Issue 1
July 17, 2024

Godley Peaks Station – New Dwelling – Infrastructure Report

Prepared by: Civilised Ltd

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Godley Peaks Station – New Dwelling – Infrastructure Report

Report prepared For: Warren Lewis

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Issue	Details	Date
1	Draft for comment	17th July 2024

Executive Summary

Mr Warren Lewis proposes to construct a new dwelling on his property at Godley Peaks Station, near Lake Tekapo. Civilised Ltd have assessed the necessary development infrastructure in relation to:

- Water supply
- Wastewater disposal
- Stormwater runoff

We confirm that it is feasible to provide the necessary development infrastructure to service the proposed dwelling.

The new dwelling will be connected to the existing farm water supply that currently services adjacent land and will be extended to the proposed dwelling. The water will be treated to ensure ongoing compliance with the Drinking Water Standards for New Zealand. Firefighting water will be provided by a suitable firefighting reserve maintained within tanks on site.

Wastewater will be managed by constructing a new, modern on-site wastewater treatment and disposal system. A new secondary wastewater treatment and disposal system has been designed and will be used for the wastewater flows from the proposed dwelling.

Stormwater runoff from dwelling roof areas will drain directly to ground. Impervious areas associated with the driveway and hardstanding areas adjacent to the dwelling will drain to the regenerating tarn nearby the proposed dwelling. Stormwater runoff from much of the new access to the site will continue to be drained to the existing drainage features on site.

Table of Contents

1 Introduction

Mr Warren Lewis has engaged Civilised Limited (CL) to investigate and report on the feasibility of providing utility services and the necessary development infrastructure for the proposed dwelling at Godley Peaks Station, near Lake Tekapo.

This report considers the nature of the proposed development, the site conditions affecting the implementation of the necessary development infrastructure and describes the proposed implementation of the following elements;

- Water supply and internal reticulation
- Wastewater collection and disposal
- Stormwater control

The report is to supplement and support the resource and building consent submissions made on behalf of Mr Lewis with regards to the applications for consents to construct the new dwelling.

2 Description of Proposal

It is proposed to construct a new five bedroom dwelling on Godley Peaks Station near Lake Tekapo.

The land is currently zoned Rural under the McKenzie District Council District Plan.

The layout and approximate location of the dwelling is shown on the drawings included in Appendix A. The new dwelling will have five bedrooms.

We note that this assessment of the necessary development infrastructure is limited to consideration of the scale of the dwelling as it is currently proposed.

3 Site Description

The proposed dwelling is located on flat to moderately sloping land north of the Cass River and west of Lake Tekapo. The site is located on land accessed from a private access road crossing the adjacent farmland to reach the site.

The area around the proposed dwelling is currently pasture grass. There is some scrub beyond the existing fence line near the proposed dwelling.

There is an existing water supply service available near the site.

Grades in the vicinity of proposed building platform can be described as flat to moderately sloping. The building platform is surrounded by land that is moderately sloping.

The subject site of the development is contained within one Certificate of Title:

- CB30B/914 (Part Run 80)

The site has an area of 14,493 ha.

The elevation of the building platform is approximately RL 740 above Mean Sea Level (MSL).

The site has an open aspect.

During our site visits no evidence of large-scale land sliding was identified within the boundaries of the proposed rural development. The site has been subject to geotechnical investigations and reporting by others.

The land receives approximately 1300mm of rainfall per annum.

4 Water Supply

4.1 Existing Systems

There is an existing farm water supply connection available to the site. The nearest reticulation is currently located on land to the north of the proposed dwelling and the reticulation will be extended underground to the site of the proposed dwelling.

This water is sourced from Mistake River and is currently used across the farm station for stock water and for potable purposes at the existing dwellings and places of work. This source of water has been used for several decades without issue.

The existing potable water supply will be reticulated to the proposed dwelling and will be the potable wate source for the proposed dwelling.

4.2 Water Demand Assessment

Peak water demand would be expected during the summer holiday period when household irrigation requirements are high and seasonal populations are at their peak.

The following design figures have been adopted.

Peak potable water consumption = 2,000 litres/day

This level of water demand can be accommodated by the existing water supply on site.

4.3 Water Treatment

The water is sourced from a surface water take.

The quality of the water will be influenced by the surface water and as such it is likely to require treatment to ensure that it is of a potable quality at all times. It is recommended that the water undergo filtration and UV disinfection prior to human consumption. This treatment can occur at the dwelling with a suitable system installed at the time a dwelling is constructed. This will ensure that the water meets the quality requirements of the Water Services (Drinking Water Standards for New Zealand) Regulations 2022.

4.4 Fire Fighting Water

The dwelling does not have coverage from fire hydrants. It is therefore necessary to provide on-site firefighting water storage for the proposed dwelling.

New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509:2008 requires that each new rural building must make the following provisions for firefighting:

- A water supply of 45,000 litres and any necessary couplings.
- A hardstand area adjacent to the firefighting water supply capable of supporting fire service vehicles.
- Firefighting water connection point within 6m of the hardstand, and 90m of the dwelling.
- Access from the property boundary to the firefighting water connection capable of accommodating and supporting fire service vehicles.

At the time that the new dwelling is constructed, new water storage tanks of at least three 22,500 litres will be installed near the proposed dwelling. These tanks will have a combined storage volume of at least 67,500 litres and will be connected in such a way that there is always a reserve volume of at least 45,000 litres in storage. A new fire coupling and connecting pipework will be constructed to ensure that a suitable connection point is available to the Fire Brigade approaching the dwelling. The ongoing requirements for the firefighting water supply should be addressed as conditions of consent.

4.5 Reticulation Concept

As discussed above, the water supply for the proposed dwelling will come from the existing potable water supply available on the site.

When the dwelling is to be constructed, a total of three new below ground water tanks of 22,500 litres will be installed near the dwelling and will be connected to the water supply. A proprietary pressure boosting pump will be used to reticulate water into the dwelling at the appropriate pressure and flowrate.

Drawings showing the proposed water supply infrastructure is included with this report in Appendix B.

4.6 Recommendations

The water supply for the development will be provided for by reticulating water from the existing nearby farm water suppluy.

5 Wastewater Disposal

5.1 General

No community or Council scheme is available for connection in close proximity to the subject site. It is not sustainable to remove waste from site therefore an individual on site wastewater disposal (OSWWD) system is to be constructed.

5.2 Site and Soil Assessment

A site and soil assessment has been undertaken by Geotago Ltd and this is included within their geotechnical report for the site.

The Geotago Ltd reporting concluded that the underlying gravelly sands are likely to be the primary receiver of the treated effluent from wastewater treatment systems and this was categorised as a Category 3 soils in accordance with Table 5.1 of AS/NZS 1547:2012.

5.3 On Site Wastewater Disposal

5.3.1 General

Disposal of wastewater within the property will be facilitated by the installation of a treatment system producing a quality of effluent that complies with modern standards, which is also suitable for disposal on site.

