

**BEFORE COMMISSIONERS APPOINTED BY THE NELSON CITY COUNCIL**

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IN THE MATTER OF                      Applications for resource consent under the  
Resource Management Act 1991

AND IN THE MATTER OF              The aberrational discharge of sewerage from  
Nelson Sewerage Business Unit (NSRBU) pump  
stations and reticulation network

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**STATEMENT OF EVIDENCE OF JEFFERY WILLIAM CUTHBERTSON**

Dated 27 November 2017

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## **1. INTRODUCTION**

- 1.1 My name is Jeffery William Cuthbertson. I am employed as the Senior Engineer -Utilities for the Tasman District Council, a position I have held since 2015. My previous positions have included the Utilities Asset Manager for the Tasman District Council from 2004 to 2015, Assets Manager at the Waitaki District Council, Drainage/Reticulation Engineer for the Dunedin City Council.
- 1.2 I have a New Zealand Certificate in Engineering (NZCE); I am a Registered Engineering Associate; and a Chartered Member (Engineering Technician) of Engineering New Zealand.
- 1.3 I have read the Code of Conduct for expert witnesses issued as part of the Environment Court Practice Note. I agree to comply with the Code of Conduct. I am satisfied that the matters addressed in this statement of evidence are within my expertise. I am not aware of any material facts that have either been omitted or might alter or detract from the opinions expressed in this statement of evidence.

## **2. TASMAN WASTEWATER FLOWS**

- 2.1 Tasman District Council (the Council) discharges wastewater flows from the communities of Richmond, Brightwater, Wakefield and Mapua to the NRSBU reticulation system.
- 2.2 Wastewater generated in Richmond, Brightwater and Wakefield reticulates to the Beach Road Pump Station and is pumped to the Bell Island facility. Wastewater from Mapua is pumped directly to the Bell Island facility.
- 2.3 In accordance with the Tasman Resource Management Plan (TRMP), no pumping station, within the Tasman District, is permitted to have a discharge of wastewater to freshwater or coastal water. The activity has a prohibited status. This applies to the Beach Road pump station.
- 2.4 The Council's contract agreement with the NRSBU permits a maximum flow rate of wastewater of 387 l/s. Council has a valve located in the reticulation upstream of the pumping station that set to that maximum flow rate. The flow

rate of 387 l/s takes into account in the pump and pipeline capacity calculations.

- 2.5 Flows beyond this rate surcharge within the wastewater reticulation and then overflow into the environment from the Council reticulation. This wastewater overflow being a Tasman District Council overflow and not related to the NRSBU.
- 2.6 The flow rate from the Beach Road pumping station operated by the NRSBU has no impact on the overflows occurring from the Saxton Road pumping station located in Nelson City Council.
- 2.7 The Council has been aware of stormwater entering its wastewater reticulation networks for period several years and have measures in place to progressively reduce this impact.

### **3. HOW DO YOU IDENTIFY THE PROBLEM?**

- 3.1 The Council has bulk flow meters at most pump stations throughout the District. These flow measurements indicate areas where potential inflow and infiltration issues are occurring, in particular in response to rainfall events.
- 3.2 The inflow / infiltration can only come from two sources, direct inflow of surface water into the pipework and infiltration of ground water through failed infrastructure such as cracked pipes and joint failures.
- 3.3 In this regard, I agree with the descriptions and discussion provided in Mr Ruffell's evidence.

### **4. COUNCIL'S WASTEWATER RETICULATION:**

- 4.1 The Council has recently engaged a contractor to undertake the following work within the Richmond Wastewater Reticulation catchment:
  - (a) Measurement of flows from the catchments within the Richmond wastewater network;
  - (b) Prioritise the catchments to undertake detailed Inflow and Infiltration (I/I) investigations; and

- (c) Catchment analysis of that catchment utilising Distributed Temperature Sensing (DTS) technology.
- 4.2 Temperature anomalies that are identified at specific sites lead to further investigations for:
- (a) A connection point for another sewer;
  - (b) A connection point for a dwelling or illegal connection;
  - (c) A break in the wastewater reticulation; and/or
  - (d) A faulty manhole or inspection point.

