

1. WASTEWATER PLAN AND RESOURCE CONSENT

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Corporate Plan Output: Liquid Waste	

The purpose of this report is to inform the Council of the need for a comprehensive Wastewater Management Plan, make recommendations covering the Estuary Green Edge development and make recommendations covering resource consents for the Christchurch Wastewater Treatment Plant.

1. INTRODUCTION AND BACKGROUND

As part of the City Council's responsibilities and functions in regard to the management of the City's wastes, the Waste Management Unit is involved in the development of management practices.

This report discusses three aspects of the Unit's management role. They are:

- The requirement for a Wastewater Management Plan.
- The improvement of the treatment and disposal environments. This report will focus specifically on the enhancement and restoration of the edge of the estuary between the Avon and Heathcote Rivers, and finally.
- The options for the treatment and disposal of Christchurch's wastewater which will enable the Council to renew its discharge consent. The report discusses the process up until the present. The Council is asked to decide on which of these solution/s it will present for further consultation with the public.

2. WASTEWATER MANAGEMENT PLAN

Although the Christchurch City Council and its predecessor the Christchurch Drainage Board have always had long term plans for the treatment and disposal of wastewater, a number of factors have led to the recognition of a need for a formal Wastewater Management Plan. They include:

Responsibilities under the Resource Management Act (1991) (RMA)

Under Section 31 of the RMA, the functions of territorial authorities are described, and this includes:

- “(a) The establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district”*

In order to achieve integrated management, and also to achieve the purposes of the RMA, the various aspects of wastewater management and the natural and physical resources which are involved should be considered together.

Local Government Act Requirements

Under the Local Government Act, Amendment No. 4. 1996, there is a requirement for every local authority to prepare and adopt a waste management plan. The Council adopted a Solid Waste Management Plan in 1998 to comply with this. However, recent legal opinion identifies that wastewater is included in the definition of waste in the Local Government Act and this implies the requirement of a waste management plan including wastewater minimisation using the international 5-step hierarchy (reduce, reuse, recycle, recovery and residue disposal)

Resource Consent Requirement

The Christchurch Wastewater Treatment Plant (CWTP) presently operates under a discharge consent. This consent will, however, expire in October 2001, and at least six months before this date the Council will be required to apply for a new consent. Unlike the present consent, the new consent will have to be made under the provisions of the RMA.

The Avon-Heathcote Estuary is part of the Coastal Marine Area (CMA) and as such any coastal permit application which involves a discharge to either the estuary or other parts of the coast will be determined by the Minister of Conservation through a recommendation by Environment Canterbury. There is a legal requirement to consider treatment and disposal options which involve passing the sewage through soil or wetland. Using the land on the western edge of the estuary can assist in meeting this requirement to some degree.

Increased public awareness and concern in relation to waste management issues and the natural resources of the City

Over the past ten years there has been a steady increase in awareness of the environmental issues facing the City. One major area of interest is waste management in a general sense, but also specifically wastewater management, its treatment and disposal.

The Council is increasingly demonstrating leadership in the development of sustainable policy and practices including commitment to The Natural Step Philosophy and more recently to the principles of Natural Capitalism championed at the recent Redesigning Resources Conference.

In parallel there has also been a development of awareness of the important natural values within the City, and the need to control the activities which may affect them. There is also a desire to restore the wetlands along the western edge of the estuary to a much more natural state.

2.1 Wastewater Management Plan: A Vision

The Christchurch City Council Annual Plan (2000/01) contains the following objective, in terms of its management of liquid wastes within the City:

Provision of liquid waste management services for the community in a safe and environmentally responsible manner.

Within the City Council's Mission are the following outputs, which relate to liquid and solid waste:

- Be responsive to local needs
- Be highly accountable for actions
- Enhance the quality of the city's environment
- Use sustainable management principles
- Efficient in delivery of high quality services
- Work constructively towards common goals held with central government and the regional unit of local government.

This objective and these outputs when developed will provide a framework for the integration of all areas of wastewater management, and encompass aspects of the health and safety of the community, as well as environmental issues and efficiency of the system.

The objective/vision also requires a plan to be developed which will meet the purposes of the RMA (to promote the sustainable management of the natural and physical resources), as well as finding solutions which work with nature rather than impose constraints on it.

2.2 The Elements of the Wastewater Management Plan

There are numerous aspects which can be incorporated within and assist in the achievement of the wastewater management plan including:

- Asset management (pipe network, pumping stations, treatment plants).
- Minimising waste.
- Cleaner production.
- Reuse and/or recycling of waste.
- Onsite treatment.
- Industrial pre-treatment.
- Use of satellite disposal systems.
- Stormwater treatment.
- Education.
- Planning mechanisms.
- Trade Waste Bylaw.
- Plant capacity upgrade.
- **Improvement of the quality of treatment and disposal environments** (including integration with other Council objectives relating to the estuary's edge).
- **Treatment and disposal of wastewater.**

This report specifically focuses on aspects of the last two elements of this list.

3. **IMPROVEMENTS OF THE QUALITY OF TREATMENT AND DISPOSAL ENVIRONMENTS - THE ESTUARY GREEN EDGE CONCEPT**

This section focuses on the improvement of the quality of the environment including and surrounding the existing Christchurch Wastewater Treatment Plant, also known as the Estuary Green Edge. The Green Edge is recognised as part of the Green Corridor, which stretches from Brookland's Lagoon in the north down the coast to Travis Wetland, the Avon river, the Estuary, and up Heathcote Valley to the Port Hills. In this report the Estuary Green Edge is defined primarily as the area between the mouths of the Avon and Heathcote Rivers, but it also covers the lower reaches of the Avon as far upstream as Owles Terrace and the lower reaches of the Heathcote, including parts of Heathcote Valley.