All work shall comply with:

- Requirements of the Building Act, including NZBC Approved Document G13, New Zealand Standards AS/NZS 1547:2012, AS/NZS 1546.1:1998 Part 1: Septic Tanks and AS/NZS 3500.2.2:1996 National plumbing and drainage code – Sanitary plumbing and drainage.
- Requirements of McKenzie District Council.
- Conditions of any applicable consents.
- Manufacturers' requirements.

Operation of the constructed wastewater treatment and disposal system shall be as per the Contractors or Suppliers Operations and Maintenance Manual (see section 5.3.8 below) and the documentation in Appendix D.

Drawings showing the proposed wastewater system site layout and details are included with this report in Appendix C.

Details on the specified Innoflow Advantex AX20 wastewater treatment system and performance certification is included with this report in Appendix E.

5.3.2 Receiving Environment

As detailed above Geotago Ltd have assessed the subsurface soils and consider the gravelly sand layer to be the primary receiver of treated effluent. Based on their knowledge of the soakage characteristics of similar soils and considering the proposed use of a secondary treatment system they have assessed the underlying sand material which will be the primary receiver of effluent discharged on site as being classified as a Category 3 soil.

We recommend a conservative maximum DLR of 30mm is used for the design of disposal beds located in the outwash gravel material. This is consistent with the recommended DLR figures given in Table L1 of AS/NSZ 1547:2012. Given the topography of the site and surrounds and the distance to waterbodies nearby significant horizontal and vertical separation exists between the disposal bed and potentially sensitive receiving environments.

5.3.3 Recommended Disposal Method

Based on our knowledge of the subsurface soils it is recommended that Low Pressure Effluent Distribution (LPED) disposal beds be used to facilitate even low-rate intermittent dosing of treated effluent in order to promote further renovation within the soil. The recommended location of the disposal area is indicated on the plan included in Appendix C.

Subsequent to our investigations, we recommend that a secondary level of wastewater treatment is provided to produce a high quality of effluent prior to land application. We envisage the secondary level of treatment will be implemented by the installation of a proprietary wastewater treatment plant utilising a biological packed bed reactor. The following parameters indicate the quality of effluent required:

- Biochemical Oxygen Demand (5 day) <30 mg/litre
- Suspended Solids <30 mg/litre
- Total Nitrogen <30 mg/litre
- Faecal Coliforms 10-15,000 cfu/100 ml

The system for the treatment and disposal of sewage effluent has been based on the findings of site investigations and assessment of conditions.

5.3.4 Design Parameters

The following parameters have been used in this design:

- The design loading is based on the current New Zealand Standard AS/NZS 1547:2012.
- The OSWWD system allows for the proposed dwelling having 5 bedrooms and a total expected occupancy of 10 people
- A daily per person wastewater generation allowance of 200 litres/day allowing for standard water using fittings and fixtures and no insinkerator (or similar).
- Peak Day design flow (PDF) loading = 2,000 litres/day.
- The disposal area for the sub-surface distribution laterals is based on a conservative design loading rate of 30mm/day (Soil Category 3 Table L1 AS/NZS 1547:2012). This equates to a minimum field area of 70m².
- We confirm that a 100% reserve area of a minimum 70m² is also available if required.

5.3.5 System Outline

The proposed on-site wastewater treatment and disposal system will comprise of the following:

- A Innoflow Advantex AX20 wastewater treatment plant (or equivalent as approved by the Engineer) with a total capacity of 6,000 litres. A submersible electric pump is to be installed in the final pump chamber to enable "dose" loading of the disposal area.
- 72m² of disposal area utilising 25mm ID HDPE distribution laterals with 3mm diameter squirt holes at 1.5m intervals within a 65mm or 100mm diameter perforated drain coil. This will be made up of two disposal beds, each being 3m wide x 12m long in size (36m² each bed, 72m² in total)
- Pipework connecting the building to the treatment plant.
- Pipework connecting the treatment plant to the distribution laterals.

Schematic drawings of the proposed on-site wastewater disposal system are included in Appendix C.

5.3.6 Construction Specification

5.3.6.1 Connecting Pipework

All pipework connecting the building foul drainage to the wastewater treatment plant shall be 110mm ø uPVC sewer class pipe, laid in accordance with the provisions of NZS 2032:2006 and have a uniform grade not less than 1:100. Mainline pipework from the treatment plant to the effluent disposal area shall be minimum 32mm ID diameter polyethylene complying with NZS 4130:2009 and be rated to withstand a minimum of 150% of the start-up/shut-off head of the dosing pump.

5.3.6.2 Ancillary Works

Vehicular access across the disposal area shall be prevented by appropriate means.

If any groundwater flows or seepage is encountered with potential to saturate disposal areas this shall be addressed with sub-surface cut-off drains placed at suitable upstream locations. Further details for ancillary works should be referred to the Engineer.

5.3.6.3 Wastewater Treatment Plant

The treatment plant shall be located in the general location as indicated on the site plan included on the drawings included as Appendix C. The exact location is to be agreed with the owners on-site prior to installation in conjunction with a site drainage plan detailing the upstream gravity foul sewer reticulation that is to be prepared by others. The tank shall be located a minimum of 3 metres from the boundary and house or any other structures in an area accessible for servicing and desludging but protected from vehicular traffic.

The wastewater plant shall be an Innoflow Advantex AX20 Wastewater Treatment System (in the manufacturers Mode 3 configuration) of minimum 6,000L capacity complying with AS/NZS 1546.1. The plant shall provide secondary effluent treatment via textile media packed bed reactor prior to wastewater being discharged to land application.

The treatment plant shall be installed in accordance with the manufacturer's instructions and AS/NZS 1546.1. Inflow into the tank shall be via an inlet tee. Ready access to all openings for desludging and maintenance shall be maintained.

The treatment plant shall be protected from vehicular loads and surface water run-off, but shall be easily accessible to a desludging tanker.

With a pumped system, a high level alarm is required, together with 12 hours of emergency storage above the alarm level.

Drawings of the Innoflow Advantex AX20 Wastewater Treatment System are included with this report as Appendix E.

5.3.6.4 Discharge/Dosing Pump

The standard dosing pump shall be included with the treatment plant. The pump level controls shall be configured to provide a maximum dose of approximately 360L. This will provide an effluent dose of approximately 5mm and the disposal bed being dosed approximately 6 times per day when operating at peak capacity. The pump operation will be controlled by a float switch calibrated to operate at the correct on/off levels.

5.3.6.5 Distribution Laterals

Sub-surface distribution laterals shall be 25mm ID uPVC lateral squirt line with 3mm diameter squirt holes drilled at 1.5m staggered centres. The laterals are to be installed inside 65mm or 100mm diameter perforated drain coil, at a minimum depth of 375mm below the final ground surface level. See Appendix C for details.

Care should be taken to ensure that the laterals are laid level and that an even distribution of effluent is achieved. Flushing/inspection ports are to be provided at the end of each lateral to enable regular flushing of the lines.

