Under The Resource Management Act 1991

In the matter of an application for resource consent to discharge wastewater overflows from Queenstown Lakes District Council's wastewater network

Statement of Evidence of Mark Andrew Baker

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Statement of Evidence of Mark Andrew Baker

1 Introduction

Qualification and experience

1.1 My full name is Mark Andrew Baker. I am the Asset Manager – Three Waters, Strategy & Asset Planning at Queenstown Lakes District Council. I have held this role since August 2019 having held previous roles (Infrastructure Analyst and Senior Three Waters Planning Engineer) within the same team since January 2016.

1.2 I am a Chartered Professional Engineer in areas of Three Waters (water supply, wastewater, and stormwater) Asset Management and Strategic Asset Planning. I have 13 years' experience in three waters infrastructure networks as a consultant as well as a member of council staff.

1.3 I am a member of Water New Zealand, a national not-for-profit sector organisation comprising approximately 1500 corporate and individual members in New Zealand and overseas. Water NZ is the principal voice for the water sector, focusing on the sustainable management and promotion of the water environment and encompassing the three waters. I have previously been on committees for Water NZ's Modelling and Digital Special Interest Groups. I am currently a member of the steering group for Water NZ's National Performance Review that collates performance data of councils and their three waters networks, including overflows.

1.4 Prior to being employed by QLDC I was a consultant engineer at Rationale Ltd for nine years specialising in hydraulic modelling and master planning of water and wastewater networks for council clients.

1.5 From my employment at Rationale, I also have extensive experience in several other facets of infrastructure planning and asset management for local government including ten year plan (**TYP**) development under the Local Government Act 2002, population projections, asset management plans, infrastructure funding (rates and development contributions), and business case development.

1.6 Through my time as a consultant I was involved in assisting client councils with developing asset management plans and long term plans through the 2009, 2012, and 2015 TYP cycles. In 2015 I was also involved in the development of QLDC's first 30-year Infrastructure Asset Management Strategy required by the 2014 amendments to the LGA.

1.7 In my current role at QLDC I have responsibility for the following four broad areas of QLDC's three waters infrastructure:

(a) Ensuring that QLDC has suitable planning tools and network performance assessments to be able to complete robust three waters infrastructure planning. These are the forward planning tools used by QLDC to assess the need for, and benefits of, potential investments or interventions (e.g. hydraulic models and demand forecasts).

(b) Managing QLDC's asset management systems, processes, and data to enable good quality management of existing assets. This includes:

(i) The collection and recording of asset condition data so that the remaining life and risk can be assessed.

(ii) Asset valuations to inform suitable funding of assets as well as insurance to cover the funding of rebuilding networks post-disaster.

(iii) Developing and using an assessment framework to quantify the consequence of failure (also known as criticality) of an asset in terms of the potential impact to network performance, public health and the environment if the asset fails.

(c) Preparing asset strategies and policies (including disaster risk and resilience, level of service, and as-built data specification) for new infrastructure.

(d) Ensuring that future capital investments are justified through suitable processes.

1.8 I am also currently working with the Department of Internal Affairs on potential improvements to local government funding mechanisms in relation to three waters infrastructure.

Purpose and scope of evidence

1.9 I am the Project Manager for QLDC's application for resource consent to authorise occasional overflows from its wastewater network. I have been responsible for contracting the expert external team, overseeing engagement activity, managing inputs from QLDC staff, managing project budgets, and providing information on QLDC's asset management and planning, as well as managing the project on a day to day basis. My role as Project Manager also includes providing monthly updates to a QLDC Project Control Group.

1.10 I have had this role from May 2018 when the previous project manager for this project resigned from QLDC.

1.11 The purpose of my evidence is to:

(a) Summarise the frequency and patterns of overflows as well as the key work streams that will reduce the frequency and/or the effects of overflows;

(b) Describe QLDC's hierarchy of wastewater planning documents from strategy through to adopted programmes of investment;

(c) Describe QLDC's processes to identify and prioritise potential investments or interventions;

(d) Summarise QLDC's current investment programme and how that will minimise the risk of overflows from both operational/asset management and growth perspectives; and

(e) Explain QLDC's approach to engaging with Iwi, key stakeholders, the public, and submitters on this project.

1.12 My evidence is set out as follows:

(a) Overflows that have occurred, associated causes, and operational response mechanisms;

(b) QLDC's infrastructure asset management, planning, and investment processes;

(c) QLDC's 2018 – 2018 wastewater investment programme;

(d) Consultation and engagement activity relating to the consent application;

(e) Consideration of the submissions received relevant to my evidence; and

(f) An assessment of matters raised in the Otago Regional Council Planners' s 42A Report.

2 Executive summary

2.1 QLDC has robust and improving wastewater asset management and investment practices. Its existing network performance is consistent (or in some instances better) than that of comparable councils.

2.2 Improving the resilience and reliability of the wastewater network is a QLDC priority.

2.3 Wastewater overflows across QLDC's network are largely driven by user activity, with blockages and third-party damage accounting for a high proportion of recorded overflows.

2.4 QLDC is responding by prioritising investment in the reliability, capacity, and resilience of its wastewater network, holding its contractors to an increasingly high standard, and dedicating ongoing resource to education and awareness activities.

2.5 QLDC is seeking this consent in recognition that overflow events within its wastewater network are random in nature and mostly unavoidable.

2.6 QLDC considers that such an approach increases overall transparency and accountability in the reporting of, and response to, overflow events. In that's regard QLDC has consulted with the stakeholders, held public open days and engaged the media in relation to this project.

3 Current overflow frequency and causes

Overflow data

3.1 QLDC have collected data on overflows for more than a decade. More recently, data has been collected through QLDC's Request for Service (**RFS**) system[1] and contractors' work systems. The data collection process was significantly improved through a new contract entered into with Veolia Water Services (ANZ) Pty Limited in July 2015.

3.2 The change in data collection requirements that occurred when the new contract with Veolia took effect means overflow information collected prior to July 2015 is not directly comparable. For this reason, I have only included and discussed July 2015 to November 2018 overflow data in Table 1 below.[2]

Cause	To Water	To Ground	Unknown	Private / No Overflow	Total
Fat	3	12		0	15
Foreign Objects	4	22		0	26
Roots	4	43		1	48
Contractor	0	4		2	6
Tennis Ball	0	1		0	1
Unknown	0	9		2	11
Broken Pipe/Pipe Repairs	1	3		1	5
Fault at Facility	0	3		0	3
Other	4	22	1	23	50
Capacity	0	0	0	0	0
Choke	1	0		29	30
Private	0	0		12	12
Total	17	119	1	70	**207**

Table 1: Causes of wastewater overflows in QLDC's wastewater network

3.3 Generally, a considerable reduction in wastewater overflows has occurred since July 2015 due to the contractual requirement for Veolia to significantly invest in its technology and plant. This is detailed in Ms Moogan's evidence.

