

Central Hawke's Bay District Council – Report

TO: Council
FROM: Chief Executive
DATE: 29 October 2009
FILE REF: SER3-100
SUBJECT: **STORMWATER PROGRAMME AND INFILTRATION STUDY**

1.0 SUMMARY

One of the Chief Executive's Objectives set by Council is

2. STORMWATER

- Firm up programme times
- Infiltration report on the study required by end of October 2009
- Report on renewal projects by end of October 2009

This report meets this Objective.

2.0 RECOMMENDATION

THAT

The report on stormwater programme and infiltration study be received.

3.0 FIRM UP PROGRAMME TIMES

All of the renewal money for stormwater renewal in 2009-10 has been spent on the Guy St/ Bennett St stormwater system renewal.

4.0 INFILTRATION REPORT

The Infiltration report is appended to this report. Additionally a presentation will be made to Council.

5.0 REPORT ON RENEWAL PROJECTS

All of the renewal money for stormwater renewal in 2009-10 has been spent on the Guy St/ Bennett St stormwater system renewal. Other projects that could be carried out if funding was available as listed in the monthly "Capital Works 2009/10", are (in priority order):

- Mt Herbert Road corrugated pipe replacement
- Eastern Interceptor erosion protection
- Mt Herbert Road drain erosion
- Upgrades for newly adopted Council drains

5.0 OPTIONS

The report on stormwater programme and infiltration study be received.

6.0 STRATEGIC LINKS

LTCCP 2009-2019

Steve Thrush
Technical Services Manager

INFILTRATION REPORT

29 October 2009

BACKGROUND

Sewerage networks and sewage treatment processes are designed allowing for extra flows recognising that some stormwater will find its way into the sewerage network. However excess volumes of stormwater entering the sewerage network cause two main problems – pipe sizes need to be increased to allow for the excessive flow or conversely overflows of sewage from the reticulation will occur, and the treatment processes may need to be designed to handle the peak flows with consequential extra capital and operating costs.

Two means of ingress of stormwater are recognised:

1. Inflow, which is stormwater gaining access to the reticulation through openings in the sewers. Examples are stormwater downpipes discharging into gully traps, gully traps being inundated by surface flooding, deliberate stormwater connections into the sewer. This is usually identified by increased inflow to the oxidation ponds corresponding with rainfall events.
2. Infiltration, which is groundwater leaking into the sewers. This is most often due to pipes and manholes having cracks, or poor or deteriorated joints where the groundwater can enter the sewers. This is usually identified by continuing inflow to the oxidation ponds well after rain events have finished.

INVESTIGATION OPTIONS

A number of processes are available to find the inflow and infiltration problems. These include the following:

- **Surface inspections of properties.**
A systematic inspection of each property connected to the sewerage network is carried out. The inspection is looking for downpipes discharging into gully traps, gully traps with low or no surround allowing surface flows into the gully trap, gully traps sited at low points so that they become the stormwater drain, and gully traps likely to be inundated with flood waters in times of high rainfall.
- **Integrity testing**
Sewers can be tested to find any leaks and illegal connections. Most commonly used is smoke testing where smoke is pumped into the sewers and comes out of the ground where the sewer is leaking, or comes out of downpipes where these are connected directly to the sewer. Sewers can also be tested with inflatable “sausages” which seal off lengths of the sewer and apply a pressure test. Loss of pressure indicates leaks or connections.
- **Dye testing**
Dye can be introduced to suspect connections to see whether they discharge into a stormwater or sewerage system.

- **Private sewers**
Private sewers typically make up at least half of the length of sewers in a sewerage network. Pressure testing of private sewers is difficult because of the small pipe sizes involved and the extent of the private sewers. However they are often a major source of inflow and infiltration.
- **Network inspection**
Inspection of manholes will reveal leaking manholes, which are then sealed or renewed. Inspection also allows an assessment of the amount of clear water flowing in the sewers, indicating where stormwater may be entering the sewer network. The flows can be followed up the sewers to pinpoint the source, which can then be addressed.
- **CCTV inspection**
Inspection can also be done with video cameras (known as CCTV). The inside of sewers can be seen, and defects noted and rectified.
- **Flow monitoring**
To determine the extent and magnitude of inflow and infiltration problems, flow in the sewers can be measured with flow monitors installed in key manholes. From the flows and particularly their correlation with rainfall, efforts at reducing inflow and infiltration can be targeted at the worst branches of the network to get best results for the effort applied.

REMEDIATION OPTIONS

A number of processes are available to rectify what is found. These include the following:

- **Notice to rectify for faults in private systems.**
Where faults found in private properties from inspections, testing and investigation, notices are sent to all non-complying properties asking for faults to be rectified. A follow up inspection is then made to ensure faults have been rectified. If necessary prosecution can be instigated.
It has been found that some properties, after having had their rectification approved, revert back to the original configuration. This requires a continuing inspection programme to be followed.
In some cases a larger problem is identified, that is no suitable stormwater system exists to divert the stormwater flows away from the sewers.
- **Repair of faults in public system.**
Where faults are found in the public sewer reticulation, repairs or replacement are either carried out immediately, or included in the longer term plan for improvements to the system.
Leaking manholes are sealed or renewed, damaged sewers are either repaired or replaced.
- **Stormwater improvements**
In some cases the removal of stormwater connections to the sewers is impossible because no suitable stormwater system is available. In these cases

a new stormwater network may have to be constructed to provide an outlet other than the public sewer.