### **Reticulation Flow Findings**

- 4.3 Catchments within the Richmond wastewater reticulation network with I/I issues have been identified. The aim is not to monitor a large storm event, but multiple smaller events, through flow monitoring and DTS testing.
- 4.4 The highest inflow/ infiltration catchments initially identified are Gilbert, Sutton and Templemore catchments. The recorded inflow monitoring for these catchments is provided as **Attachment 1** to my evidence.
- 4.5 Points to note from the inflow graphs are:
- (a) Inflow appears to be directly related to storm events as when the rainfall event commences flow rates increase.
  - (b) It appears that at some point inflow is replaced with infiltration flow. These flows carry on for a period of days following the main rain event.
- 4.6 Findings to date include:
- (a) Council has a number of issues relating to the ingress of surface stormwater into manholes from either poor joints, bad benching, pipework sealing and leaking manhole lids;
  - (b) Manhole lids located very close to the kerb and channel allow stormwater to enter through the lifting points;

- (c) The need to CCTV approximately 1400 metres of higher risk wastewater reticulation to locate potential connection points or faulty pipe work; and
- (d) A number of private laterals have been identified as potential I/I points.

### **What is Council doing about this inflow?**

4.7 Council has undertaken several measures to determine the extent and volume of the I/I from within the identified catchments. These measures include:

- (a) The installation of bulk flow meters at pump stations;
- (b) CCTV programme of Council's reticulation;
- (c) House inspections;
- (d) The installation of inspection points on private laterals;
- (e) Visual inspections of flows during rain events;
- (f) Inline reticulation flow metering;
- (g) Distributed Temperature Sensing (DTS) technology;
- (h) Installation of Low Pressure Sewer (LPS) pump systems;

4.8 From the DTS data, the Council can identify areas that potential I/I is occurring. In the case where properties have been identified via the DTS data, the Council is sending out letters to landowners indicating that the Council will be installing inspection points on the private lateral within the road reserve area.

4.9 The Council is sending out letters in accordance with section 171 of the Local Government Act 2002 and section 128 of the Health Act 1956, allowing staff to undertake inspections of the property. These inspections are limited to visual inspection only.

4.10 Monitoring lateral inspection points can then occur during wet weather.

- 4.11 Properties identified with stormwater entering the wastewater network will be required to remedy the fault. A letter in accordance with section 459 of the Local Government Act 1974 will be sent to the owner requiring remedial work, stating a time frame for this work to be completed in. If the owner fails to undertake the remedial work Council has the right to undertake the work and recover all costs from the owner.
- 4.12 Where faults are identified with the Council's reticulation this will be CCTV'd to identify if work is required to mitigate the Inflow and Infiltration issues. Specific manholes are being inspected during wet weather to check on inflows.
- 4.13 Minor maintenance works are scheduled immediately. If major work is required, this will be funded from the upgrade and renewals budget in Council's next Long Term Plan (2018-2028).

#### **How do we stop the problem in the future?**

- 4.14 The Council is accepting additional wastewater reticulation from new developments which has been significant due to regional growth. Checks of this new reticulation now includes checks on potential inflows. Previously air tests alone have been the standard test of water tightness. Staff are also checking all new public reticulation during wet periods to identify water ingress. Any ingress has to be remediated before new wastewater reticulation is accepted by the Council.
- 4.15 The Council changed the Engineering Standards in 2005 to require that an inspection point is installed on all new wastewater laterals at the property boundary. The location of the inspection point identifies the limit of the private lateral.
- 4.16 The Council has also identified areas where Low Pressure Sewer (LPS) pumping systems will be required to be constructed, generally in areas with high ground water and/or very flat land. Each lot has an individual pump station that connects to a pressure sewer network. Excessive pumping will quickly identify I/I issues which will be dealt with by the owners. Also during wet weather the pressure sewer network bulk meters will identify higher flows. An advantage of the LPS system is that at times of high rainfall the LPS

system can be shut down reducing flows in the downstream network as each pump station has 24-hour storage.

### **Example of work completed to date**

- 4.17 In Upper Takaka, the Council has been exceeding its Discharge Resource Consent as stormwater and groundwater has been entering the wastewater network. Wastewater overflows at the pump station occurred almost every rain event. Investigations showed that there were numerous faults with the Council's reticulation. Repairs were made in 2009 and inspection points installed on each private lateral. This work reduced the inflow by approximately 50%. Recent inspections have confirmed a number of private laterals and two manholes need further attention.

