Wastewater Collection

Activity Management Plan

Long Term Plan 2015–2025

5 November 2014

Christchurch City Council

Quality Assurance Statement

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	Status	**Final**
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1 Key Issues for the Wastewater Collection Activity

1.1 Community Outcomes

Everything that the Council does in its day-to-day work is focused on achieving community outcomes. All activities outlined in this plan aim to deliver the results required to achieve these outcomes, contribute to Council strategies and meet legislative requirements. Likewise, all Council capital and operating expenditure is directed towards a level of service that moves the community closer to these outcomes now or at some future point.

The effective management of Wastewater Collection for Christchurch means achieving the community outcomes that:

- Injuries and risks to public health are minimised
- Water quality in rivers, streams, lakes and wetlands is improved
- Statutory obligations are met by Council;
- City assets, financial resources and infrastructure are well managed, now and in the future;
- Energy is used more efficiently.

Section 4 shows how these outcomes flow down into and influence the Council's activities and levels of service in relation to Wastewater Collection.

1.2 Effects of growth, demand and sustainability

Population Growth and Demand:

A forecast of population growth has been used to determine where and when Council infrastructure needs to be developed and at what capacity. Council has considered the influence of changing demographics, community expectations, industrial/commercial demand, technology and legislation on the demand for this service. As part of wastewater planning Council has:

- Used the medium growth scenario from the Land Use Recovery Plan;
- Assumed the ratio of commercial to residential demand will remain constant;
- Assumed the current wastewater production per connection will remain unchanged.

Development of new subdivisions to support growth and meet demand for housing as a consequence of the 2010 and 2011 earthquakes is resulting in a number of projects where growth is a contributing factor and allowance has been made in the design of future works and in funding arrangements. Potential subdivision land in multiple directions has been made available at the same time under the LURP, this is resulting in multiple growth projects and adding to the financial pressure on the activity. The major growth projects are listed in Table 10-1 and are identifiable by the project driver column.

Intensification of residential land is encouraged under the LURP and the preceding UDS. Intensification will see a higher population and therefore increased wastewater flows and loads per unit area. These higher flows may exceed the capacities of existing wastewater mains and therefore require upgrades. Uncertainty over the rate of intensification makes it difficult to show how quickly intensification will affect demand, if at all.

Sustainability:

The Local Government Act 2002 requires local authorities to take a sustainable development approach while conducting its business. Sustainable development is the fundamental philosophy that is embraced in Council's Vision, Mission and Objectives, and that shapes the community outcomes. The levels of service and the performance measures that flow from these inherently incorporate the achievement of sustainable outcomes as defined by:

- The Christchurch City Council Sustainability Policy;
- Christchurch City Council Wastewater Strategy 2013;
- Sustainable Energy Strategy for Christchurch 2008-2018.

1.3 Key Challenges and Opportunities for Wastewater Collection

In working towards the community outcomes and influenced by population growth and demand, Council faces the challenge of making decisions that prioritise resources to deliver the best mix of services at the right level and in a sustainable way. The key challenges and opportunities that have been priorities by Council are below in Table 1-1.

Table 1-1

Key Issue	Discussion
Earthquake and the Earthquake Rebuild	A series of earthquakes including a magnitude 7.1 on 4 September 2010, a magnitude 6.3 on 22 February 2011 and over 10,000 aftershocks, 2 of which were greater than 6.0 and 59 greater than 5.0. These seismic events caused a significant level of damage to the water supply network. The majority of Earthquake damage occurred in Lyttelton and the Eastern Suburbs of Christchurch City. The Infrastructure Rebuild Management Office (IRMO) and Stronger Christchurch Infrastructure Rebuild Team (SCIRT) were created for repair and rebuild of horizontal infrastructure. Although there has been a significant amount of wastewater reticulation repairs and renewals completed SCIRT will not bring the network back to pre earthquake and performance condition or standard. In addition, areas of residential land within Christchurch City were red-zoned by the Canterbury Earthquake Recovery Authority (CERA) and are being compulsorily acquired by the Crown. The future of this land and infrastructure passing through the land is uncertain. However for planning purposes it has been assumed that all wastewater collection infrastructure in the residential red-zone will become redundant except where it passes through red zones to service 'green zone' areas..
An aging reticulation network	Wastewater collection services were first installed in Christchurch in 1876 with a period of creation from 1876 to 1885. Sewer construction resumed with significant periods of construction in the 1900-1912, 1924-1933, 1950-1975 and 1984-2008 periods. Materials changed over time with the first two construction booms using EW pipes, a mixture of EW and concrete between the wars, a mixture of reinforced concrete and AC post war and plastic in modern times. The different effective life-spans of each material in conjunction with different life reductions from earthquakes have resulted in renewal dates of the different materials overlapping. Forecasts show the overlap starting in 2020 with an extremely large renewals peak until 2068. This will need extensive planning and cost effective execution for decades to come.
Wet-Weather Overflows	Increased Environmental and Cultural awareness is resulting in the public being less tolerant of wastewater overflows to water bodies. Inflow and infiltration (I&I) has increased due to the earthquake damaged network which is increasing the wet weather overflows. A decision is required to either increase the network capacity and therefore require an earlier WwTP upgrade or to conduct I&I investigations and repair works. The infrastructure rebuild will leave the City with a leaky network and increased risks of wet weather and dry weather overflows on public and private land.
New Infrastructure Types	Vacuum and pressure sewer systems have been installed through the earthquake rebuild and in new subdivisions. Although there are cost estimates for operation and maintenance of these systems, actual costs will be confirmed over first 5 years of operation.
Concurrent growth areas	Land for potential subdivision has been made available in multiple directions at the same time under the LURP. Meeting the needs of multiple growth areas concurrently is adding to the quantity of growth driven projects the Council must deliver. There is a risk all these sections will not be taken up or the demand will slow significantly post relocation of red zone property owners and thus leave a financial burden on the City for under-utilised growth infrastructure.

2 Proposed changes to activity

No changes are planned for the management of Waste Water Collection services

Table 2-1 Proposed changes to activity

Key Change	Reason	Level of significance? What investigations are needed?	Options for consultation and engagement
Installation of Pressure Sewer Systems	Improved resilience in liquefaction prone areas.	Under construction.	Consultation ongoing in some areas.
Installation of Vacuum Sewer Systems	Improved resilience in wet and weak ground conditions.	Under construction.	Project consultation as required.
Inflow and infiltration (I&I) Studies	High areas of I&I need ongoing identification and rectification.	Impact is a consequence of earthquakes. Affects volume and frequency of wastewater overflows as well as increased operating costs.	Property by property discussions as survey work progresses. Current flows at the Christchurch Wastewater Treatment Plant (CWTP) are 40% higher than a normal dry day pre-earthquake. This significant additional inflow means that there is less capacity in the network in wet weather and thius the risk of overflows is much higher. Further the cost water in the network costs more to pump to and through the CWTP. Damage to private laterals is also a contributing factor to these larger inflows. Residents who have not surveyed their private sewer lateral post earthquake should continue to be encouraged to do so as the repair of earthquake related damage should be recoverable from their insurers.

3 Activity description

3.1 Focusing on what we want to achieve

Council undertakes activities in order to deliver on the community outcomes for Christchurch. The outcomes that relate most directly to the management of the city's wastewater collection are that:

- Injuries and risks to public health are minimised;
- Water quality in rivers, streams, lakes and wetlands is improved;
- Statutory obligations are met by Council; and
- City assets, financial resources and infrastructure are well managed, now and in the future.