3.1 **History**

The western edge of the Avon–Heathcote Estuary is a part of the City which, since European settlement, has undergone major transformations in terms of its natural and physical values. It has been an area of concentrated waste treatment and disposal (both liquid and solid wastes) while at the same time retaining important natural, recreational, historic and cultural values.

Prior to European settlement, the western side of the estuary comprised a series of dunes covered in coastal vegetation. In the hollows between the dunes nestled wetland patches, and around the rim grew tidal saltmarsh.

The site was important to tangata whenua particularly as a site for mahinga kai. Ihutai, which was centred on the Avon-Heathcote Estuary, was part of a large fishery.

The role of the rivers and estuary to the early European settlers was major. Trading ships used both the Avon and Heathcote Rivers to move goods and passengers. When the metalled all weather roads and the Lyttelton tunnel were developed, the river traffic reduced significantly. The early communities of Christchurch were scattered, with the beach and estuary suburbs being quite separate from the rest of the City.

Remnants of the early European heritage exist such as the Cob Cottage at Ferrymead. In spite of the fact that there are land-based open spaces in the area, there are few that are suitable for active recreation. With the steady development of the hill suburbs (where flat land is at a premium), and increasing residential development around Linwood and Woolston, there is a significant deficiency in active recreational areas in the broader area.

The Ferrymead Bridge which crosses the Heathcote River at the Avon-Heathcote Estuary links the hills suburbs with the rest of the city. In the “lifeline” study commissioned in 1992, it was identified that during an earthquake the Ferrymead Bridge would be at significant risk, and therefore a stronger alternative was required. This is just one of the traffic issues which affect the area.

The development of Humphreys Drive along the edge of the estuary, has created a hard edge which is both a visual and ecological concern, as it limits the extent of the saltmarsh vegetation by creating a barrier. Over the past 10 years a number of alternative routes have been identified that could divert the road away from the edge. The future development of the state highway through the middle of the oxidation pond complex is a further issue.

From the early days of European settlement the Avon-Heathcote Estuary (and ultimately the sea beyond) has been the recipient of the City’s wastes. A sewage farm was established at Bromley in 1883, at which time the sandhills were flattened and converted to paddocks, and sewage channelled out onto the Estuary. The suburbs which developed to the west of the estuary along the Heathcote River, contained many industrial activities, (parts of this area are still zoned for industrial activities) and the wastes from these industries also entered the Estuary via the Heathcote River.

Between 1958 and 1962 the Bromley sewage farm was expanded into the present day system, including the oxidation ponds. Over the years various areas around the edge of the estuary have been used as landfills, including at the mouth of the Heathcote River (mixture of domestic and chemical wastes), Sandy Point (which lies between the Linwood paddocks and the oxidation ponds and contains bone and sulphur products), and the large Bexley landfill (which lies to the north of the area containing both domestic and other wastes).

Both the Bexley paddocks (covering an area of approximately 100 hectares, and used as a landfill between 1950–1985) and the Linwood paddocks have been used for farming, and these and other sites around the estuary were used for the disposal of biosolids. This use has now ceased, but grazing continues.

The original natural habitats which existed in this area have largely disappeared. Remnants of saltmarsh vegetation have clung on around the mouth of the two rivers, and are actively being restored and protected. None of the dunes remain. However, the oxidation ponds, which have replaced them, have provided a different but valuable natural habitat for many species of waterfowl, and estuarine birds. Together with the estuary, the ponds and Linwood paddocks have created a wetland ecosystem of international importance.

With population growth, the desire for higher environmental standards, increased public awareness, and the legal responsibilities of the City, improvement and maintenance of the liquid waste treatment and disposal is required.

Given the valuable existing resource and the potential to recreate lost habitats and mitigate past land practices, an opportunity exists to develop an integrated development and protection plan for the western edge of the Estuary. This can be achieved by working with nature to create the best outcomes for both the natural environment and the community's physical, mental and cultural wellbeing.