## **5. PRIVATE DRAINAGE LATERALS**

- 5.1 The private laterals connecting to the Council's wastewater reticulation must comply with the Building Act. At completion of the building a Code Compliance Certificate (CCC) is issued. This is the assurance that building work is complete and has been undertaken and inspected in accordance with the Building Act.
- 5.2 We have found that once building work commences, stormwater enters the wastewater reticulation even though Council has checked the new wastewater reticulation network is dry prior to taking over the new asset from the developer.
- 5.3 The only thing that has changes is the introduction of new dwellings. So how is this stormwater inflow occurring? From my experience and observations, the I/I from newly constructed dwellings is occurring as a result of:
- (a) Poor plumbing / drain laying practice;
  - (b) Poor joining of pipework;
  - (c) Gulley traps being installed incorrectly;
  - (d) Gulley traps not sealed around pipework; and
  - (e) Insufficient inspections and self-certification.

- 5.4 Visual observations have indicated that drain layers are not always sealing the gully traps, especially when the plumbing from the new dwelling comes under the floor slabs. This poor workmanship allows water entry into the wastewater reticulation.
- 5.5 The next issue on the building site is the private works, undertaken after the Building Consent process. This work includes:
- (a) landscaping – lifting the lawn or garden up to the lip of the gully trap or higher;
  - (b) Construction of retaining walls – subsoil drains behind the retaining wall discharge are often illegally discharged into the wastewater network;
  - (c) Concrete footpaths, patios and driveways – lifting the concrete path flush with the top of the gully trap so that runoff water pools and flows down the gully trap; and
  - (d) Paving around swimming pools allowing stormwater to flow into gully traps.
- 5.6 All of this work is undertaken outside of the Building Consent process and outside of the Council's control. The stormwater tends to be directed to the nearest pipe, regardless if that pipe is stormwater or wastewater.

### **Example of Inflow in New Development.**

- 5.7 In Mapua there is a new development of 80 lots. Inspections of the wastewater reticulation included air testing and visual inspections during wet weather prior to any new dwellings being constructed.
- 5.8 All the wastewater from this development collects at a pumping station and these flows are measured.
- 5.9 After approximately 20 new houses had been constructed, it was observed that during rain events wastewater pumping increased. During dry periods the pumped flow of wastewater from the development was approximately 6 to 7 cubic metres per day. During subsequent rain events, this flow increased to 50 cubic metres, and peaked on one day at 90 cubic metres. These high flow

events caused the downstream receiving reticulation to surcharge resulting in the Mapua School having to be closed on three occasions.

- 5.10 Properties that have been identified as having stormwater inflow to the private lateral have been written to requiring the drainage issue be repaired.
- 5.11 If property owners chose not to undertake the work required to eliminate the stormwater the Council will send to the property owner a “Notice to Carry Out Remedial Drainage Work” referencing section 459 of the Local Government Act. If owners do not respond in a timely manner, Council under the Local Government Act can go to the property and have the ingress of stormwater repaired and recover all cost from the owner.

## **6. SUMMARY**

- 6.1 The Council is taking Inflow and Infiltration (I/I) of stormwater into its wastewater reticulation seriously.
- 6.2 It is the Council’s intention to reduce I/I to:
  - (a) Reduce capital expenditure on upgrading pump stations and storage;
  - (b) Reduce capital expenditure for extra emergency storage capacity;
  - (c) Reduce capital expenditure on upgrading reticulation capacity;
  - (d) Provide extra capacity within the pumping network to the NRSBU;
  - (e) Reduce treatment and conveyance costs at NRSBU;
  - (f) Provide for growth; and
  - (g) Reduce overflows.
- 6.3 The Council has used new technologies to trace and identify potential inflow and infiltration sources from both private laterals and the Council reticulation.
- 6.4 The Council has commenced investigations and installed inspection points at the boundary of private laterals to identify properties with stormwater issues.

