ON PROPERTY LPSS SPECIFICATION

INTRODUCTION

This document is a supplement to the Queenstown Lake's District Council's (QLDC) *'Land Development and Subdivision Code of Practice'* (CoP). It documents the technical standards for the supply and installation of on property pressure sewer equipment in the Queenstown Lakes District and must be read in conjunction with the CoP. These pressure sewer systems are known as and referred to throughout this document as 'Low Pressure Sewer Systems' (LPSS).

This document is not intended to cover private pumping facilities to the gravity network (known as pump ups); however it's use as a proxy for those designs is recognised. These pump ups are specifically addressed in the *'Appendix G – Sewer Pump Stations'* section of the CoP.

This document does not cover, and QLDC do not currently permit, vacuum pressure sewer systems.

This specification is based on the objectives outlined in QLDC's *'Pressure Sewer Policy'* and gives technical information to suppliers to achieve these.

1 CONTENTS

1 DEFINITIONS

1.1 GENERAL

ALARM
A visual and/or audible signalling device used for indication of alarm conditions.

AVERAGE DRY WEATHER FLOW (ADWF)
The combined average daily sanitary flow into a sewer from domestic, commercial, and industrial sources.

BOUNDARY
Survey line separating adjoining properties for the purposes of defining ownership/title.

COLLECTION/PUMP UNIT
A package of sewer components installed on a property, including a collection tank, grinder pump, level switches, pipework, valves and other appurtenances within the unit.

COLLECTION TANK
That part of a collection/pump unit which collects and stores flows from the customer sanitary drain(s).

COMMISSIONING
The running of the plant and equipment to ensure flow through the collection and pumping system, carrying out any necessary testing and adjustments until it is ready and suitable for normal starting and running under service conditions.

CONNECTION POINT
Point of connection between the collection tank and the inlet pipework. Also called property connection point. See also connection point inspection shaft.

CONNECTION POINT INSPECTION SHAFT
A shaft at the connection point to allow inspection and maintenance of the sanitary drain.

CONTROL/ALARM PANEL
The power and control panel that controls operation of the grinder pump and which contains audible and visual alarm components. The panel also contains a dedicated circuit breaker for power disconnection.

CONTROL VOLUME STORAGE
The storage volume within the collection tank above the pump-off level (BWL) and below the pump on level (TWL).

CORROSION
Deterioration of a material and alteration of its properties due to chemical or electrochemical reaction between the material and its environment.

DEAD STORAGE
The volume within the collection tank below the pump-off level i.e., the volume that remains in the tank after a normal pumping cycle is complete. Also known as collection sump.

DISCHARGE PIPEWORK
Any pipework within the collection tank (i.e., from the grinder pump to the outlet pipework).

ELECTRICAL CABLE
A cable that delivers power from the building electrical distribution box to the control/alarm panel.

ELECTRICAL DISTRIBUTION BOX
A board that disseminates the main power supply to the property and is the primary source for metering.

EMERGENCY STORAGE
The volume within a collection tank between pump on level and overflow level i.e., the volume of sewage that can be accumulated once the pump has been activated and prior to overflow.

GRINDER/CUTTER PUMP

A mechanical device designed to pump liquid and, in the process, reduce the size of solids contained in the sewage.

HEAD
Pressure expressed in terms of the height of a column of water (in metres).

INFILTRATION
Ingress of groundwater into a sewer system.

INFLOW
Ingress of stormwater into a sewer system.

INLET PIPEWORK
A pipeline installed by a licensed plumber within the property boundary and operated by a property owner to convey sewage from buildings to the connection point; constructed to plumbing code standards. Also called house drain, house service line, house sewer, sanitary connection, property drain, sanitary drain, customer sanitary drain.

LEVEL SENSOR
A device used to activate a grinder/cutter pump when a predetermined level of sewage has been reached in the collection tank.

LEVEL SWITCHES
Control devices operating at single point levels to effect control of pump operation.

OPERATING STORAGE
The storage volume within the collection tank above the pump-off level and below the high water/alarm level. Comprises control volume storage and reserve (buffer storage).

OUTLET PIPEWORK
A pressure sewer line located on private property that connects the collection/pump unit to the property boundary assembly/kit, referred to as property discharge line in other publications.

OVERFLOW LEVEL
The level at which the collection tank will begin to overflow. This will be the lower of either the overflow gully level or top of tank.

OVERLOAD PROTECTION DEVICE
A device which protects electrical components from current overload.

PEAK DRY WEATHER FLOW
The most likely peak sanitary flow in the sewer during a normal day. Exhibits a regular pattern of usage with morning and evening peaks related to water usage for toilets, shower, baths, washing, and other household activities.

PRESSURE RETICULATION SEWER
A common main which transfers sewage from a number of properties to a downstream point in a pressure sewer system i.e., a component of pressure sewer reticulation.

PRESSURE SEWER LATERAL
A main that connects a pressure reticulation sewer to a property boundary assembly.

PRESSURE SEWER RETICULATION
A network of mains including pressure sewer laterals and property boundary assemblies which transports sewage from properties to a sewage treatment facility or another sewerage system.

PRESSURE SEWER SYSTEM
A complete system wherein macerated sewage is conveyed under pressure generated by pumping units located on each property to a sewage treatment facility or another sewerage system.

PROPERTY BOUNDARY ASSEMBLY/KIT
A fitting assembly that:

a) Connects a pressure sewer lateral to a property discharge line; and

b) Provides a means of isolating pressure sewer reticulation from a property discharge line and associated collection/pump unit/

It consists of, as a minimum, a reflux valve, inspection tee, and isolation valve and is generally located within a pit at the boundary of the property being served by the system.

PROPERTY CONNECTION SEWER
A short sewer, owned and operated by QLDC, which connects the main sewer and the boundary kit; it includes a junction on the main sewer, a property connection fitting, in some cases a vertical riser, and sufficient straight pipes to ensure the property connection fitting is within the lot to be serviced.

PUMP CONNECTION POINT
The point where the discharge pipework of the pump passes through the wall of the collection tank.

PUMP CONTROL/POWER CABLE
A cable which delivers power from the control/alarm panel to the grinder pump located within the collection tank and transmits control signals between the panel and the pump.

PUMP LEVEL CONTROLLERS
A device that detects sewage levels in the collection tank and initiates pump start/stop sequences.

RESERVE (BUFFER) STORAGE
The volume within the collection tank above the pump-on level and below the high water/alarm level i.e., the volume of sewage that can be accumulated beyond the normal operating volume prior to alarm activation.

SEWAGE
Water polluted by use and discharged to a sewer system.

SEWER
Pipeline or other construction, usually buried, designed to carry sewage from more than one source.

SEWER SYSTEM
Network of pipelines and ancillary works that conveys sewage to a treatment works or other place of disposal; see also *pressure sewer system.*

SURCHARGE
Condition in which sewage is held within a collection tank and sanitary drainage system but does not overflow.

SURFACE BOX
A purpose designed and manufactured pit and cover to provide access to appurtenances for operations and maintenance.

UNUSABLE STORAGE
The volume within a collection tank above the overflow level i.e., the volume of the tank that is unusable.