3.2 Development Features

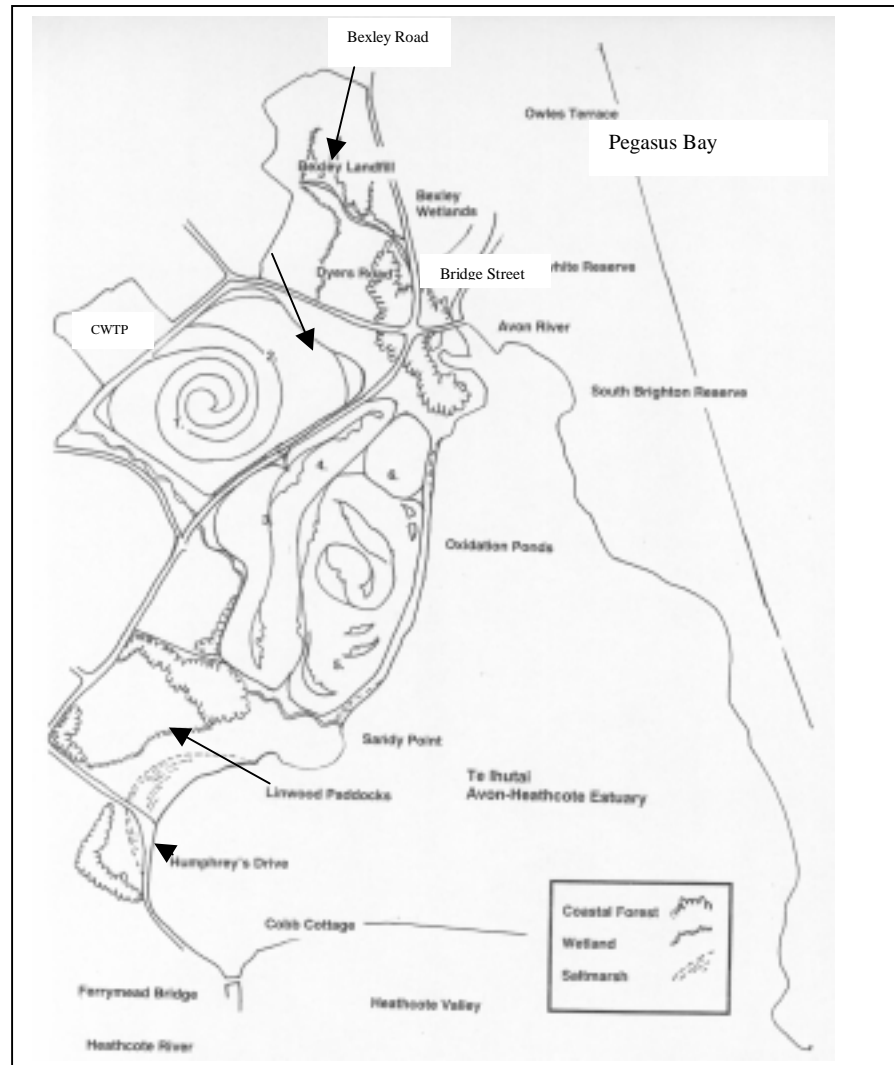
Figure 1 below shows a preliminary concept plan for development of the Estuary Green Edge, and Appendix A ([attached](#)) shows another more detailed plan of the waste treatment and disposal activities.

The preliminary concept plan for the Estuary Green Edge illustrates from south to north:

- Restoration and/or relocation of the protected Cob Cottage.
- New Ferrymead Bridge.
- Restoration of saltmarsh at the mouth of the Heathcote River, and around Humphreys Drive. (It is also possible that at some stage in the future, Humphreys Drive could be closed and traffic re-routed to the Ferry Road and Dyer's Road. This would allow future naturalisation of this area).
- Linwood paddocks are shown as being developed as a passive recreational area, with excavation of the paddocks to allow the re-vegetation by saltmarsh habitat, and an area of grassland maintained to provide the required wintering sites for pied stilts and other waders as well as the pukeko.
- Development of part of the Linwood paddocks as a wetland, thereby creating an opportunity to pass the treated sewage through soil or wetlands as favoured by national and regional policy statements.
- At the edge of the Linwood paddocks, wetland, shrubland and coastal forest could be established.
- Sandy Point would provide a key area for visitor access and interpretative centres, as well as providing nesting and resting areas for estuary birds.
- As part of the requirement for improved treatment of the City's wastewater, the existing oxidation ponds will have to be modified, to ensure a longer retention period.
- Soft edging of the oxidation ponds to restore a type of sandland topography.
- Finally Bexley landfill could be enhanced by the establishment of coastal forest where soil depths allow;
- The other parts of the landfill could be used as either farmland, or active recreation. For example, biking, horse riding, eco-tourism and walking in this area are possibilities.

By working with the natural systems and the needs of the wildlife of the area, a solution can be found which meets the wildlife, aesthetic and treatment requirements. The pond system is a major aspect of this solution. Preliminary concept plans shown in Figure 1 and Appendix A provide one option.

Figure 1. Preliminary Estuary Green Edge Concept Plan



Ponds 1 and 2 receive the treated effluent from the Plant. Their basic function of oxidation requires a large area of open water. The wildlife values of these ponds are not significant. Aesthetically, their appearance can be improved by a design which breaks the hard edges of existing structures and is connected to the design for the other ponds in the series.

The broken spiral form of the lower ponds 3,4,5 and 6 (to the east of Dyer's Road) will meet both wildlife and broader ecological requirements as well as the requirement to extend the time the wastewater takes to pass through the pond system. The spiral islands incorporate the existing islands, and the open water spaces between them are calculated on the area presently used by birds for resting and feeding. The design allows new habitats to be created, while maintaining the existing integrity of the ecosystem flourishing on the ponds at present.

The importance of the natural values of the estuary are recognised by all interested parties, the general public, and local and regional government. There now exists a unique opportunity to incorporate the development, restoration and enhancement of the area at a time when there is a requirement for major investment in the treatment of wastewater. Options for restoration may be lost after modification, and ecological values significantly adversely affected if integrated management is not undertaken.

4. **THE TREATMENT AND DISPOSAL OF WASTEWATER**

Over the past ten years there has been a growing awareness in the general community of the issues related to waste management, not only awareness about what comprises our waste, but also concerns about how we treat and dispose of it.

Christchurch's wastewater treatment facility was seen during the 70's and 80's as an excellent example of the management of a city's wastewater. However, increased knowledge, higher required standards and public expectations mean that treatment of the City's waste and consideration of better disposal methods are under review.

In 1996 the Council embarked on a nine year \$33.7 million programme to increase the capacity of the treatment plant to handle 30 years of city growth, including industrial growth. The capacity increase will also lead to a better quality of discharge with a substantial reduction in the numbers of bacteria and also some improvements in nutrient concentrations. However, this work addresses only the mechanics of treatment and disposal, and the Council is also required to have legal permission to discharge the treated effluent into the environment.

Resource Consent Requirements

Under the Resource Management Act, Section 124, the City Council is required to apply for a new consent for the operation of the CWTP, six months prior to the expiry date of October 2001. Therefore over the last four years, the Council has been consulting with the public and investigating the issues and options related to this application.