3.4 Between July 2015 and November 2018, 207 overflow events were recorded. Of the 207 events, 136 were confirmed as originating from the QLDC network, 12 originated from private properties, 58 were incorrectly reported as overflows, with the point of origin and cause for the remaining one overflow either unknown or undocumented.

3.5 No overflows from the QLDC network have occurred due to insufficient capacity. This is confirmed by findings from the external system performance assessments that have been recently completed. These assessments are discussed in further detail in section 4 of my evidence. As major wastewater assets have a long useful life (sometimes up to 80 to 100 years), careful engineering design is required to ensure investment in network capacity that will service future

[1] The RFS system is the part of QLDC's enterprise system that records all requests from the public as well as many from QLDC contractors if they are the first to find an issue.

[2] This data is consistent with QLDC's first s 92 response dated 5 June 2019 and has not been updated to account for the recording errors identified in Ms Moogan's evidence.

demand can be provided for whilst also maintaining minimum flow velocities[3] in the earlier years of the investment's operation. This is further discussed in section 4 of my evidence.

3.6 Overflows that occur from private infrastructure (i.e. wastewater infrastructure within private property boundaries) are the responsibility of the property owner. QLDC contractors will, however, attempt to remediate the overflow in order to minimise environmental and public health effects if they are the first responder onsite.

3.7 Verified overflows with a recorded cause of 'choke, 'other', or 'unknown' are those where a blockage was evident but a specific reason for the mass that caused the blockage could not be ascertained. This may be because the blockage self-cleared, was dislodged by the contractor's camera, or the camera couldn't obtain a clear image.

3.8 In late 2017 QLDC refined its reporting of overflows to include a specific criterion relating to overflows that were caused by a third party contractor damaging the network (including but not limited to drain layers/plumbers or other utility operators). Eight overflows due to third-party damage have been assessed since this specific cause was separately identified.

Overflow reduction measures

3.9 There are two main operational mechanisms to reduce the number of overflows depending on the cause:

(a) Education to reduce the overflows caused by the build-up of fat, foreign objects (including wipes and building debris) entering the network, and third party damage. This includes education programmes for tradewaste producers as tradewaste is a significant contributor to fat entering the network which is a cause of overflows. This is further discussed in Mr Glasner's evidence.

(b) Condition inspections, including closed circuit television or acoustic inspections of pipes or visual inspections of manholes, will provide an early warning of any issues developing (particularly due to tree roots and deteriorating network condition). Condition inspections may also identify foreign objects in the network that may lead to potential overflows.

3.10 Periodic CCTV inspections are completed using specialist camera equipment that can be driven along pipes, allowing assessment of the structural condition of the pipe as well as the service performance of the pipe e.g. checking for fat or sediment build up. The QLDC specification for these assessments has been developed by a national expert on condition inspections and pipe renewal assessments, and is based on the New Zealand Pipe Inspection Manual.

[3] Sewer system trunk mains are designed to self-clear blockages through achieving a minimum velocity (0.75 m/s) that should occur at least once a day through the natural peak flow cycle.

3.11 QLDC also carries out periodic acoustic inspections whereby a sound is transmitted through a pipe from manhole to manhole using specialist equipment. This is a relatively quick assessment compared to CCTV. The size, length, material, and flow depth of a pipe determines how the sound should travel through the pipe. Anomalies in the sound recorded at the receiving manhole can be translated to assess if a blockage or abnormal flow patterns exists within the pipe that can then be further investigated using CCTV.

3.12 Proactive condition inspection can also be used to monitor issues if repeat blockages or overflows occur at a particular point in the network. Historically, repeat events within the network have been rare with only one repeat occurrence (Loop Road, Kelvin Heights) identified in the data.

4 Infrastructure asset management, planning, and investment

Asset management

4.1 QLDC measures and benchmarks the capability and effectiveness of its asset management, planning, and investment processes through a number of exercises including:

(a) Asset Management Maturity assessment, as described in paragraph 4.2 below. This process considers maturity across transport, solid waste, and three waters. It does not distinguish wastewater-specific asset management practices.

(b) Water NZ National Performance Review, as described in paragraph 4.4 below.

(c) Statutory audits such as those for the 30 Year Infrastructure Asset Management Strategy and the TYP processes under the LGA.

4.2 The key measure is an independent audit of Asset Management Maturity that is completed in line with the National Asset Management Support's International Infrastructure Management Manual. The last assessment was completed in November 2018 and demonstrates an improvement in QLDC's three waters asset management maturity since 2012. The assessment report is **attached as Appendix 1**, with transport and solid waste components removed for brevity.

4.3 The gap between the current performance and the targeted score is used to develop QLDC's current 'Performance Plan' that creates a focus for improvements within the Property and Infrastructure team. The Performance Plan is reported to QLDC's Property and Infrastructure General Manager (Mr Hansby) on a regular basis.

4.4 The Water NZ National Performance Review is "an annual benchmarking exercise of drinking water, wastewater, and stormwater service delivery across NZ. Benchmarking and the development of this report is co-ordinated by Water NZ, an independent not-for-profit organisation representing water professionals and organisations."[4] Two key points from this report are:

[4] Water New Zealand 2017-2018 National Performance Review

(a) During 2017/18, across the country there were more capacity related overflows than those caused by blockages. As previously discussed in paragraph 3.6, QLDC does not currently experience capacity related overflows.

(b) Nationally there are ten times more overflows caused by blockages than those caused by pump station failure. This is likely to be because the industry has increased levels of redundancy and early warning alarming at pump stations. Figure 1 shows wastewater dry weather overflows (also known as blockages) from the Review for 2017/18. QLDC's level of performance is around average when compared with other participating councils (Appendix 2, Figure 18 refers).

