Workshop Minutes

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Background

All communities face the delimma of how to manage aging infrastructure. In many cases the need for change is also driven by advancement in technology. Wairoa's wastewater system is no different, with many components using old technologies and in a state where upgrades are needed. Changes and upgrades have occurred historically, but there has been and is a forward plan to speed up the rate of change and improvement. To assist with this process, and reflect on the changes already made, a workshop was held to identify changes, being past, current and proposed.

Focus of Workshop

The focus of this workshop was to describe where we have come from, and where we can go with future development of Wairoa's wastewater system. The key wastewater system components to describe and, where possible, quantify were:

- reticulation and pump station changes (deterioration, repairs, upgrades, and network expansion);
- changes in daily flow volumes and overflow events from pump stations and manholes including how these relate to changes in reticulation condition, pumping capacity or design, network expansion, and population;
- WWTP design and operation changes; and
- river discharge structure design and operation changes.

Each component needed its design and operation to be described for:

- its historic condition (over the last 20 years, with a particular focus on the last 5 years);
- recently implemented or currently planned modifications (from LTP and Asset Management Plan); and
- future options and opportunities for additional improvements.

It was important to identify chain reactions or consequences from current or changed design, condition, and operation of each component of the system.

This information is needed and seen as being important for telling the story as part of the consent applications, to identify and quantify discharge and consenting parameters, and to help assess the changes in effects over time. It is also needed so that LTP funding and timing can be determined and then seek informed public feedback.

It was noted that WDC need to take credit for the recent improvements and their plans for future improvements, many of which were already planned before commencing the Stakeholder Group and public consultation processes. Recent works to reduce I & I and improve pumping reliability have already been shown to have prevented overflows and blockages and are expected to assist treatment performance.

The identified current and future activities require commitment by council to implement changes. This commitment has been started with current changes and many of the future activities programmed to occur within the next 2 years. The current council Long Term Plan sets out a schedule of investment to continue the momentum of making changes.

An overall aim for the reticulation, treatment, and discharge systems is to create resilience, design for future proofing, and prepare for future climate change effects.

Potable Water System			
Issue	**Past**	**Current**	**Future**
Pressure	High pressure	Lower pressure	Pressure reducing valves in zones
Flow rates and daily volumes	High flows and water usage rates.	Similar flows and demands; water usage still high (500 l/pe/d).	Reduce flow (consumption) • Education • Metering – pressure zones and houses • Charging? → leverage?
Electricity consumption and costs	High power consumption	Similar to past	Reduced power consumption
Treatment costs	High treatment costs	Similar to past	Reduced treatment costs
Breakages and repairs	High % leakage / breakage	Breakages less from lower past	Reach target service levels for breakage rates and life expectancies
Old and brittle pipe materials	High % old, brittle AC piping	More renewals investment	More renewals investment
Water modelling and forward planning	No water model available	Developed water model	More effective development planning and management using water model
Storage	Low storage capacity	New reservoir to increase storage	May need more storage; ideally not
Emergency resilience	Limited emergency supply resilience	More focus on system resilience	Develop emergency response plans
Standard operating procedures (SOP)	Limited SOP	Improving SOP	Robust SOP

The consequences for wastewater management have been high wastewater flows that have been generated from high potable water usage rates. This has diluted wastewater strength and increased leakage to groundwater which then increases ingress into the wastewater reticulation. This issue can be managed by reducing water flows which will result in a more typical wastewater strength.

Wastewater Reticulation			
Issue	**Past**	**Current**	**Future**
I & I	Direct inflow (intentional and unintentional). Poor lateral condition.	Similar to past.	Target no intentional private inflow.
Groundwater infiltration sources	Infiltration source • River levels (when high) • Groundwater • Rain	Metering / trends showing improvement	Water level assessment • Stormwater improvements • Target replacement
Stormwater ingress sources	Inundation • Downpipes • Low lying areas • Gulley traps (esp low lying) • Poor piping • Infiltration	Targeted property inspections (get interview), make changes. North Clyde toilet surcharging problems resolved.	Increase functionality – all toilets flush 100% of time (no surcharging). Reduce / no private property sewer overflows or downpipe connections.
Building standards	Building code less stringent	Building code requirements increased	Develop target acceptable inflow (PWWF = 4? x DWF)
Reticulation materials	Poor quality material (porous earthenware) which may have been standard practice at the time of installation	Similar to past.	Increased percentage of reticulation uses more modern materials e.g. rubber jointed PVC pipes.
Construction techniques	Poor quality installation techniques which may have been standard practice at the time of installation	Similar to past.	Increased percentage of reticulation uses modern installation practices.
Deterioration	Joint cracks/ pipe cracks Multiple joints – shorter pipes	Similar to past.	Increased percentage of reticulation uses modern jointing practices.
Reticulation slumping and alignment	Ground movements • Earthquake • Settlement • Roading – vehicles	Similar to past.	Increased percentage of reticulation has been renewed.
Reticulation inspections	No/minimal <$20k/yr for inspection / upgrading / replacements	Ongoing condition assessment (trending up). More investigation • Observations • Modelling • Metering • Smoke testing • CCTV 30% of network	Investigation of entire network with regular on-going repeat inspections.
Sewer renewals	No/minimal <$20k/yr for inspection / upgrading / replacements	Relined 1,500 m (last 2 years) Ongoing renewals (1,000 m/year for next 4 years)	Renewal ($250k / year for next 10 years) • Reline • Renew • Inspect
Strategic management - renewals	No/minimal management strategy	Observation tools / portals developed / used	Develop renewal strategy which is affordable.

