in Permit	Agreement
	2.2 FOOD AND SANITARY NAPKIN DISPOSAL UNIT CHARGE	All categories including trade waste exempt and domestic	
3.	PENALTIES		
	3.1 NON-COMPLIANCE CHARGES		
	Inspections	YES	YES
	Sampling	YES	YES
	Testing	YES	YES
	3.2 DAMAGE CHARGES		
	Pipe renovation	All categories	
	anti-foam oil	at cost	
	Media flush, oil		
	3.3 PENALTIES AND FINES	Commensurate with seriousness of offence	

SOURCE: DELM SEWERAGE MANAGEMENT PROGRAM, GUIDELINES FOR ACCEPTANCE OF LIQUID WASTES TO SEWER, JUNE 1994

APPENDIX F
ENVIRONMENT PROTECTION (WATER POLLUTION) REGULATIONS 1974



APPENDIX G
COMPLIANCE STATUS OF TASMANIAN WASTEWATER TREATMENT PLANTS

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
Break O' Day	Fingal	L	S	South Esk River	Inland	1993	50	NO	NO	NO	125
							90	NO	YES	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
	St Helens	L	S	Georges Bay	Bay	1993	50	NO	NO	NO	690
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	YES	NO	NO	
	St Marys	L	S	Break O' Day River	Inland	1993	50	NO	NO	NO	190
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
	Steiglitz	L	S	Intended for irrigation		1993	50	na	na	na	59
							90	na	na	na	
						1994	50	na	na	na	
							90	na	na	na	
Brighton	Bridgewater	M/B	S	Derwent River	Estuarine	1993	50	YES	YES	YES	3125
							90	YES	YES	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	NO	
	Brighton	L	S	Jordan River	Inland	1993	50	YES	NO	NO	200
							90	YES	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
Burnie	Cooee Point	M/B	P	Bass Strait		1993	50	YES	YES	na	1900
							90	YES	YES	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	
	Ridgley	PDL	S	Pet River	Inland	1993	50	YES	YES	YES	110
							90	YES	NO	YES	
						1994	50	YES	YES	YES	
							90	YES	NO	YES	
	Round Hill	M/B	P	Emu Bay Bass Strait		1993	50	YES	YES	na	8000
							90	YES	YES	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	
Central Coast	Dial Point	PD	P	Bass Strait	Coastal	1993	50	YES	YES	na	730
							90	YES	YES	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
	Turners Beach	L	S	Forth River	Estuarine	1993	50	YES	NO	YES	400
							90	YES	NO	YES	
						1994	50	YES	NO	YES	
							90	YES	NO	YES	
	Ulverstone	M/B	S	Picnic Point Bass Strait	Coastal	1993	50	NO	NO	na	7500
							90	NO	NO	na	
						1994	50	NO	NO	na	
							90	NO	NO	na	
Central Highlands	Bothwell	L	S	Clyde River	Inland	1993	50	NO	NO	NO	155
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	YES	NO	NO	
	Hamilton	L	S	Clyde River	Inland	1993	50	na	na	na	34
							90	na	na	na	
						1994	50	YES	YES	YES	
							90	YES	YES	NO	
	Ouse	L	S	Ouse River	Inland	1993	50	na	na	na	35
							90	na	na	na	
						1994	50	YES	NO	YES	
							90	YES	NO	NO	
	Tarraleah	M/B	S	Nive River	Inland	1993	50	YES	NO	YES	270
							90	YES	NO	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
	Wayatinah	S	P	Nil	Nil	1993	50	NO	YES	NO	50
							90	NO	YES	NO	
						1994	50	NO	YES	NO	
							90	NO	YES	NO	
Circular Head	Smithton (Pelican Point)	AL	PT	Pelican Pt Duck Bay	Bay	1993	50	YES	YES	YES	5200
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	NO	YES	
	Stanley	L	S	Unnamed Creek	Inland	1993	50	YES	NO	YES	276
							90	YES	NO	NO	
						1994	50	NO	NO	NO	
							90	YES	NO	NO	
Clarence	Cambridge	L	S	Barilla Rivulet	Inland	1993	50	YES	YES	YES	125
							90	YES	YES	YES	
						1994	50	YES	YES	na	
							90	YES	YES	na	
	East Risdon	PDL	S	Risdon Cove	Estuarine	1993	50	YES	YES	YES	1000
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
	Rokeby	ASL	S	Ralphs Bay	Bay	1993	50	YES	YES	YES	1330
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	NO	
	Rosny	M/B	S	Derwent	Estuarine	1993	50	NO	YES	YES	7500
							90	NO	YES	NO	
