MEMORANDUM

TO: Moutere Ward Councillors

FROM: Richard Kirby and Mike Schruer

DATE: 18/12/2023

RE: Wastewater overflows and the connection to Inflow and Infiltration in Māpua

Wastewater overflows and the connection to Inflow and Infiltration in Māpua

History

1. Māpua was initially reticulated for wastewater around the wharf area in 1988 and the network has vastly expanded since. The reticulation network generally drains south and east via gravity, interspersed with pumping stations, delivering all wastewater to Māpua Wharf pump station. From the wharf, a rising main crosses the Māpua Channel to Rabbit Island and then to Bell Island Wastewater Treatment Plant (WWTP). The Council's responsibility for this rising main ends at the connection to the Nelson Regional Sewerage Business Unit inlet works on Bell Island.
2. There are 12 pump stations in the Māpua/Ruby Bay network. The six small pump stations have pumps that operate in duty/assist mode. The other larger pump stations operate in duty/standby mode. The Māpua Wharf pump station was upgraded in 2012 and includes a dedicated backup generator, emergency storage tanks and an odour treatment system.
3. Operation of the pump stations are monitored in real time by the Council's telemetry system, which can be viewed and interrogated by Council staff and the maintenance contractor. This contractor is responsible for monitoring and responding to alarms and ensuring the pump stations operate. The gravity trunk main running up Aranui Road and Stafford Drive was replaced with a pressure main in 2020/2021. Rather than the main pump stations being in a daisy chain, they now inject into the new pressure main. As part of the upgrade some pump stations had emergency storage upgrades. The gravity main is still in use but now has wet weather capacity for the local network.
4. There are two pressure mains under the Māpua Channel. The 250mm diameter PE pipeline is the duty main, the 150mm PE main is an emergency back-up pipeline.
5. The Council has made new developments in low-lying and/or high groundwater areas, install low pressure pump systems with 24 hours of storage. This assists with reducing inflow and infiltration and managing the network when overloaded during long or heavy rainfall.

Stormwater impacts and effects on dwellings with floor levels below inundation levels.

6. Low ground levels, where stormwater inundation becomes an issue in high rainfall or tidal surge events, can also become an issue for dwellings and wastewater infrastructure. Where inundation floods the wastewater network, usually through gully traps and manholes, wastewater overflows can occur, contaminating stormwater and potentially flooding low lying dwellings.

7. This is a significant health risk for occupant/s, and there will be impacts for Council in terms of the Building Act, with the dwelling being rendered uninhabitable.

A summary of overflows since 01 July 2017 for the Māpua/Ruby Bay wastewater network are included in **Table 1**. More detail is provided in Table 2.

Table 1: Overflow Records for Māpua/Ruby Bay (July 2017-November 2023)

Summary of overflows		**The issue**
2023/24	3	
2022/23	9	Six were attributed rain, five of those in one rain event
2021/22	1	
2020/21	0	
2019/20	1	
2018/19	0	
2017/18	2	

Table 2: Details of each recorded overflow since July 2017. **Note:** Highlighted cells - indicate rain event (PS = Pump station)

Location	Date Year/month/day	Wet Weather	Dry Weather		Volume (m^3)	Duration (hrs)	Notification	Cause	Rain Event size
			Plant failure	Blockage					
94 Brabant Dr	2023.12.08			**1**	**2**	**2.5**		**Tree roots**	
14 Brabant Dr	2023.09.15			**1**				**Tree roots**	
Mapua Wharf PS	2023.05.06	**1**			**128**	**0.9**	**1**	**Rain**	**1 in 2 - year event** (consistent rainfall over the day)
41 Korepo Rd	2022.12.06			**1**	**0.01**	**0.5**		**Roots**	
Mapua Leisure Park	2022.11.11		**1**				**1**	**Main break**	
22 Brabant Dr	2022.08.23			**1**	**5**	**3**		**Fat and roots**	
Mapua Wharf PS	2022.08.18-19	**1**			**975**	**22.1**	**1**	**Rain**	**1 in 16 - year event,** (3 - 5-day duration)

Mapua Rise PS	2022.08.19-20	**1**			**17.4**		**Rain and swimming pools**	**As above**
102 Aranui Rd PS	2022.08.20	**1**			**7.7**		**Rain**	**As above**
Ruby Bay PS	2022.08.19-20	**1**			**16.5**		**Rain and swimming pools**	**As above**
Outside 37 Iwa St	2022.08.17	**1**		**12**	**unknown**		**Rain**	**As above**
Mapua Rise WWPS	2022.07.12	**1**		**10**	**1**	**1**	**Rain and swimming pools**	**1 in ?? - year event** (49.5mm over the day)
40 Pomona Rd	2021.09.19		**1**		**1**	**minimal**	**Tree roots**	
Mapua Rise WWPS	2019.07.19	**1**		**10**	**0.5**	**1**	**Inflow and infiltration from illegal connections**	
Outside Mapua School	2018.02.11	**1**		**0.1-0.2**	**7**	**1**	**Rain**	**1 in 10 - year event**
Mapua School	2017.07.02	**1**		**3**	**0.5**	**1**	**Rain, inflow into school plumbing**	