5.3.6.6 Disposal Area

The disposal beds shall be excavated to a minimum depth of 600mm below final ground level and be founded within the alluvial gravel horizon. The base of the disposal beds shall be horizontal to within +/- 20mm. The disposal beds shall be a 300mm minimum layer of clean, no-fines drainage gravel topped with a layer of filter cloth with a minimum of 300mm of backfill/topsoil overtop. The top of the 65mm diameter drain coil will be positioned approximately 75mm from the top of the sand and the filter cloth.

The disposal bed areas and typical construction detail is indicated on the drawing included as Appendix C. Surface water run-off shall be directed away from the disposal area by shaping of the surrounding ground or construction of an upslope cut-off drain.

5.3.7 Inspection and Pre-Commissioning Tests

5.3.7.1 Inspection during Construction

The Contractor shall arrange for the Engineer to inspect the construction of the lateral distribution system, following placement of lateral pipework and prior to backfill. At this stage, the pre-commissioning test will be carried out.

5.3.7.2 Pre-Commissioning Tests

The Engineer shall be present for the pre-commissioning test.

The treatment plant shall be filled with clean water and the system pump operated to allow the distribution lateral drip lines to be charged.

Flow from the distribution laterals shall be observed to ensure that it is even.

The Contractor shall give the Engineer at least 48 hours' notice of the date and time of testing.

5.3.8 Operation and Maintenance Manual

The Contractor shall provide two copies of the following information to be included in an operation and maintenance manual. The manual which will be prepared by the Contractor shall include:

- Copy of as built drawings.

Copies of all manufacturers' literature, instructions and recommendations, including those of the septic tank supplier and outlet screen supplier.

6 Stormwater Disposal

6.1 General

The development of the dwelling on the building platform on the site will alter the existing stormwater run-off patterns from the site catchment.

6.2 Driveway

The access to the dwelling is to be completed as part of the works. There will also be hardstanding and parking areas adjacent to the dwelling and ancillary buildings. Most of the driveway runoff ill be managed using roadside swales to facilitate drainage to ground and conveying excess runoff to lower parts of the site and drainage into existing water courses. It is proposed that runoff from driveway and hardstanding areas around the dwelling will be collected and conveyed to the existing tarn basin that will be regenerated as part of the dwelling establishment.

6.3 Dwelling

The runoff from the roof areas will flow directly to ground. This approach has been used so that spouting is not required and be subject to potential damage during heavy snowfall events.

It is proposed that roof runoff will drain to specifically designed landscaping around the dwelling that allows for the uptake of water and the prevention of any scour effects.

7 Limitations

This report has been written for the particular brief to Civilised Ltd from their client and no responsibility is accepted for the use of the report for any other purpose, or in any other context or by any third party without prior review and agreement.

In addition, this report contains information and recommendations based on information obtained from a variety of methods and sources including inspection, sampling or testing at specific times and locations with limited site coverage and by third parties as outlined in this report. This report does not purport to completely describe all site characteristics and properties and it must be appreciated that the actual conditions encountered throughout the site may vary, particularly where ground conditions and continuity have been inferred between test locations. If conditions at the site are subsequently found to differ significantly from those described and/or anticipated in this report, Civilised Ltd must be notified to advise and provide further interpretation.

Appendix A

Dwelling Drawings

6643-GODLEY-PEAKS-STN-HOMESTEAD-TEK-RC1-240620

Schedule of Areas	m²
House	800
Garage	100
Pool	170
Cabana	70
Total	**1140**
Sep. Garage	120
Implement Shed	400
Wintergarden	90

Site and Overall Floor Plan

ORIGINAL SIZE A3

MASON&WALES
ARCHITECTS

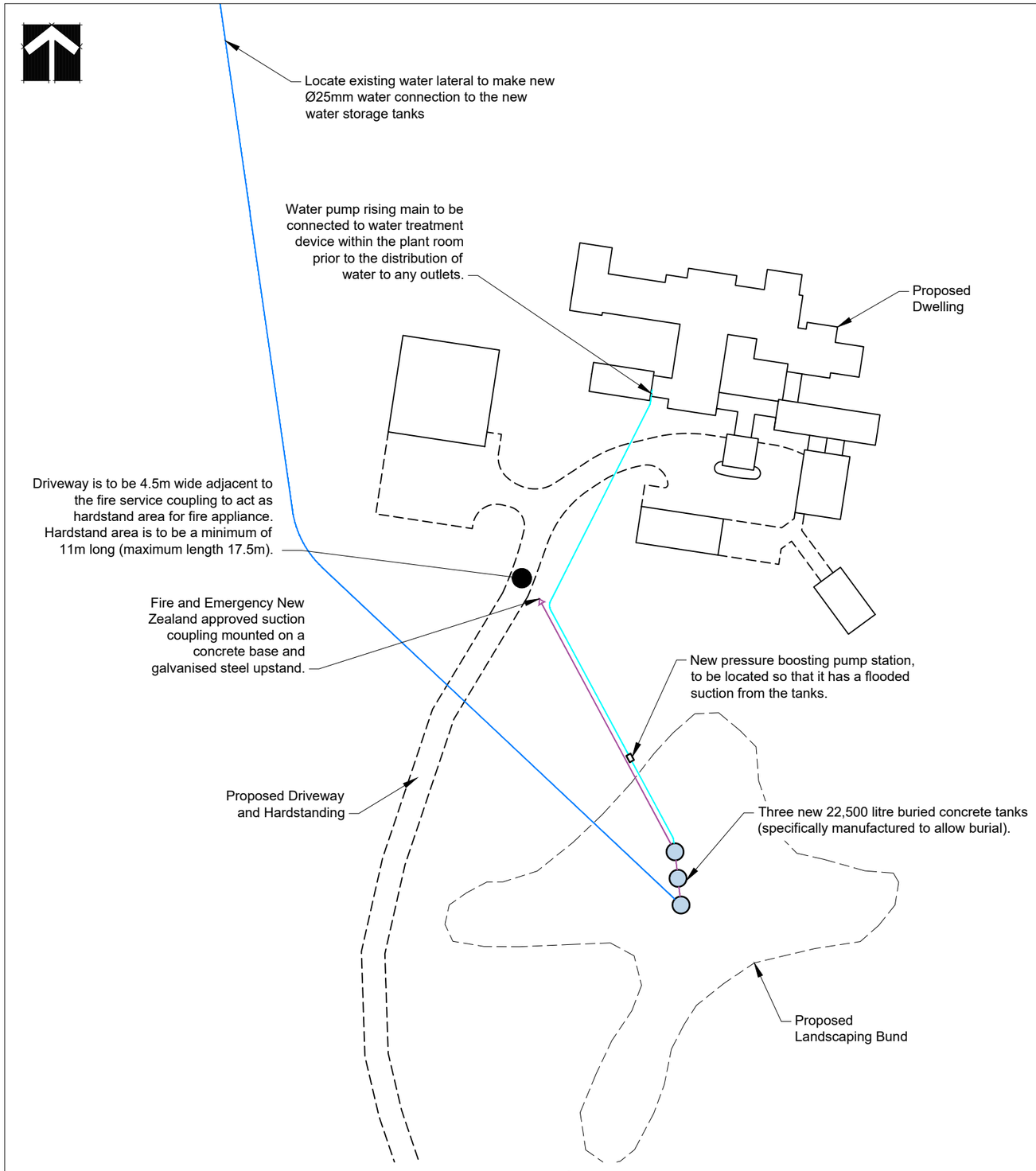
GODLEY PEAKS STATION HOMESTEAD
LAKE TEKAPO