24 HOUR STORAGE REQUIREMENTS
The volume of wastewater in Litres expected to be produced per day, based on the guidelines outlined in the Queenstown Lakes District Council's Land Development and Subdivision Code of Practice.

2 GENERAL REQUIREMENTS

Low Pressure Sewer System (LPSS) units offered shall be complete systems including specifically designed collection tanks, grinder pumps, control/alarm panels, level sensors, pipework, and valves. They shall be designed and supplied as an integral unit.

The supplier/manufacturer of the LPSS shall be Aquatec or Ecoflow (or approved equivalent – refer to QLDC approved materials list).

To be considered for addition to the QLDC approved materials list, the supplier/manufacturer must demonstrate proven

track record supplying pressure sewer systems in Australia/New Zealand over a period of at least 15 years. The supplier/manufacturer shall provide proof that their products have been designed and built specifically for use in low pressure sewer systems (LPSS). Suppliers/manufacturers shall submit detailed installation and user instructions; and submit evidence of an established service and spare parts backup program, with spare parts and pumps available locally.

2.1 STANDARDS AND GUIDANCE DOCUMENTS

All components included within the LPSS shall comply with the following standards and codes:

- WSA 07-2007 - Pressure Sewerage Code of Australia
- AS/NZS 1546.1:2008 - Septic Tanks
- AS/NZS 3000:2018 - Electrical Installations
- AS/NZS 3500.2:2021 - Plumbing and Drainage
- AS/NZS 2566.1:1998 – Buried Flexible Pipelines – Part 1: Structural Design
- AS/NZS 5065:2005 – Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
- Water New Zealand Pressure Sewer National Guidelines
- NSW Health Certification
- SA Health Certification
- ISO9001:2008 – Quality management systems
- ASTM A351
- ANSI/NSF 46:2020 – Evaluation of Components and Devices Used in Wastewater Treatment Systems

2.2 QUALITY ASSURANCE

All collection tanks, pump units, boundary kits, and control panels shall be identified with a unique serial number. These serial numbers shall be:

- Permanently inscribed onto the component at the time of manufacture; or
- attached by means of a 316 stainless steel embossed/engraved plate with stainless steel drive screws; and
- not be painted or stickered; and
- located in a position that can be easily read after installation; and
- sufficiently detailed such that the quality assurance system provides traceability of the manufacturer from the serial number.

All LPSS installed shall comply with the quality assurance specifications outlined in Sections 8 through 11 of this document.

3 COLLECTION TANKS

3.1 GENERAL

Collection tank design and manufacture shall be for complete fabricated units and shall meet and adhere to all applicable standards. For residential units high-grade virgin polyethylene or glass reinforced fibre plastic (GRP) is preferred. Concrete is not an accepted material for any LPSS collection tanks.

Bases of collection tanks shall be domed, with a minimal flat section underneath the pump to minimise solids build up on the floor of the well/tank. LPSS tank depths shall be adapted for specific site conditions, volume requirements, and OH&S purposes when installing.

Collection tanks shall be able to be installed using small lifting equipment in areas with minimal access. The wells shall be of leak-proof design using proven materials and manufacturing techniques. They shall be designed for a service life of not less than 50 years.

The wells, including lids, shall be constructed from materials that are not subject to corrosion from sewage or galvanic action. All parts exposed to sunlight shall be resistant to UV degradation both in strength and colour. The wells, including lids, shall be designed and installed in accordance with AS3996 as below:

- Non-trafficable locations shall be rated to Class A loading.
- Standard chamber design in trafficable locations on-property (i.e., driveway) shall be rated to Class B loading;
- Non-standard chamber design or locations outside the property boundary shall be rated to Class C or D loading.

All metalwork within collection tanks shall be stainless steel Grade 316. Council may approve other corrosion resistant material where adequate corrosion performance can be demonstrated through previous applications.

Collection tanks shall be designed to resist structural failure under all service conditions. Selection of the appropriate pipe class, tank strength/stiffness and embedment, combined with correct manufacturer's installation practice, shall be undertaken to achieve this.

Commercial applications of this standard shall comply with all requirements outlined within this technical specification and have specifically engineered designs for each application. Load ratings for commercial installations shall be from Class C to Class E based on AS3996. Examples of tank materials for commercial applications are fibreglass filament wound reinforced fibre plastic (RFP) units in a designed and constructed one-piece construction; or HDPE100 material (Borealis HE-3490-LS) which is commonly used for large underground pipework up to 3 m in diameter.

3.2 TANK SIZING AND VOLUME

All collection tanks shall be designed and sized sufficiently to meet daily flow and 24-hour storage requirements (refer to QLDC CoP), having considered static/dynamic loading and water table requirements in design. Pipe sizes may be based on septicity requirements and confirmed with QLDC prior to construction.

The various storage volume components which make up the total storage requirement for an LPSS collection tank are shown in Figures 1 and 2 and described below.