Overflows at the Māpua/Ruby Bay Pump station since July 2022 are attributed to the following:

8. The high flows during rain in the Māpua Rise subdivision were resolved prior to 2022. The cause was inflow (stormwater intrusion) from hardstand areas (such as concrete paving/driveways) entering through poorly constructed gully traps and direct connections of subsoil drains and other entry points to the WW network.

9. New housing developments in the area put additional pressure on the network through poor quality plumbing/ drainage which allowed surface and ground water to enter the wastewater network. This has led to the Council paying closer attention to plumbing work during building compliance inspections and educating local plumbers and drain layers on acceptable plumbing solutions.

10. Since those issues were resolved, a further four inground swimming pools have connected to the Māpua Rise wastewater network and this has caused wet weather flows to increase again and contributed to subsequent overflows.

11. There are known Inflow and infiltration (I&I) from rainfall and/or groundwater entering the network around Pinehill, Van Beek and Pomona Road areas that contribute to WW network over loading. Swimming pools connected to the wastewater network in this area also contribute to overflows at Ruby Bay pump station.

Emerging issue

12. Swimming pools act like a roof or other impermeable surface and accumulate rainfall, which is often drained through the wastewater connection. The connection from swimming pool to wastewater (WW) network is designed to manage the limited volume of backwash water and its chemical load only. However, most pool installers connect the pool overflow too. The rainfall captured by swimming pools can become a large volume of rainwater entering the WW network and overwhelming its capacity.

13. The increasing number of private swimming pools being installed and connected to the WW network will contribute to increase the volume of rainwater entering the WW network.

14. In high rainfall events, as experienced on the 12 July 2022 (Māpua Rise pump station catchment), the rainwater captured by 4 pools and discharged into the ww pipe network would have contributed a volume equivalent to the average daily discharge from an additional 11 dwellings.

15. Emptying a single swimming pool to the wastewater network has overwhelmed the Ruby Bay pump station on several occasions.

Comments

16. Council staff do need to make strategic decisions in rainfall events that exceed the network design capacity, about where to let the system overflow i.e., choose to discharge to the Māpua Channel rather than to land within urban/residential streets where the wastewater can mix with stormwater and where dwelling floor levels are low, this contaminated stormwater can enter dwellings.

16. The environmental health of the coastal marine area will be compromised at the time of the overflows/over pumping to the Māpua channel. The Māpua channel tidal volume will clear and dilute the contaminated water faster than leaving it pooling on residential land/ streets.

Estimated cost for an upgrade to Māpua WW network to be paid from a targeted rate.

6(a) Estimated cost for investigation and assessment needed to identify sources of I/I to be resolved.			
Nos of properties (wastewater connections) in Māpua	**Time to survey each property**	**Total Manhours**	**Total cost estimate**
958	**15 minutes/property**	**240 hours**	**$72,000**
Follow up reporting, notification and checking of reparations still needed following this.			
6(b) Increased and more comprehensive monitoring of flows in manholes to identify priority catchment areas of inflow and infiltration.			
x11 Māpua catchments Two ways of monitoring flow in manholes	**Option 1** Install monitoring equipment in key manholes	**Option 2** Lift manhole lids at key manholes during dry weather then again in wet weather to determine increase in flows. In wet weather, tracking up the catchment to narrow down the priority area. Resource intensive. Each key manhole would need 2 or 3 visits (one dry weather, at least one wet weather), each visit being 30minutes when taking into account measuring/ recording/TMP requirements etc.	
Costs	**$100,000**	**$90,000**	
6(c) Increase scope of current I/I programme to include more intensive and comprehensive research and assessment.			
DTS – Distributed Temperature Sensing	This involves installing fibre optic into the sewer which detects sources of I/I. Quite often followed up with CCTV.	DTS survey of Motueka cost **$275,000**	Would expect Mapua to be in the region of **$200,000**
CCTV – used to follow up on other investigation methods to pinpoint nature of damage to network unknown at this time.	Costs to repair defects unknown at this time		
6d the option of retrofitting a pressure sewer system into Mapua		**Cost =** the best guesstimate here is around $15K /property, 958 properties = **$14.4m** (does not include upgrading of mains to pressure mains)	