The application will be made to Environment Canterbury, who have responsibilities both for consents to discharge contaminants and for managing the Coastal Marine Area, of which the estuary is part. The Minister of Conservation is also likely to be involved, as the minister is responsible for decisions on coastal permits in relation to restricted coastal activities.

Further requirements under the RMA are:

- The consideration of alternative methods of disposal, including disposal to land. The Council must also undertake a full assessment of the environmental effects (AEE) of the activity. This will include assessment of effects on the community including any socio-economic and cultural effects, physical effects on the locality, such as landscape or visual effects, any disturbance to ecosystems, effects on natural and physical resource having aesthetic, recreational, scientific, historical, spiritual, or cultural value for present or future generations.
- The Council must consult with the public. Precedents confirm that enough information must be provided to the public to allow them to make intelligent and informed feedback. There must be enough time for feedback, and the Council must give genuine consideration to the comments.

4.1 Public Participation and Consultation

Tangata Whenua Consultation

As a matter of “national importance” under the RMA is the requirement to recognise and provide for the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga. Consultation is underway with Ngai Tahu as tangata whenua, and Ngai Tuahuriri as the local hapu.

Te Runanga o Ngai Tahu representatives have expressed in writing a preference for a ten year consent for an estuary outfall, and are keen to see the Estuary Green Edge Concept developed. Mitigation measures in relation to the impacts on the estuary have also been discussed and a draft memorandum of understanding to define consultation processes between them and the Council is presently being developed. The objectives of this memorandum of understanding will include the measures to mitigate environmental impacts, as well as establishing an ongoing partnership between Ngai Tahu and the City Council in relation to the uses of the lands on the western edge of the estuary.

Wastewater Working Party

A core group established to obtain a wide range of community views has been the Wastewater Working Party. This group was established in 1996 to advise and recommend on issues, options and possible solutions to the City’s wastewater treatment and disposal situation.

In August 1998 the Council resolved to favourably consider for possible adoption the interim findings of the Working Party.

More recently, in May 2000, the Working Party recommended to the Council that it should achieve a high standard of treatment before discharge. A large majority preferred a long-term consent for an ocean outfall, with the minority supporting a long-term consent for continuing to discharge to the estuary. In addition to these actions the Working Party recommended a range of environmental outcomes. The full preferences of the Working Party are attached as Appendix B.

General Public

Other public input has been obtained through special interest groups, public meetings and information and articles in the news media. Approximately 90 meetings have been attended by staff, and 15 newsletters and articles distributed.

Expressed preferences amongst the general public have varied enormously with a general consensus that improved quality of the wastewater is important, along with protection of the natural values existing in the estuary. Diversity of opinion exists on how this should be achieved and on disposal locations in particular.

4.2 Studies Undertaken

In response to the need to assess the issues, options and ultimately the solutions to the alternative treatments and disposal methods; a wide range of studies have been undertaken. Initially an Issues and Option Document was commissioned and completed, looking at the issues and all the potential treatment and disposal alternatives. As a result of this report, a series of studies were undertaken with the aim of addressing gaps in knowledge about the various issues and options and potential wastewater solutions. These studies included:

- Issues and Options Report
- Issues and Options Easy Read Report
- Ocean Morphology
- Ocean and Estuary Current Modelling
- Sedimentation in the Estuary
- Avon and Heathcote Rivers Water Quality
- Dissolved Oxygen and Clarity in the Estuary
- Public Health: Viruses
- Sea Lettuce and Algal Blooms
- Existing Benthic and Invertebrate Data
- Wildlife Impacts

Coastal Fisheries
Visual Effects
Cultural Tangata Whenua Issues
Community Issues
Urban Development
Green Edge Concept
Construction Impacts
Risk Assessment
Surf Clam Assessment
Water Standards Assessment
Pegasus Bay Benthos Assessment
Some of the most significant studies were:

- The *Issues and Options Report* discusses all the various options for either treatment or disposal of the wastewater. It also includes a discussion of the issues of concern and how the options address them.
- The *Ocean Modelling Study*; which used existing and new data to model the potential spread of treated wastewater within both the estuary and Pegasus Bay.
- The *Tangata Whenua, participating Papatipu Runanga Report*, covers, local history, Tangata whenua interests, a description of affected values, issues and concerns.
- The *Sea Lettuce and Algal Blooms Study*, which discusses the sea lettuce and algae, issues of concern within the estuary. The ocean modelling study also looked at the impacts of various wastewater treatment and disposal options impacts of sea lettuce growth. The results showed that removing the discharge from the estuary would lead to a 20% reduction in sea lettuce biomass.

A brief description of the contents of the various other reports is included in Appendix C ([attached](#)).

4.3 **Solutions for Wastewater Treatment And Disposal**

There is a wide range of mechanisms which may have impacts on wastewater treatment and disposal. Institutional, at source, and educational mechanisms will be covered within the broader Wastewater Management Plan.

The other options for treatment and disposal of wastewater have been covered in the Issues and Options Study (referenced above in section 4.2). These options are briefly described in Appendix D ([attached](#)).

Ecological, social and economic analysis has reduced the likely solutions (a combination of treatment and disposal options), to the following potential solutions.

Land Disposal Solutions

Two land disposal solutions were considered, with:

1. an agricultural option and;
2. a high rate disposal (aquifer recharge) option.

Both of these options would require biological nutrient removal and UV disinfection, as well as changes to the ponds.