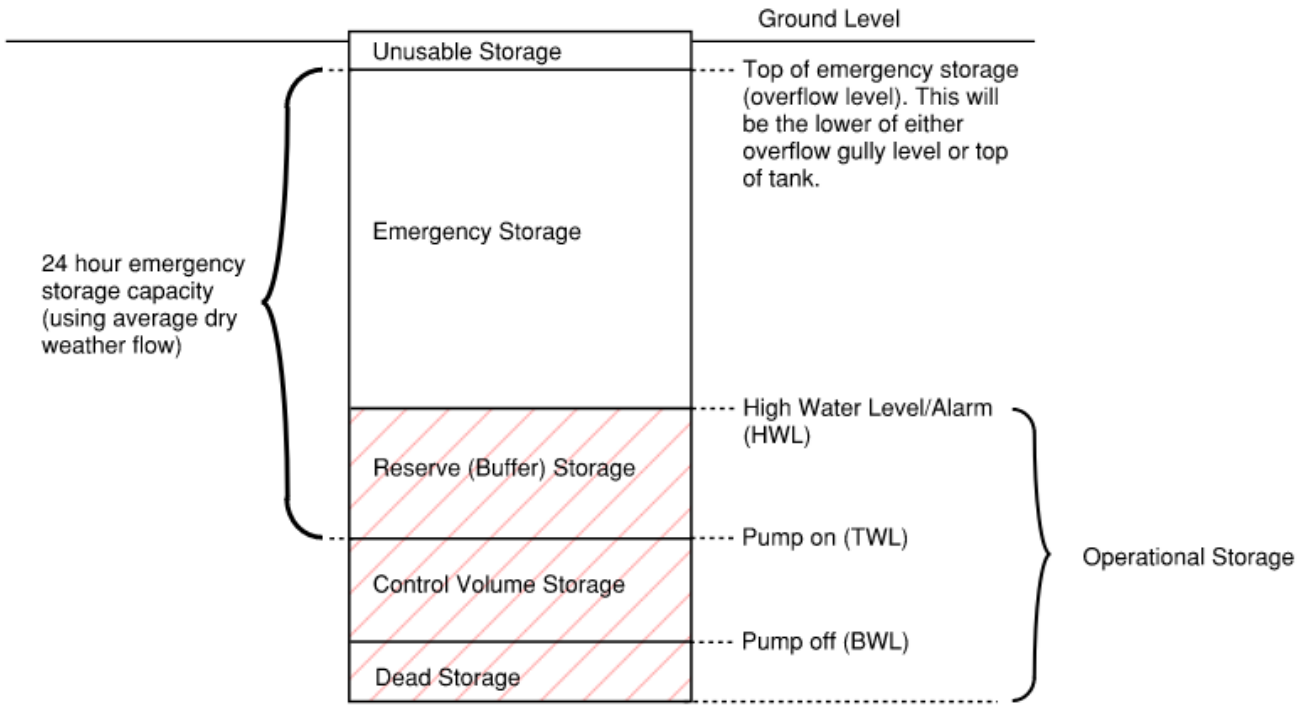

Figure 1. Storage components of collection tanks without network buffering

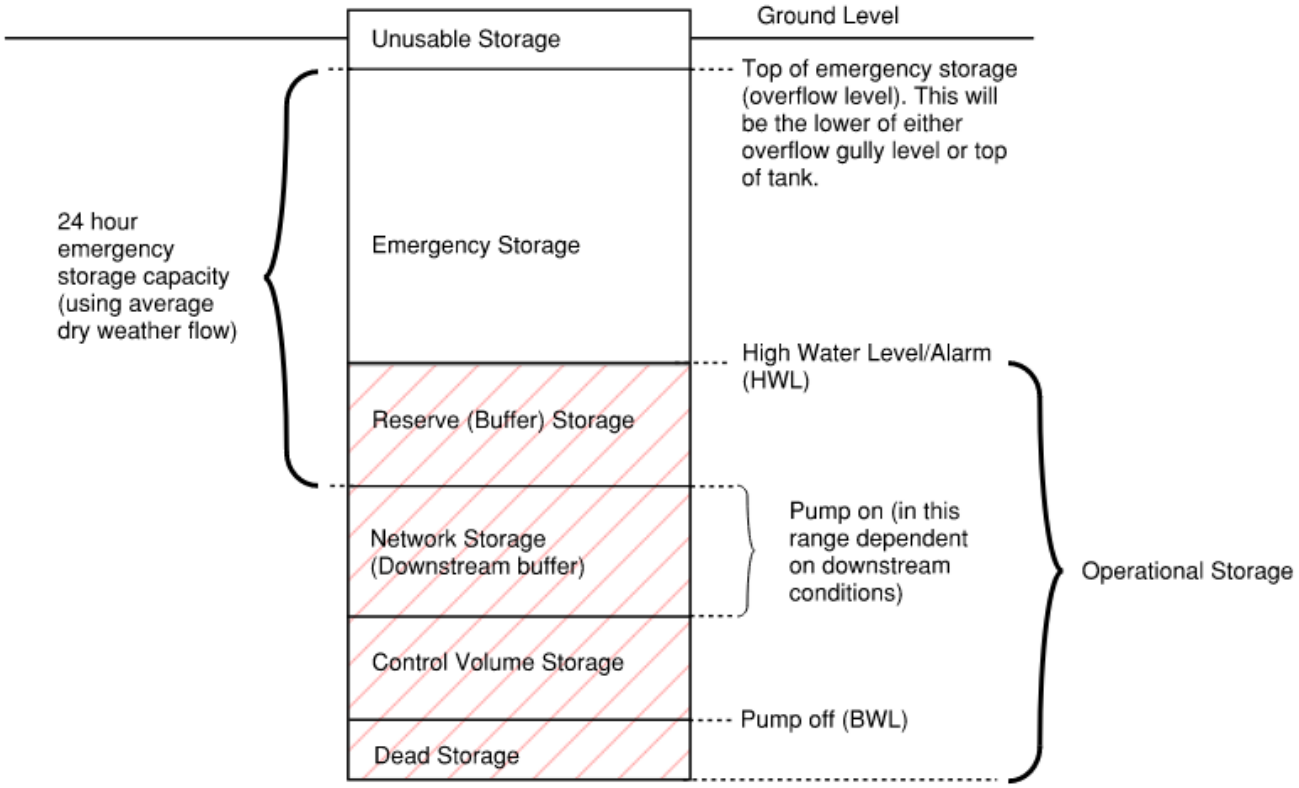

Figure 2. Storage components of collection tanks with network buffering

Residential collection tanks shall have a minimum storage as below:

- For collection tanks that have no requirement for network buffering (i.e., no additional network storage to reduce diurnal peaks entering the wastewater treatment plant):
    - Total Storage Volume of the collection tank (tank size) of at least 900 litres.
    - Emergency storage volume component (above pump on and below overflow) of minimum 24 hours emergency storage capacity (using average dry weather flow e.g., 750L for standard household assuming 3 inhabitants). *
- For collection tanks that are in areas that have a requirement for network buffering (i.e., diurnal peak and/or wet-weather attenuation prerequisites due to downstream capacity constraints):
    - Total Storage Volume of the collection tank (tank size) of at least 1100 litres.
    - Emergency storage volume component (above pump on and below overflow) of minimum 24 hours emergency storage capacity (using average dry weather flow e.g., 750L for standard household assuming 3 inhabitants).
    - Any sizing of these tanks shall be pre-agreed with QLDC, approved by the Infrastructure Delivery and Engineering Manager, and clearly include all design considerations required into their sizing.

*Where the above cannot be met due to standardised manufacturing constraints, compliance with the above shall be considered for any tank that is within 10% of the requirements outlined.

Commercial collection tanks shall have a minimum storage as below:

- Total Storage Volume of the collection tank (tank size) of at least 1500 litres.

This information is correct at date of issue. Always check in the relevant QLDC policy manual that this copy is the most recent version.

- Emergency storage volume component (above pump on and below overflow) of minimum 24 hours emergency storage capacity (using average dry weather flow).

Other tank sizing's or customisations where available in polyethylene or fiberglass require QLDC approval from the Infrastructure Delivery and Engineering Manager. Commercial collection tanks shall be designed on a case-by-case basis to suit the development. In some cases, subject to Council's detailed review and approval, a separate emergency storage vessel may be provided.

Collection tanks shall be selected to allow the most economic installation that meets the network design criteria. The well depth shall be sufficient to allow drainage pipes to be connected without backup in the pipe during normal operation. For normal installations it shall be assumed that the cover to the incoming pipe will be at least 1 m in trafficable areas; and 600 mm in non-trafficable areas as per the Code of Practice.

SPECIFIC REQUIREMENTS FOR COMMERCIAL UNITS AND PUBLIC AMENITIES

The number of pumps installed shall relate to flow output per day and serviceability (i.e., maintaining a minimum time between normal servicing of the pumps over a five year period). Where a two (or more) pump configuration must be installed into the collection tank, pumps shall be: industrial grade 2-stage centrifugal units; 2-Stage centrifugal vortex style grinder pumps; positive displacement/progressive cavity pumps; or semi positive displacement pumps specifically designed for commercial use in LPSS.

Flow and storage may differ from each site due to downstream capacity constraints. The ability to control the number of concurrent pumps operating at any one time shall be considered in order to manage flow conditions and optimise storage requirements across each catchment. Further specifications regarding this capability are included in section 7.2 'Controls'. Each design shall be submitted to QLDC for approval prior to construction.