3.2 How we will know we are achieving the outcomes

We will know we are achieving the above outcomes when we see the following results:

- **A** public **network** of underground pipes and pumping stations **is maintained that enables wastewater to be conveyed** to the wastewater treatment plants, **safely**.
- Ongoing **maintenance and monitoring ensures continuity of** public wastewater **collection and minimises odour complaints** associated with the wastewater reticulation system.
- Ongoing **monitoring** of the wastewater collection system **ensures compliance** with resource consent conditions **for** wet weather **overflows into rivers and waterways**.
- The Council **meets statutory requirements** for providing wastewater collection services.
- Wastewater collection networks are operated in a way that **minimises adverse social, cultural environmental and economic effects and meets statutory requirements** in these areas.

The activities that follow in section 4 and the levels of service within them are all linked to the above results to ensure Councils stays focused on moving towards the community outcomes. This link aims to confirm why we are doing the activities – that they will realistically move us closer to our goals – and that service delivery remains relevant to strategic direction.

3.3 What services we provide

This activity includes the following services:

- Collecting wastewater from properties within the reticulated area and conveying the wastewater to treatment plants.

Ongoing strategies to deliver this service include a balanced mix of maintenance and renewal to preserve levels of service plus a capital response where appropriate to respond to increasing demands. Assets installed during historical growth periods are now at or nearing the end of their lives, combined with ongoing renewal of earthquake damaged assets a significant increase in renewals is required over the next 30 years.

Wastewater overflows are expected to remain an issue with the wastewater collection network. Earthquake damage to the network has increased the rates of inflow and infiltration (I&I). Increased I&I results in increased wet weather flows which can exceed network capacities resulting in overflows. I&I investigations and reduction works and network upgrades are planned which will reduce I&I and overflows over time.

Much of the infrastructure to serve growth is delivered by private developers then vested in Council. Council standards including the Infrastructure Design Standard (IDS), Construction Standard Specification (CSS) Approved Drainlayer program and Approved Materials List are maintained and updated on a regular basis to ensure these new assets meet Council requirements. Recent updates have focussed with resiliency aiming to result in less damage should further disasters occur.

New technologies such as pressure and vacuum wastewater systems have been installed as part of the earthquake recovery and are being well received by developers. These new technologies allow different network configurations, improved system management, cost reductions and resiliency enabling the network to recover more quickly from future earthquake events.

The wastewater collection activity includes 180 pump stations, 56 lift stations, 34 odour control sites, 10 radio repeaters, 1,734km of sewer mains, 945km of laterals and 30,817 manholes collecting wastewater from approximately 160,000 customers in Christchurch, Lyttelton, Diamond Harbour, Governors Bay, Akaroa, Duvauchelle Bay, Tikao Bay and Wainui.

3.4 Benefits and Funding Sources

3.4.1 Who Benefits?

Who benefits?	
Individual	
Identifiable part of the community	
Whole community	Full

Key:
Full
Majority
Some

Explanatory Comments:

The entire community benefits from this activity.

There are health and environmental benefits from a wastewater collection system for the whole community.

3.4.2 Who pays?

Funding - Fees / User Charges	Other revenue Grants & Subsidies	General rate	Targeted rate
1%	15%	1%	83%
	Some		Majority

Note, Funding Split % is derived from the 'Summary of Cost for Activity' (section 13).

Key:		Typically
Full	All or almost all the cost is funded from that source. If the comment is made in the general or targeted rate columns it does not preclude making minor charges for the service but indicates that the charges are a negligible part of the fund.	95%+
Majority	The majority of the activity is funded from this source.	50%+
Some	Some revenue is derived from this source.	<50%

Does this Activity generate surplus funds that can be applied to other areas? **No**

Explanatory Comments:

The majority of the cost of this service is covered by Targeted Rate.

3.5 Key legislation and Council strategies

The Local Government Act 2002; The Local Government (Rating) Act 2002; The Resource Management Act 1995; The Health Act 1956; The Council Trade Waste Bylaw 2006; Water Related Services Bylaw 2008; Canterbury Earthquake Recovery Act 2011.

4 Levels of service and performance measures

Table 4-1 summarises the levels of service and performance measures for the Wastewater Collection activity. Shaded rows are the levels of service and performance measures to be included in the Long Term Plan. Non-shaded rows are non-LTP management level measures, agreed with and reported to Council but not included as part of the community consulted document.

Table 4-1

Performance Standards Levels of Service (we provide)	**Results** (Activities will contribute to these results, strategies and legislation)	**Method of Measurement** (We will know we are meeting the level of service if.....)	**Current Performance**	**Benchmarks**	**Future Performance (targets)**			**Future Performance (targets) by Year 10**
					Year 1	**Year 2**	**Year 3**	
					2015/16	**2016/17**	**2017/18**	**2024/25**
Collecting wastewater from properties within the reticulated area								

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	2024/25
11.0.1	Provide Wastewater collection in a safe, convenient and efficient manner.	A network is maintained that enables wastewater to be conveyed safely.	*Measuring and managing contractor response times, and continuity of wastewater collection and transportation services. Different response times for Banks Peninsula to allow for travel time and more difficult access.*	2013/14: 88.2% 2012/13: 86.8% 2011/12: 58.9% 2010/11: 82.9% 2009/10: 94.1%		11.0.1.1: Proportion of urban blockages responded to within 1 hour of notification: ≥80%	11.0.1.1: Proportion of urban blockages responded to within 1 hour of notification: ≥90%	11.0.1.1: Proportion of urban blockages responded to within 1 hour of notification: ≥90%	11.0.1.1: Proportion of urban blockages responded to within 1 hour of notification: ≥90%
				2013/14: 100% 2012/13: 93.7% 2011/12: * 2010/11: 93.9% 2009/10: 99.1%	WaterCare Auckland 2013 – achieved 96% across all agreed time frame targets	11.0.1.2: Proportion of urban blockages responded to within 2 hours of notification: ≥95%	11.0.1.2: Proportion of urban blockages responded to within 2 hours of notification: ≥99%	11.0.1.2: Proportion of urban blockages responded to within 2 hours of notification: ≥99%	11.0.1.2: Proportion of urban blockages responded to within 2 hours of notification: ≥99%
				2013/14: 91.6% 2012/13: 100% 2011/12: 94.7% 2010/11: * 2009/10: 97%		11.0.1.3: Proportion of rural blockages responded to within 2 hours of notification: ≥90%	11.0.1.3: Proportion of rural blockages responded to within 2 hours of notification: ≥90%	11.0.1.3: Proportion of rural blockages responded to within 2 hours of notification: ≥90%	11.0.1.3: Proportion of rural blockages responded to within 2 hours of notification: ≥90%
				2013/14: 100% 2012/13: 100% 2011/12: 100% 2010/11: * 2009/10: 100% * no data EQ impact	National Performance Review 13/14 will provide NZ wide data from 2015 on	11.0.1.4: Proportion of rural blockages responded to within 4 hours of notification: ≥99%	11.0.1.4: Proportion of rural blockages responded to within 4 hours of notification: ≥99%	11.0.1.4: Proportion of rural blockages responded to within 4 hours of notification: ≥99%	11.0.1.4: Proportion of rural blockages responded to within 4 hours of notification: ≥99%