						1994	50	NO	YES	YES	
							90	NO	NO	NO	
Devonport	Pardoe Downs	M	PP	Bass Strait - Esperance Bay	Coastal	1993	50	NO	NO	na	14700
							90	NO	NO	na	
						1994	50	NO	NO	na	
							90	NO	NO	na	
Dorset	Bridport	L	S	Andersons Bay	Ocean	1993	50	YES	YES	na	500
							90	YES	YES	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	
	Scottsdale	M/B(L)	S	Unnamed Creek	Inland	1993	50	YES	YES	NO	2000
							90	YES	YES	NO	
						1994	50	NO	NO	YES	
							90	YES	NO	NO	
George Town	George Town (1993/94 - Commis-sioning)	ASL	PT	Tamar River	Estuarine	1993	50	na	na	na	....
							90	na	na	na	
						1994	50	na	na	na	
							90	na	na	na	
Glamorgan/ Spring Bay	Bicheno	L	S	Old Mines Lagoon	Irrigation	1993	50	na	na	na	450
							90	na	na	na	
						1994	50	na	na	na	
							90	na	na	na	
	Orford	L	S	Quarry Point	Coastal	1993	50	YES	YES	na	473
							90	YES	YES	na	
						1994	50	na	na	na	
							90	na	na	na	
	Swansea	L	S	Water Creek	Irrigation	1993	50	na	na	na	200
							90	na	na	na	
						1994	50	na	na	na	
							90	na	na	na	
	Triabunna	L	S	Vicarys River	Estuarine	1993	50	YES	NO	YES	210
							90	YES	NO	NO	
						1994	50	na	na	na	
							90	na	na	na	
Glenorchy	Cameron Bay	M/B	S	Cameron Bay	Estuarine	1993	50	YES	YES	NO	6000
							90	NO	NO	NO	
						1994	50	YES	YES	NO	
							90	YES	YES	NO	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
	Prince of Wales Bay	M/B	S	Prince of Wales Bay	Estuarine	1993	50	YES	YES	NO	9900
							90	YES	YES	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
Hobart	Long Point	M	N	Blinking Billy	Estuarine	1993	50	NO	NO	NO	2700
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
	Macquarie Point	M/B	S	Macquarie Point	Estuarine	1993	50	YES	YES	YES	18000
							90	NO*	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
	Selfs Point	M/B	S	New Town Bay	Estuarine	1993	50	YES	YES	YES	6250
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
Huon Valley	Dover	L	S	Esperance Bay	Bay	1993	50	YES	NO	NO	175
							90	YES	NO	NO	
						1994	50	YES	NO	NO	
							90	NO	NO	NO	
	Geeveston	M/B	S	Kermandie River	Inland	1993	50	NO	NO	NO	218
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
	Cygnet	PD	S	Cygnet Bay	Bay	1993	50	na	na	na	400
							90	na	na	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	
	Sullage Scheme (Decommissioned)	SO	P	Cygnet Bay	Bay	1993	50	NO	NO	NO	170
							90	NO	NO	NO	
						1994	50	na	na	na	
							90	na	na	na	
	Ranelagh	L	S	Huon River	Inland	1993	50	YES	YES	NO	525
							90	YES	YES	NO	
						1994	50	YES	YES	NO	
							90	YES	NO	NO	
Kentish	Railton	L	S	Redwater Creek	Inland	1993	50	YES	YES	YES	600
							90	YES	YES	NO	
						1994	50	YES	YES	NO	
							90	YES	NO	NO	
	Sheffield	L	S	Dodder Rivulet	Inland	1993	50	YES	NO	NO	324
							90	YES	NO	NO	
						1994	50	YES	NO	NO	
							90	YES	NO	NO	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
King Island	Currie	RO	N	Bass Strait	Coastal	1993	50	NO	NO	na	240
							90	NO	NO	na	
						1994	50	na	YES	na	
							90	na	YES	na	
Kingborough	Blackmans Bay	M/B	S	Derwent River	Estuarine	1993	50	NO	NO	NO	4125
							90	NO	NO	NO	
						1994	50	NO	YES	YES	
							90	NO	NO	NO	
	Electrona	EA	S	North- West Bay	Bay	1993	50	NO	YES	YES	270
							90	NO	YES	NO	
						1994	50	NO	YES	YES	
							90	NO	YES	NO	
	Margate	L	S	North-West Bay	Bay	1993	50	YES	YES	YES	167
							90	YES	YES	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	NO	
	Snug	SO	P	North-West Bay	Bay	1993	50	na	na	na	270
							90	na	na	na	
						1994	50	na	na	na	
							90	na	na	na	
	Taroona	M/B	S	Derwent River	Estuarine	1993	50	NO	YES	YES	1150
							90	NO	YES	NO	
						1994	50	NO	YES	NO	
							90	NO	NO	NO	