3.3 LIDS

Collection tank lids shall be manufactured from UV resistant polyethylene and shall blend in with the environment. Lids shall be low profile, no more than 50 mm above ground level, installed to avoid surface water ingress and ponding, and suitable for pedestrian or trafficable areas as outlined in Section 3.1. Any lids in flood prone areas shall be able to be sealed. Lids shall be child safe and capable of being locked. A padlock or approved security bolt with unlocking tool supplied is acceptable. The lid to the tank shall be secured to the well body in such a way that it cannot be removed without special tools.

The lids shall be lightweight, so that one person can open them. Removal of the lid from the collection tank shall give easy access to the pumps and associated equipment. When the lid is removed it shall be possible to see the entire surface of the sewage collected and to use a 100 mm diameter eduction truck hose to empty the tank. It shall also be possible to clean any fats and oils that are sticking to the wall of the tank.

3.4 INLET AND OUTLET CONNECTIONS

All penetrations through the collection tank wall (other than the household drainage line/inlet connection point) shall be factory sealed to ensure no ingress of groundwater.

The collection tank shall incorporate a connection point via an approved 100 mm flexible rubber coupling. This rubber coupling shall be able to be cut short onsite to provide a clear opening for the 100 mm PVC inlet pipework. The inlet connection point shall be installed on the opposing side of the tank as the outlet pipework. All accessories required to install this connection point with a watertight seal shall be provided. The seals shall ensure that there is no ingress of groundwater into the collection tank. Each inlet connection point shall include a connection point inspection shaft consisting of a shaft and threaded cap opening at ground level, which shall be located below the overflow level of the tank.

A 316 stainless steel isolation valve and tank outlet shall be pre-installed into the chamber to connect the discharge pipework to the outlet pipework. Connection points shall not be cored onsite and uniseal connections are not acceptable

unless they are an approved repeatable part of the installation system; installed by an approved manufacturer's representative in accordance with manufacturer's installation procedures; and each methodology is approved by QLDC in advance; and QA records of these installations are kept and clearly marked.

Commercial units may have larger diameter inlet connections. These sizes shall be confirmed with QLDC in advance and be based on peak inlet flow.

The electrical conduit connections for pump and level controls need to have dedicated bulkhead fittings incorporating an electrical gland inside the chamber which can be tightened and sealed around the cables to eliminate the risk groundwater entering via cracked conduit and into the tank.

3.5 BALLAST

Collection tanks shall be installed with a suitable solution to prevent flotation and resist uplift either through tank design or installation method. Ballast calculations shall be provided for each proposed installation. The design shall prevent the units from floating when the water level is at the top of the unit. This may be achieved by the use of concrete if applicable. The units shall be shaped to adequately bond with any concrete or other backfill material. A factor of safety against flotation of at least 1.5 shall be provided.

3.6 PUMP CONNECTION POINT

Each system shall have a quick disconnection point within the collection tank to allow for efficient removal and disconnection of the pump for maintenance. This quick disconnection point shall be secure and reliable during operations. A 316 stainless steel camlock within the chamber is preferred, however suitable substitutes may be accepted by Council (such as a Goose Neck Mac Union coupler to Valve with pressure relief on outlet pipe).

Except for the pump connection point, the pump shall be able to be removed and reinstalled without the need to dismantle, or risk damage to, any other equipment. It shall be possible to properly reinstall the pumps while the well is near full (below the level of the pump connection point) of sewage. The pump connection points shall be located as high as possible, and in easily accessible locations. The pump connection point shall be accessible from the top of the lid without the need to lean into the tank. Multiple risers are not acceptable due to the health and safety risks they may create.

3.7 VENTILATION

Ventilation shall be provided so that sewage can fill to the top of the tank and empty without causing pressure build-up or suction. This ventilation may be provided through the lid. For flood prone areas, the ventilation system shall ensure that floodwater does not enter the tank and an external vent may be required along the wall of a nearby building.

Trafficable installations shall include a separate vent that is not subject to blocking or damage from vehicle movements.

4 PIPEWORK

4.1 GENERAL

All pipework shall be designed, manufactured, and constructed in accordance with QLDC's Land Development and Subdivision Code of Practice and standards outlined in Section 2.1 of this document. This includes but is not limited to minimum pipe sizes; gradient; gully traps; air vents; cleaning or rodding eyes.

All buried pipework shall be of polyethylene (PE) material and have a minimum pressure class of PN16. Pipework within collection tanks may be PE, PVC, or other suitable pressure piping system. Products, materials, and jointing methods shall be selected and specified for each location to ensure structural adequacy; corrosion resistance; suitability for geological conditions; appropriate construction methods.

4.2 INLET PIPEWORK

All inlet pipe work (customer sanitary drains) within the private property boundary between the serviceable or rated unit and the collection tank shall be minimised so as to limit unnecessary distances of private gravity infrastructure, and corresponding depths required to achieve appropriate gravity profiles.

4.3 DISCHARGE/OUTLET PIPEWORK

The discharge pipework shall have a pressure relief that may be manually actuated to mitigate the risk of splash back contamination to the operator upon disconnection of the pump.

Where possible, the outlet pipework shall be located parallel to lot boundaries.

5 BOUNDARY KITS

5.1 GENERAL

Each property shall have a boundary kit containing at a minimum:

- Isolation Valve (full bore or gate)
- Check Valve with top access
- Flushing Point

All boundary kit fittings shall be bronze (max zinc component 7%) or grade 316 Stainless Steel with a pressure rating of minimum PN16. The above shall be of integral one piece construction and included within a boundary kit pit.

5.2 BOUNDARY KIT PIT

The boundary kit pit shall have the following characteristics:

- Be large enough to contain valves and flushing points, with a minimum depth of 400 mm.
- Be installed with the cover flush with ground level.
- Be constructed from materials that are not subject to corrosion due to contact with sewage or galvanic action.
- Any parts exposed to sunlight shall be resistant to UV degradation in both strength and colour and shall be of an unobtrusive colour.
- Some pits and covers may be subject to vehicle loads. This is to be confirmed per site, with load ratings the same as for collection tank lids.

6 GRINDER PUMP UNITS

6.1 PUMP GENERAL

A pump with an integral grinder unit shall be supplied with each collection tank. The pump shall be supplied with all necessary pipework, valves, and pressure sensing equipment. The pumps shall be submersible to IP68, specifically designed for the pressure sewer market, and may be one of the following:

- Regenerative Turbine Grinder Pump.

- 2-Stage centrifugal vortex style grinder pump.
- positive displacement/progressive cavity pump; or
- semi positive displacement pump.

All pumps, including the check valves that are part of the grinder pump package shall be tested to NSF/ANSI 46-2007. Pumps shall have a minimum design life of 25 years and include no materials that may degrade significantly while the product is on the shelf.

The pump identification nameplate shall include:

- manufacturer's name;
- address;
- pump type;
- Horsepower
- Hz
- Voltage
- Ampage
- Manufactured date
- Patent
- Serial number
- Head
- capacity;
- size;
- motor kW;
- serial number;
- order/contract number;
- speed;
- year of manufacture;
- and pump casing test head.