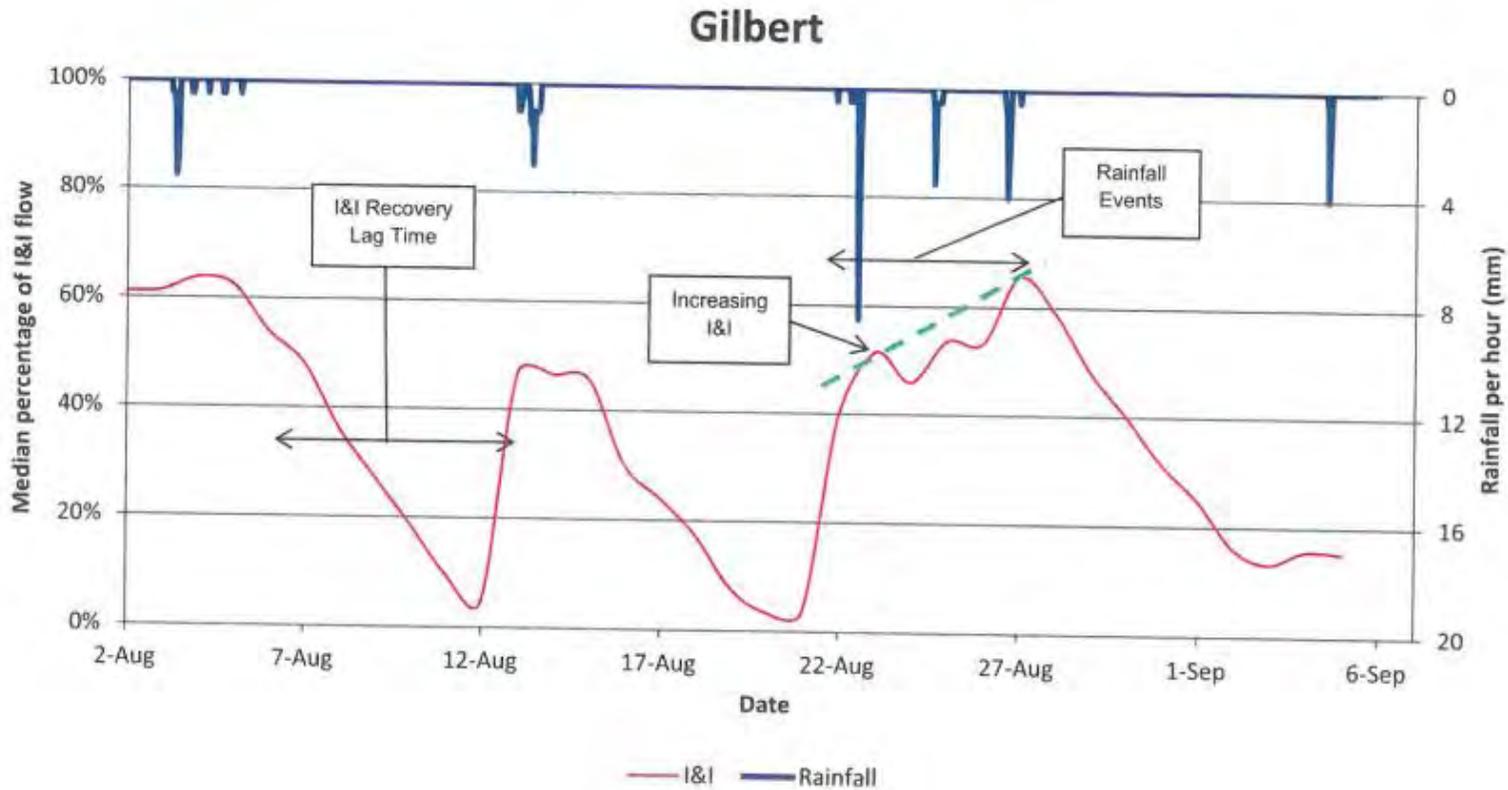
- 6.5 The installation of Low Pressure Sewer pumping systems reduce inflow and infiltration and allow for storage of effluent during rain events.
- 6.6 Staff work closely with the building inspectors and drain layers to attempt to ensure that work is undertaken in accordance with the Building Act to minimise the potential for I/I at Code Compliance Certificate time.
- 6.7 How we deal with the private works undertaken by the land owner after Code Compliance Certificate can only be resolved by education and/or enforcement and ongoing monitoring of the inspection point on the private laterals and within the Council's reticulation.
- 6.8 I/I resolution needs to be a long-term ongoing regular part of the operations required to maintain a sustainable wastewater reticulation network.