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets) Year 1 2015/16	Year 2 2016/17	Year 3 2017/18	Future Performance (targets) by Year 10 2024/25
11.0.1 (cont'd)	Provide Wastewater collection in a safe, convenient and efficient manner.	A network is maintained that enables wastewater to be conveyed safely.	*This measure counts the number of individual properties that experience wastewater blowing back into private property as a consequence of a blockage in council owned asset or as a consequence of council cleaning operations (i.e. blowbacks). It also includes pressure and vacuum systems.* *Note – SCIRT cleaning and CCTV operations increase the risk of blowbacks whilst the infrastructure rebuild is in progress.*	2013/14: 184 2012/13: 159 2011/12: 139 2010/11: 69 *Note: majority of these = EQ impact*	Christchurch only issue	---------- Non-LTP 11.0.1.5: Number of properties affected by wastewater blowbacks per year due to network operations: ≤250	---------- Non-LTP 11.0.1.5: Number of properties affected by wastewater blowbacks per year due to network operations: ≤200	---------- Non-LTP 11.0.1.5: Number of properties affected by wastewater blowbacks per year due to network operations: ≤150	---------- Non-LTP 11.0.1.5: Number of properties affected by wastewater blowbacks per year due to network operations: ≤150
				2013/14: 74% 2012/13: 84% 2011/12: 82% 2010/11: no survey 2009/10: 88%		Remain LTP 11.0.1.6: Proportion of customers satisfied with the wastewater services: ≥75%	Remain LTP 11.0.1.6: Proportion of customers satisfied with the wastewater services: ≥75%	Remain LTP 11.0.1.6: Proportion of customers satisfied with the wastewater services: ≥75%	Remain LTP 11.0.1.6: Proportion of customers satisfied with the wastewater services: ≥80%

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	2024/25
11.0.1 (cont'd)	Provide Wastewater collection in a safe, convenient and efficient manner.		*Where the territorial authority attends to sewerage overflows resulting from a blockage or other fault in the authority's sewerage system, the median response time is measured.* *Attendance time: from the time that the territorial authority receives notification to the time that service personnel reach the site.* *Sewerage and the Treatment and Disposal of Sewage mandatory performance measure 3a.*	*New* *2013/14: tba*	Tbd	11.0.1.7 Attendance time: Median response time from the time that the territorial authority receives notification to the time that service personnel reach the site: <1 Hour	11.0.1.7 Attendance time: Median response time from the time that the territorial authority receives notification to the time that service personnel reach the site: <1 Hour	11.0.1.7 Attendance time: Median response time from the time that the territorial authority receives notification to the time that service personnel reach the site: <1 Hour	11.0.1.7 Attendance time: Median response time from the time that the territorial authority receives notification to the time that service personnel reach the site: <1 Hour
			Resolution time: from the time that the territorial authority receives notification to the time that service personnel confirm resolution of the blockage or other fault. *Sewerage and the Treatment and Disposal of Sewage mandatory performance measure 3b.*	*New* *2013/14: tba*	Tbd	11.0.1.8 Resolution time: Median response time from the time that the territorial authority receives notification to the time that service personnel confirm resolution of the blockage or other fault: < 24 Hours	11.0.1.8 Resolution time: Median response time from the time that the territorial authority receives notification to the time that service personnel confirm resolution of the blockage or other fault: <24 hours	11.0.1.8 Resolution time: Median response time from the time that the territorial authority receives notification to the time that service personnel confirm resolution of the blockage or other fault: < 24 hours	11.0.1.8 Resolution time: Median response time from the time that the territorial authority receives notification to the time that service personnel confirm resolution of the blockage or other fault: <24 Hours

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	2024/25
11.0.1 (cont'd)	Provide Wastewater collection in a safe, convenient and efficient manner.	Minimises adverse social, cultural environmental and economic effects and meets statutory requirements	*Sewage odour; sewerage system faults; sewerage system blockages; and CCC response to issues with its sewerage system. Expressed per 1000 connections to the sewerage system.*	Breaks/Chokes per 1000 properties 2013/14: 13 2012/13: 9 2011/12: not avail 2010/11: not avail 2009/10: 4	5.2 - 17.4 breaks / chokes per 1000 properties served (range from 7 Auckland authorities, Auckland Water Industry Report – 5.2 to 17.4 per 1,000 properties)	11.0.1.9: Number of blockage complaints received per 1000 connected properties per year: ≤10	11.0.1.9: Number of blockage complaints received per 1000 connected properties per year: ≤10	11.0.1.9: Number of blockage complaints received per 1000 connected properties per year: ≤10	11.0.1.9: Number of blockage complaints received per 1000 connected properties per year: ≤10
			Sewerage and the Treatment and Disposal of Sewage mandatory performance measures 4a-d..	Complaints per 1000 properties 2013/14: 0.2 2012/13: 0.2 2011/12: 0.7 2010/11: 0.7 2009/10: 0.4	Watercare: - 0.12 Northshore City Council: 1.54 Hutt Valley Water Services: 0.2 *these all measure odour complaints for both the treatment plant and reticulation network combined*	11.0.1.10: Number of odour complaints received per 1000 connected properties per year: ≤0.3	11.0.1.10: Number of odour complaints received per 1000 connected properties per year: ≤0.3	11.0.1.10: Number of odour complaints received per 1000 connected properties per year: ≤0.3	11.0.1.10: Number of odour complaints received per 1000 connected properties per year: ≤0.3
				New LoS – No past performance.		11.0.1.11: Number of sewerage system faults received per 1000 connected properties per year. *(excludes blockages & odours)* ≤0.3	11.0.1.11: Number of sewerage system faults received per 1000 connected properties per year. *(excludes blockages & odours)* ≤0.3	11.0.1.11: Number of sewerage system faults received per 1000 connected properties per year. *(excludes blockages & odours)* ≤0.3	11.0.1.11: Number of sewerage system faults received per 1000 connected properties per year. *(excludes blockages & odours):* ≤0.3
				New LoS – No past performance. (*complaints re performance of Council and contractor – non performance*		11.0.1.12: Proportion of complaints remediated to the customers satisfaction: ≥95%	11.0.1.12: Proportion of complaints remediated to the customers satisfaction: ≥95%	11.0.1.12: Proportion of complaints remediated to the customers satisfaction: ≥95%	11.0.1.12: Proportion of complaints remediated to the customers satisfaction: ≥95%

