

# wastewater collection, treatment and disposal

## Nature and Scope

- Treating and disposing of all liquid wastes in a safe, environmentally sound manner
- Providing and maintaining the sewerage collection system and ensuring its maintenance and renewal to sustain the quality of the service
- Researching the need for, and planning the development of, sewerage services
- Providing information and advice on sewerage systems and services as a basis for public and private decision-making, ecological and trade waste assessments

This activity has a significant impact on the maintenance of the health of the citizens of Christchurch and the quality of their environment. The sewerage system serves all of the Christchurch city urban area and comprises 1,560 km of sewer mains, approximately 22,700 manholes, 1,180km of sewer laterals (118,000 connections), 1600 flush tanks, 86 pumping stations, and two treatment works. The latter treat 150 million litres per day of sewage to required standards and includes the operation of effluent disposal and sludge reuse systems.



The oxidation tanks at the Wastewater Treatment Plant, in Bromley

## Wastewater Collection

Wastewater is collected from properties via a piped sewage network and conveyed to the treatment facilities.

### Performance Measures

Service	Performance Measure
<b>Economic</b>	
Wastewater services are cost-effective.	Customer satisfaction that the wastewater service is value for money. (target 90%)
<b>Environmental</b>	
Mains blockages and overflows are responded to promptly.	Staff on-site within one hour of Council notification. (target 90%)
Overflows are managed to acceptable environmental standards.	Incidents of wet weather overflows comply with consent conditions, that is reducing to an average of once every two years by 2013. (target: less than 4 in 2004/05)
Odours originating from collection system are managed and reduced.	Number of reported incidents of offensive odours from the collection system. (target: less than 5 incidents per year)

# wastewater collection, treatment and disposal

## Contribution to Outcomes

Outcome	How Wastewater Collection Contributes to this Outcome
Healthy and Active People	Wastewater is collected and disposed of before it can become a health hazard
A Sustainable City	Wastewater is collected before it can do harm to the environment
A Safe City	Wastewater is collected and disposed of before it can become a health hazard

## Negative Effects

- Periodic odour from the wastewater pipe network
- Periodic overflows into the waterways and onto land that could pose a hazard to the environment and public health

## Wastewater Treatment and Disposal

The treatment and disposal of the City's sewage so that residues comply with resource consent conditions, and do not endanger the environment or the health of the community.

## Performance Measures

Service	Performance Measure
<b>Environmental</b>	
Odours originating from the Treatment Plant are managed and reduced.	Number of reported incidents of offensive odours originating from the Treatment Plant. (target: less than 5 incidents per year)
Discharges into the environment are managed to the appropriate environmental standards.	Quality of wastewater discharge to the estuary complies with consent conditions. (target: Nil major or persistent breaches)

## Contribution to Outcomes

Outcome	How Wastewater Treatment and Disposal Contributes to this Outcome
Healthy and Active People	Health risks from inadequately treated sewage in the environment are minimised
A Sustainable City	Damage to the natural environment from inadequately treated sewage is minimised
A Safe City	Health risks from inadequately treated sewage in the environment are minimised

## Negative Effects

- Health and environmental impacts related to the sewer outfall
- Periodic odour from the waste water treatment plant and pipe network

# wastewater collection, treatment and disposal

## Wastewater

### Asset Information

The purpose of the City's wastewater assets is to collect and treat liquid waste from the City's homes and businesses, maximising resource recovery and appropriately disposing the residual wastes.

Asset Description	Quantity	Book Value at 30 June 03 (\$millions)
Sewer pipe network (excluding laterals)	1,560 km	339
Lateral connections in public roads	940 km	61
Sewer Connections	118,000	
Manholes	22,700	37
Pumping stations (including mechanical, electrical)	86	15
Christchurch Wastewater Treatment Plant	1	56
Belfast Treatment Plant	1	0.2
Flush Tanks	1,600	3
<b>Total</b>		<b>511</b>