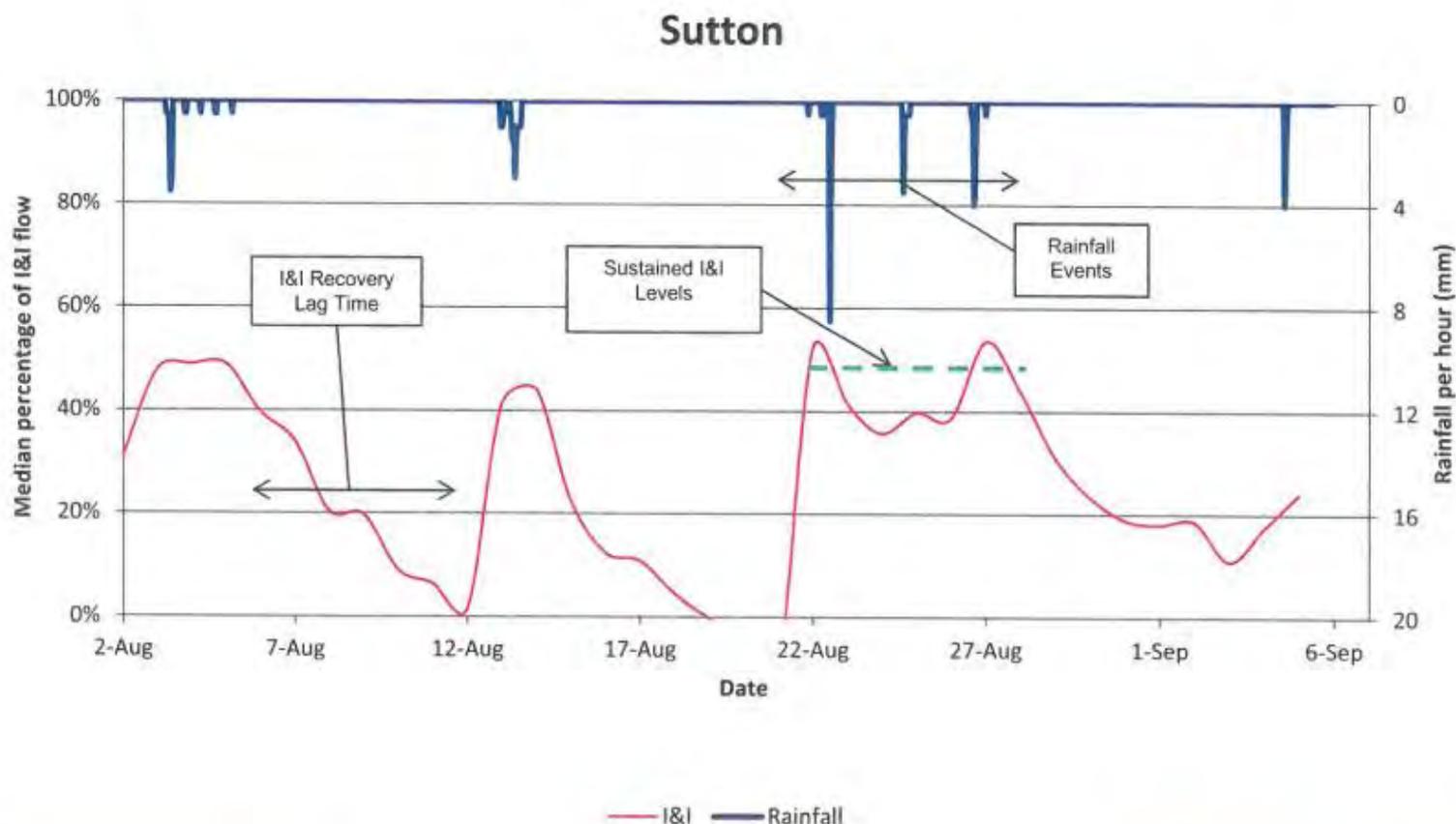
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Jeffery William Cuthbertson

# Sub-catchment Gilbert Flow Monitoring



# Sub-catchment Sutton Flow Monitoring



# Sub-catchment Templemore Flow Monitoring