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	2024/25
11.0.1 (cont'd)	Provide Wastewater collection in a safe, convenient and efficient manner.	A network is maintained that enables wastewater to be conveyed safely. Note: Assume all median time targets relate to urgent jobs (faults) only		New LoS – No past performance.	*New – no previous data available*	11.0.1.13: Median time for a CCC representative to arrive on site following notification of an urban fault. ≤1 hr	11.0.1.13: Median time for a CCC representative to arrive on site following notification of an urban fault. ≤1 hr	11.0.1.13: Median time for a CCC representative to arrive on site following notification of an urban fault. ≤1 hr	11.0.1.13: Median time for a CCC representative to arrive on site following notification of an urban fault. ≤1 hr
				New LoS – No past performance.	*New – no previous data available*	11.0.1.14: Median time until resolution following notification of an urban fault.≤24 hr	11.0.1.14: Median time until resolution following notification of an urban fault.≤24 hr	11.0.1.14: Median time until resolution following notification of an urban fault.≤24 hr	11.0.1.14: Median time until resolution following notification of an urban fault. ≤24 hr
				New LoS – No past performance.	*New – no previous data available*	11.0.1.15: Median time for a CCC representative to arrive on site following notification of a rural fault. ≤2 hr	11.0.1.15: Median time for a CCC representative to arrive on site following notification of a rural fault. ≤2 hr	11.0.1.15: Median time for a CCC representative to arrive on site following notification of a rural fault. ≤2 hr	11.0.1.15: Median time for a CCC representative to arrive on site following notification of a rural fault. ≤2 hr
				New LoS – No past performance.	*New – no previous data available*	11.0.1.16: Median time until resolution following notification of a rural fault. ≤24 hr	11.0.1.16: Median time until resolution following notification of a rural fault. ≤24 hr	11.0.1.16: Median time until resolution following notification of a rural fault. ≤24 hr	11.0.1.16: Median time until resolution following notification of a rural fault. ≤24 hr

≤0.3

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	2024/25
11.0.3	Resource consents reporting		Reporting on wet weather overflows into rivers and waterways (rolling 10 year average)	2013/14: 5.7 2012/13: 5.5 2011/12: 5.0 2010/11: 5.3 2009/10: 5.3 2008/09: 5.0 2007/08: 4.0 100% of events reported on time		Report on number of overflow events: reports lodged on time 100%	Report on number of overflow events: reports lodged on time 100%	Report on number of overflow events: reports lodged on time 100%	Report on number of overflow events: reports lodged on time 100%

Performance Standards Levels of Service (we provide)		Results (Activities will contribute to these results, strategies and legislation)	Method of Measurement (We will know we are meeting the level of service if…..)	Current Performance	Benchmarks	Future Performance (targets)			Future Performance (targets) by Year 10
						Year 1	Year 2	Year 3	
						2015/16	2016/17	2017/18	2024/25
11.0.5	Minimise number of dry weather sewerage overflows	Less than benchmark standard of number of overflows into rivers & waterways.	*The number of dry weather sewerage overflows from the sewerage system, expressed per 1000 sewerage connections to that sewerage system.* *Sewerage and the Treatment and Disposal of Sewage mandatory performance measure 1.* SCIRT design guideline DG43b used in infrastructure rebuild – and overflows will increase due to pipe collapse, root intrusion & reduced renewal budget	2013/14: 0.2 2012/13: 0.2 2011/12: 0.3 2010/11: * * no data EQ impact	*Local Government Act requirement*	11.0.5.1: Number of dry weather sewerage overflows from the CCC sewer system per 1000 connected properties per year: 0.7 --- Non-LTP 11.0.5.2: Complete computer modelling to inform compliance achievement setting for 2017/18 and beyond for wet weather overflow to local waterways: No	11.0.5.1: Number of dry weather sewerage overflows from the CCC sewer system per 1000 connected properties per year: 0.7 --- Non-LTP 11.0.5.2: Complete computer modelling to inform compliance achievement setting for 2017/18 and beyond for wet weather overflow to local waterways: Yes	11.0.5.1: Number of dry weather sewerage overflows from the CCC sewer system per 1000 connected properties per year: 0.7 --- Non-LTP 11.0.5.2 Targets to be set post computer modelling	11.0.5.1: Number of dry weather sewerage overflows from the CCC sewer system per 1000 connected properties per year: 0.6 --- Non-LTP 11.0.5.2 Targets to be set post computer modelling

5 Review of cost effectiveness - regulatory functions and service delivery

Service: Wastewater Collection

Current Arrangements			
Governance	**Funding**	**Delivery**	Estimated Cost
CCC	CCC	CCC and CCO (City Care Ltd)	$38.0 million

Arrangements that cannot reasonably be changed in next two years			
Governed by Legislation	**Contract or binding agreement**	**Not cost effective to review**	**Option**
	Christchurch City Council Maintenance of City Water and Wastewater Network Contract.	This contract has been in place for less than 6 years and has greater than 2 years remaining.	No review necessary at this time

Network operation and communication systems maintenance are completed in-house by CCC as these are key components of a strategic asset providing a mandatory service.

General network maintenance is carried out by City Care Limited under the Christchurch City Council Maintenance of City Water and Wastewater Network Contract. The contract commenced 1 July 2010 with an initial 5 year duration and extensions for high performance. Including extensions the contract will expire in at least 2017 with further extensions moving this out to 2019. Award of the contract was on a non-competitive, closed basis so as to retain the key strategic asset in Council or CCO control; however an external, independent review of contract rates was conducted to ensure Council obtained market value.

6 Long Term Infrastructure Strategy

6.1 Issues, principles and implications

Residential Red Zone

41.4km of wastewater mains are within the residential red zone areas. For planning purposes it has been assumed all wastewater mains infrastructure in the Avon River residential red zone will be decommissioned once it becomes redundant. The exact process for abandonment is uncertain and potential additional costs exist should Council be required to remove and fill-in manholes.

Pump stations, overflows and trunk mains within the red zones will be retained as they serve "Green Zone" housing areas.

Earthquake Legacy

Earthquake damage to the reticulation network includes large numbers of cracked pipes and separated joints on wastewater pipes. As a result of this damage inflow and infiltration (I&I) have significantly increased, especially during wet weather events. In addition to I&I increases, cracks increase maintenance requirements by permitting tree root intrusion, providing a location for blockage build-up and allowing silt intrusion. Crack growth over time also leads to premature pipe failure. Due to funding limitations SCIRT is conducting an optimisation process and will replace or repair only the worst damage, this leaves a legacy of damage and potential failures to be repaired by Council.

In order to optimise the rebuild and add resiliency additional types of wastewater system have been approved, these include lift stations, pressure sewer systems and vacuum sewer systems. All three of these new designs incorporate pumps and therefore result in increased operational and maintenance costs, especially in the short term. The shallow installation and small diameters of pressure and vacuum system pipes mean they cost less to install and therefore decrease renewal costs. These savings will only occur over an 80-120 year life cycle.

Silt ingress is anticipated to be the major long-term issue to WwTPs. Additional operational costs for silt removal and disposal will be incurred. In addition the abrasive nature of silt will increase wear on mechanical plant and therefore increase maintenance costs. Silt ingress will decrease as damaged pipes are renewed.

6.1.1 Overflows

Urban development also leads to increased flows in the wastewater network. There are already capacity issues with some parts of the network, with overflows of untreated wastewater to the environment during storm events. Unless urban development is well managed in tandem with upgrades to the wastewater network overflows have the potential to increase. Good design and construction management should mitigate these risks.

Dry weather overflows previous to the earthquake events were rare. Due to the pipe cracks and increased root intrusion in the damaged network dry weather blockages and overflows have increased substantially. The numbers are unlikely to decrease until all badly cracked and holed pipes are replaced or repaired.

Wet weather overflows occur when flows increase due to high levels of Inflow & Infiltration (I&I) during storm events. Climate change predictions include an increase in the frequency of high intensity rain events and therefore are expected to increase overflows unless network upgrades continue in line with modelled predictions Renewals and repairs to decrease I&I will reduce wet-weather flows and therefore wet weather overflows.