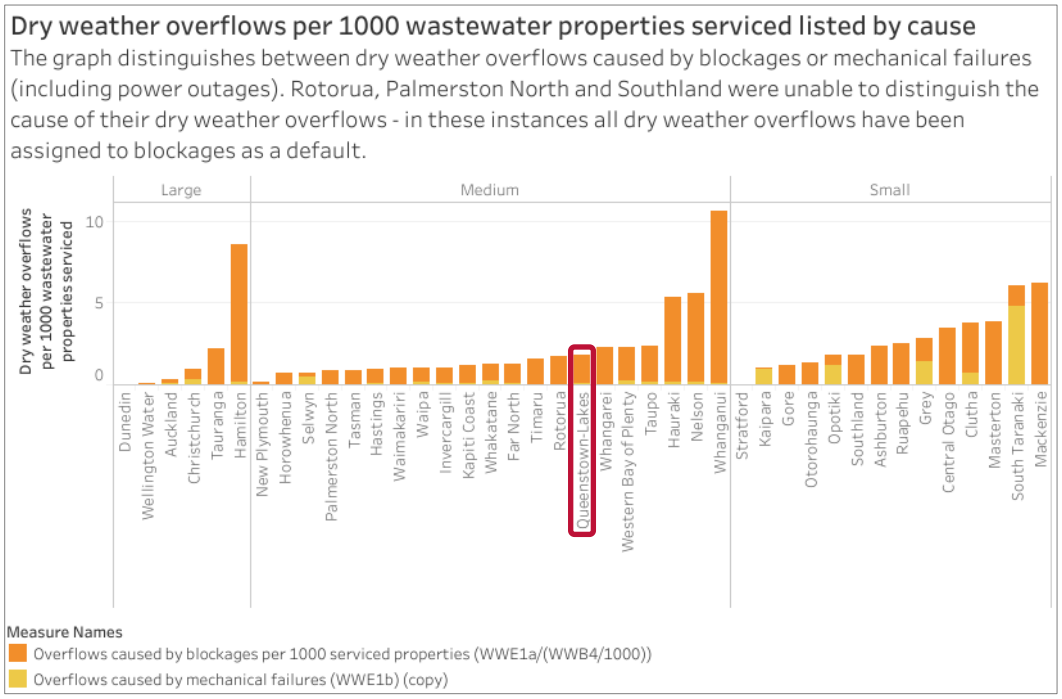

Figure 1: Water New Zealand National Performance Review Results – Dry Weather Overflows

QLDC 30-year Infrastructure Asset Management Strategy

4.5 There is a hierarchy of statutory and non-statutory documents that set the strategic direction of QLDC's wastewater investment process. As discussed in Mr Hansby's evidence, the authoritative strategic document for QLDC's wastewater infrastructure is the 30 Year Infrastructure Asset Management Strategy (**IAMS**).

4.6 The strategic outcomes defined in the IAMS guide QLDC's planned investment in long-life infrastructure i.e. infrastructure with up to a 100-year life. These strategic outcomes and examples of supporting investment projects are further discussed in section 5 of my evidence.

4.7 Every planned wastewater investment will directly or indirectly reduce the risk of uncontrolled wastewater flows and the resulting potential for adverse environmental effects.

Master plans

4.8 QLDC is updating master plans for all of the wastewater schemes that it owns and operates. The evidence of Mr Glasner identifies these wastewater schemes and their key components. Guided by the strategic outcomes defined in the IAMS, these master plans identify current and future issues and opportunities, describe the desired future state of the scheme, and provide a high-level roadmap for delivery.

4.9 The master planning process considers the most current population projections, whether catchments within the schemes are predominantly resident or visitor based, and how the population's composition is likely to influence wastewater flows. The hydraulic models use this information to identify any potential for blockages to occur and network issues for further investigation. Amongst other things, the speed (**velocity**) that wastewater flows through the network is an important consideration in ensuring mains have the ability to self-clear blockages.

4.10 Master planning also pays particular regard to the location of critical infrastructure and its vulnerability to natural hazards. Criticality of infrastructure is determined based on the consequence of failure of each wastewater pipe within the network. The consequence is a function of the number of connections served (a proxy of the pipe size is used to assess this) with additional scores for proximity to a water body or a drinking water intake, being in high amenity areas (parks/reserves), proximity to buildings, or being positions in a significant road.

4.11 An objective of master planning is to reduce the number of critical assets within the network. Subsequent business cases explore the options for achieving a reduction in criticality, or where this cannot be achieved, alternative investment opportunities to ensure the reliability and resilience of the network.

4.12 The delivery roadmap set out in a master plan triggers programme and project investment justification cases (referred to as business cases). Business cases are completed in advance of TYP or Annual Planning cycles to confirm short to medium-term network investment needs. Well informed master plans and business cases ensure that projects included in the TYP will cater for projected growth and deliver a sound return on investment in the wastewater network.

4.13 Master plans are periodically reviewed and updated as part of business-as-usual activity to ensure QLDC's prioritisation of programme and project delivery remains responsive to current and future network and service needs.

Business cases

4.14 An overarching business case development framework ensures QLDC's infrastructure investment decision are strategically aligned, represent value for money, and deliver on identified business needs.

4.15 The need for investment is informed by considering any actual or perceived risks associated with the current state. A range of QLDC experts (usually a representative mix of engineering, operations, asset management, and environmental expertise)[5] are assembled to assess the level of risk posed by the asset across a range of pre-defined categories.

4.16 Potential investment options are then assessed based on the extent to which they reduce the identified risks.[6] The outcome of this process is incorporated into the overall assessment of the investment options identified; typically, risk mitigation is weighted the highest of all investment criteria considered when assessing investment options.

4.17 All investments will be subjected to a comprehensive Post Implementation Review process. The PIR will assess whether the anticipated outcomes and benefits of the investment are being delivered as planned. The PIR enables QLDC to identify where ongoing benefit realisation and risk management may be off-track, and put mechanisms in place to improve delivery or recalibrate key performance indicators. Any lessons learnt through the PIR are captured to inform planning and delivery of future projects.

Network planning tools

4.18 Evidence to support planning of, and investment in, the wastewater network (either via master planning, business cases, or the annual asset renewal and replacement programme) can come from a number of sources including the RFS, contractor data of overflows/blockages or assets that require excessive maintenance, demand forecasts, flow surveys, asset condition data, hydraulic models, and risk assessments.

(a) Regular demand forecasts assess the total flows that are generated by the connected properties, plus potential stormwater ingress during storm events.

(b) Detailed flow surveys capture flow data at critical points in the network. Information obtained includes flow depth and velocity and an analysis of pipe flow versus capacity.[7] Detailed flow surveys of Queenstown, Arrowtown, Arthurs Point, Lake Hayes, and Wanaka schemes are planned for this financial year.

(c) An improved proactive inspection programme is to be varied into the main Veolia wastewater network and operations contract that will significantly improve asset condition data from both a structural (asset condition) and service (fat build up, root intrusion, etc) point of view.

4.19 Information collected through these network planning tools is used to calibrate hydraulic models, which along with QLDC's growth projections, enable more accurate modelling of capacity required to service growth. Hydraulic models are computer models detailed down to each pipe/manhole and account for each connection in the wastewater scheme.

[5] When required, independent expert advisory reports will be commissioned to inform this process.
[6] By way of example, an option that conveys wastewater via a rising main (no manholes) using a resilient material (e.g. PE) will score much higher than an option with a gravity main (manholes) using a less resilient material (e.g. concrete).

4.20 A network-wide understanding of all current wastewater assets' relative criticality ensures funding is appropriately prioritised. Independent reviews of the network's vulnerability to seismic events has also been undertaken. The application of asset criticality and vulnerability in the formation of TYP investment programmes has been discussed above.