### Wastewater Production Trends

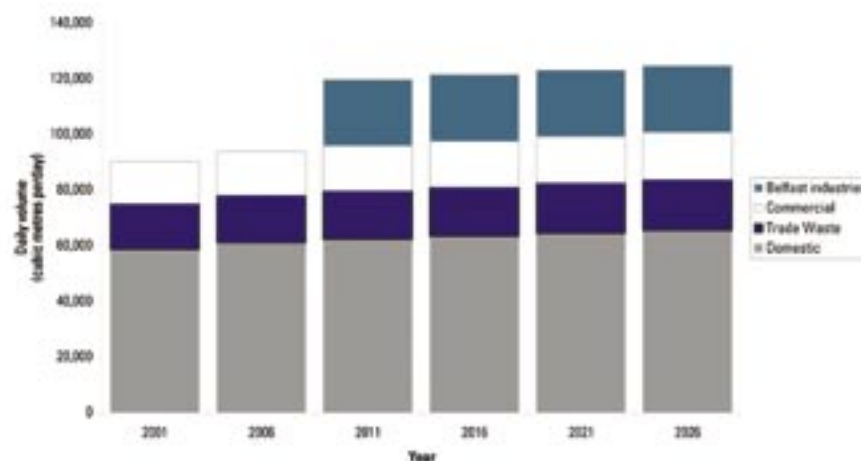
At present, approximately 90,000 cubic metres of wastewater from residents and businesses is collected daily by the Christchurch sewerage system (excluding stormwater entry and groundwater infiltration).

Wastewater from domestic properties is expected to increase with city growth, although the volume per person is predicted to decline slightly reflecting the trend to appliances and fittings that use less water.

In addition, groundwater and stormwater increase the flow in the sewers and it is the combined flow which governs requirements for asset capacity.

An increase in trade waste from industry at Belfast is predicted around 2010 when their existing discharge consent expires.

Daily Wastewater Production Projections for Christchurch



# wastewater collection, treatment and disposal

## Levels of Service

This table shows the levels of service currently provided by the wastewater system, along with desirable improvements identified from recent research. These improvements will be fully investigated with a view to implementing them within the next two years where appropriate.

Characteristic	Issue	Current LoS Measure	Desired LoS from 2003 Research	Strategy
Odours	Perception issue not previously investigated in detail	1% of population experience odours originating from system (not achieved)	Regular offensive odours eliminated from reticulation	Develop proactive odour detection and management strategy
Overflows	Resource consent	Improve to average of no more than one breach event every two years by 2003	No change	System upgrade and inflow management to programme
Response times	Response times and standards for customer service	Urgent– (blockages) on-site within one hour of request Non-urgent - (e.g. odours) on-site within 1 day	Non-urgent improved to response within 4 hours	Strategy developed for overall council response to non-urgent call-outs

Effluent quality	Resource Consent, sustainability	Consent conditions for estuary discharge	No change	Plan for ocean outfall to be operational when consent expires (2009)
Risk		Progressively reduce the severity and magnitude of risks evaluated through the Council's risk assessment process (e.g. earthquake damage, malodours from treatment plant, pressure main failure - refer to the Council's Wastewater Management Plan (Part 2) for details)		

## Requirements for Additional Assets and Financial Implications

New wastewater assets are required both to improve the level of service and to provide for urban expansion. The major planned wastewater projects serve both functions and the costs have been apportioned between growth related assets and Level of Service (LoS) as shown below:

Asset	Value	Growth	LoS	Timeframe
Treatment Plant upgrade	\$40 million	34%	66%	1996 to 2006
Ocean outfall	\$50 million	10%	90%	2006 to 2009
Trunk system upgrade	\$40 million	30%	70%	2003 to 2013 and beyond
"Green edge"	\$9 million	-	100%	2008 to 2011

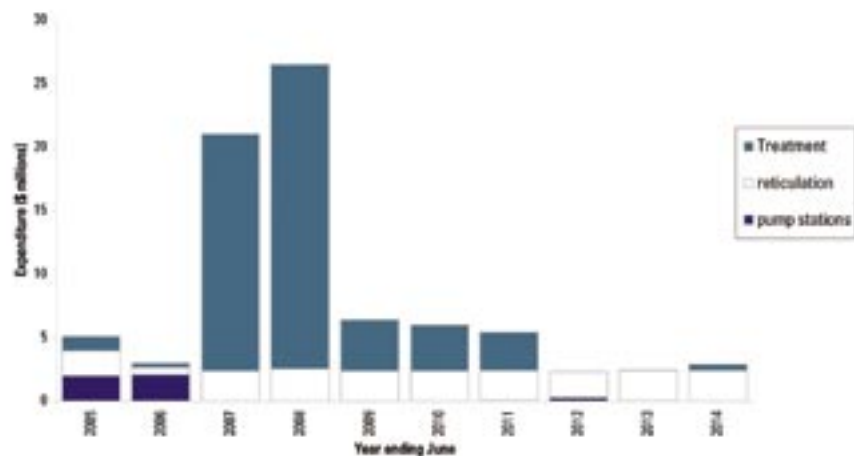
# wastewater collection, treatment and disposal

## Assets for Level of Service Improvements

This chart shows the value of the new assets attributable to improvements in the level of service.