Project 6643
Designed by: Mason and Wales
Scale: 1:500 @ A3, 1:250 @ A1
20 June 2024

REV RC
SHEET 02

Appendix B

Water Supply Drawing



WATER SUPPLY PLAN
SCALE 1:1000

Legend

- Blackline PE100 PN16 DN25 Water supply pipe - to be built as part of the dwelling construction.
- Blackline PE100 PN16 DN40 Water Pipe - to be built as part of the dwelling construction.
- Blackline PE100 PN16 DN110 Water Pipe - to be built as part of the dwelling construction.

Notes

1. New tanks are to be placed on a suitably prepared level bench within the excavation, in accordance with the manufacturers instructions.
2. All tank penetrations are to be sealed to ensure a water proof connection.
3. Any above ground exposed pipework is to be appropriately insulated to prevent freezing.
4. All plumbing and drainage is to be installed in accordance with the New Zealand Building Code.
5. The new tanks are to be used as the fire fighting water supply. The tanks shall be connected so that there is a minimum staic firefighting reserve of 45,000 litres at all times. The tanks shall be interconnected with a Blackline PE100 PN16 DN110 pipe at the lowest possible levels within the tanks. The tanks shall be connected to a Fire and Emergency New Zealand approved suction coupling within 5m of a hardstand area accessible by a fire service appliance. The hardstand area shall be located in the centre of a clear working space with a minimum width of 4.5 metres. Pavements or roadways providing access to the hardstand area must have a minimum formed width as required by NZS4404:2010 standards for rural roads. The roadway shall be trafficable in all weathers and be capable of withstanding an axle load of 8.2 tonnes or have a load bearing capacity of no less than the public roadway serving the property, whichever is the lower. Access shall be maintained at all times to the hardstand area.
6. The fire fighting water supply must be located so that it is clearly visible and/or provided with appropriate signage to enable connection of a fire appliance.
7. The domestic water pressure boosting pump is to be installed within the new pump shed shown in accordance with the manufacturers instructions.
8. The domestic water pressure boosting pump is to be a **Lowara 5SVE08S15M-PS Vertical Multistage Smart Pump**. This pump and the necessary controls and accessories are available from Brown Brothers Engineers Ltd. Contact: Mr Phil Sinclair - 0274 342 320.
9. The water is to be treated to ensure ongoing compliance with the New Zealand Drinking Water Standards. This is to comprise a **Promax 130 Lpm Hybrid G9 Water Filter & UV System** installed within the plant room prior to the distribution of water to any outlets.