4.21 These network planning tools also enable us to ensure we can maintain minimum velocity levels when an asset's capacity is upgraded. Achieving minimum velocity is critical to ensuring wastewater mains have the ability to self-clear potential blockages. The engineering mechanisms in which we can achieve the balance between minimum velocity and future-proofed capacity are an important consideration of the business case and design processes.

5 Current TYP investment programme

5.1 **Attached as Appendix 2** is a spreadsheet of the current wastewater projects in the TYP programme, along with a brief description on how the investment benefits the wastewater network. Expenditure on planned wastewater project within this TYP period total $105m[8].

5.2 Mr Hansby's evidence discusses a range of key wastewater projects within the TYP[9] that will directly or indirectly reduce the risk of overflows within the network, as well as improve the quality of treated wastewater that is discharged into the environment.

5.3 Wastewater projects within the TYP are underpinned by the strategic outcomes for QLDC's network as defined by the IAMS. Examples of how specific projects within the appended investment schedule deliver on these outcomes are addressed below.

No contamination of public water supply is attributed to three waters infrastructure

(a) The Renewals programme responds to the risk of blockages due to poor asset condition, and projects such as CBD to Frankton Reticulation and North Wanaka Conveyance Scheme will divert wastewater flows away from high-amenity areas and convey those flows through new or refurbished pipelines that are less susceptible to degradation, accident, or disaster, and where possible, eliminate the need for manholes. Additionally, many of the TYP investments will add capacity to the network in advance of projected demand growth to ensure no overflows will result due to capacity constraints.

Adverse effects on the environment from three waters infrastructure are managed/mitigated

(b) Upgrades to the capacity and capability of existing wastewater treatment plants will ensure QLDC treated wastewater discharged to the environment remains of a high or higher standard. Some smaller

[8] Total spend in Appendix 3 amounts to $104,921,982.
[9] Note that Mr Hansby discusses an upgrade of the Shotover Wastewater Treatment Plant. This investment was originally planned for delivery beyond the current 2018 TYP programme; however, was subsequently brought forward as a result of observed growth in wastewater demand.

schemes will be connected to larger existing treatment facilities, enabling QLDC to consolidate points of discharge to the environment and decommission ageing and isolated treatment plants.

Compliance with resource consents

(c) This consent application project is an important part of delivering this three waters strategic outcome. It seeks to achieve compliance through a new network consent, whereby the proposed conditions set the standard for transparency, rigour, and accountability in the management of QLDC's wastewater network.

5.4 I am confident that the robust business case and master planning process that QLDC uses to prioritise investment means that the projects included in the TYP will improve the resilience and capacity of the wastewater network, reduce the risk of overflows occurring, and contribute to meeting the IAMS outcomes.

6 Consultation and Engagement

6.1 QLDC's approach to engagement on this project has been to be open and transparent with the community, ORC,[10] and other key stakeholders including, Kāi Tahu, Ministry of Health, Department of Conservation, and Fish and Game.

6.2 My colleague, Ms Jen McGirr,[11] has been the QLDC representative at engagement meetings because, through her role at QLDC, she has existing established relationships with several of the parties involved.

6.3 I have not personally attended all of the engagement meetings, but as the QLDC Project Manager I have been involved in consultation and engagement strategy decisions, and have been kept well-informed of discussion that has occurred during meetings, including actions and outcomes. A summary of these engagements is provided under the headings below.

Iwi representatives

6.4 While in Dunedin on 3 July 2018, Ms McGirr and Ms Blight took the opportunity to have a first face to face engagement meeting with Aukaha as Kāi Tahu representatives for four of the rūnanga who affiliate with the Queenstown Lakes area. During this initial meeting, the opportunity to hold collective stakeholder discussions was identified (referred to as **stakeholder hui**).

6.5 Ms McGirr and Ms Blight also travelled to Invercargill on 8 August 2018 to meet with Te Ao Marama as Kāi Tahu representatives for three of the rūnanga who affiliate with the Queenstown Lakes area. As with Aukaha, this meeting introduced the project and discussed ongoing engagement prior to lodgement of the application. Also discussed was Te Ao Marama and Aukaha working together to provide one cultural impact statement[12] which was subsequently undertaken.

[10] A pre-application meeting was held with ORC representatives on 3 July 2018, and a follow up meeting was held on 1 November 2018.
[11] Senior Environmental Advisor, Property and Infrastructure
[12] Note that Aukaha and Te Ao Marama made the decision to provide a Cultural Impact Statement.

Stakeholder hui

6.6 Two collective stakeholder hui were held in Queenstown, the first on 27 September 2018 and the second on 14 March 2019, before lodgement of the application.[13] Mr Christophers from ORC also attended the second hui to receive an update on the project and to listen to the discussion and feedback provided by the stakeholder group.

Department of Conservation

6.7 Ms Blight met with Ms Nadia Yozin from the Department of Conservation (**DoC**) on 7 August 2018 in Christchurch to provide a face to face introduction to the project. DoC was also represented at both stakeholder hui by personnel from the local conservancy office.

Ministry of Health

6.8 Ms McGirr and Ms Blight had a face to face meeting with Ms Susan Moore from the Ministry of Health (**MoH**) on 26 July 2018. Following this meeting Ms Moore attended the both stakeholder hui. MoH have not submitted on the application.

Public open days

6.9 Two public open days were organised for November 2018; one in Queenstown on 8 November 2018, and the other in Wanaka on 12 November 2018. The open days were advertised on QLDC's Facebook page several times, its website, and in local media publications.

(a) Various community groups in Wanaka and Upper Clutha concerned with water quality were invited to attend the Wanaka open day; ten representatives of these groups attended. A good discussion was held on the overflows, the reasons why these occur, and what QLDC was proposing under the consent application. From the QLDC project team, I attended along with Mr Glasner, Ms McGirr, and Ms Blight. Additionally, Deputy Mayor Calum McLeod attended in his role as a local elected member.

(b) Two members of the public attended the Queenstown session, both were representatives of the Lake Hayes and Shotover Country Community Association. The reliability and resilience of their community's local infrastructure was discussed. The QLDC project team was represented by Mr Hansby, Ms McGirr, Mr Mason,[14] and Ms Blight. Councillor Alexa Forbes also attended in her role as a local elected member of QLDC.

[13] Pages 16 and 17 of the AEE provide further information on these two hui.
[14] QLDC Three Waters Operations Manager who has been heavily involved in the project but is currently on sabbatical.

7 Submissions

Historical data

7.1 A number of submitters have requested that QLDC provide overflow data for the past ten years. In my view this would not be helpful in terms of understanding the current frequency, magnitude, or causes of overflows from the wastewater network.

7.2 As explained in section 3 of my evidence, data collection has improved over time, and comparisons of data of up to ten years of history may not be comparing 'like for like'. Data since 2015 has been consistent through the implementation of the current contract with Veolia, as well as the introduction of statutory reporting to the Department of Internal Affairs, with the exception of the additional reporting of damage by third parties.