6.1.2 Aging Network

Wastewater collection services were first installed in Christchurch between 1876-1885. Wastewater network construction resumed with significant periods of construction in the 1900-1912, 1924-1933, 1950-1975 and 1984-2008 periods. Materials changed over time with the first two construction booms using earthenware pipes, a mixture of earthenware and concrete between the wars, a mixture of reinforced concrete and asbestos cement post war, and plastic in modern times. The different effective life spans of each material in conjunction with different life reductions from earthquakes have resulted in renewal dates of the different materials overlapping.

Prior to the earthquake sequence the required wastewater pipe renewals were 2-3km per year. As the end of life approaches the required renewals will increase to 5km in 2020, 10km in 2027 and reach 30km in 2041. Detailed advance planning will be required to prioritise and complete these works particularly with regard to the SCIRT wastewater reticulation legacy work and other infrastructure services required in the network.

6.1.3 Expectations of Service Delivery

In the mid to late twentieth century wastewater collection, treatment and disposal was seen as a basic human right and only noticed when problems existed. In the late twentieth century and early twenty-first century the expectation for wastewater to be an “invisible uninterruptible service remains. However additional expectations have developed including compliance with cultural beliefs and improving discharge quality as well as relying on treatment processes to screen out modern personal care protects and effects of urbanised lifestyles. These new expectations could potentially change the statutory requirements that must be met under resource consents for the wastewater system.

Iwi cultural desires include no discharges of human effluent to water bodies. This is also reflected in social desires where discharges to water are undesirable from food gathering and recreational standpoints. Environmental desires often include the treatment of wastewater to the highest standard possible before discharge. High levels of treatment and discharge to land are expensive which conflicts with the public desires for lower cost services. Finding an acceptable balance of cost, social, cultural and economic factors is often a challenge in dealing with wastewater issues.

Increased environmental and cultural awareness is resulting in the public being less tolerant of wastewater overflows to water bodies and public pressure for overflow elimination may eventuate.

7 Review of cost-effectiveness - infrastructure delivery

The Local Government Act requires local authorities to review the cost effectiveness of current arrangements for delivering infrastructure. The same criteria and options as defined in section 5 above apply (*Review of cost effectiveness - regulatory functions and service delivery*).

Wastewater collection creations, renewals and replacements

Current Arrangements			
Governance	**Funding**	**Delivery**	**Estimated Cost**
CCC	CCC	CCC and Various contractors	Dependant on LTP.
CCC	CCC and Private Developers	Various contractors	Dependant on LTP and growth.
CCC	CCC and Private Developers	Private Developers	Dependant on LTP and growth.
CCC	Private Developers	Private Developers	No cost to Council.

Arrangements that cannot reasonably be changed in next two years			
Governed by Legislation	**Contract or binding agreement**	**Not cost effective to review**	**Option**
Local Government Act	Council Procurement Policy	Design work is tendered or completed in-house dependant on cost, resources and specific skills requirements. All construction work is tendered.	No review necessary

8 Significant Effects

The significant negative and significant positive effects are listed below in Tables 8-1 and 8-2 respectively.

Table 8-1 Significant Negative Effects

Effect	Council's Mitigation Measure
Cost to Council/Ratepayers of operating wastewater treatment systems.	Follow applicable documented procedures and industry best practice for cost minimisation. Follow technological developments and implement cost saving initiatives on a continuous improvement basis. Ensure staff are kept update to date with technological and operational best practice through attendance at conferences and participation in specialist industry working groups.
Social, Cultural and Environmental effects of wastewater overflows	Processes for signage erection and public notification where overflows could result in health risks. Optimising asset capacity through improved network control and optimisation. Maintaining resource consent compliance.
Odours from Sewers	Odour control systems installed in problem areas. Maintenance to remove build-ups of odour causing compounds. Good design of servers to prevent creation of anaerobic conditions.

Table 8-2 Significant Positive Effects

Effect	Description
Public Health	Collection and isolation of wastewater significantly reduces the risks of water and faecal borne diseases. Allows intensive urban environments to exist and develop.
Economic Development	Provision of wastewater collection systems promotes economic development by permitting intensification of land and industry.
Environmental Protection.	Collection of wastewater followed by treatment reduces the load on the receiving environment. Environmental advantages of wastewater collection, treatment and disposal include pathogen reduction, nutrient reduction and avoiding anaerobic, dead zones or algal blooms in receiving areas.

8.1 Assumptions

Council has made a number of assumptions in preparing the Activity Management Plan. Table 8-3 lists the most significant assumptions and uncertainties that underline the approach taken for this activity.

Table 8-3 Major Assumptions

Financial assumptions.	That all expenditure has been stated in 1 July 2015 dollar values and no allowance has been made for inflation.	The LTP will incorporate inflation factors. This could have a significant impact on the affordability of the plans if inflation is higher than allowed for, but Council is using the best information practically available from Business and Economic Research Limited (BERL).
Asset data knowledge.	That Council has adequate knowledge of the assets	There are several areas where Council needs to improve its knowledge and assessments. Significant uncertainty

	and their condition so that the planned renewal works will allow Council to meet the proposed levels of service.	exists about the works that will be completed by SCIRT and there is a risk that a change to the level of expenditure will be required. Although the uncertainty exists this assumption had to be made as the data used was the best available.
Growth forecasts.	That the district will grow as forecast in the LURP and Growth Demand and Supply Model.	If the growth is very different it will have a moderate impact. If higher, Council may need to advance capital projects. If it is lower, Council may have to defer planned works.
Network capacity.	That Council's knowledge of network capacity is sufficient enough to accurately programme capital works.	If the network capacity is higher than assumed, Council may be able to defer works. The risk of this occurring is low and will have little significance. If the network capacity is lower than assumed, Council may be required to advance capital works projects to address congestion. The risk of this occurring is low; however the impact on expenditure would be significant.
Emergency funding.	That the level of funding in these budgets and held in Council's disaster fund reserves will be adequate to cover reinstatement following emergency events.	Funding levels are based on historic requirements. The risk of requiring additional funding is moderate and may have a moderate effect on planned works due to reprioritisation of funds. Council funds emergency events from Council-wide budgets and does not hold emergency funds in each activity.
Timing of capital projects.	That capital projects will be undertaken when planned.	The risk of the timing of projects changing is high due to factors like resource consents, funding and land purchase. Council tries to mitigate these issues by undertaking the consultation, investigation and design phases sufficiently in advance of the construction phase. If delays are to occur, it could have significant effects on the level of service.
Accuracy of capital project cost estimates	That the capital project cost estimates are sufficiently accurate enough to determine the required funding level.	The risk of large under estimation is low; however the importance is moderate as Council may not be able to afford the true cost of the projects. Council tries to reduce the risk by including a standard contingency based on the projects lifecycle. Project estimates are updated through the life cycle of the project.
Changes in legislation and policy, and financial assistance.	That there will be no major changes in legislation or policy.	The risk of major change is moderate due to the changing nature of the government and politics. If major changes occur it is likely to have an impact on the required expenditure. Council has not mitigated the effect of this.

9 Risk Management

Council's risk management approach is described in detail elsewhere

High risk items are listed in Table 9-1 below.