Also where there is large scale inundation of gully traps by surface water, the flooding of a large area may have to be addressed and a stormwater system installed to alleviate the flooding.

These works would be included in the longer term Council plans for improvements.

RESOURCE CONSENT REQUIREMENT

The resource consents for Waipawa and Waipukurau state:

Within 3 months of the date of commencement of this consent, the consent holder shall prepare and forward to the Council (HBRC) a 'Stormwater Infiltration Management Plan'.

The report shall be to the satisfaction of the Council's (Manager: Environmental Regulation) and shall, as a minimum, address the following:

- (a) The incidence of stormwater infiltration into the reticulated wastewater system and measures available to reduce such infiltration as far as practicable;*
- (b) A strategy for reducing stormwater infiltration into the reticulated wastewater system and an implementation plan for achieving the strategy to be reported as the Stormwater Infiltration Management Plan;*
- (c) Any proposed works or methods to address sources of stormwater infiltration into the reticulated wastewater system where those sources have been identified as part of the Stormwater Infiltration Management Plan.*

The wastewater resource consents for Otane, Waipawa, Waipukurau, Takapau, Porangahau and Te Paerahi all have a limit on the outflow from the treatment system. Extra stormwater in the sewerage reticulation can cause the flow limits to be exceeded.

There is a requirement in the wastewater resource consents for Porangahau and Te Paerahi to minimise inflow and infiltration.

REDUCTION STRATEGY

The Strategy that will be followed is:

Generally

Work through the various investigations and follow up with remedial options.

Inspection

1. Within each sewerage system inspect all properties connected to the reticulation for stormwater connections or ingress to the sewerage reticulation.
2. Serve notices to rectify faults wherever faults are found.

3. Follow up the notices until all rectification has been done.

Investigation

1. Open all manholes on the sewerage reticulation and check for unusual volumes of clean water.
2. Follow the clean water flow to find its source.
3. Carry out appropriate remedial action to eliminate the clean water flow into the reticulation.
4. Repair or replace manholes that are leaking.
5. Repair or replace any pipes that are found to be leaking.

Testing

1. CCTV inspect sewers that are suspect for leaking.
2. Carry out appropriate remedial action depending on the condition of the sewers inspected.

Analysis

1. Place flow recorders on strategic manholes to determine the influence of rainfall on flows in various branches of the reticulation.
2. Investigate the branches with the most rainfall related flows.
3. Remedy any faults found from the investigation.

Testing

3. Smoke test sewers where there is still significant inflow occurring.
4. Carry out appropriate remedial action depending on the results of the testing.

STORMWATER INFILTRATION MANAGEMENT PLAN

The Stormwater Infiltration Management Plan was completed in February 2007. The information above is extracted from that Plan. A copy of the Plan is available for councillors to read. The Plan was submitted to the Regional Council in November 2007, and they have approved the Plan. Staff have been working to this Plan since then.

WORK CARRIED OUT

Examples of the work carried out in infiltration reduction will be shown in presentation at the Meeting.

OVERVIEW OF INFILTRATION PROJECTS 2009-10

Work being carried out in 2009-10 is summarised below.

Report and presentation prepared by

Steve Thrush
Technical Services Manager

Brett Way
Utilities Manager

Karen Bothwell
Wastewater Manager

OVERVIEW OF INFILTRATION PROJECTS 2009/2010

Project	Methodology	Expected Outcomes
Identification		
Property Infiltration Survey	AES house to house inspections and smoke testing.	Identification and rectification of infiltration from private property. Identification of infiltration from public smoke faults.
Manhole Investigations during / after rain	Follow branches of sewer systems to identify whether there is infiltration during or after rain	Identification of sections of sewer systems where infiltration is present and assess the volume impact from it.
Flow Recording	Installing the Isco flow recording equipment in lines to assess flows in fine weather and in rain events	Identification of volume impact of infiltration
CCTV	Camera lines where blockages have occurred Camera lines where infiltration is suspected	Priority list for renewals. Identify lines where scheduled annual maintenance is required. Minor repairs as required. Assessment for rectification
Pump Station Run Hours	Benchmarking usual run hours then overlaying rain	Identification of severity of rain impact on different catchments within network
Rectification		
Rectification of public smoke faults from AES survey		Faults rectified through minor repairs Faults rectified through renewal
Renewal of sewer mains	Identify from CCTV the condition/ performance and therefore priority of sewer renewal/relining projects	A priority list for sewer renewals
Manhole Sealing	Engaging PCP or Infracon to seal manholes.	
Possible Future Actions		
CCTV	Set up a vehicle with CCTV equipment to camera Purchase a camera capable of TVing house systems	All mains progressively CCTVed and rated. Identification of sources of infiltration within properties.
Council Decision	Discussion and decision required about renewal of sewer lines on private property	