Wastewater Reticulation			
Issue	**Past**	**Current**	**Future**
Strategic management – reticulation	No/minimal reticulation strategy	Strategy meeting	Develop reticulation strategy (formalise)→ future proofing
Data capture	Minimal data capture	More data capture • Locations • Levels	Increased data capture Asset management programme (set target ...words?)
Stormwater system	Poor stormwater management / system. $30k-$40k /yr – no capital investment, only maintenance	Some stormwater improvements, eg. $300k to pipe open drains	Stormwater improvements ($200k / year for next 10 years) • Alternatives to current • Provide connections

A suggested key target was to optimise the balance of investment into renewals and percentage reductions in I & I against accepting the flow rates and designing / operating the wastewater facilities to cope with conveying, treating, storing, and discharging those flows.

Wastewater Pump Stations			
Issue	**Past**	**Current**	**Future**
Pump blockages	Frequent pump blockages	New chopper pumps at Fitzroy have eliminated blockages and high level alarms	All pumps new chopper design and rare blockage events
River backflow into wet wells	River backflow occurred during floods	Flap valves prevent river backflows	No river backflows
Overflow events and causes	Reticulation under capacity – less flow or overflow. Reticulation surcharging: • Private overflows • Man holes lifting	Some reductions in overflow event frequencies and volumes.	New Kopu → Fitzroy in LTP and new additional line Fitzroy → WWTP $1M
Wet well level and pump flow monitoring	Lack of accurate data High well water level = river overflow? Over-estimation of overflow frequencies and volumes. Poor flow monitoring.	Better monitoring – replaced floats and transducers • Better pump control • Less blockage • Less power	Accurate data, few blockage alarms and overflows, good flow monitoring data and accuracy.
Pump controls	Mixed hardware and controls	Upgrade pumps to DOL (soft start) – no VSD • Less blockage • Pump cycling between duty and standby	Electrical upgrade (10-20 years)
Pump controls		Upgrade controls at Fitzroy	Upgrade all P.S. modelled on Fitzroy. Funding committed in LTP.
Servicing	Poor asset servicing • Programmed • Parts	Some improvements in servicing.	Planned and timely servicing. Readily available parts.
Power consumption	High power consumption	Reduced power consumption, down by $10k in 5 months at Fitzroy Street	Reduced power consumption due to smarter controls and lower flows.
Power cuts and reliability	Power outages / frequency / dirty – not priority. Ownership of problem (austerity).	Same power supply and low priority restoration issues.	Hopefully improved priority for power restoration.
Emergency power back-up	Back-up generator available, but not used	1 mobile back-up generator available for use at all pump stations	Dedicated generator installed at each pump station.
Health and safety	Frequency of inspection / attendance high • $ of attendance / inspection • H&S risk	Recent changes: • Auto fan in all P.S. • Job safety analysis for each entry	All health and safety risks are actively avoided, mitigated, or managed.
Maintenance triggers	Reactionary eg. Fitzroy – attendance 3x week reactive to problems / alarms	Planned maintenance: • Target 0x week reactive • Target 4x year planned	Planned maintenance: • Target 0x week reactive • Target 4x year planned

Key target changes for the pump stations are:

Historic	Future
Reactionary maintenance	Planned maintenance
Old technology	Modern technology
Power outage issues	Back-up power and rapid reconnection
Frequent pump blockages	No pump blockages
Slow and difficult pump repairs	Rapid pump repairs

Stephen noted that WDC are unable to quantify pump station overflow volumes because the emergency outlets have not been metered and will start flowing as soon as water levels reach the pipe invert level (pipes are not always full when flowing). Their improved understanding and monitoring of wet well levels against overflow levels allows WDC to identify the locations, dates, and durations of overflow events at pump stations. WDC are unable to identify locations, dates, durations, or volumes of overflows from manholes or reticulation because there is no monitoring and they are difficult to monitor except to record complaints and staff observations.

Recent works to reduce I & I and improve pumping reliability have already been shown to have prevented overflows and blockages and are expected to assist treatment performance.