Table 9-1 Significant Risks and Control Measures

Risk	Impact	Priority	Risk Strategy	Risk Response / Mitigation
Renewal programme does not match the demand for asset renewal in the field - ie. Break rates increase	Increased maintenance costs and reduced level of service. Increased risk of overflows. Economic impact on commercial and industrial customers. Increased inflow and infiltration.	Extreme	Mitigate	• SCIRT undertaking dilapidations study of waste water network to inform remaining asset lives. • This will be used to revisit renewal programme. • Current renewal programme likely to be grossly understated • Accurate analysis and forecasting of opex versus capex investment
Corrosion of lengths of the network due to hydrogen sulphide corrosion	Reduced asset life, increased renewal costs, risk of road failure, increased infiltration, reduced levels of service, increased risk of damage downstream	Extreme	Mitigate	• CCC identify high risk areas and monitor corrosion • CCC to specify corrosion resistant materials when assets renewed and refurbished • CCC install odour treatment facilities to remove hydrogen sulphide at high risk sites.
Inadequate site security	Potential public illness/injury. Theft of components leading to higher risks on site. Loss of communication. Damage to	Extreme	Mitigate	• Scada monitoring to improve security • Secure all access gates / lids • Maintain strict control on access to sites. • Communication protocols for site access to be well understood

Risk	Impact	Priority	Risk Strategy	Risk Response / Mitigation
	equipment. Potential overflows.			
Excessive inflow during wet weather events	Surcharging of sewers, overflows and loss of service. Foul flooding of residential properties.	Very High	Mitigate	• SCIRT undertaking inflow and infiltration studies • New sewer technologies will reduce inflow due to nature of construction. • More flow monitoring on all waste water pump stations and trunk sewers. • Utilise flood modelling scenarios to identify areas at risk
Uncontrolled dry weather discharge from network to waterways	Breach of resource consent, damage to environment and possible fine. Reputation damage	Very High	Mitigate	• Siphons/ mains to be cleaned in accordance with contractor plan. • CCL need to understand alternative options – ie diverting flow. • Utilise GIS tools to identify hotspots
Air relief valves do not allow pumping mains to operate correctly due to poor maintenance	Air locked mains. Leaking air valves. Odour. Reduced pumping efficiency and possible asset damage	Very High	Mitigate	• Regular inspection and testing in line with contractors plan. • Regular auditing of work completed undertaken. • Flow monitoring via scada of pressure mains • Ensure new air valves added to GIS and AMS.
Objectionable odour generated at boundary	Public complaint. Resource consent breach.	Very High	Mitigate	• Contractor effectively operates and maintains odour control facilities according to SOPs and contractor plans. • Odour treatment facilities designed into WWTP and pump stations as required. • Enforce trade waste bylaws
Objectionable odour form the	Public complaint	Very High	Mitigate	• Contractor to ensure pipelines and plant maintained and operated according to contractor

Risk	Impact	Priority	Risk Strategy	Risk Response / Mitigation
network				plans • CCC to enforce tradewaste bylaws • Sewers designed with adequate ventilation
Failure of brick barrel waste water pipes	Degradation of mortar joints leads to collapse of bricks and blockages and low flows. Road sub-base washes into brick barrel causing road collapse / tomos	High	Mitigate	• Brick barrel lining undertaken as part of infrastructure rebuild • Seismic modelling of brick barrels has been undertaken under EQ conditions.

10 Improvement Plan

City Water and Waste have developed a Contract Management Improvement Plan. Version 1.0 dated May 2014 is saved in TRIM – reference 14/995771.

Appendix A of the plan – Actions Table - sets out the actions, responsibilities, expected benefits and owner of the various actions identified. It is a snapshot as at May 2014. It is intended that the Improvement Plan is continually updated and monitored as a live document.

Contractors report their innovations, improved work practices and application of technology through contract meetings.

Staff attend conferences and participate in technical working groups to maintain knowledge and share best practice experience.

11 Operations, Maintenance and Renewals Strategy

11.1 Operations and Maintenance

Council has determined that the most effective way to achieve its objectives is a mixture of in-house operations and contracting out professional engineering services and physical maintenance works to commercial consultants and contractors. Contractors and Consultants are employed to execute work at market value.

Wastewater collection operations are largely automated with monitoring and manual control of most sites conducted by Council staff using the SCADA system based at Christchurch WWTP. Communication to Banks Peninsula sites is currently limited; however planned upgrades to the Akaroa water treatment plant, Little River water treatment plant and radio repeaters are expected to remediate this and allow expansion of the SCADA system. SCADA, controls, communications and IT maintenance is carried out by in-house Council staff. Purchase of electricity and fuel for auxiliary plant are also undertaken by Council.

Excluding the low-voltage SCADA, control and communications assets the remainder of assets are maintained by an external Contractor under the Christchurch City Council Maintenance of City Water and Wastewater Network Contract. This contract includes preventative maintenance, reactive maintenance, replenishment of consumables (except electricity and fuel), condition assessment and cleaning.

11.2 Renewals

Assets are considered for renewal as condition assessments show renewal is required. Renewal is driven by the asset nearing the end of its effective working life, where the cost of maintenance becomes uneconomical or where required by the renewal of another asset. Criticality of assets is considered during renewals planning with higher levels of condition monitoring applied to assets where the risk of failure of critical assets is sufficiently high while low criticality assets are renewed on a reactive basis.

Due to the inherent health hazards and access issues relating to wastewater, submerged assets are often run until failure and renewed reactively where failure will not cause operational issues.

The remainder of the wastewater collection network is formed by the reticulation network. Critical mains in the reticulation network are condition assessed and renewals planned accordingly. Lower criticality mains become renewals candidates following CCTV inspection and fault scoring with candidates prioritised by condition and renewed as budget allows. Manholes and other chambers are typically renewed as part of sewer main renewals.

Based on age and number of failures the earthenware pipes installed pre 1900, concrete pipes installed 1910-1940 and asbestos cement pipes installed in 1950s and 1960s booms are approaching the end of their lives and significantly increased renewals expenditure is required over the next 30 years.

It is currently anticipated that the infrastructure rebuild will not return the wastewater network back to pre-earthquake performance or condition. This will pass the following legacy issues onto Council to manage:

(a) Significant increase in I&I will cause more frequent and larger overflow events.

(b) Increased maintenance costs with damaged network.

(c) Increased blockings and sewerage on private property (health risk).

12 Key Projects

Table 12-1 details the key capital and renewal work programmed for years 2015 to 2025.