The general philosophy of using land as an alternative disposal environment is to minimise the adverse environmental effects on the environment, as well as meeting cultural and spiritual concerns of the mixing of “clean” water and “unclean” waters.

The use of land disposal for Christchurch’s wastewater would be restricted to the drylands of the plains. Large areas of land would be required to achieve land disposal. For example, an agricultural solution would require approximately 6000 hectares. High rate discharge options, dependent of the process, would require between 100-3000 hectares. This is likely to involve the use of land beyond Christchurch City’s legal boundaries, which would have to be either leased or acquired, and in addition would involve very significant infrastructure costs. Total capital costs for the agricultural solution have been estimated at \$350m, with annual operating costs of approximately \$7.5m, and the high rate disposal solution estimated to cost \$258m, with annual operating costs of \$6.2m. (Note that all cost estimates exclude GST).

An additional important issue for any land disposal on the Canterbury Plains is the significant potential adverse impact on the region’s groundwater resources, which are used to supply drinking water. This would be particularly a problem in winter when evaporation rates are low.

For these reasons it was determined that the land solutions were not appropriate at this time, as a means of managing the City’s wastewater.

Ocean Outfall Solutions

A number of ocean disposal solutions have been identified. Ocean disposal would include further upgrades in treatment quality, then a buried pipeline off Bridge Street in South Brighton, discharging the treated effluent 2 kilometres offshore in water 12 to 15 metres in depth. Ocean disposal solutions include variations on treatment types involving ultra-violet (UV) disinfection and various levels of modification to the ponds and wetlands. An ocean disposal option would be a long-term disposal option. Recreational standards (200 faecal coliforms (FC)/100ml) would be easily met within the estuary, and the quality of the water on the coast would easily meet shellfish gathering standards (14 FC/100ml). Nutrient levels would be significantly reduced in the estuary, and this may have possibly adverse impacts on the ecosystems of both the estuary and the coastal environment. The odour and aesthetic issues related specifically to the discharge will be eliminated.

While initial capital costs of this solution will be higher than an estuary outfall, the operating costs would be less.

Disturbance during construction of the pipeline out to the coast is likely to have economic and social impacts for the communities it travels through as well as ecological impacts to the natural environment.

The modifications developed in the Estuary Green Edge Concept can be used to meet the requirements of an ocean disposal solution, with the only variation being to have a filter gravel bed where an estuary disposal solution would involve a large tidal storage pond. The tidal storage pond would not be required as disposal to the ocean would be continuous.

Estuary Outfall Solutions

A range of estuary outfall solutions were also considered. Estuary disposal would include further upgrades in treatment quality followed by discharge through pipes from the oxidation ponds to the present site at the western edge of the estuary. However the discharge would be through rock filters that would be more aesthetically pleasing and would reduce foaming. In order for the required water quality standards for the Avon-Heathcote Estuary to be met, UV disinfection of the wastewater will have to occur. Treatment would also involve modification of the ponds. The Green Edge Concept takes into account the treatment requirements for an estuary solution.

The estuary solution can be seen as both a medium and a long-term solution. The focus of these solutions would be the increasing improvement of the wastewater discharge quality. This would be achieved by UV disinfection to improve the water quality in the outfall pipe to at least contact recreational levels (200 FC/100ml). This compares to the present water quality in the outfall pipe of 5000/100ml. In addition the new outfall structure which will be constructed will be done in such a way as to significantly reduce aesthetic and odour issues. Adverse effects on the ecosystem within the estuary itself are likely to be significantly reduced with this option.

Finally, this option will allow flexibility and provide greater encouragement for the focusing on the introduction of other methods of treatment and disposal in the future. This will involve the development of processes to recycle and re-use waste products, such as nutrients, reduce the quantity of wastewater entering the system, or use the oxidation ponds for other purposes, such as an eel fishery; thereby turning a waste into a valuable resource.

Although the capital costs of this option are significantly less than ocean solutions, the operating costs would be higher.

The City Council resolved in August 1999 to consider only the Ocean and Estuary solutions; this decision is contained in Appendix D.

4.4 Discussion of Effects of Estuary and Ocean Solutions

The following section lists the environmental effects of the various solutions. The term environmental is used very broadly to take the meaning provided in the RMA. Environment includes ecosystems and their parts, people and communities, natural and physical resources, amenity values, social, economic, aesthetic and cultural conditions which affect the fore-mentioned aspects. The discussion covers both positive and negative aspects. Note that many of the features are common to both options.

Ocean Outfall Solutions

Environmental Effect	Advantages	Disadvantages
Ecological, Natural and Physical resources	<ul style="list-style-type: none"> • Removal of treated wastewater from the estuary environment. • Using natural processes to treat wastewater in pond modifications. • Maintaining and developing wildlife habitat. • Some reduction in nutrient levels. • Significant improvement of water quality in the estuary. • Ponds will provided some natural solar disinfection. 	<ul style="list-style-type: none"> • Potential impact on fisheries and oceanic ecosystems. • Loss of nutrients from the estuary may have long-term impacts on the ecology of the estuary ecosystem. • Construction impacts are likely to be greater and spread over a wider area.
Social	<ul style="list-style-type: none"> • Removal of treated wastewater from the estuary. • Contact recreation standards can be met easily in the estuary. • Estimated 20% reduction in sea lettuce. • No scum or odour from the discharge. • Improve aesthetic values in the Estuary. • Shellfish gathering standards can be met at beach shore. 	<ul style="list-style-type: none"> • Perception of potential impacts on recreationalists along the coast. • Potential impacts on fisheries along the coast. • Construction impacts are likely to be greater and spread over a wider area. • Lack of incentive for continued improvement • Lack of incentive for recovery or reuse of nutrients in an added value way. • Perception of “out of sight out of mind”.
Cultural	<ul style="list-style-type: none"> • Removal of treated wastewater from the estuary. 	<ul style="list-style-type: none"> • Impacts on tangata whenua values.
Economic	<ul style="list-style-type: none"> • Lower UV disinfection standards may be acceptable in the long term. 	<ul style="list-style-type: none"> • Higher cost in development of pipeline into ocean.