Wastewater Treatment			
Issue	**Past**	**Current**	**Future**
Screen at WWTP inlet	No screen, then screen broke.	Screen operational	Screen operational and maintained
WWTP outflow metering	Broken and bypassed outflow meter	Outflow meter still broken	Fix or replace outflow meter
Flow monitoring accuracy.	Flow monitoring at pond not accurate Based on calculations	Improved / validated flow monitoring using flow model	Accurate and validated in- and out-flow monitoring
WWTP inflow metering	Broken flow monitoring @ Fitzroy	Meter still broken	Fix or replace meter
Sludge levels	High sludge accumulation, not fully removed in past de-sludging.	Recently de-sludged – 2,200 m^3 removed.	De-sludge 2nd pond more often.
Sludge carry over	Sludge carrying over from 1st pond into 2nd pond	Less sludge carry-over. Use of sludge bombs to break down sludge & reduce sludge accumulation rates.	No sludge carry-over and less accumulation of sludge in 2nd pond
Aeration adequacy	Aerators failing	Added trial new generation air sparge aerator to 1st pond.	Add air in 2nd pond?
Maintenance	Reactive and frequent. 1st pond aerators frequently clogged with rags.	New air sparge on 1st pond has resulted in power saving and fewer call outs. Easier to maintain too.	Less maintenance requirements. Programmed in advance, not simply reactive.
Design records	Designs changed but no accurate as-built design drawings exist.	As built drawings being acquired for current designs.	All design details have accurate as-built drawings.
Monitoring and controls	No monitoring of pond performance	Controls being upgraded	Greater performance assessment
	Limited quality monitoring within ponds	Little or no change from past monitoring	Robust monitoring programme
Treatment performance	Poor treatment performance? Low capacity in 1st pond.	Treatment quality OK?	Treatment quality suitable for consent conditions and discharges
Design changes to improve treatment performance	No changes made from original 1980 design	New air sparge on 1st pond	Revisit design based on discharge requirements
			Pre-treatment • Imhoff? Post treatment • Sand filter • UV • Clarifier
			Add baffle – avoid short circuiting of 2nd pond?

Wastewater Treatment			
Issue	**Past**	**Current**	**Future**
Flow concerns for design and performance	High flow (>80 L/s) bypass of 1st pond directly to 2nd pond		Match treatment to • Pump station / I & I changes • DWF + WWF Maybe set upper limit on I & I changes / improvements
Storage	Limited buffering capacity	No change from past	Storage – new /additional → why / requirements? Reconfigure pond & 1st → 2nd pond
Health & safety features	Reactionary H & S	H & S review: • Risk assessed site • Improvements made	Additional H & S features added
Reliability and resilience	No odours, no complaints	Backup generator for screen and valves	Enhance – Maintenance plan • Monitor • Sludge control

It was noted that there are different monitoring requirements for consenting purposes and treatment performance purposes. WDC need to optimise and balance these competing priorities while managing costs.

It was noted that the outlet meter at Fitzroy Street pump station is buried deep underground so it will be expensive to access and replace. A decision on the appropriate size of the outfall pipe diameter and resolution of the surcharging problem are required or at least desirable before ordering and installing a new flow meter.

Treated Wastewater Discharge Pipeline			
Issue	**Past**	**Current**	**Future**
Debris and silt accumulations	Debris accumulates around outlet. No / limited maintenance.	Silt in estuary around pipe – greater accumulation (2m cover in last 4 years) – causing surcharge	Design self-clearing ports / diffuser
Pipeline and manhole capacity and condition	Under capacity - at current flows • DWF ok • Have had manhole overflows • Straps on manhole covers to stop overflows	Poor manhole condition Diffuser causing back pressure	Remove manholes and change to pressure line? Do we need to increase pipe capacity?
Surcharging	Original design was ok for the smaller discharge volumes and flow rates but it now surcharges which has reduced the duration window	Greater surcharging (outlet restriction)	New pipe with larger diameter and improved diffuser design needed? Change to 24/7 discharge to reduce flow rate and avoid changing pipe diameter? Reduced I & I will reduce daily flows?
Outlet structure design	A flood event modified the outlet structure and left a large log across its outlet	Large log across outlet forced use of a snorkel with a smaller diameter • 375mm → 277mm ID • Increased back pressure • More overflows of manholes	Extend outfall points • Have flexible discharge point
Discharge timing	Management around tidal sequence leads to split discharge times	Have new surcharge overflow beside riverbank	Discharge regime • 24 hrs vs 6 hrs and all day vs night only • River flow discharge criteria? • Use in conjunction with storage
River conditions during discharges	Discharges occur regardless of river flow conditions all year round	No change	Reduce river low flow discharge need • Land discharge systems • Storage
Public awareness and support	Limited public awareness (applies to every aspect) with some opposition and criticism	Improved public awareness and endorsement through consultation	Improved public awareness and endorsement through consenting and operation.