Table 12-1

Project Name	Description	Year 1 ($)	Year 2($)	Year 3 ($)	Years 4-10 ($)	Project Driver
	For details of the capital works relating to this activity refer to the draft Capital Programme, draft Long Term Plan, volume 1					

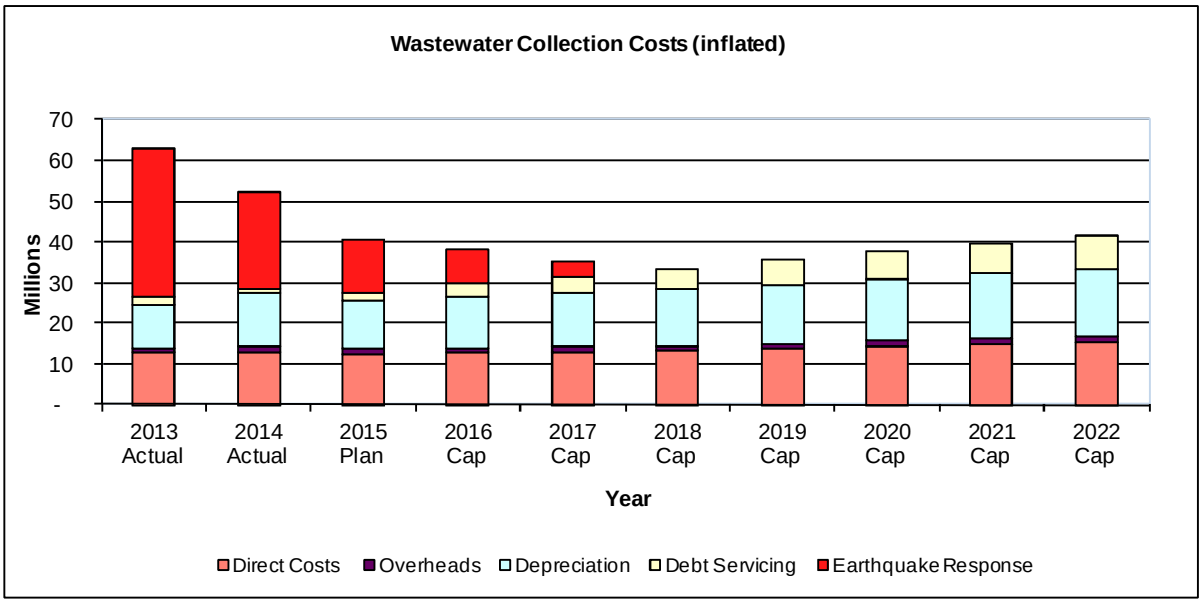
Note: G = Growth, LoS = Levels of Service, R = Renewal

13 Summary of Cost for Activity

Figure 13-1

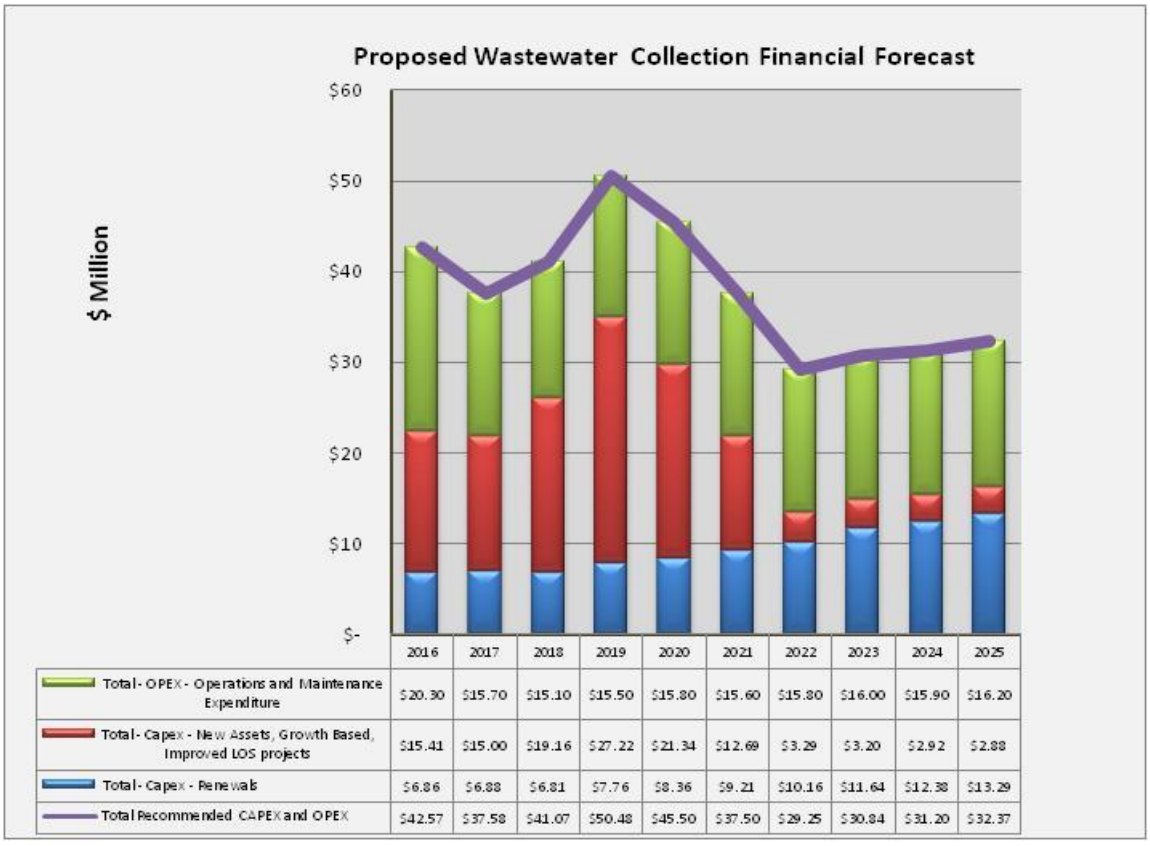
SEWERAGE COLLECTION, TREATMENT AND DISPOSAL - WASTEWATER COLLECTION		Funding Caps in 2015/16 Dollars				*Funding splits exclude EQ Costs from all calculations*					
	2014/15 Annual Plan	2015/16	2016/17	2017/18		Funding - User Charges	Other revenue	General rate	Targeted rate	Period of Benefit (years)	Comments
	000's										
Operational Budget											
Collecting Wastewater from Properties	12,616	12,742	12,477	12,398							
Activity Costs before Overheads	12,616	12,742	12,477	12,398							
Earthquake Response Costs	13,126	8,328	3,626	-							
Corporate Overhead	1,289	1,294	1,289	1,236							
Depreciation	11,583	12,431	12,678	12,984							
Interest	2,215	3,189	4,148	4,983							
Total Activity Cost	**40,830**	**37,984**	**34,218**	**31,600**		0%	0%	0%	100%		
						Availability			Full		
Funded By:											
Fees and Charges	41	42	42	42							
Grants and Subsidies	-	-	-	-							
Earthquake Recoveries	7,723	4,859	2,276	-							
Total Operational Revenue	**7,763**	**4,901**	**2,318**	**42**							
Net Cost of Service	**33,066**	**33,083**	**31,900**	**31,558**							
Funded by:											
Rates	**27,663**	**29,614**	**30,550**	**31,558**							
Earthquake Borrowing	**5,403**	**3,469**	**1,350**	**-**							
	33,066	**33,083**	**31,900**	**31,558**							
Capital Expenditure											
Earthquake Rebuild											
Renewals and Replacements											
Improved Levels of Service											
Additional Demand											

Figure 13-2



The following figures have been developed from forecasts of the operations, maintenance, renewal, creation and disposal cost requirements. Forecast preparation used all available information including modelling, the LURP and information from SCIRT. Inflation is excluded from the figures and all costs are presented in 2015 dollars.