Estuary Outfall Solutions

Environmental Effect	Advantages	Disadvantages
Ecological, Natural and Physical resources	<ul style="list-style-type: none"> • Using natural processes to treat wastewater in pond modifications. • Maintaining and developing wildlife habitat. • Improvement of water quality in the estuary. • UV disinfection will reduce bacteria. • Limited reduction in sea lettuce. • May be changes to ecosystems. • Encourages focus on opportunities to recover or reuse nutrients in added values manner. 	<ul style="list-style-type: none"> • Fragile environment which will require careful management. • Likely to need to keep improving the quality of the treatment in future years.
Social	<ul style="list-style-type: none"> • Contact recreation standards can be met in the estuary. • Treatment will reduce scum or odour from the discharge. • Improve aesthetic values of the outfall structure. 	<ul style="list-style-type: none"> • Potential impacts on recreationalists in the estuary will remain but at a significantly reduced level.
Cultural		<ul style="list-style-type: none"> • Impacts on tangata whenua values.
Economic	<ul style="list-style-type: none"> • Lower capital costs to the community. • Lower annual costs of owning and operating. 	<ul style="list-style-type: none"> • Will include costs of UV disinfection and possible future upgrading of treatment. • Higher operating costs.

It should be noted that shellfish gathering standards cannot be met in the estuary, by improving the quality or location of the wastewater discharge, due to inputs from the rivers. This relates to the fact that a large urban city is located in the catchments.

4.5 **Environmental Outcomes**

The following table summarises both the quantitative and qualitative environmental outcomes of the two outfall solutions and the preliminary estuary green edge concept.

Ocean Outfall Solution

Quantitative Outcomes	Qualitative Outcomes
<ul style="list-style-type: none"> • Contact recreation standard (200FC/100ml) met at the discharge point. • Shellfish gathering standard (14FC/100ml) met at the ocean beaches. • Limits set on a range of contaminants. 	<ul style="list-style-type: none"> • Discharge plume not visible to the naked eye. • Outfall pipe not visible. • Softening of the edge of the estuary. • Enhancement of the ponds for wildlife and increased efficiency for treatment. • Removal of discharge leading to more “natural” estuary ecosystem developing. • Increasing nutrients directly entering the Pegasus Bay environment. • Loss of odour issues from the discharge. • Improved recreational quality of the estuary and surrounds. • Potential ecotourism enhancement of the estuary. • Potentially a 20% reduction in sea lettuce biomass in the estuary.

Estuary Outfall Solution

<ul style="list-style-type: none"> • Short-term Option, contact recreation standard (200FC/100ml) met in the discharge pipe. • Long-term significantly better than contact recreation standard (50FC/100ml) met in the discharge pipe. • Dissolved oxygen not to be less than 80% of saturation level. • Limits set on a range of contaminants. • Shellfish gathering standard (14FC/100ml) met at the ocean beaches. 	<ul style="list-style-type: none"> • Discharge plume not visible to the naked eye. • Softening of the edge of the estuary. • Enhancement of the ponds for wildlife and increased efficiency for treatment. • Improved quality of discharge leading to more “natural” estuary ecosystem developing. • Significant reduction in the odour issues from the discharge. • Improved recreational quality of the estuary and surrounds. • Potential ecotourism enhancement of the estuary.
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4.6 Resource Consents and Staging Options

Although the consenting requirement for a discharge application is a significant initiator of this process, ultimately a package of consents will have to be applied for involving land use, coastal permits, and discharge permits from both Environment Canterbury and the City Council. These will relate to both the chosen solution and the construction phase.

It is likely that the most practical solution will be staged over time, due to a number of reasons including, the monitoring of effects, the practical sequencing of the project, and the spreading of costs.

4.7 Costs

A summary table of the costs of the Ocean and Estuary Solutions as well as the preliminary costing for the Green Edge Proposal are included below. Detailed costing can be found in Appendix E ([attached](#)).

Item	Stage 1 Initial 15 year program (1)	Stage 2 Estuary outfall option (2)	Stage 2 Ocean outfall option (3)	Total long- term estuary outfall option (1)+(2)	Total long- term ocean outfall option (1)+(3)
Capital cost	\$32.1M	\$11.75M	\$41.7M	\$43.85M	\$73.8M
Annual running cost (excluding debt servicing and depreciation)	\$1.3M	\$0.8M	\$0.38M	\$2.1M	\$1.68M
Net present cost	\$27.3M	-	-	\$37.4M	\$44.9M
Impact on rates	Already included in draft annual plan	na	na	+0.88% after 10 years +1.45% after 20 years	+0.97% after 10 years +2.81% after 20 years

5. SUMMARY

The purpose of this report is to inform the Council of the need for a comprehensive Wastewater Management Plan, make recommendations covering the Estuary Green Edge development and make recommendations covering resource consents for the Christchurch Wastewater Treatment Plant.

The City Council has responsibilities under both the RMA and the Local Government Act to manage waste in an integrated manner. There is also a growing interest and understanding of the significant natural and social values of the Avon-Heathcote Estuary. These aspects provide an incentive to develop an integrated plan that works together with nature to provide the best possible solutions.