Latrobe	Latrobe	M/B	S	Mersey River	Estuarine	1993	50	YES	YES	NO	924
							90	NO	YES	NO	
						1994	50	NO	YES	NO	
							90	YES	YES	NO	
	Port Sorell	L	S	Eddies Point	Estuarine	1993	50	NO	YES	NO	961
							90	NO	YES	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
Launceston	Hoblers Bridge	M/B	S	North Esk River	Estuarine	1993	50	YES	YES	YES	3000
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
	Lilydale	L	S	Rocky Creek Pipers River	Inland	1993	50	YES	NO	NO	135
							90	YES	NO	NO	
						1994	50	YES	NO	NO	
							90	YES	NO	NO	
	Newnham Drive	M/B	S	Tamar River	Estuarine Tamar	1993	50	YES	YES	YES	3920
							90	YES	YES	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	NO	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
	Norwood	EAL	S	South Esk River	Estuarine	1993	50	YES	NO	YES	4050
							90	NO	NO	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
	Ti-Tree Bend	M/B	S	Tamar River	Estuarine	1993	50	YES	YES	YES	25000
							90	YES	YES	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
Meander Valley	Carrick	L	S	Liffey River	Inland	1993	50	YES	NO	NO	500
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	YES	NO	NO	
	Deloraine	L	S	Meander River	Inland	1993	50	YES	NO	NO	568
							90	YES	NO	NO	
						1994	50	YES	NO	NO	
							90	NO	NO	NO	
	Prospect Vale	L	S	Dalrymple Creek	Inland	1993	50	YES	NO	NO	1400
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
	Westbury	L	S	Quamby Brook	Inland	1993	50	YES	NO	NO	600
							90	YES	NO	NO	
						1994	50	YES	NO	YES	
							90	NO	NO	NO	
New Norfolk	Turiff Lodge	M/B	S	Derwent River	Inland	1993	50	YES	YES	YES	4100
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	
Northern Midlands	Campbell Town	L	S	Elizabeth River	Inland	1993	50	YES	NO	YES	325
							90	YES	NO	YES	
						1994	50	NO	NO	YES	
							90	YES	NO	NO	
	Cressy	L	S	Back Creek	Inland	1993	50	YES	YES	YES	240
							90	YES	NO	NO	
						1994	50	YES	NO	YES	
							90	YES	NO	NO	
	Evandale	LC	S	Boyes Creek	Inland	1993	50	YES	NO	YES	375
							90	YES	NO	YES	
						1994	50	YES	NO	YES	
							90	NO	NO	NO	
	Longford	AL	S	Back Creek	Inland	1993	50	NO	NO	NO	1700
							90	YES	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
	Perth	L	S	South Esk	Inland	1993	50	YES	YES	NO	450
							90	YES	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	YES	
							90	NO	NO	NO	
Sorell	Midway Point	PD	S	Orielton Lagoon	Bay	1993	50	YES	YES	NO	810
							90	NO	NO	NO	
						1994	50	YES	YES	NO	
							90	NO	NO	NO	
	Sorell	PP	P	Pittwater	Bay	1993	50	NO	NO	NO	200
							90	NO	NO	NO	
						1994	50	NO	NO	NO	
							90	NO	NO	NO	
Waratah-Wynyard	East Wynyard	PD	S	Bass Strait	Coastal	1993	50	YES	YES	na	2900
							90	YES	YES	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	
	Somerset	PD	S	Bass Strait	Coastal	1993	50	YES	YES	na	1200
							90	YES	YES	na	
						1994	50	YES	YES	na	
							90	YES	YES	na	
West Coast	Queenstown	EAL	S	Queen River	Inland	1993	50	YES	YES	NO	1100
							90	YES	YES	NO	
						1994	50	YES	YES	NO	
							90	YES	YES	NO	
	Strahan	L	S	Manuaka River	Inland	1993	50	YES	NO	NO	240
							90	YES	NO	NO	
						1994	50	YES	YES	NO	
							90	YES	NO	NO	
	Tullah	L	S	Lake Rosebery	Inland	1993	50	YES	YES	NO	243
							90	YES	NO	NO	
						1994	50	YES	NO	YES	
							90	NO	NO	YES	
	Zeehan	L	S	Little Henty River	Inland	1993	50	YES	NO	YES	214
							90	YES	NO	NO	
						1994	50	YES	YES	YES	
							90	YES	YES	NO	
West Tamar	Beaconsfield	L	S	Brandy Crk, Tamar	Inland	1993	50	YES	NO	YES	324
							90	YES	NO	NO	
						1994	50	YES	NO	NO	
							90	NO	NO	NO	
	Exeter	L	S	Unnamed Creek to Tamar	Inland	1993	50	YES	NO	YES	115
							90	YES	NO	NO	
						1994	50	YES	NO	YES	
							90	NO	NO	NO	