REV	DATE	DESCRIPTION	APPROVED
A	17/07/2024	Initial Issue	JFM

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DESIGN	DATE
JFM	17/07/2024
DRAWN	DATE
JFM	17/07/2024
CHECKED	DATE

CLIENT: WARREN LEWIS

PROJECT/LOCATION: PROPOSED DWELLING
GODLEY PEAKS STATION - LAKE TEKAPO

CONTRACT NUMBER: -

SCALE (AT A3): 1:500

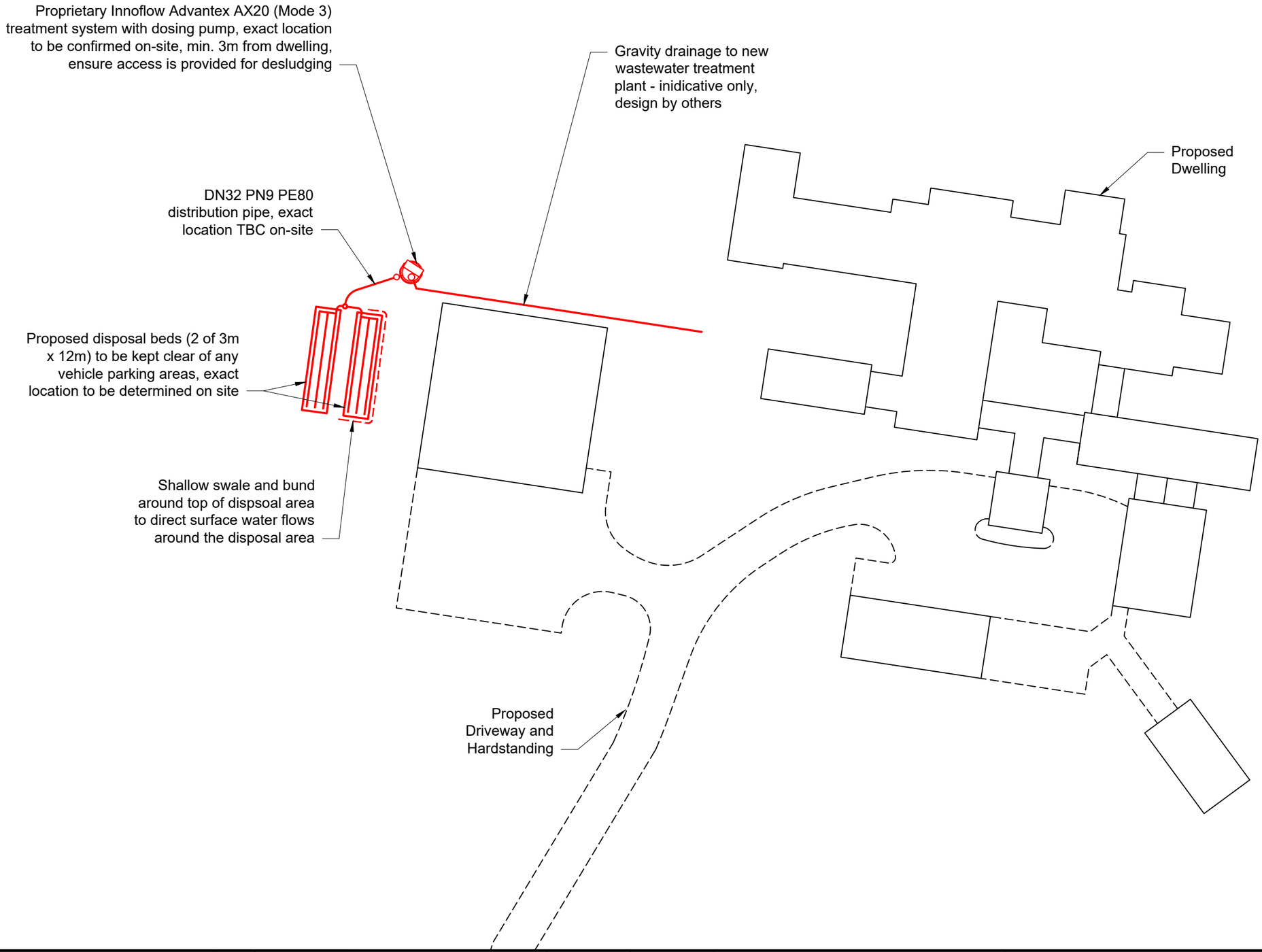
TITLE: WATER SUPPLY
GENERAL LAYOUT

DRAWING NUMBER: QV068-D-410

REVISION: A

Appendix C

Wastewater Drawing



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CLIENT

WARREN LEWIS

PROJECT/LOCATION

PROPOSED DWELLING
GODLEY PEAKS STATION - LAKE TEKAPO

TITLE

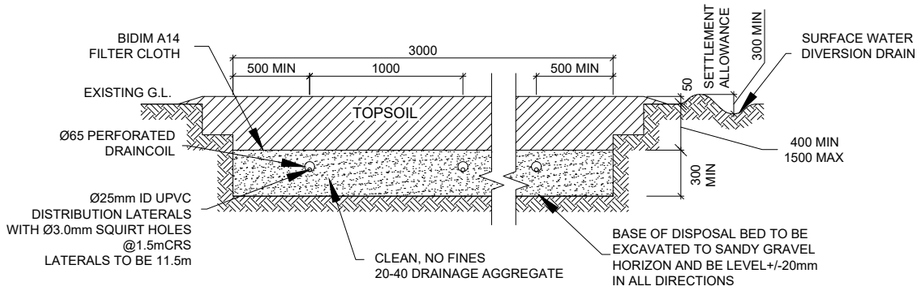
WASTEWATER DRAINAGE
GENERAL LAYOUT

CONTRACT NUMBER: -

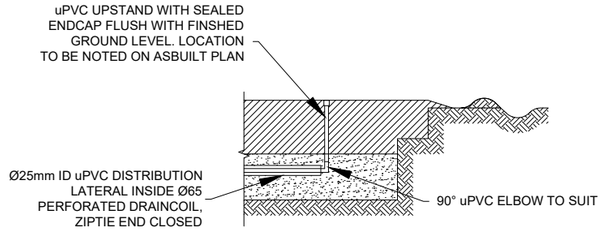
SCALE (AT A3): 1:500

DRAWING NUMBER: QV068-D-510

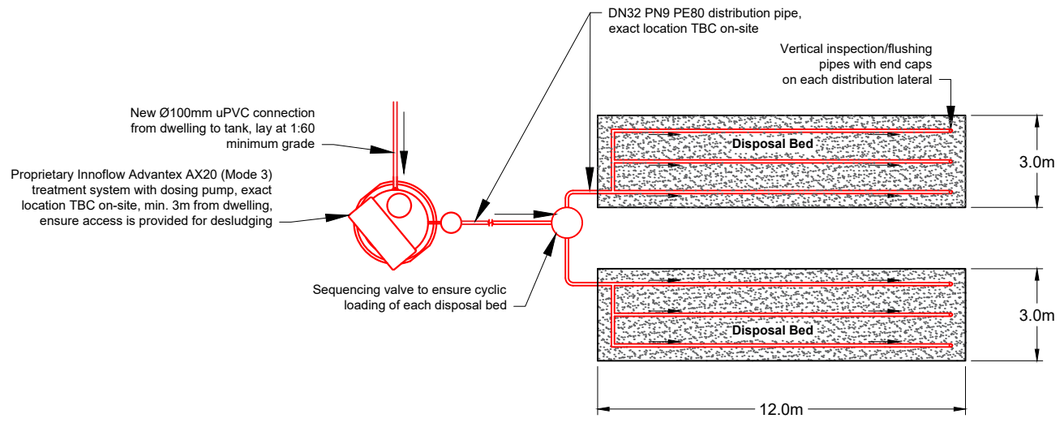
REVISION: A



DISPOSAL BED CROSS SECTION
SCALE 1:40



TYPICAL DISTRIBUTION LATERAL FLUSHING POINT DETAIL
SCALE 1:40



DISPOSAL BED DETAILS
SCALE 1:200

NOTES:
1. Engineer to inspect ground conditions prior to disposal field installation. Notify engineer once excavated.
2. Locations of septic tank and disposal field indicative only. Exact location to be determined on-site . Maintain minimum 3.0m clearance from foundations.
3. Gravity drainage indicative only. Refer to drainage plan by others.

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JFM	17/07/2024
CHECKED	DATE

CLIENT

WARREN
LEWIS

PROJECT/LOCATION

PROPOSED DWELLING
GODLEY PEAKS STATION - LAKE TEKAPO

TITLE

WASTEWATER DRAINAGE
DISPOSAL BED DETAILS

CONTRACT NUMBER: -

SCALE (AT A3): AS SHOWN

DRAWING NUMBER: QV068-D-520

REVISION: A

Appendix D

Wastewater System Homeowners Manual

HOMEOWNER'S MANUAL

Onsite Wastewater Collection & Treatment Systems

How to Take Care of Your Wastewater System

Orenco Systems®
Incorporated
www.orenco.com

Orenco products supplied by:

inno flow
wastewater specialists
www.innoflowtechnologies.com

How to Take Care of Your Wastewater System

Congratulations! Your home includes reliable, carefully engineered equipment — manufactured by Orenco Systems®, Inc. — for the collection and/or treatment of household wastewater.

When properly designed and installed, onsite wastewater treatment does a terrific job of decomposing household waste and recycling precious water resources. Orenco's systems use little energy and frequently outperform municipal sewage treatment plants. The treated effluent is often returned harmlessly to the soil, where it receives final polishing and filtration for groundwater recharge. There's no degrading of our nation's rivers and oceans . . . which is so often the case with municipal sewage.

As with any engineered system, such as your car or your heat pump, your onsite wastewater system will work better and last longer if it is regularly maintained by a qualified service provider. Your service provider should be present during installation, so he or she is familiar with your system, especially those service lines, conduits, and connections that get buried.

And your service provider should have a copy of this manual for his or her records. To order another copy, just e-mail or call Innoflow Technologies at info@innoflowtechnologies.com, 1800 466 635 (AU) or 0800 466 635 (NZ free phone).

Your system will also work better and last longer if you learn what can go into it — and what can not. Little effort is required. Just read and practice the "do's and don'ts" that follow. Every member of your household should be familiar with these. And if you have guests who want to "help out in the kitchen," be sure to tell them, too. With this preventive maintenance, along with periodic inspections, your onsite wastewater system should function for decades. And you'll save water, energy and pumpout costs, too!