The pumps shall:

- Be self-priming;
- Be current models which have proven successful operation under similar conditions;
- Be fit for purpose (i.e. their duty point must be adequate for the area with the highest head requirement, considering implications of the entire catchment and wider area);
- Have easily replaceable parts that protect the integrity of the pump motor by acting as a sacrificial layer;
- Be suitable for domestic, commercial and industrial sewage;
- Be suitable for intermittent operation with up to 20 starts per hour;
- Have a maximum speed of 3000 rpm;
- Have shaft and rotors of stainless steel.

PUMP MOTORS

Pump motors shall be specifically designed for New Zealand (Queenstown Lakes District) conditions, and domestic units shall be at minimum 0.75KW, 240v 50Hz, single phase with IP68 submergence rating. Residential pump units may be air cooled or oil coiled.

Commercial units may be either single phase, or three phase 415v 50Hz, depending on the flows per day, storage requirements, and service intervals. Industrial units shall be three phase 415v 50Hz. Commercial units shall be oil cooled and capable of continuous running for an extended period without deterioration of pump performance.

Each pump shall have an inbuilt anti-siphon valve and a non-return valve located on the discharge standpipe of the pump, removable by a flanged arrangement.

The supplier shall carry spare parts (overnight and complete pump availability) and offer 24-hour support in the case of any faults.

Any industrial units/applications shall be agreed with QLDC prior to construction. Residential units are not considered adequate for industrial applications and will not be accepted.

6.2 PUMP OPERATIONS

Residential pumps shall have a predictable and constant flow rate across the required pressure head ranges, and shall comply with the following head and flow capabilities:

- Maximum flow rate of less than 1.25 L/s at zero head;
- Minimum flow rate of greater than 0.4 L/s at 55 m head;
- Rated for continuous operation at 55 m head;
- Ability to run continuously at no head and maximum flow;
- Ability to operate intermittently at between 55 m and 80 m head
    - ‘Intermittent’ running is expected to be on rare or unplanned occasions (i.e. after prolonged power outages); and
- Either have the ability to run against a closed discharge head for unintentional long periods of time with no impact on the performance or damage to the pump (for the avoidance of doubt the system shall be designed so that these events are avoided or mitigated) or; otherwise have protections in place to trip the pump so these do not occur.

The maximum designed continuous operating head for any pump in a system shall be 55 m. The pumps shall also have integral built-in protection to mitigate situations where overheating or excessive head is encountered, guarding the integrity of the pump and achieving the longest possible asset life.

The pumps shall also comply with the following requirements:

- Be able to handle sand and abrasive material, with proven results on wearing parts;
- Have a standard cord length of minimum 15 metres (for connection to the control panel), with longer options available from the manufacturer.
- Have all wearing parts of the regenerative pump turbine coated with an approved abrasive coating that has proven performance for pressure sewer applications.
- For progressive cavity style pumps the material of the stator shall be EPDM

6.3 GRINDER/CUTTER PUMPS

Grinding mechanisms shall be designed to minimise the inlet velocity such that solids have sufficient opportunity to be processed. Grinding mechanisms shall be manufactured from materials with proven performance in wastewater environments and with high wear or abrasion resistance. Grinder pump grinding performance shall comply and be tested to ANSI/NSF 46:2007. Suppliers shall provide evidence of a grinder pumps certification and test results from the Household Items Loading Test (section 9.4 table 1 in ANSI/NSF 46:2007). Grinder mechanism shall include features to promote stirring to keep solids in suspension.

Grinders shall comply with the following requirements:

- The grinder shall be positioned in such a way that solids are fed in an upward flow direction.
- The impeller mechanism shall rotate at a nominal speed of no greater than 3000 rpm.
- The grinder shall be placed immediately below the pumping elements and shall be direct driven by a single, one-piece, Stainless Steel motor shaft.
- Should an item come to rest lying inside the cutting or shearing face, the grinder pump should have sufficient torque to restart when debris is lodged inside the grinding mechanism.

The pumps shall be able to handle sewage debris which includes but is not limited to:

- Fibrous items such as sanitary pads, tampons, nylon stockings, underwear, baby wipes etc.
- Flexible items such as condoms, plastic bags
- Solid items such as bottle tops, hypodermic needles, cotton buds
- Coagulating liquids such as fats and oils

6.4 ELECTRIC MOTORS

Electric motors shall be squirrel cage induction type with a low starting current (does not exceed 30 amperes or allowable circuit protection startup currents). Inherent protection against running overloads or locked rotor conditions shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. For submersible pumps, the electric motor shall be IP68 for submergence to a depth of 6 metres. The pump units shall be capable of being operated on a single phase power supply typical of a residential household without the need to augment the power supply.

Semi positive displacement pump motors shall be 0.75kW, 1425 RPM, 240 Volt 50 Hertz, single phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current (does not exceed 30 amperes, or allowable circuit protection startup currents), and high starting/locked torque of 11.4/15.6 Nm.

6.5 PUMP PROTECTION

Grinder pump motors shall be fitted with inbuilt no-flow and thermal overload protection as standard. Current sensors for over pressure protection are also acceptable.

Pump motors shall be suitably sized for the pump type. The grinder pump shall include features to protect the pump from operating under unideal conditions. These features include thermal overload protection, over pressure protection. Pump motors shall be oil-cooled or air-cooled and the supplier shall provide evidence that the motor is capable of operating across the entire performance range and a variety of duty cycles without overheating. For oil-cooled motors, suppliers shall provide proper guidance and training for periodic replacement of dielectric oil and instruction on disposal so oil does not pose an environmental or health and safety risk.

6.6 PUMP ACCESS

The pump shall be able to be lifted by a means other than the discharge pipework or cabling. The pump shall therefore be fitted with a permanently fixed and suitable lifting chain, marine grade polypropylene rope (suitable for sewer conditions) or equivalent for lifting and manoeuvring the pump into position inside the tank.

Pumps shall be installed such that removal from the well can be achieved without entering the collection tank. The internal outlet quick connector and plug for the pump shall be reachable from ground level without the need to lean into the pump chamber.

Commercial Duplex and Triplex grinder pump units shall be installed on 316 stainless steel C-channels for chambers greater than 3 metres in depth. When installed with C-channels the discharge pipework within the well shall also be 316 stainless steel.

Service technicians shall follow local and national health and safety guidelines when handling grinder pumps and other components of the grinder pump system. Lifting trolleys shall be used when installing or removing grinder pumps from tanks.

7 ELECTRICS & CONTROLS

7.1 GENERAL

An alarm/control panel shall be supplied for each collection tank, installed by the unit installer. The control panel shall contain the operational controls and alarms needed to operate the pump, including at minimum:

- Pump/panel Circuit Breaker
- A switch with On/Off/Auto Positions
- Alarm and Control Components
- Battery backup for alarms for at least 48 hours without power.

The pump controller/alarm panel provided shall be a complete control system incorporating all equipment pre-assembled, wired and tested prior to delivery. The panels shall comply with the requirements of AS/NZS3000:2018 Wiring Rules, shall be wired to a dedicated separate circuit breaker at the property's existing meter box, and shall be wall or pedestal mounted.