The proposed “green edge” project, subject to further investigation, involves enhancements to land around the estuary incorporating natural systems to remove nutrients.

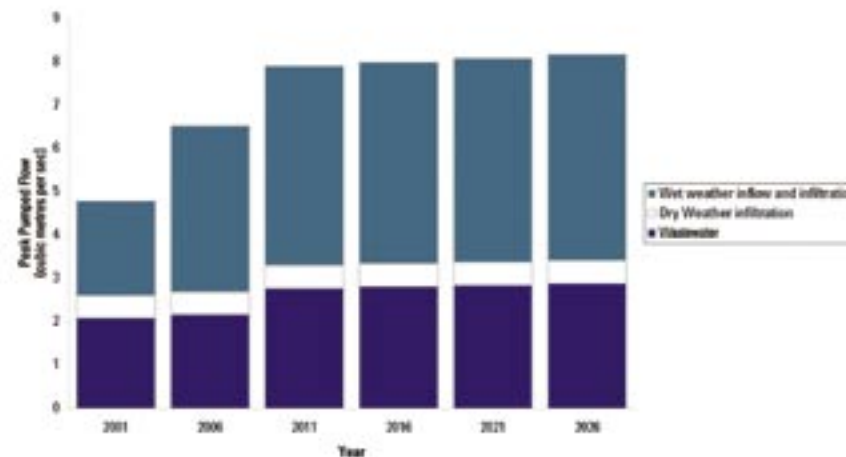
New Assets to Improve Levels of Service



The improvement component of the collection system improvements is planned to reduce the frequency of overflow events from several times a year to once every two years on average, as defined in resource consent conditions.

The trunk upgrade will increase the capacity of the system for city growth and to cater for overflows, as shown in this chart.

Peak Flow Pumped to Treatment Plant



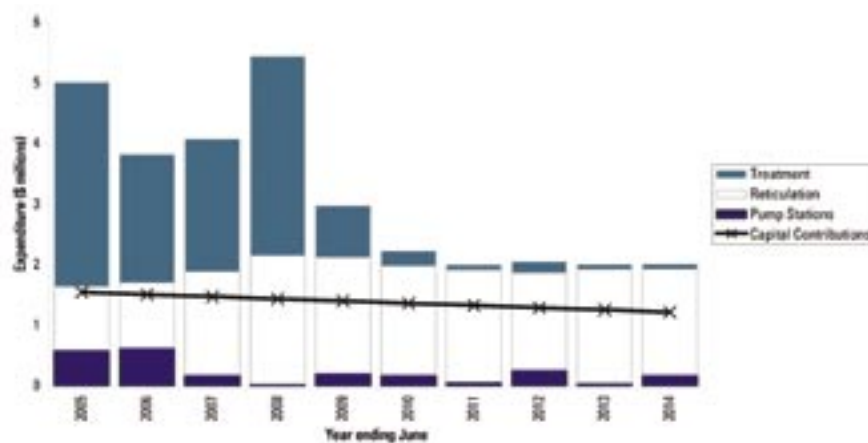
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## Growth

A proportion of the collection system upgrade (34%), the collection system upgrade (27%) and the Ocean Outfall (10%) is attributable to growth. The Council also needs to provide other new assets within catchments to provide for growth areas.