There's a place on the back of this Homeowner's Manual to record "Important System Facts." If those have not been filled in for you, please record those now, before you file or shelve this manual. And give a copy of these facts to your service provider, especially if your service provider changes. You'll be glad you did.

Do's and Don'ts for INSIDE the House

There are a number of do's and don'ts that will help ensure a long life and minimal maintenance for your system. As a general rule, nothing should be disposed into any wastewater system that hasn't first been ingested, other than toilet tissue, mild detergents, and wash water. Here are some additional guidelines.

Don't flush dangerous and damaging substances into your wastewater treatment system. (Please refer to the "Substitutes for Household Hazardous Waste," on the next panel.) Specifically, do not flush . . .

- Pharmaceuticals
- Excessive amounts of bath or body oils
- Water softener backwash
- Flammable or toxic products
- Household cleaners, especially floor wax and rug cleaners
- Chlorine bleach, chlorides, and pool or spa products
- Pesticides, herbicides, agricultural chemicals, or fertilizers

Don't ignore leaky plumbing fixtures; repair them. A leaky toilet can waste up to 7500 liters of water in a single day. That's 10-20 times more water than a house-hold's typical daily usage. Leaky plumbing fixtures increase your water bill, waste natural resources, and overload your system.

Don't leave interior taps on to protect water lines during cold spells. A running tap can easily increase your wastewater flow by 4000 to 12,000 liters per day and hydraulically overload your system. Instead, properly insulate or heat your faucets and plumbing.

Don't use special additives that are touted to enhance the performance of your tank or system. Additives can cause major damage to other areas in the collection system. The natural microorganisms that grow in your system generate their own enzymes that are sufficient for breaking down and digesting nutrients in the wastewater.

Do collect grease in a container and dispose with your trash. And avoid using garbage disposals excessively. Compost scraps or dispose with your trash, also. Food by-products accelerate the need for septage pumping and increase maintenance.

Do keep lint out of your wastewater treatment system by cleaning the lint filters on your washing machine and dryer before every load. Installing a supplemental lint filter on your washing machine would be a good precautionary measure. (This normally takes just a few minutes. Lint and other such materials can make a big difference in the frequency and cost of pumping out your primary treatment tank.)

Do use your trash can to dispose of substances that cause maintenance problems and/or increase the need for septage pumping. Dispose of the following with your trash:

- Egg shells, cantaloupe seeds, gum, coffee grounds
- Tea bags, chewing tobacco, cigarette butts
- Condoms, dental floss, sanitary napkins, diapers
- Paper towels, newspapers, candy wrappers
- Rags, large amounts of hair
- "Flushable" wipes, baby wipes, medicated wipes, cleaning wipes

DON'T plumb water softener discharge brine into your wastewater system. (The softened WATER is OK, just not the BRINE that's produced during the regeneration cycle.)

DO route the brine around your wastewater system so it discharges directly into the soil. This is a cost-effective solution that ensures the long-term performance of your system and the biological processes that occur inside it.

Water softener brine interferes with nitrogen removal. And it degrades treatment by interfering with the settling process inside the tank. Without proper settling, solids, grease, and oils are carried through your system, clogging components. This increases your costs by...

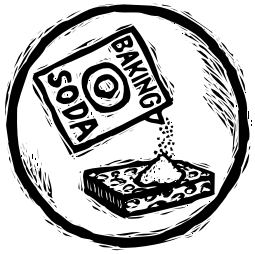
- requiring the tank to be pumped more often (at hundreds of dollars per pumpout)
- requiring filters to be cleaned more often
- fouling drainfields and other downstream equipment

Do's and Don'ts for INSIDE the House

Don't use excessive amounts of water. Using 140-180 litres per person per day is typical. If your household does not practice any of the "water conserving tips" below, you may be using too much water.

Do conserve water:

- Take shorter showers or take baths with a partially filled tub. Be cautious about excessive use of large soaking tubs.
- Don't let water run unnecessarily while brushing teeth or washing hands, food, dishes, etc.
- Wash dishes and clothes when you have a full load.
- When possible, avoid doing several loads in one day.
- Use water-saving devices on taps and showerheads.
- When replacing old toilets, buy low-flush models.



Do use substitutes for household hazardous waste. Replace the following hazardous products with products that are less environmentally harmful. The hazardous cleaners are listed below, followed by the suggested substitute.

Ammonia-based cleaners:

- For surfaces, sprinkle baking soda on a damp sponge.
- Or for windows, use a solution of 30 mL white vinegar to 1 L water. Pour the mixture into a spray bottle.

Disinfectants:

Use borax: 100 g in 4 L of water; deodorizes also.

Drain decloggers:

Use a plunger or metal snake, or remove and clean the trap.

Scouring cleaners & powders:

Sprinkle baking soda on a damp sponge or add 50 g baking soda to 1 L warm water.

Carpet/upholstery cleaners:

Sprinkle dry cornstarch or baking soda on, then vacuum. For tougher stains, blot with white vinegar in soapy water.

Toilet cleaners:

Sprinkle on baking soda, then scrub with a toilet brush.

Furniture/floor polishes:

To clean, use oil soap and warm water. Dry with soft cloth. Polish with 1 part lemon juice and 2 parts oil (any kind), or use natural products with lemon oil or beeswax in mineral oil.

Metal cleaners:

- Brass and copper: scrub with a used half of lemon dipped in salt.
- Stainless steel: use scouring pad and soapy water.
- Silver: rub gently with toothpaste and soft wet cloth.

Oven cleaners:

Quickly sprinkle salt on drips; then scrub. Use baking soda and scouring pads on older spills.

Laundry detergents:

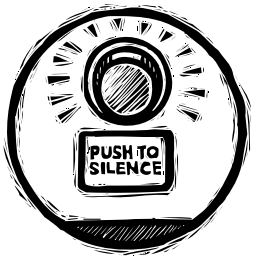
Choose a liquid detergent (not a powder) that doesn't have chlorine or phosphates.

At the Control Panel

Do locate your electrical control panel where it will be protected from potential vandalism and have unobstructed access.

Do familiarize yourself with the location of your wastewater system and electrical control panel. Refer to the panel's model and UL number (inside the door panel) when reporting a malfunction in the system.

Do take immediate action to correct the problem in the event of an alarm condition. Call your system operator or maintenance company immediately whenever an alarm comes on. (It sounds like a smoke alarm.)



Do remember that the audible alarm can be silenced by pushing the lighted button located directly above the "Push to Silence" label on the front of the electrical control panel. With normal use, the tank has a reserve storage capacity good for 24-48 hours.

Don't turn off the main circuit breaker to the wastewater pumps when going on vacation. If there is any infiltration or inflow into the system, the pumps will need to handle it.

IMPORTANT! CAUTION!

Only a qualified electrician or authorized installer/operator can work on your control panel. Before anyone does any work on either the wiring to the level control floats and pumps in the vault or on the control panel itself, it is imperative to first switch the isolation fuse/breaker and the circuit breakers in the panel to the "Off" positions, then switch "Off" the power to the system at the main breaker!