Figure 13-3 Total Expenditure



	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total - OPEX - Operations and Maintenance Expenditure	$20.30	$15.70	$15.10	$15.50	$15.80	$15.60	$15.80	$16.00	$15.90	$16.20
Total - Capex - New Assets, Growth Based, Improved LOS projects	$15.41	$15.00	$19.16	$27.22	$21.34	$12.69	$3.29	$3.20	$2.92	$2.88
Total - Capex - Renewals	$6.86	$6.88	$6.81	$7.76	$8.36	$9.21	$10.16	$11.64	$12.38	$13.29
Total Recommended CAPEX and OPEX	$42.57	$37.58	$41.07	$50.48	$45.50	$37.50	$29.25	$30.84	$31.20	$32.37

Over the long next 30-45 years wastewater collection costs are expected to steadily increase driven by the increasing renewals demands, this is seen in years 2022-25 in Figure 13-3. Short

term the wastewater collection activity is predominantly driven by backlog requirements with elevated costs in the 2016-21 period mainly relating to reducing orr eliminating wastewater overflows.

Figure 13-4 Operating Expenditure

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Earthquake O&M	$10.00	$5.00	$4.00	$4.00	$4.00	$3.50	$3.50	$3.50	$3.00	$3.00
BAU O&M	$10.30	$10.70	$11.10	$11.50	$11.80	$12.10	$12.30	$12.50	$12.90	$13.20

Operational and maintenance costs changes are dependant on two factors. Growth increases business as usual (BAU) costs through additional pumping. Additional pumping and maintenance requirements exist due to earthquake damage to the wastewater collection network. As renewals to damaged assets are carried out the earthquake related O&M is expected to decrease. The costs shown in Figure 13-4 assume the renewals funding is supplied and renewals carried out.

Figure 13-5 Capital Expenditure

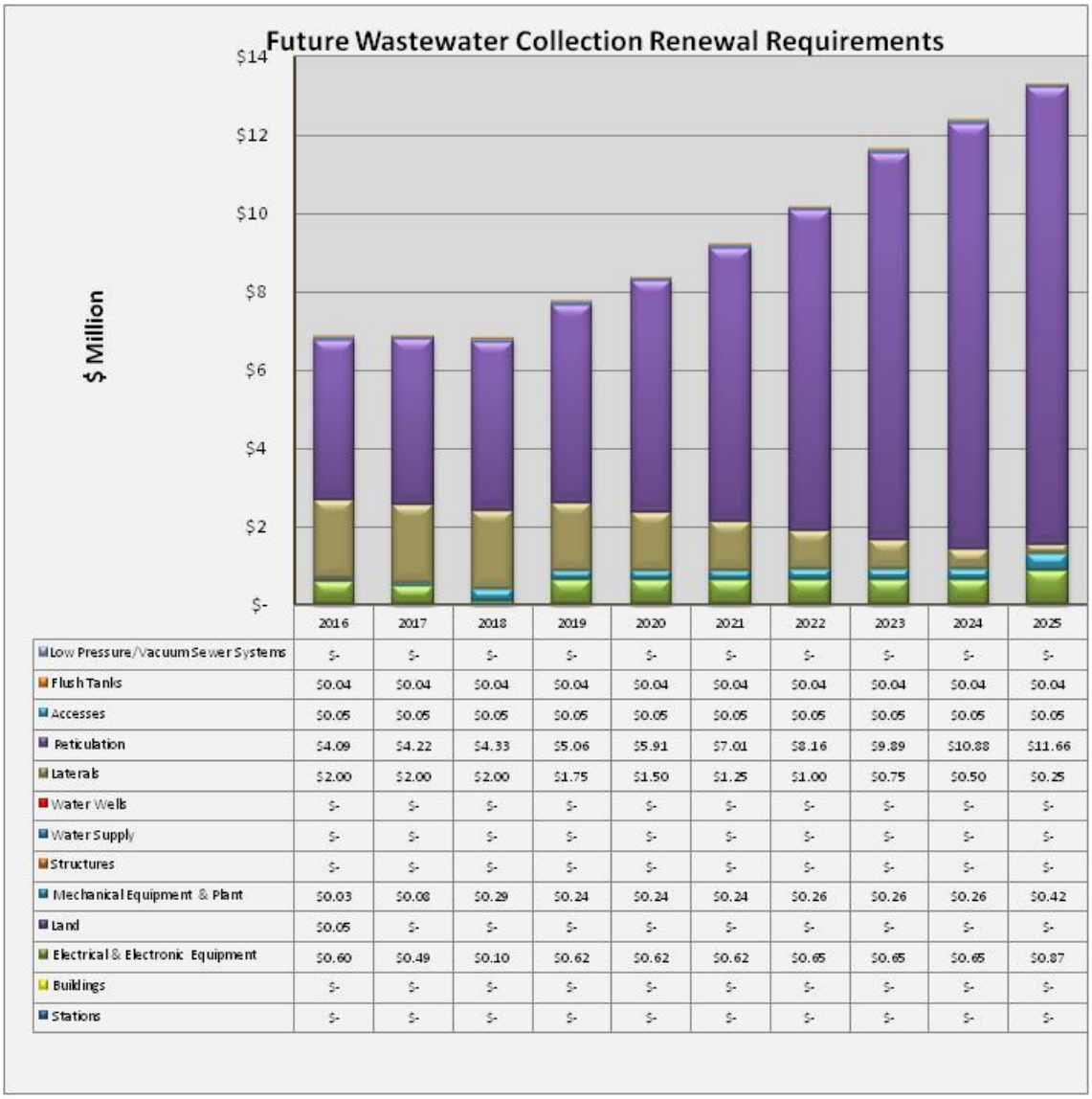
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Backlog Projects	$7.86	$7.13	$14.13	$21.96	$17.53	$9.63	$0.22	$0.13	$0.15	$0.13
Growth Based Projects	$7.56	$7.87	$5.03	$5.26	$3.81	$3.06	$3.07	$3.07	$2.77	$2.75
Improved Level of Service	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
New Services	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-

Capital Expenditure over the LTP period is focussed on projects to:

- Meet backlog demands by reducing wastewater overflows; and
- Supply new infrastructure to meet growth demands.

Overflow reduction is focussed on the 2016-21 period and has a significant increase on capital expenditure. Growth requirements are focussed in the 2016-19 period due to the LURP making multiple locations available for subdivision. After 2019 growth projects are expected to return to current stable levels.

Figure 13-6 Renewals Expenditure



	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Low Pressure/Vacuum Sewer Systems	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Flush Tanks	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04
Accesses	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05
Reticulation	$4.09	$4.22	$4.33	$5.06	$5.91	$7.01	$8.16	$9.89	$10.88	$11.66
Laterals	$2.00	$2.00	$2.00	$1.75	$1.50	$1.25	$1.00	$0.75	$0.50	$0.25
Water Wells	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Water Supply	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Structures	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Mechanical Equipment & Plant	$0.03	$0.08	$0.29	$0.24	$0.24	$0.24	$0.26	$0.26	$0.26	$0.42
Land	$0.05	$-	$-	$-	$-	$-	$-	$-	$-	$-
Electrical & Electronic Equipment	$0.60	$0.49	$0.10	$0.62	$0.62	$0.62	$0.65	$0.65	$0.65	$0.87
Buildings	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-
Stations	$-	$-	$-	$-	$-	$-	$-	$-	$-	$-

Wastewater collection renewals requirements are predominantly driven by reticulation renewals as discussed in Section 11.2 and the Infrastructure Strategy. Pipes from historical growth periods are now approaching the end of their lives. Different materials with different lives were used in different growth periods causing pipes from two or more growth periods to require renewals at the same time. Beginning 2019 a large renewals peak is shown by modelling. This peak will reach $33 million per year and last for 45-50 years.