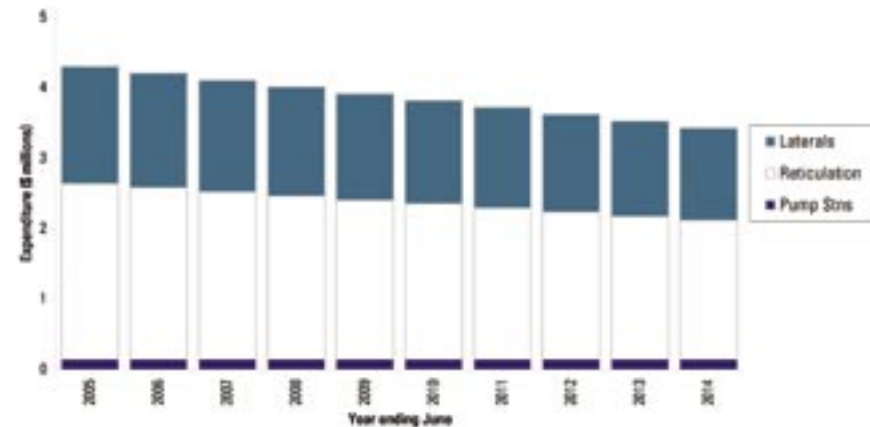
The accompanying chart shows budgeted Council expenditure on new assets for the next ten years, along with expected revenue from capital contributions, as set out in the Council's Development Contributions Policy. The difference between Capital expenditure and revenue will be funded in accordance with the Council's Funding Policy.

Council Funded New Assets for Growth and Capital Revenue



In addition to new capital works programmed by the Council, new assets to service developments (created through subdivision or building consent) are provided by developers and vested in the Council. This chart shows the value of new infrastructure expected to be vested over the next ten years (assuming Statistics NZ medium growth projections).

Developer Funded New Assets for Growth



# wastewater collection, treatment and disposal

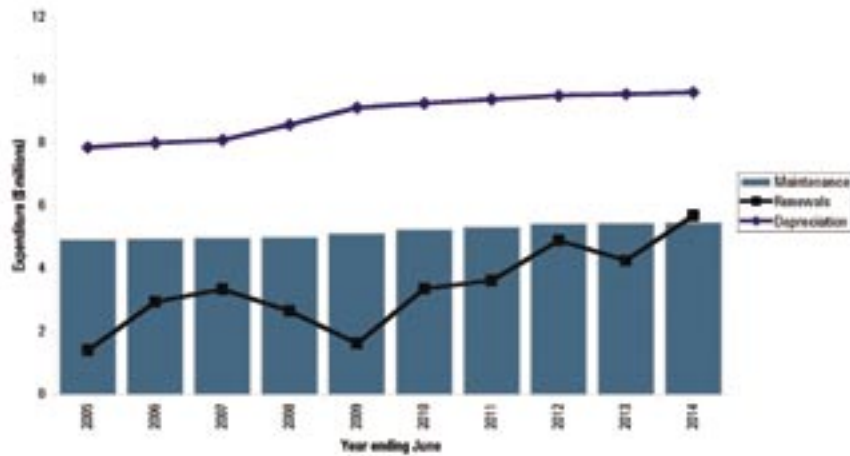
## Maintenance and Renewals

Maintenance on wastewater assets is carried out by a medium-to-long-term contract. Maintenance costs are expected to gradually increase as the system grows and existing assets age.

Assets are renewed based on their condition and ability to provide the required level of service and renewal projects are competitively tendered. The accompanying graph shows that renewals expenditure is significantly less than the calculated depreciation, due to the assets presently being relatively new (the wastewater assets are on average about 40% of the way through their life cycle).

Maintenance and depreciation charges form part of the annual operating budget for wastewater as indicated in the following chart.

Renewals, Maintenance and Depreciation

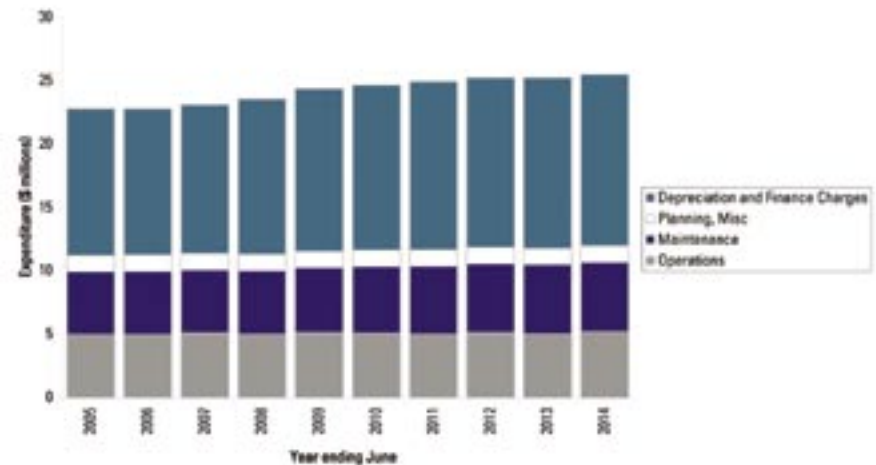


## Summary of operating projections

The total wastewater projected operating costs are shown in this chart. The steady increase in total projected operating costs over the next ten years is due mainly to increased depreciation for the proposed ocean outfall and reticulation capacity upgrade.