Do's and Don'ts for OUTSIDE the House

Don't enter your tank. Entering an underground tank without the necessary confined space entry training and procedures can result in death from asphyxiation or drowning. Keep children away from tank openings if lids are off or lid bolts are removed.

Do keep the tank access lid fastened to the riser at all times with stainless steel lid bolts. If bolts are lost or damaged, call Innoflow immediately for replacement at 1800 466 635 or 07 5549 2416 for AU and 0800 466 635 or 09 426 1027 for NZ. If the tank lid becomes detached from the riser or if the lid or riser becomes damaged, BLOCK ACCESS TO THE TANK OPENING IMMEDIATELY AND KEEP CHILDREN AWAY until all repairs are made.

Don't dig without knowing the location of your wastewater system. As much as possible, plan landscaping and permanent outdoor structures before installation. Avoid placing heavy objects on your land application area. Lightweight, easily removable items, such as bird baths and picnic tables, are OK to place on top of your system and land application area.

Don't drive over your tank riser with vehicles or ride-on mowing equipment unless the riser has been equipped with a special traffic lid.

Also, don't drive over the buried components in your system or the land application area. If the system is subject to possible traffic, put up a barricade or a row of shrubs.

Do keep the land application area in good working order, clear of weeds and debris so it can be easily accessed by your service provider.

Don't dump RV waste into your wastewater system. It will increase the frequency of required septage pumping. When dumped directly into the pumping vault, RV waste clogs or fouls equipment, causing undue maintenance and repair costs. (Also, some RV waste may contain chemicals that are toxic or that may retard the biological digestion occurring within the tank.)

Don't ever connect rain gutters or storm drains to the sewer or allow surface water to drain into it. And don't discharge hot-tub water into your system. The additional water will increase costs, reduce the capacity of the collection and treatment systems, and flood the drainfield. It can also wash excess solids through the tank.

Do make arrangements with a reliable service person to provide regular monitoring and maintenance. Place the service person's phone number on or in your control panel!

Do keep a file copy of your service provider's sludge and scum monitoring report and pumpout schedule. This information will be beneficial for real estate transactions or regulatory visits.

Do keep an "as built" system diagram in a safe place for reference.

HOMEOWNER'S MANUAL

Onsite Wastewater Collection & Treatment Systems

Do keep accurate records of maintenance and service calls. Make sure whoever services your tank keeps a complete record, and ask for a copy for your records.

IMPORTANT SYSTEM FACTS

Distributor or Dealer:

Please fill out the following important information before giving out this Homeowner's Manual:

Innoflow Australia
Distributor/Dealer Name

PO Box 263, Ormeau, Queensland 4208
Distributor/Dealer Address

1800 466 635 or 07 5549 2416
Distributor/Dealer Phone Number(s)

Innoflow Technologies NZ, Ltd.
Distributor/Dealer Name

PO Box 300527, Albany, North Shore City 0752
Distributor/Dealer Address

0800 466 635 (freephone)
Distributor/Dealer Phone Number(s)

Authorized Service Provider Name

Authorized Service Provider Phone Number(s)

Authorized Installer Name

Authorized Installer Phone Number(s)

Engineer Name (if applicable)

Engineer Phone Number(s)

Regulatory Agency

Regulatory Contact Name

Regulatory Contact Phone Number(s)

Permit # (if applicable)

Property Address

Property Owner Name(s)

Start-Up Date

Control Panel Model # and UL #

AdvanTex® Model # (if applicable)

AdvanTex® Serial # (if applicable)

Orenco Systems®
Incorporated

Changing the Way the World Does Wastewater®

+1-541-459-4449
www.orenco.com

Orenco products supplied by:

innoflow
wastewater specialists
1800 466 635 (AU)
0800 466 635 (NZ)
www.innoflowtechnologies.com

Certified Product
Australian Standard

AdvanTex® Treatment System complies with AS/NZS Standards 1546.1 and 1546.3, as well as the regulatory codes of your state.

ABR-OM-INTL-1
Rev. 1.1, © 3/10
Orenco Systems®, Inc.

Appendix E

Innoflow Advantex AX20 Information

AdvanTex® Design Criteria

Orenco Systems® Incorporated
800-348-9843

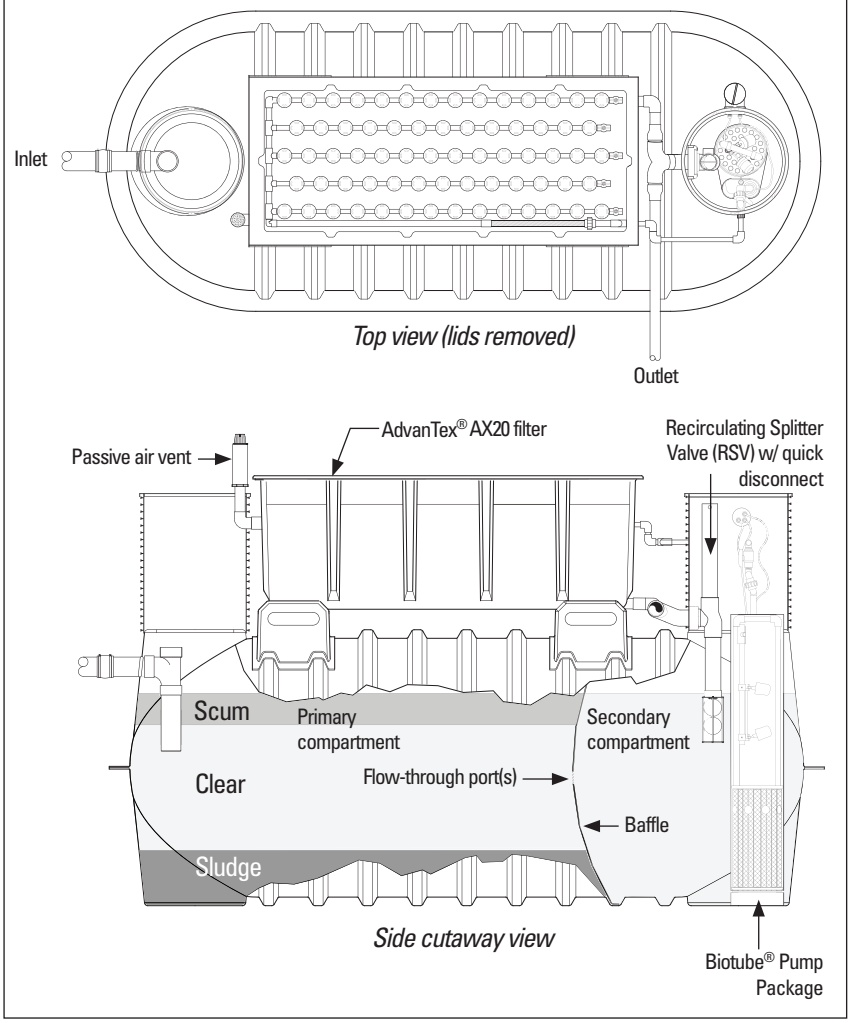
*For Residential Applications — International**

System Description and Treatment Process

The AdvanTex® Treatment System is a multiple-pass, packed-bed aerobic wastewater treatment system specifically designed and engineered for long-term processing of residential strength wastewater. The treatment media is an engineered textile, which has an extremely high void capacity, moisture-holding capacity, and surface area per unit volume. Consequently, AdvanTex Treatment Systems are capable of processing residential strength wastewater to better than "secondary standards" (see Figure 3, page 4).