Improvement of the environmental quality of the estuary and its surrounds has led over the last 10 years to a number of proposals to enhance the area. This report discusses a preliminary concept plan for the enhancement, remediation and restoration of the western edge of the estuary between the Avon and Heathcote Rivers, called the Estuary Green Edge. The Estuary Green Edge Proposal is important as it identifies ways of improving the environmental quality of the oxidation ponds, whilst also achieving the wastewater treatment and disposal requirements, and also improving the environmental quality of the land along the western edge of the estuary.

A wide range of treatment and disposal options for the City's liquid wastes have been researched including disposal to land, ocean and estuary, and numerous forms of treatment. There has been consultation with tangata whenua, the general public, and through a Working Party comprising interested parties. Land, estuary and ocean solutions are described and the advantages and disadvantages of each are briefly identified. Previous decisions by the Council short-listed the ocean and estuary solutions to be investigated further. The costs of these two solutions and preliminary costs for the Green Edge Concept have been included, thereby providing a basis for discussion of which solution/s should be chosen for further consultation.

6. CONCLUSIONS AND CONSENTING PREFERENCE OF THE SUBCOMMITTEE

A wide range of treatment and disposal options have been considered. It is possible that the Council could aim for the minimum standards presented in the Proposed Regional Coastal Environment Plan, which sets minimum standards for public and ecological health. However, the Subcommittee believes that a minimum standard solution does not best meet the interests of the city, given that environmental standards are constantly rising, and that the highest practical standards should be met.

Flexibility is an important criterion in deciding which solution to follow. The estuary and the coastal marine area as a whole are recognised as sensitive and dynamic systems. Therefore, any decisions on waste management must consider the possible impacts on these environments. Flexibility is required in order to monitor the changes that occur and manage effects in the best possible manner.

As technological advances in the area of waste management continue to develop rapidly, there needs to be flexibility to allow new and more effective technology to be incorporated in future management practices. Future technology may find more sustainable means of treating waste, recovery of nutrients, which are efficient and affordable.

Flexibility is also reflected in the costs. The shorter-term estuary solution has the lowest capital and operating costs, and none of the expenditure for this solution is "wasted" if in the longer term an ocean or an even higher quality estuary solution is developed.

Community preferences are diverse, with a general consensus that a high quality wastewater treatment is important, and opinion on the best disposal environment varying.

It is important that the Council shows leadership in its choices of waste management in terms of both treatment and disposal of wastewater.

A short-term consent (15 years) for an estuary outfall provides the greatest flexibility, both in terms of environmental needs and technological advances, and does not preclude an ocean outfall after 15 years. This short-term consent will also necessitate the continued assessment of management practices, as the consent is of a limited time span.

Any chosen outfall solution will have to be staged, and **improved treatment of the wastewater will be the highest priority for any solution**. In both estuary or ocean solutions this will also involve the modification of the ponds as an early step.

Sustainability can be seen as a process towards a desired end. It may not be possible to achieve a sustainable outcome immediately but it is important to ensure that decisions made contribute to this outcome rather than eliminate future options. The Subcommittee believes that the Council has an opportunity show leadership in the promotion of sustainable management.

Taking all these matters into consideration, the Subcommittee believes that a short-term consent for an estuary outfall, incorporating the Estuary Green Edge development described in this report, is the better solution as it will allow resources and research to be concentrated on improving the quality of the existing discharge. A long-term strategy should be developed to carry on beyond 2015.

CHAIRMAN'S COMMENTS

“Christchurch’s wastewater disposal consent expires in October 2001. For the last three years the City Council has been engaged in a public consultation process through the wastewater working party (which comprised a wide range of interested people appointed by the Council after widespread advertising) to assist the Council to establish options for future wastewater disposal, and also to ascertain community standards for wastewater disposal purposes. This report identifies the two main options, and also a preferred option recommended for general public consultation by the wastewater subcommittee of the City Services Committee.

As Councillors will be aware, the Council is already engaged in the upgrade of the Bromley wastewater treatment plant at a cost which will total approximately \$33 million. Depending upon which wastewater disposal option and associated work is chosen, additional costs ranging from \$44 million to over \$70 million will be required. There is therefore no doubt that these improvements to the City’s wastewater treatment infrastructure represent the largest project the Council has yet undertaken. There is also no doubt that the project will have significant ramifications for the City’s natural environment.

Councillors will realise, upon reading the report, that the Wastewater Working Party and the Wastewater Subcommittee are in total agreement on the goal of a high standard for the treatment and disposal environments. However whilst a majority of the Working Party favour an ocean outfall the Subcommittee prefers an Estuary Outfall.

There is no argument that water quality in estuary must be very significantly improved so that contact recreation standards are easily met. Unfortunately, as the report describes, due to the effect of the Avon and Heathcote discharge, shellfish gathering standards cannot be met whether wastewater is discharged into the estuary or not. As the report also describes, sea lettuce cannot be significantly reduced by not discharging wastewater into the estuary. Essentially where the views of the Wastewater Working Party and the Wastewater Subcommittee differ, is that the Wastewater Subcommittee believes that the Council's investment is better made in the treatment of the wastewater than in the construction of the ocean outfall. While cost is an important consideration, it is not the determining factor for the Subcommittee. Indeed, the determining factor is the desired outcome over the long term. **The desired outcome is that water used for Christchurch's sewage treatment system should be treated to the degree that its discharge into the environment should have impacts so low that the method of discharge (ie via the estuary, or direct to ocean via the ocean outfall pipeline) becomes a relatively minor consideration.**

From my personal point of view, environmental security has been the major consideration since the commencement of the process. I have closely followed the deliberations of the Wastewater Working Party and am very grateful for the work it has done. In August 1998 I supported the Wastewater Working Party's preliminary recommendations, by moving (inter alia) that the Council "*favourably consider for possible adoption, the implementation of an ocean outfall*" After my trip to the United States in August 1999, during which I had the opportunity to discuss the use of natural resources with Paul Hawken, I realised that while an ocean outfall would guarantee contact recreation standards for the estuary, it was unsatisfactory in principle to take the easier (though costlier) option of discharging wastewater into the ocean via a 2km or 3km ocean pipeline, since this would not encourage current or future generations of Christchurch people to adopt the highest achievable standards for the wastewater in the long term. Not only would there be a risk of 'out of sight out of mind', but the opportunity to see and use the treated wastewater as a resource would be lost.