Trade waste charges and the acceptance of wastewater from Selwyn District provide revenue to recover 16% of the total operating costs, with the remainder recovered from a targeted wastewater rate. The targeted rate per ratepayer is expected to remain relatively constant over the 10 year period, as the increase operating costs is offset by the growing number of ratepayers.

Total Operating Costs



# wastewater collection, treatment and disposal

## Cost of Proposed Services

Budget 2003/04 \$000's		Plan 2004/05 \$000's	Forecast 2005/06 \$000's	Forecast 2006/07 \$000's	Projection 2007/08 \$000's	Projection 2008/09 \$000's	Projection 2009/10 \$000's	Projection 2010/11 \$000's	Projection 2011/12 \$000's	Projection 2012/13 \$000's	Projection 2013/14 \$000's
24,392	Expenditure (After Internal Recoveries)	24,606	25,460	26,288	27,021	28,361	28,976	29,427	30,020	30,425	31,042
(4,080)	Revenue	(5,106)	(5,100)	(5,090)	(5,077)	(5,062)	(5,045)	(5,026)	(4,990)	(4,954)	(4,918)
<b>20,312</b>	<b>Net Cost of Service</b>	<b>19,500</b>	<b>20,360</b>	<b>21,198</b>	<b>21,944</b>	<b>23,299</b>	<b>23,931</b>	<b>24,401</b>	<b>25,030</b>	<b>25,471</b>	<b>26,124</b>

The Net Cost of Service is funded from rates and other revenue. See the Funding Impact Statement in volume 3 for details.

## Consisting of the following Activities

15,529	Wastewater Collection	14,942	15,327	15,955	16,181	16,746	17,004	17,222	17,565	17,825	18,278
6,041	Wastewater Treatment and Disposal	6,028	6,467	6,641	7,125	7,879	8,217	8,433	8,683	8,828	8,991
(1,258)	Capital Revenue (*)	(1,470)	(1,434)	(1,398)	(1,362)	(1,326)	(1,290)	(1,254)	(1,218)	(1,182)	(1,146)
<b>20,312</b>	<b>Net Cost of Service</b>	<b>19,500</b>	<b>20,360</b>	<b>21,198</b>	<b>21,944</b>	<b>23,299</b>	<b>23,931</b>	<b>24,401</b>	<b>25,030</b>	<b>25,471</b>	<b>26,124</b>

Notes

(\*) Capital revenue is referred to under the capital comment below.

## Capital Expenditure

2003/04 \$000's		2004/05 \$000's	2005/06 \$000's	2006/07 \$000's	2007/08 \$000's	2008/09 \$000's	2009/10 \$000's	2010/11 \$000's	2011/12 \$000's	2012/13 \$000's	2013/14 \$000's
3,315	Renewals and Replacements	1,945	3,478	3,618	3,736	2,598	3,513	3,730	5,195	4,419	5,290
6,680	Improved Service Levels	5,345	4,538	22,038	25,274	10,118	6,258	5,728	2,522	2,686	2,699
5,910	Increased Demand	3,433	6,291	7,093	4,627	2,816	2,053	1,988	1,936	1,995	1,999
<b>15,904</b>	<b>Total Capital Expenditure</b>	<b>10,722</b>	<b>14,307</b>	<b>32,749</b>	<b>33,636</b>	<b>15,533</b>	<b>11,824</b>	<b>11,446</b>	<b>9,653</b>	<b>9,100</b>	<b>9,988</b>

Notes

Capital Expenditure is corporately funded from asset sales, rates (depreciation and surplus), capital revenues, special funds, and loans. See Capital Funding Summary in volume 1, and the Funding Impact Statement in volume 3 for details. For details of capital projects, see the 5 year Capital Works Programme pages in volume 1.