Understanding risks associated with the wastewater network

7.3 It has been suggested that the application for a district wide consent indicates QLDC does not understand where the wastewater network is at high risk of failure; this is not the case.

7.4 QLDC considers the risks to its wastewater network at a range of levels:

(a) Network planning tools (section 4 refers) provide early warning signals where the capacity of the network is at risk due to increasing demand. A responding business case is then programmed into QLDC's capital planning and delivery cycle, ensuring the implications of identified capacity constraints are fully understood and adequately responded to through investment. Section 4 of my evidence further discusses the business case process.

(b) Network planning tools (section 4 refers) also alert us to potential risks associated with the condition of our assets. Risks that can be satisfactorily and economically responded to as part of the asset renewal and replacement programme are prioritised for delivery accordingly. Where a resolution cannot be appropriately accommodated within the renewals and replacement programme, the risk is prioritised for business case development (section 4 refers).

7.5 QLDC is continually working to prioritise and resolve any potential risks for overflows that are within its control. Examples include investing in more resilient materials (lowering the risk of breakages, root intrusion, stormwater ingress etc), hydraulic design (e.g. rising mains instead of gravity mains where possible), future proofing network capacity for projected demand increases, creating more storage capacity at pump stations, and relocating critical assets away from high amenity areas. QLDC cannot reasonably predict where overflows will occur as a result of accident or user behaviour. This is further discussed in Section 3 of my evidence, as well as in Mr Glasner's evidence.

Use of holding tanks to prevent wastewater reaching water

7.6 Submitters have expressed their view that that QLDC should be using storage tanks to prevent wastewater from reaching water. Storage is one way to reduce risk of overflows and is a particularly suitable solution at pump stations where there is a natural break in a gravity system.

7.7 The QLDC network does include storage tanks at numerous pump stations, however these come at a significant cost for an asset that is not utilised on a frequent basis and similar levels of risk reduction can be achieved through other investments. For example, the Marine Parade wastewater pump station has limited space for storage to be built, but recent investment has built a second rising main to allow continued pumping if an issue occurs on the primary rising main. This is also backed up by spare (redundancy) pumps, level alarms, and onsite power generation.

7.8 Away from pump stations it is difficult to include storage as the network generally relies on gravity and naturally wastewater does not generally flow into and out of storage under gravity. Oversize pipes are a way of achieving this, but oversize pipes cause significant operational issues like sedimentation and odour from stagnant wastewater as the velocity naturally slows. Given the random nature of the overflows, predicting where storage is required is also impossible, so to mitigate these small overflows an increased amount of storage would be required at almost all of QLDC's manholes.

7.9 Furthermore, the wastewater system is usually located in transport corridors along with multiple other utilities, limiting the availability of space to store wastewater overflows.

7.10 The network audit proposed in the draft consent conditions will identify any further opportunities for targeted investments to minimise the effect of potential overflows. Storage may be one solution.

National Policy Statement for Freshwater Management

7.11 Submitters have raised concerns around what forward planning is being done to ensure that QLDC's wastewater network continues to comply with the National Policy Statement for Freshwater Management.

7.12 Development of the IAMS, network master plans, and investment business cases are tested for alignment with strategic directives such as the NPS FM. Section 4 of my evidence further details these planning processes.

7.13 QLDC's approach to network planning and asset management is of a high standard and continually improving - this is reflected in the proposed consent conditions which will ensure that QLDC is held to a higher standard of transparency and accountability than is currently required. I am therefore confident that QLDC's forward planning upholds the underpinning principles of the NPS FM, and that every reasonable endeavour is being made to protect the quality of the district's freshwater and to understand and uphold the concept of Te Mana o te Wai.

Capacity exceedance

7.14 I am aware that one of the key concerns of the community is that QLDC should not be authorised to discharge untreated wastewater if those discharges are as a result of QLDC not having provided sufficient capacity in the network to keep pace with growth. This is not the case in the Queenstown Lakes district and it is not why QLDC is seeking consent.

7.15 The most common reason why wastewater networks around NZ have capacity related overflows is that wastewater and stormwater networks are combined in these locations, meaning that when excessive stormwater enters the network as a result of rainfall events, capacity can be exceeded resulting in both wastewater and stormwater overflows. QLDC does not have any combined networks.

7.16 Some amount of stormwater ingress is normal in a wastewater network and occurs through manhole lids or defective seals. However, assessments of the QLDC network show that stormwater ingress is not a significant issue compared to defined metrics under the Water NZ Inflow and Infiltration Manual. Hydraulic modelling uses a conservative approach to test the network's capacity to withstand a one in five-year storm event on a peak demand day. Maintaining this level of capacity within the network results in a significantly higher level of service than most comparable councils where capacity related overflows may occur multiple time per year.

Future unbuilt and unconsented wastewater schemes

7.17 Some of the submissions consider that the consent should be limited to existing QLDC owned and managed wastewater schemes. Future networks will be built to a modern standard with resilient materials and construction techniques. They will also be designed to accommodate projected levels of growth based on the zoning of the area that the network will service. However, despite best practice, that does not mean that they will not experience overflows. A contractor may still accidentally dig up a pipe or someone may put a foreign object into the network that causes a blockage. In that context, it is more efficient for future schemes to be included in this consent rather than QLDC seeking a separate consent for overflow events for each new scheme.

7.18 QLDC is proposing robust conditions that require reporting on proposed investment and overflow responses to ORC. The proposed conditions will provide:

(a) transparency in the nature of overflows occurring and QLDC's response to ORC, key stakeholders, and the public, provide information on the completed and planned works that will contribute to reduction of overflows, and

(b) allow ORC to review the conditions of the consent if they do not believe that QLDC is sufficiently avoiding, remedying, or mitigating the effects of overflows.

7.19 In my view it is desirable for these conditions to automatically apply to future wastewater networks as they come online.

8 Section 42A Report

8.1 The Section 42A report suggests that QLDC has not adequately considered alternative overflow mitigation solutions, particularly short-term and progressive solutions, or adequately explained why targeted interventions (e.g. containment at potential discharge points) are not viable.

8.2 Where a network issue is identified QLDC considers all response options available. Ms Moogan's evidence refers to operational solutions that can be implemented by QLDC contractors.

8.3 QLDC has proposed (condition 11 of QLDC's proposed draft conditions refers) to complete a comprehensive wastewater network review within twelve months of consent being granted. The review will identify any practical opportunities for increased overflow prevention or mitigation on a site-by-site basis; these interventions could include, but are not limited to, increasing network redundancy (e.g. storage capacity, standby generators), alarm systems, and new overflow ponding areas or diversion flow paths. Any practical opportunities identified would be prioritised for consideration as part of the renewals programme or for investment through a business case.