The control panel identification nameplate shall be visible on the outside of the control box and include at minumum:

- Telephone number to call in case of issue with the LPSS
- Manufacturer's name

A further identification nameplate may be included on the inside or outside of the control box and shall include:

- Pump Type
- Pump Capacity
- Pump Size
- Pump Motor KW
- Serial number
- Order/contract number
- Pump speed
- Year of manufacture
- Pump casing test head.

7.2 CONTROL PANEL

An electrical alarm/control panel shall be supplied for each collection tank. The panel shall be suitable both for wall mounting and pole mounting. The panel shall be constructed to comply with AS/NZS 3000.2018 Electrical Installations. All controls shall be contained within the control cubicle preventing the necessity to remove the pump unit to attend to electrical faults.

The control panel shall be manufactured from polycarbonate or GR 316 stainless steel to ensure robustness and have suitable protection against vandalism and UV rays seen in Australian / New Zealand conditions and be of weatherproof construction to a minimum IP65 rating. It shall utilise high quality componentry. All penetrations shall be on the underside of the panel only and an appropriately sized gland is to be provided to prevent any water ingress. The panel shall be fitted with corrosion proof hinges. QLDC may accept other corrosion resistant material where adequate corrosion performance can be demonstrated.

Internally, the panel shall have a safety barrier (An internal escutcheon panel which covers the entire area of the panel and which only allows access to the operator controls for protection against unauthorised entry) compliant with AS/NZS 3000:2018.

The control panel shall incorporate the following features:

- Key lockable with the lock uniform across all installations
- Audible alarm 90Db with mute button
- Low voltage visual alarm light
- Automatic mute for audible alarms after 5 minutes with 12 hour restart
- Pump/Panel Circuit Breaker (must be double pole)
- Selector switch with Auto/Off/Manual positions
- Compatible with level switches, or 4-20mA, 0-5v and 0-10v pressure transducers
- Under and over voltage protection
- Hours run display
- Number of starts display
- High level and low level (run dry) indication
- Over pressure protection
- LED status indication for pump run fault, pump stop and common faults
- Backlit LCD screen for all status and alarm displays
- Ability to record, view, or store a downloadable history of events
- Inbuilt event history for minimum 4000 events
- Adjustable random restart delay after power failure
- Ground Lug for incoming connections
- Battery backup for alarms
- Generator plug in point (for emergency power outages)
-

The control panel shall be able to be upgraded simply and without enclosure modification to natively support the following:

1) Sim card for cellular based communication or alternative communications module (e.g. fibre optics);
2) Fully integrated SCADA to suit QLDC's existing telemetry system which may include the following features:
    - Adjust start periods or pause pump operation,
    - Full remote visibility of all operational information,
    - 2-way control of all stations,

This information is correct at date of issue. Always check in the relevant QLDC policy manual that this copy is the most recent version.

- Ability to remotely communicate Firmware updates.
- Real time clock
- USB port access or web based portal for history and real time view faults

Battery backup to allow communications and alarms

Control circuitry and/or level sensors operating in the collection tank shall be low voltage and suitably designed and installed for use in areas that may contain explosive gases.

Cable entries from the collection tank to the control panel shall be designed and sealed appropriately to ensure no fumes/gases are able to enter the control panel. Design shall be rugged, durable, and preventative of gas build up, fire, or explosion. Design shall also be tolerant to operators, maintenance contractor, or owner error.

The control panel shall ensure that the maximum pump starts per hour (recommended by manufacturers) are not exceeded.

SPECIFIC REQUIREMENTS FOR SMART SYSTEMS WHERE WASTEWATER FLOW CONTROL IS REQUIRED

Where Wastewater flow control is required, such as for network buffering to minimise downstream storage requirements, the controller installed at each property must include the following features:

- IP65 minimum rating;
- 240V controlled output to pump;
- Local Pump control on cut in / out levels with remote setting option;
- Telemetry connection for monitoring and control to back end server;
- Fault alarms direct to operators via email and/SMS to include as a minimum the following:
  - High level alarm above cut in level;
  - Power outage alarm (Black out or Brown Out);
  - Communication fault alarm;
  - Pump over current alarm;
  - Pump long run alarm;
  - Level sensor fault alarm.
- Online portal for operator access to include as a minimum the following:
  - Map showing individual connection locations;
  - List showing individual connection status;
  - Filters to select all active alarms;
  - Individual connection graphs of continuous liquid levels monitoring;
  - Options for operator selection of pump controls;
  - Options to add new sites or update controller reference data.
- Operator pump control of individual or multiple selected connections via online portal to include as a minimum the following:
  - Control mode to reduce diurnal peak flows based on network based concurrent pump control;
  - Control mode to generate self-cleansing flushing velocity in network;
  - Control mode to inhibit pumps in an emergency.
- Automated control mode for post emergency recovery to prioritise connections with highest levels and control peak flows;
- Connection hard wire to tablet with App for controller diagnosis to include as a minimum the following:
  - Alarm status;
  - Pump Status;
  - Amps draw during pumping;
  - Pump Voltage ;

  - Level reading;
  - Comms status with communication network;
  - Comms signal strength;
  - Comms status with back end server;
- Backup audible buzzer and light alarm on the controller;
- Float switch pump activation trigger and remote alarm in high level situation.
- Spare IO to facilitate connectivity of potable and recycled water pulse meters to achieve daily flow data reporting

7.3 LEVEL CONTROLS

Level Controls shall be installed as per manufacturer's recommendations and shall be pre-set at the factory. Level controls shall also have a back-up system to provide an alarm should the main level system fail.

Level sensors for measuring the level of sewage in the pump well shall be supplied. The primary sensors may be integral to the pump unit, or separate from the pump. A separate level sensor shall be used to detect high level in the pump well and to provide a high-level alarm signal. This shall be a back-up system to provide an alarm should the main level system fail. Level sensors may be pre-installed at the factory. If not factory installed, the installer shall be adequately trained to install the sensors and correctly set their levels.

Any pressure sewer system with more than one pump must not utilise level switches integrated to the pump. Separate level controls shall be installed independently of the pump and be connected to the control panel to allow full coordination of pump operation and adjustability to suit each application.

The pumps shall be controlled by probes or pressure sensors installed in the pump well. The probes or pressure sensors shall indicate the following levels:

- Low Level (BWL) – the pump stops;
- High Level (TWL) – the pump starts;
- Above High Level (HWL) – the alarm is activated.

A *'below low level'* sensor may also be supplied which shuts down the pump and activates the alarm. The '*low level'* shall be set as low as possible, while maintaining adequate submergence of the pump. The *'high level'* shall be set as low as possible to minimise storage, while not exceeding allowable pump start frequency at any flow rate. The *'above high level'* shall be set so that in normal operation it is not reached. Adequate volume between *'high level'* and *'above high level'* shall be installed to balance instantaneous inflows. If the operating levels can be adjusted they shall be readily adjustable by a worker remaining outside the well and complying with all OH&S requirements for safe working.

Control circuitry for the level sensors shall be contained in the alarm/control panel. The panel shall also have an OFF/Auto/ON switch or equivalent button configuration for the pumps. The ON setting shall bypass all pump controls except the thermal overload. The pumps shall be protected from overload and over pressure operation.