I am now firmly of the view that, while the Council must now put both of the major options fairly and objectively before the public during the imminent round of general public consultation, the Council should also indicate its preference for continued discharge of the City's treated wastewater into the estuary, at least for the next 15 years. The upgrade of the Bromley plant together with the new estuary disposal option described in the report, will result in a huge improvement in the quality of the

wastewater discharged into the estuary (currently there are 5000 FC per 100ml of wastewater and this would improve by 25 times to 200 FC per 100ml of wastewater). Therefore contact recreation standards can be guaranteed. Discharge of nutrients into the estuary would also be reduced.

In order to maintain and improve these standards in the future (and to further reduce nutrients going into the estuary) much effort, research, and trialing will be necessary to determine what further work will be needed. This will lead to further action being taken, and no doubt further investment, to permit continued discharge of a high standard of wastewater into the estuary in the long term. In the event that such work is insufficient to ensure a high standard of continued estuary discharge, an ocean outfall cannot entirely be ruled out in the long term (ie after 15 years). Given further developments, new technologies, and even higher environmental standards, it is my strong desire and expectation that an ocean outfall will be unnecessary and the long-term estuary discharge option will always be possible and desirable.

Appendix E details the action plan for the years 2000 to 2015. It also describes the recommendation of the Wastewater Subcommittee for the development of a long term waste management plan. This will cover not only the wastewater treatment and discharge strategy, but also issues of minimisation, reuse, and the recovery of both biosolids and of the dissolved nutrients within the wastewater. It is envisaged that pathogens in the treated wastewater will be further reduced to probably 50 FC per 100ml.

Councillors will also recall that in my motion adopted by the Council in August 1998, I moved that the Council:

“Develop a coordinated plan for the western edge of the estuary taking these objectives into account:

- (a) the wastewater treatment plant;*
- (b) the lifelines project relating to the Ferrymead Bridge and its roading connections (with special reference to Humphreys Drive), and the heritage cob cottage;*
- (c) the green edge concept previously recommended to the Council;*
- (d) opportunities to enhance tourism, recreation, and the protection and enhancement of wildlife in this area”.*

This part of the project is very close to my heart. It is vital that the Green Edge project as originally conceived be amended and expanded, both as to the area and content, to achieve all of the objectives which the Council has for the western edge of the estuary. These objectives include those listed in the resolution quoted above. This will require vision, boldness, and strong determination by the Council, not to mention a willingness to invest public money. The result however, will be stunning. The western edge of the estuary can become an ecological wonder, and a recreational facility, unparalleled anywhere – a contribution to the quality of the garden city equal for our generation to the establishment of Hagley Park and the Botanic Gardens by earlier generations.

Recently I met with the City Manager to discuss the development of the “coordinated plan” referred to in the August 1998 resolution. A staff project team has now been set up. Councillors should refer to Appendix E, table 1, fifth panel (“2005-2007”). This panel details the development to take place for the area from and including the Bexley landfill and Bexley wetland to Ferry Road, including the Linwood Paddocks. A capital budget of \$14 million is indicated for this work, with an annual running cost of \$300,000. An important aspect of the Green Edge development is the use of the area, through enhanced planting to absorb dissolved nutrients from the wastewater as far as is practicable. Research and investigations will be necessary over several years to establish the most effective ways this objective can be reached. This also coincides with the desire of the tangata whenua to establish a partnership arrangement under which the restoration for their traditional mahinga kai might be achieved.

A very large commitment of time has been put into the project by the Wastewater Working Party, the Wastewater Subcommittee, Council staff, and the Council’s consultants; and the costs have also been considerable. I commend the comprehensive set of recommendations to the committee. Presuming adoption by the full Council, the period for general public consultation will then follow, after which the Council should be in a position to seek the necessary consents and to begin detailed planning for the implementation of this exciting project.”

- Recommendation:**
1. That the Wastewater Working Party be thanked for their assistance in clarifying community expectations for the guidance of the Council in developing options.
 2. That subject to the outcome of public consultation, the Council support a 15 year consent based on the Estuary outfall option, incorporating the Estuary Green Edge.
 3. That the Council develop a long-term wastewater management plan in terms of Part XXXI of the Local Government Act 1996, incorporating:
 - (a) research and resources to achieve the highest environmental outcomes, including the various elements described in this report.
 - (b) an assessment of the viability of a continued Estuary outfall in comparison with the Ocean outfall, in the long-term.

4. That a public consultation and information programme be undertaken on the resource consent options, including clear information about the various alternatives that have been investigated.
5. That the Council undertake to negotiate a memorandum of understanding with the tangata whenua, on the future management of the Estuary Green Edge and environs and other related issues.
6. That the public be given opportunity to make oral submissions and that these be heard by the Wastewater Subcommittee, augmented by other elected representatives as necessary.

(Note: The above recommendation was passed unanimously by the Committee.)