9 Conclusions

9.1 Ensuring the wastewater network is as resilient and reliable as possible is one of QLDC's highest priorities, as evidenced by the magnitude of wastewater investment approved in the TYP.

9.2 Planning of, and investment in, the network is consistent with best-practice guidelines for both wastewater asset management and public sector investment. QLDC's wastewater investment programme is underpinned by expert knowledge, evidence-based decision making, and risk-based prioritisation.

9.3 In the period July 2015 to November 2018, 136 wastewater overflows occurred from the QLDC network; of these only 17 were assessed as either reaching water or having the potential to reach water, and only seven occurred due to an asset fault. The majority of overflows that have occurred within the network have been due to causes beyond QLDC control (e.g. fats or foreign objects entering the network, root intrusion, contractor damage).

9.4 QLDC considers that the best way to avoid wastewater overflows across the district is through education and awareness and proactive condition inspections. These methods of minimisation do not require construction or alteration of assets and are currently being implemented.

9.5 QLDC is committed to providing wastewater reticulation services that meet the unique needs and aspirations of the community and surrounding natural environment. Engaging with the community, iwi, and key stakeholders about this project has been an important, informative, and valuable process. Throughout this project, feedback received through these engagements has been carefully considered and incorporated into the application, revised and conditions.

Mark Andrew Baker, 18 October 2018

Appendix 1 – Queenstown Lakes District Council Asset Maturity Assessment

QUEENSTOWN LAKES DISTRICT COUNCIL
ASSET MANAGEMENT MATURITY ASSESSMENT

Transportation, Three Waters and Solid Waste

November 2018

Report Prepared By:
Lisa Roberts

INFRASTRUCTURE
DECISIONS LIMITED

1. INTRODUCTION

1.1 SCOPE

This report summarises a review of the level of asset management (AM) maturity for QLDC as at October 2018 and progress achieved since previous assessments.

The scope of this review was to:

- Update the assessment of the transportation and three-waters activities.
- Develop the first assessment for the Solid Waste activity.
- Review and make recommendations relating to the Infrastructure Strategy and AM Plans.

A separate assessment report is being prepared for the Open Spaces activity.

1.2 METHODOLOGY

The review included an assessment of the status of current and appropriate AM practice based on the 2015 International Infrastructure Management Manual (IIMM)[1] AM Maturity Index. The functions assessed are shown in Figure 1.

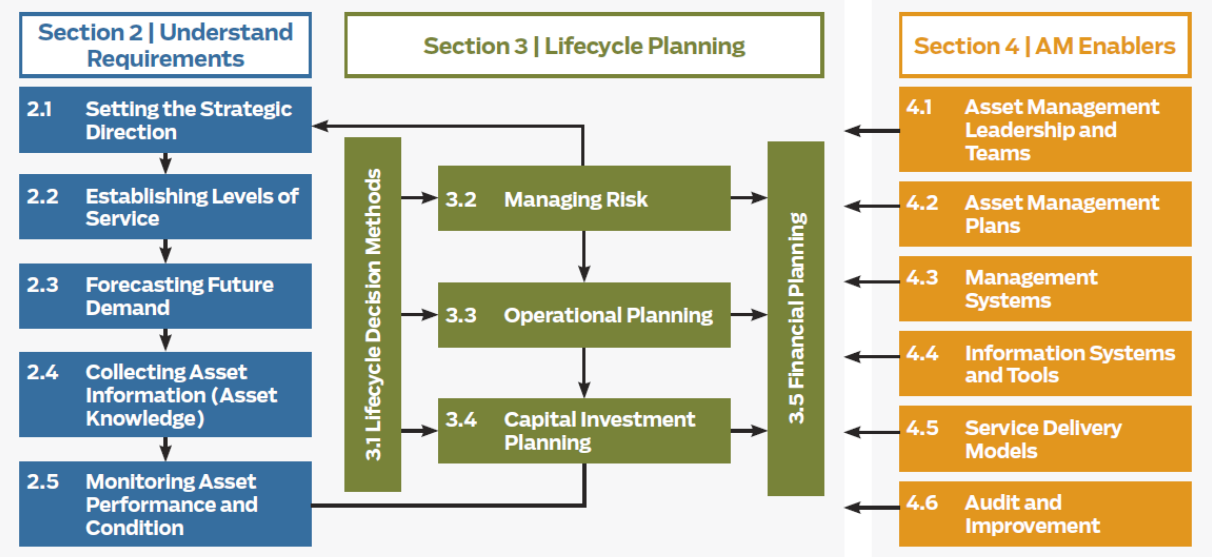

FIGURE 1: AM FUNCTIONS ASSESSED (SOURCE INTERNATIONAL INFRASTRUCTURE MANAGEMENT 2015

The basis for the scoring of each AM function is detailed in Attachment A which details the expected development of processes for each maturity level. Other factors considered in the overall scoring are the extent of process documentation, coverage and frequency, as illustrated below. More detailed comments on the assessment score and improvements are included in the assessment spreadsheets provided to QLDC.

IIMM Descriptors	Aware	Minimum	Core	Intermediate	Advanced
Process Development and Documentation	Ad hoc processes, minimal documentation.	Process and documentation in development	Main process components developed and documented	Process complete, optimisation developing	Optimised process in place, documentation complete.
Coverage (assets, people, frequency)	Rarely	Occasionally	Often	Usually	Always

The review process was based on staff interviews (Attachment B) and reviews of key supporting documents (Attachment C), but did not include detailed audits of process documentation and implementation or data quality.

[1] Institute of Public Works Engineering Australasia, International Infrastructure Management Manual, 2015 Edition.

4. THREE WATERS RESULTS

4.1 MATURITY ASSESSMENT RESULTS

The maturity assessment results are presented in Figure 3 and explained in Table 3-1.