In situations of recovery after a blackout, pumps shall be programmed to come online through a deliberate strategy that staggers individual pump restarts so they are not all at once (i.e. time delay starts whether locally or from SCADA).

7.4 ALARMS

The pump controller shall be fitted with an audible alarm (buzzer) and a flashing red light that activates if the level of sewage in the collection tank reaches a high level. The audible alarm shall comply with the lower of: EPA rules; or noise restrictions outlined in QLDC's Operative District Plan ODP (PDP) where applicable. The audible alarm shall run for a maximum of ten (10) minutes and may only be restarted on activation of a new fault after the mute button has been pressed and the initial fault has been rectified.

The control panel shall include a mute button for the audible alarm to silence it on acknowledgement. The mute button shall be accessible externally to the pump control cubicle and shall be located in a protected position (generally underside of cubicle).

The operation of alarms shall be as follows:

- Above High Level: visual and audible alarm activates but pump does not stop. Alarm resets when the high level condition is rectified.
- For all other faults including over temperature, no flow, over pressure, overload, and *'below low level'*: the pump shall stop and operation re-commence when the fault is rectified.

The control panel shall have a reset procedure, which may only be carried out when the panel is opened. The procedure may use either the OFF/Auto/ON switch or a separate "Reset" button. The audible alarm shall be capable of field disconnection without interference to any other electrical functions.

7.5 ELECTRICAL INSTALLATION

All Electrical work shall be performed by a Licensed Electrician and shall be installed to comply with AS/NZS 3000.2018 Electrical Installations. The alarm/control panel shall be suitable for connection to a standard residential meter panel.

8 FACTORY TESTING AND COMMISSIONING

8.1 FACTORY TYPE TESTING

Before any units are installed, the following tests shall be carried out at the suppliers workshop.

Alternatives may be considered by QLDC if the supplier can provide details of a proven, standardised testing regime already adopted by the factory that addresses the intent of the following clauses.

If the unit supplier has already carried out type testing, type test certificates which cover the required tests may be accepted in lieu of factory testing.

Certificates giving records of tests carried out shall be supplied.

A copy of the completed supplier testing certificates and results for all components (tank, boundary kit, pump, electrical and control boxes). Factory Test shall be carried out and serialised for traceability and certificates provided with supply and delivery.

8.2 GRINDER PUMPS

Pump tests shall be carried out in accordance with AS 2417-2001 Annex A, or where not relevant, applicable international standard.

The pump casings shall withstand a hydrostatic test pressure scheduled for a period of 15 minutes without any leakage or permanent distortion.

8.3 COLLECTION TANKS

The collection tank shall be hydrostatically tested prior to installation to ensure that all penetrations are watertight.

The collection tank shall be prepared by installing a short section of test pipe (using the method for installation of inlet pipework) and sealing off all openings and vents. The unit shall then be tested via a hydrostatic test to a pressure of 3 m above the top of the well. The test shall be considered acceptable if there are no drips or weeps.

8.4 BOUNDARY KITS

The boundary kit shall be individually pressure tested at the factory and serialized for traceability of the pressure test. Testing regime shall include closed ball valve test, open ball valve test, and check valve test. Test pressure shall be minimum 16 bar.

8.5 ELECTRICAL AND CONTROL PANEL

The electrical and control panel shall be tested at the factory and serialized for traceability of the tests. Testing regime shall include input/output tests, power-up, logic and programming tests, and communications module testing.

9 SITE TESTING AND COMMISSIONING

Site testing shall be carried out by the unit installer. Completion of commissioning of any unit shall mark the start of the warranty period for that unit.

9.1 GENERAL

All operational tests on the pumping units shall be conducted using Queenstown Lakes District Council's Code of Practice, connection to council services application and integrated three waters bylaw, with the pumping unit only connected to the sewerage reticulation system after these tests using town water have been successfully carried out.

9.2 LEAKAGE TEST

A leakage test shall be carried out after completion of all pipework connections, but before the electrical control panel is switched on. The test shall be performed as below:

- The pump well shall be filled to the underside of the lid.
- Losses shall be observed after a minimum of 2 hours.
- No leakage should be observed.
- This test is to test the pump well, pipe seals and part of the connecting pipework.
- The connecting pipes may need to be plugged temporarily.

If leakage is observed, the collection tank and inlet penetration shall be inspected and any faults found rectified before retesting is undertaken.

9.3 SIMULATED POWER FAILURE TEST

The leakage test shall be conducted immediately before tests for operational readiness. As such, the initial operational tests will commence with the pump storage vessel filled to a high water level.

The pump should thus commence in an alarm mode when the power is turned on to the alarm panel, as per a power failure scenario.

This shall be the first test to determine if the alarms will automatically turn on and then off, as the pump reduces the volume stored in the storage vessel to below the high level alarm, and then to the normal pump 'OFF' levels.

9.4 TIME BASED OPERATIONAL TEST

The pumps shall be considered operationally ready when they have successfully operated for a period of one to four hours (or as needed to achieve 3 on/off cycles) with a constant inflow rate of around 0.1 to 0.2 L/s (this is the typical inflow from a garden hose discharging into the system at reasonable pressure). This test should involve at least three on/off cycles.

The variable time period above has been deliberately included to allow for regions where there are drought conditions being experienced or lack of water for other reasons. The test may be reduced to one hour to minimise any water wastage. QLDC shall instruct the unit installer as to the test parameters to be carried out.

9.5 ALARM TEST

In addition to the above operational test, the unit installer shall suddenly discharge quantities of water into the pumping unit's storage vessel rapidly from large water containers, such that the alarm level is exceeded. The pumping unit shall then be observed to see if the alarm initially comes on and subsequently if the alarm then automatically shuts off, after normal pumping levels have been achieved.

9.6 PUMP PROTECTION TEST

The pump shall also be tested against a closed valve, to ensure that the pump's safety cut-outs are working satisfactorily. This test need be conducted only once and due precautions shall be taken against sudden pipe failure. The pump shall be tested against the closed the boundary property valve.

9.7 COMMISSIONING OF PUMPS

The commissioning will consist of opening the isolation valve(s), and turning on the control panel for automatic operation. Commissioning will be considered complete after one week of fault free operation.

9.8 SYSTEM TEST

Based on the design calculations provided by the designer, the supplier and contractors shall carry out for QLDC to witness tests of the installed system. Flow rates and pressures shall be measured as part of this test to ensure that the system performs in accordance with the design. Any significant departure from the anticipated performance shall be referred to the designer and/or unit installer for rectification.

10 MANUALS

10.1 INSTALLATION MANUALS

Detailed instructions for the installation of the pump stations shall be provided in an installation manual specifically prepared for pressure sewer installations.

The Contractor shall ensure the LPSS is installed and commissioned in accordance with manufacturer's specifications.

10.2 OPERATIONS AND MAINTENANCE MANUALS

The grinder pump supplier shall have a suitably qualified local service agent to support privately owned grinder pumps. The service agent should hold adequate spares to support the install base. The suppliers phone number shall be on the alarm panel to enable the homeowner to contact them in the event of an alarm. The supplier shall demonstrate they have adequate 24/7 support to the homeowners and can achieve a response time within the 24hr emergency storage time.