Council	WWTP Location	WWTP Type	WWT Level	Outfall Point	Receiving Waters	Year	Percentile	BOD	NFR	cfn	Licensed Flow(kL/d)
	Beauty Point	L	S	West Arm Port Dalrymple	Estuarine Tamar River	1993	50	YES	NO	YES	540
							90	YES	NO	NO	
	Beauty Point	L	S	West Arm Port Dalyrymple	Estuarine Tamar River	1994	50	YES	NO	YES	
							90	NO	NO	YES	
	Legana Industrial Park	L	S	Bernard Pt Tamar River	Estuarine	1993	50	YES	NO	YES	540
							90	YES	NO	NO	
						1994	50	YES	NO	YES	
							90	YES	NO	NO	
	Riverside	M/B	S	Ti-Tree Bend Tamar	Estuarine Tamar River	1993	50	YES	YES	YES	2800
							90	YES	YES	YES	
						1994	50	YES	YES	YES	
							90	YES	YES	YES	

Legend:

WWTP	L	Lagoon
	AL	Aerated Lagoon
	ASL	Activated Sludge Lagoon
	EAL	Extended Aerated Lagoon
	LC	Lagoon & Chlorination
	M/B	Mechanical/ Biological
	PD	Pasveer Ditch
	PDL	Pasveer Ditch & Lagoon
	I	Imhoff Tank
	SO	Septic Outfall
	M	Masceration
	RO	Raw Outfall
Treatment	N	None
	P	Primary
	PP	Partial Primary
	S	Secondary
	T	Tertiary
	PT	Partial Tertiary

* additional testing conducted by council provided results which were inconsistent with those provided to DELM. Reasons for discrepancy could not be determined.

PREVIOUS REPORTS TO PARLIAMENT

SPECIAL REPORT NO. 1	REGIONAL HEALTH SUPPORT SERVICES
SPECIAL REPORT NO. 2	STUDENT TRANSPORT
SPECIAL REPORT NO. 3	EDUCATION INSTITUTIONS CLEANING SERVICES
SPECIAL REPORT NO. 4	STANDARD OF ANNUAL REPORTING BY GOVERNMENT DEPARTMENTS
SPECIAL REPORT NO. 5	MUNICIPAL SOLID WASTE MANAGEMENT
SPECIAL REPORT NO. 6	ADMINISTRATION AND ACCOUNTABILITY OF GRANTS
SPECIAL REPORT NO 7	REGIONAL HEALTH MEDICAL REVIEW