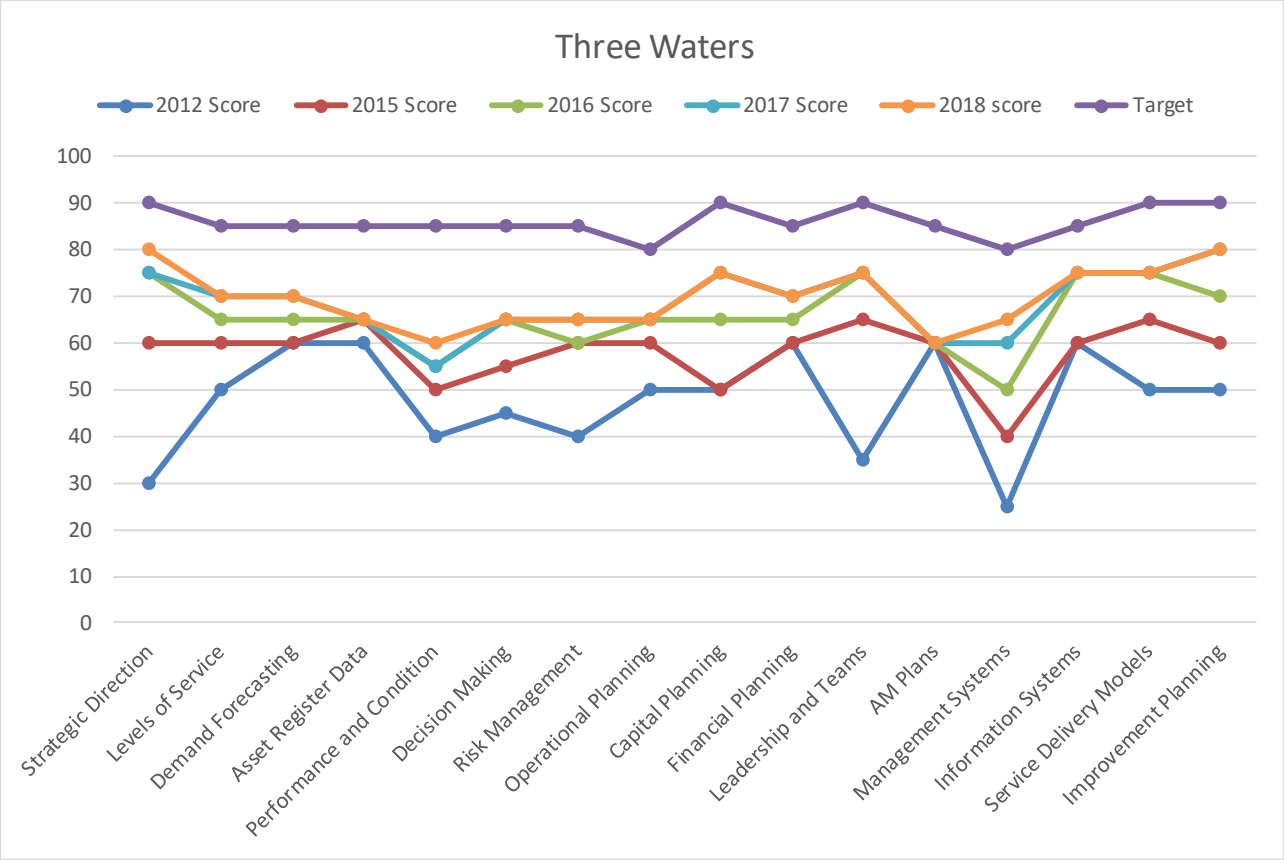

FIGURE 3: THREE WATERS MATURITY ASSESSMENT

AM Function	Current Status	Future Improvements
Establishing Strategic Direction	AM Policy and Inf Strategy in place. Corporate policy team established. Strategic context documented in AMP.	Refer Section 2.
Levels of Service and Performance Management	Good range of measures in place, annual reporting. Developing understanding of LoS / cost. Technical levels of service document drafted. Consultation occurs through Council and LTP process.	Complete the technical LoS document and process for reporting on measures. Consult on level of service targets with Council. Align AMP LoS and above.
Demand Forecasting	Draft water demand management plan in place. Demand management is considered in business cases. Demand forecast models in place for all schemes. Urban Development Capacity has been determined as a consistent basis for all infrastructure planning.	Use water demand plan strategies to model demand management scenarios. Annual update demand forecast models. Stormwater model updating. Include demand forecasts in AMP.
Asset Register Data	Reliable asset registers (GIS is primary register, also plant data in VAMS and work history in Infonet). Infrastructure Data Management Policy in place. Data analysis working group oversees data sharing/quality.	Ongoing focus on data improvements, data quality management and data 'ownership'. Review / document asset capitalisation processes.
Asset Performance/ Condition Assessment	Works history transferred from contractor system into Infonet to assist with maint/renewal planning (complete for ww, underway for ws/sw). Hydraulic models with network capacity / performance in place for most ws/ww schemes. Stormwater models in place but many several years old.	Develop/document condition and performance assessment strategy and programme. Ongoing development and update of hydraulic and catchment models. Maintain processes for capturing works history information for all assets.
Decision Making	BBC framework applied to major projects and programmes. Operational/renewal decisions still largely judgement based, but supported by improved works history data.	Ongoing management of BBC process. Renewal decision framework. Operational decision framework.
Risk Management	Risk management framework/register regularly reviewed. TechOne Risk Mgt System being implemented. Strategic risks built into BBC and Council reporting. Risk and Audit Committee established. Framework in place to assess criticality. BCP in place, but technology focus.	Development of a network resilience strategy. Implementation of Tech1 risk module. Criticality ratings applied to all assets, with strategy documented for applying these in OPEX/CAPEX planning. Expand BCPs beyond current technology focus.
Operational Planning	O&M manuals/procedures in place, held by contractor. Technical levels of service document drafted, plus '3-waters Network Management Plan' to document operational processes and decisions. Preventive maintenance programmes reviewed annually.	Complete 3-waters network management plan. Incorporate works history analysis to support optimisation of operational programmes and continuous improvement (eg: 'root cause analysis'). Operations procedures captured in Council system.
Capital Investment Strategies	Projects are identified / recorded / managed in 'El Cappo'. Renewal forecast is based contractor/ staff knowledge. Water and ww network models have been updated and calibrated to support upgrade programmes. External review of capital delivery being undertaken (EQ).	Ongoing development and upgrade of Master Plans, BBC project cases. Renewal programmes developed with condition / performance information. Implement recommendations of EY and ICR reviews.
Financial and Funding Strategies	Revaluations 3 yearly, looking to do bi-annually or annually. Financial forecasts are well developed through AMP and LTP. Confidence levels for asset data and financial forecasts. Costs being captured in Infonet.	Review asset lives and costs with analysis of work history / condition data for next revaluation. Confirm asset capitalisation/valuation hierarchy. Ongoing improvements to financial reporting.
Asset Management Leaders and Teams	AM team embedded in Council structure and relationships across Council well defined. Strong support at management and Council level for asset management and awareness of AM across Council is good.	Establish new structure and monitor for effectiveness and improvements.
AM Plans	Reliable AMP in place with most of the major components required of a core AMP.	Refer Section 4.2
Management Systems	Promapp used to support workflow process documentation, though review/auditing processes are not yet in place Corporate policy team established focussed on quality management, audits, change management.	Mapping of all major AM workflow processes. Data quality management processes reviewed, including clarifying ownership/responsibilities. Implement improvement module in Promapp.
Information Systems	GIS primary asset register. Infonet used to capture works history.	Continue to develop / manage Infonet. Implement Tech1.
Service Delivery Models	External competitive tendering for major maintenance contract. Strong partnering model in place. Significant review of procurement by ArcBlue in 2018. Market analysis to determine peak capacity.	Implement recommendations from procurement reviews (Arcblue).
Improvement Planning	Improvement plan developed and monitored. This assessment process used to monitor improvement.	Maintain current practice.