The unit installer shall provide an operation and maintenance manual for the system. The manual shall comprise the following sections:

- Introduction;
- General principles of operation;
- Technical details of all equipment supplied;
- Typical installation schematics;
- Routine Maintenance (if applicable);
- Troubleshooting;
- Dismantling and re-assembly procedures;
- System design drawings for each area;
- Training Manual.

10.3 SPARE PARTS

A spare parts list and replacement equipment specifications shall be provided to ensure that the owners/operators always have adequate information for procurement and replacement of parts, and to allow service crews to take a replacement unit to all call outs.

Spare parts shall be available locally at all times.

10.4 WARRANTIES AND INSURANCE

All warranties shall be provided to the owner as part of the owners operations and maintenance manual.

A warranty for each pressure sewer collection/pump unit shall, as a minimum, begin from the date of delivery and cease not less than twenty-four (24) months following the date of installation. The supplier shall also maintain a quality control system for managing the delivery of pumps and recording the pump numbers, unit serial numbers and delivery dates for warranty work.

The warranty shall be to rectify any defect in the materials and equipment supplied under the contract for the duration of the warranty period. The supplier shall also guarantee the components against installation defects if installed by an accredited pump installation contractor.

11 AS-BUILT INFORMATION PACKAGES

A file shall be maintained on each pressure sewer system area. Information shall be submitted to QLDC in an electronic format and shall include, but is not limited to the following:

REPORTS

- Concept Report
- Design Report
- Final Design Report

RETICULATION MAINS

- Work As Executed Drawings/ As-builts and asset data as per QLDC's standard requirements in the QLDC Subdivision and Land Development Code of Practice;
- Long sections to indicate pipelines that have been directionally drilled;
- Dates of construction completed for the pressure sewer system area;
- Dates made operational;
- Dates of boundary kits installed on the property
- Pressure test results and verification
- Dates of each property lateral laid

ON PROPERTY INFORMATION

- Property Address, lot number, GPS coordinates, owner's details, and any special property features;
- Work As Executed (WAE) drawing for each property;
- Sewer Service Diagram (SSD) requirements for the house drainage details (may be included with the Work As Executed drawings). The house drainage portion of the WAE to comply with all the rules and regulations of Queenstown Lakes District Council. Plans to include but not limited to the following details:
  - well location

- house sanitary drain connection location
- all pipe, valves and fittings up to the boundary kit
- control panel and power and control cable locations
- boundary kit location

- Tapping point and isolation valve location on common rising main
- The date work commenced on the property The date the work was completed and the installer had left the property
- The date the pump made operational and results of pump testing
- Date and number of pump commissioning certificate
- Manufacturer, serial number and warranty information of pump station/collection tank, electrical/control panel, Isolation details for the site
- Electrical details
- Operation and Maintenance Manual and emergency contact details
- For all trade waste installations and for private installations where the on-property equipment is to be privately owned, evidence that a service agreement is in place

APPENDIX A: TECHNICAL SCHEDULE – RESIDENTIAL UNITS

Pumping Equipment	*Ecoflow - E/One*	*Aquatec - Barnes*
Nominal Duty at 40m Head	0.5 l/s	0.5L/Sec
Maximum Continuous Operation Head	56m	60 metres
Manufacturer	Environment One - E/One	Aquatec Barnes (or approved equivalent)
Country of Manufacturer	USA	USA
Model	Extreeme Series Grinder Pump	OGT 10S2 AU
Type	Progressive cavity	Regenerative Turbine
Casing Material	Cast Iron	Cast Iron ASTM a-48, Class 30
Pump/Motor seal type/material	Mechanical Seal ceramic seat, carbon rotating surface	Mechanical/Silicon Carbide
Pump Shaft Material	One piece Stainless steel	416 Stainless Steel
Pump Impeller Casing	Cast Iron	Stainless Steel
Grinder/Type/Hardness	Forged 4140 cutter wheel with cutter teeth (Rockwell 55-58c)	440C Stainless Steel Hardened to Rockwell C-55
Motor Size (kW)	0.75kW IP68	0.75KW rated IP68 submersible to 9 meters
Motor Protection	Thermal Overload	Thermal Overload
Motor Insulation	Class F	Class F
Electrical Quick Disconnect	Radial Seals Nema 6P	Rated IP68
Pump and Pipework Protection over Pressure Protection (Optional)	Adjustable wattage sensor, typical trip out at 70m -1500W	Pressure control must cut power to unit at preset discharge head and reset automatically.
Sound Level Emissions outside of Pump Well	Not detectable	Not Detectable
Weight of Pump Unit (kg) Maximum	45kg	38kg
Lifting Material	Marine Grade Polypropylene rope	Marine Grade Polypropylene rope

Pipework & Fittings	*Ecoflow - E/One*	*Aquatec - Barnes*
Inlet coupling type/size	Proprietry E/One uniseal to suit 10mm thick wall	Flexible connector/100mm
Discharge Pipework Size & Material (describe fully)	32 PN16 flexible pipework with propriety E/One 316 S/S ballvalve and disconnection gooseneck.	32 PN16 flexible pipework with 316 S/S camlock couplings for disconnection.
Discharge Valve and Tank Outlet	32mm 2 piece 316 stainless steel ball valve and threaded tank outlet.	32mm 2 piece 316 stainless steel ball valve and threaded tank outlet.

Electric and Controls - Standard	*Ecoflow - E/One*	*Aquatec - Barnes*
Pump Controller	Single, Duplex pump operation.	Single, Duplex or Triplex pump operation.
Material	Polycarbonate (lockable)	316 stainless steel (lockable) or polycarbonate (lockable)
Proposed Location	Wall of dwelling	Wall of dwelling
Designed to Australian / New Zealand Standard (Nominate)	AS 3000:2018	AS 3000:2018
Level Switches	*Ecoflow - E/One*	*Aquatec - Barnes*
Type	Pressure switches in head of pump	Float Switch Level Control Assembly
Make	E/One or (Iota for smart controller)	Aquatec (or approved equivalent)

Pump Well - Residential	*Ecoflow - E/One 2013ip*	*Aquatec - Barnes*
Material	Polyethylene	Polyethylene
Designed to Australian / New Zealand Standard (Nominate)	AS/NZS 1546.1.2008	AS/NZS 1546.1.2008
Depth	1660	1.6m
Diameter	1032mm	1000mm
Total Volume	910L	950L
Storage between On level and overflow (L)	692	670

Pump Well - Commercial	*Ecoflow - E/One 2013ip*	*Aquatec - Barnes*
Material	Polyethylene - Large diameter horizontal pipe construction	Fibreglass
Designed to Australian / New Zealand Standard (Nominate)	AS/NZS 2566.1:1998	AS/NZS 1546.1.2008
Depth	Custom built to suit site specific application	2.2
Diameter	1500-1800mm (horizontal)	1070-1850
Total Volume	1500L-20,000L	1500L-15000L as standard with custom built chambers available on request
Storage between On level and overflow (L)	Custom built to suit site specific application	Min. 1168L