


## 10. WET WEATHER SEWER OVERFLOWS



<b>General Manager responsible:</b>	General Manager City Environment, DDI 941 8656
<b>Officer responsible:</b>	Unit Manager City Water and Waste
<b>Author:</b>	Mike Bourke, Operations Manager

### PURPOSE OF REPORT

#### **Wet Weather Sewer Overflows**

1. The purpose of this report is to respond to Councillor requests for information about the occurrence of sewage overflows into the rivers in wet weather in 2006.

### EXECUTIVE SUMMARY

2. At the Council meeting on 17 August 2006 the Council requested a report on the frequency of overflows into the Avon and Heathcote rivers in 2006.
3. A review of rainfall events in 2006 has confirmed six overflow events (most with multiple overflow points) compared with two events in 2005 and three events in 2004.
4. The Council has nearly completed works on the Heathcote wastewater catchments aimed at reducing overflows from wet weather events with an average return interval (ARI) of two years. Completion of work on the Heathcote would have seen only two overflow events instead of the six reported in 2006. Work to reduce overflows to the Avon are due for completion by December 2010. These works are aimed at containing overflows to the Avon and Heathcote with an ARI of two years.

### FINANCIAL AND LEGAL CONSIDERATIONS

5. There are no financial or legal considerations associated with this report.

### STAFF RECOMMENDATIONS

It is recommended that the Council receive this information.

## BACKGROUND

6. Sewer systems all over the world are constructed to take a maximum flow. If that maximum is exceeded the system will overflow. Combined sewer overflows (CSO's) are a feature of large sewer networks in every city worldwide. In Christchurch the sewer system design has over 100 overflow points that allow the system to overflow in the event of a major disaster, blockage or flow in excess of the pipe capacity. It is important that if overflows occur they do so in a manner that first and foremost protects public health. It is preferable to overflow to a river or drain than on to public roads or on to private property. In the lead up to the planning for the major sewer upgrade the frequency of wet weather overflows was on average six per year with an average return interval (ARI) of two months. The major sewer upgrade is designed to reduce the frequency and volume of wet weather sewer overflows as well as providing for growth of the city. The Council has a resource consent for overflows at a total of 12 locations on the Heathcote and Avon rivers. The overflows occur on the Heathcote River in large storm events and less often and only in severe storms on the Avon River.
7. Sewer overflows are caused by excessive stormwater and ground water getting into the piped sewer network and in the Christchurch situation these events are exacerbated by flooding of low lying areas, particularly near the rivers, where inundated properties and roads very quickly fill the sewers and cause overflows.

### Resource Consents For Sewer Overflows

8. A resource consent for sewer overflows is required under the RMA as these discharges are deemed "foreseen" events. We know that in significant storm events overflows will occur at one or more of the consented locations. A resource consent was obtained in 2002 that requires the Council to achieve an ARI of two years. The consent target was programmed to be met by 2005 in the Heathcote River and by 2010 in the Avon River. For any overflow events there are response protocols in place that require the Council to notify the statutory bodies, river user groups and erect signs advising of a pollution event (Ministry of Health protocols) until testing shows that the rivers have returned to normal.
9. As part of the consent (as well as providing for City growth) the major sewer upgrade program of works aims to achieve a greatly reduced overflow frequency and volume, with a target ARI of two years. A two year ARI standard was agreed in the consent process as this provides a balance between cost and the need to maintain environmental standards. The consented ARI standard is better than many other cities and is in line with best practice in NZ. Many cities are working towards achieving a lesser standard over a longer period of time (eg North Shore aim to achieve a six month standard, requiring \$400m of expenditure over 20 years).
10. It is worth noting that simply building bigger pipes and systems to cope with every event is not the answer. Increasing the ARI capacity exponentially increases the cost. It can also lead to increased sedimentation (with subsequent odour and potential concrete corrosion problems) during normal dry weather conditions.

### Overflows In Christchurch Last Three Years;

	Events per year	Storm Date	No of Overflow locations	Total Rainfall (Bowenvale site) mm	Storm Duration (hours)	Storm Return Period (years)
2004	3	6 Aug	3	88.8	46	5
		27 Aug	1	60.6	65	2
		18 Dec	1	51.4	41	2
2005	2	19 Sept	2	70.6	33	5
		8 Oct	2	26.6	6	2
2006	6 (so far)	12 May	6+	87.4	18	10
		12 June	6+	55.4	12	2
		23 June	3	33.6	22	2
		21 July	1	18.6	11	2
		7 Aug	3	109	50	10
		21 Aug	5	34	6	2

11. In addition to the events detailed in the table above there have been three storm events over ten hours duration in 2006 that have not caused an overflow.
12. Occurrence of overflows is dependent on both the storm event and on the preceding conditions (ie the amount of preceding rainfall and groundwater conditions just prior to the storm). All of the activated overflow events in 2006 have been preceded by significant rainfall events in the days and weeks prior. This indicates the effect of ground water entering into the sewer system. High groundwater levels are further demonstrated by the fact that it can take weeks for storm flows (as measured at the treatment plant) to return to normal levels after a large event. Year to date rainfall in Christchurch is 17 % above average. Had the new No 11 Pumping Station been operational this winter it is predicted that only two of the above storm events would have resulted in overflows (12 May and 7 August which were both events of around a ten year ARI).
13. It has been suggested that overflow points could be fitted with filters to catch any solids that may discharge with the overflow. This option is somewhat impractical as any filter fine enough to trap solids would very quickly block. It should also be noted that the discharged material is very diluted by the extra water and is discharging into a waterway in flood. It is very difficult to observe any significant gross pollution in a river in this condition. It should also be noted that rivers in a flood condition are contaminated by first flush surface water runoff and heavy silt loadings. Protocols require that once an overflow ceases contractors clean up any obvious signs of the overflow. The preliminary results of a recent benthic study on impacts of these overflows on flora and fauna show no observable effects due to the intermittent overflow events.

#### **Current State Of Major Sewer Upgrade Project**

14. The Sewer Overflow Consent listed a total of ten capital projects six of which directly impact on overflow reduction to the Heathcote River. Three of these six projects have been completed with the major item, Pump Station 11 renewal, nearing completion. Further modelling work has shown that the other two minor capital works are no longer necessary to achieve the two year ARI. Environment Canterbury are in agreement that the two deferred projects are not necessary at this stage. These projects have been reprogrammed in the 2006/16 LTCCP to occur between 2011-2013. Further modelling work will review the requirements for the capital projects associated with sewer overflow reduction in the Avon River catchment.
15. The consent deadline for completing the Heathcote works was extended by ECAN from December 2005 to September 2006 due to construction delays on Pump Station 11. This delay will be registered by ECAN as a minor non-conformance with no enforcement action.
16. To support the capital expenditure in the MSU project Christchurch City Council also have a rolling reticulation renewal programme. This programme is prioritised according to asset condition and effects on inflow and infiltration. Christchurch City Council currently video approximately 35km of sewers per annum in support of the renewal programme.

#### **OPTIONS**

17. That the Council receive this report.