TABLE 4-1: AM MATURITY ASSESSMENT – THREE WATERS

Appendix 2: 2018 – 2028 TYP wastewater investments (as per approved TYP, budget inflated to year of funding)

Project Description	Commentary	Budget ($)
Luggate Reticulation - extension	Scheme extension to service area currently on septic tanks. Improving treatment and environmental/public health outcomes.	1,488,195
Wastewater - Renewals - Queenstown	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	6,774,751
Wastewater - Renewals - Wanaka	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	2,434,619
Wastewater - Renewals - Arrowtown	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	1,572,389
Wastewater - Renewals - Hawea	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	615,561
Wastewater - Renewals - Lake Hayes	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	373,685
Wastewater - Renewals - Arthurs Point	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	150,120
Wastewater - Renewals - Luggate	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	205,194
Glenorchy New Wastewater Scheme	Investigation budgets - New scheme to consolidate private schemes/septic tanks. Improving treatment and environmental/public health outcomes. Will also allow for growth.	53,260
Cardrona new Wastewater Scheme	New scheme to consolidate private schemes/septic tanks. Improving treatment and environmental/public health outcomes. Will also allow for growth.	3,001,749
Wastewater - AM Improvements	Asset management improvements including hydraulic modelling, flow testing and asset management systems.	3,566,957
Gordon Road Pump Station upgrade	Pump station upgrade to service growth in the Cardrona Valley Road, West Meadows and 'Alpha Series' area	808,196
Recreation Ground new WW Pump Station	New pump station at Queenstown Recreation Ground. Will divert wastewater away from the Queenstown Bay lakefront area. New location is also more contained if a catastrophic event occurred.	2,901,218
Lakeview Development WW servicing	Infrastructure to service significant growth area. Will convey wastewater to new recreation ground pump station avoiding the lakefront around Queenstown Bay.	288,514
Wanaka Airport wastewater connection to Project Pure	Investment to be driven by Wanaka Airport's needs.	740,529
Project Shotover new WW Disposal Field	Delivered - new ground disposal at Project Shotover	2,846,066

Marine Parade WWPS upgrades	Upgrades of the Marine Parade pump station. Will significantly reduce likelihood of overflows in the Queenstown Bay area.	448,164
Trade Waste - Customer Management System	IT system to improve trade waste enforcement. Trade waste controls will reduce fat build up in pipes causing overflows.	147,544
Project Pure WWTP upgrade	Capacity and resilience upgrades at Project Pure treatment plant.	5,987,890
Network Consents Programme	Network consenting activities	1,159,950
Arrowtown - Scheme Design	Masterplanning Budget	76,560
Arthurs Point Scheme Design	Masterplanning Budget	52,360
Hawea Scheme Design	Masterplanning Budget	52,360
Ladies Mile HIF Wastewater new Scheme	Scheme extension to service subdivision/plan change area on Ladies Mile.	2,039,700
Hawea WW Connection to Project Pure WWTP	Conveyance of wastewater to 'Project Pure' treatment plant. Will allow decommissioning of current Hawea treatment plant. Solution still to be confirmed, could be a new local treatment plant.	4,411,588
Willow Place WWPS Rising Main upgrade	Upgrade to the Willow Place rising main to connect to pipe constructed in 6828. Will enable flows to be conveyed across new pipe in the new Kawarau Bridge (new technology, less likelihood of breakages) and along Hawthorne Drive avoiding the Frankton Beach area.	517,982
Drainage Water Minor Capex	Minor capital improvement budget	88,690
Events Centre WWPS decommission	Gravity connection for small pump station at events centre.	60,000
Quail Rise HIF WW servicing	Scheme extension to service subdivision/plan change area on Ladies Mile.	1,439,242
Kawarau Bridge Remarks Park WW Rising Main	Delivered - stage 1 of removing flow from Hanley Farm and Kelvin Heights away from the Frankton Beach area.	1,980,580
Drainage Water Minor Capex Queenstown	Minor capital improvement budget	88,690
Project Shotover FOG Treatment facility	Investigations - how to treat Fats, Oils and Greases	1,009,000
Edith Cavell Bridge to Arthurs Point PS	Minor network upgrade	10,000
Nichol St Pump Station decommission	Decommissioning of pump station and reticulation via Cemetery Road now development has constructed required infrastructure.	172,370
Luggate new WWPS & Connection to Project Pure	Conveyance of wastewater to 'Project Pure' treatment plant. Will allow decommissioning of current Luggate treatment plant. Solution under construction.	2,413,125
Project Shotover WWTP upgrade	Capacity and resilience upgrades at Project Shotover treatment plant.	4,012,800
Luggate Scheme Design	Masterplanning Budget	50,440
Cardrona Scheme Design	Masterplanning Budget	53,260

Queenstown WW Scheme Design	Masterplanning Budget	90,440
Kingston HIF Wastewater new scheme	New scheme to service new subdivision, consolidate private schemes/septic tanks. Improving treatment and environmental/public health outcomes. Will also allow for growth.	25,866,904
Ballantyne Road disposal site upgrades	Security improvements	80,000
Ballantyne Road South WWPS upgrades	Pump station and network improvements	324,500
Project Pure FOG Treatment facility	Investigations - how to treat Fats, Oils and Greases	1,030,000
North Wanaka new WW conveyance scheme	New pump station in the Beacon Point Rd area. Removes significant flow from the Lakeside area and conveys it away from water directly to the main pump station that pumps to Project Pure.	6,155,712
Renewal of Resource Consent - Cardrona	Non-infrastructure	110,698
Wanaka Wastewater Scheme Design	Masterplanning Budget	56,740
CBD to Frankton Reticulation	Duplicate existing pipe with new technology and pressure main technology and upgrade (probably a structural liner) existing pipe, will significantly reduce the likelihood of overflows along lakefront.	10,248,227
Remarkables Park Pump Station Upgrades - New PS2	New pump station (development driven) and network upgrades that will also move flow away from the Kawarau River area.	532,185
Frankton to Ponds Wastewater Reticulation	Duplicate existing pipe with new technology and pressure main technology and allow upgrade of (probably a structural liner) existing pipe, will significantly reduce the likelihood of overflows.	3,407,236
Dungarvon #2 Pump Station	Investigation budget for long term solution	65,520
Network Connection to existing township	Scheme extension to service area currently on septic tanks. Improving treatment and environmental/public health outcomes.	2,240,128
Wastewater - Renewals - Glenorchy	No current scheme. Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	220,443
Wastewater - Renewals - Kingston	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	188,141
Wastewater - Renewals - Cardrona 2	Renewals to replace poor condition assets and reinstate life. Will reduce overflows by removing the potential for blockages caused by broken pipes etc.	211,809