Here's how it works in our standard configuration (see Figure 1). Raw sewage enters the two-compartment Processing Tank through its inlet tee. In the first compartment, the raw sewage separates into three distinct zones: a scum layer, a clear layer, and a sludge layer. A flow-through port or ports in the tank's baffle wall allows effluent from the clear layer to flow into the second compartment of the tank. The Biotube® Pump Package in the second compartment pumps filtered effluent to a distribution manifold in the AdvanTex filter. Effluent percolates down through the textile media and is collected in the bottom of the filter pod. The treated effluent flows out of the filter pod through the filtrate return line, which returns the treated effluent to the recirculating splitter valve (RSV). The RSV automatically splits or diverts the flow between the processing tank and the final discharge. The RSV also controls the liquid level within the processing tank. During extended periods of no flow, 100 percent of the treated filtrate effluent is returned to the processing tank. Residential AdvanTex filters have a passive vent system and do not require the use of a fan.

Figure 1. AdvanTex Treatment System
(with 6000-liter, two-compartment processing tank)



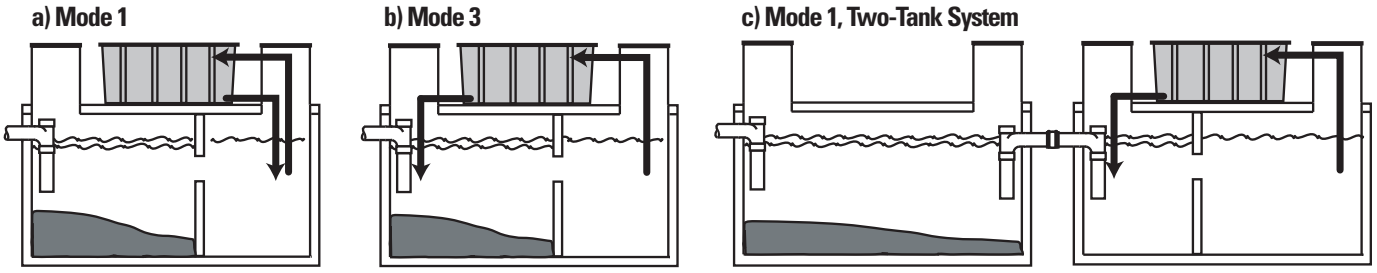
System Selection: Models and Configurations

Typically, residential-sized AdvanTex Treatment Systems include one or two AdvanTex AX20 filter pods. The AdvanTex Treatment System can be configured in several modes (See Figure 2). Mode 1 is the operating configuration used most frequently. In Mode 1, the filtrate recirculates through the second compartment of the processing tank. In Mode 3, a portion or all of the filtrate may be recirculated through the primary chamber of the tank to enhance nutrient removal.

** This document is for residential applications only. For commercial applications, call Orenco's Engineered Systems Department.*

Some of the systems in Mode 1 incorporate two tanks: a primary tank and a recirculation tank. In the primary tank, sludge and scum are separated from liquid effluent, which then flows into a separate recirculation tank, into which the AdvanTex filtrate is recirculated (see Figure 2, example c). Refer to the AdvanTex Treatment System drawings in the Design/ Engineering Package for Residential Applications Binder for further details on mode and discharge options.

Figure 2. AdvanTex Treatment System Configurations



Effluent recirculates into secondary compartment

Effluent recirculates into primary compartment for improved denitrification

Effluent recirculates into primary compartment of second tank in a Mode 1 two-tank system

System Requirements: Residential Strength Wastewater

Residential wastewater must meet the criteria in Table 1, below. Consult Orenco or your AdvanTex Dealer for larger system designs.

Table 1. Residential Strength Wastewater (Influent Characteristics)[1]

Characteristic	Average (mg/L)	Weekly Peak (mg/L)	Rarely Exceed (mg/L)
$CBOD_5$	130	200	300
TSS	40	60	150
TKN	65	75	150
G&O	20	25	25

[1] *AdvanTex® Treatment Systems are typically expected to receive residential-strength wastewater from typical primary septic tanks. Residential-strength wastewater is defined as primary sewage effluent from a septic tank that does not exceed the parameters in this table.*

System Requirements: Processing Tank

Homes with four or fewer bedrooms require a minimum two-compartment, 6000-liter (nominal) tank with a flow through port or ports equaling a minimum flow-through area of not less than 77 cm^2 (12 in^2) at 60 to 70 percent of the lowest normal liquid level (see "Appendix 3: RSV and Float Level Diagram" in the *Residential AX Installation Manual*, NIM-ATX-AX-1, for typical liquid level positions). In larger residential systems, the first compartment should be sized at approximately ⅔ to ¾ of the total processing tank volume.

All tank designs must be approved by Orenco before use. Each tank must meet Orenco's minimum structural and configuration requirements. In addition, each tank will be required to pass a 24-hr in-ground watertight test (including the riser/ tank connection), and be covered under a written warranty.

Table 2 defines the minimum required tankage for residential AdvanTex applications (unless otherwise approved by both Orenco and the local regulatory body).

Table 2. ecommended Tankage: Single and Dual Tank Configurations

Number of Bedrooms[1]	=	Processing Tank[2]	or	Septic Tank	Recirculation Tank[3]
4 (or fewer)		6000 L		4000 L	4000 L
5		10000 L		6000 L	4000 L
6		12000 L		8000 L	4000 L

[1] *In jurisdictions where the calculated peak hydraulic loading rate does not exceed 2000 L/day (500 gpd) nominal, a 6000-liter tank may be used as long as the system's anticipated treatment levels (see Figure 3) meet local requirements. For homes with more than six bedrooms or homes that are larger than 500 m^2 (5380 ft^2), contact Orenco Systems, Inc*

[2] *Processing tank = a single, two-compartment tank that includes a primary (septic) and a secondary (recirculation) compartment (see Figure 2, examples a and b).*

[3] *The 4000 liter minimum is due to float settings and reserve requirements.*

System Requirements: Filter Units

Orenco's suggested design loading rates are based on typical per capita flow rates — 190 to 230 L/day per person (50 to 60 gpd/person) — and average strength characteristics expected from residential type installations, as shown in Table 1. Orenco's requirements assume that peak daily flows (Q_p) from a residence are typically twice the average daily flows (Q_a). System design must meet local regulations governing flow-to-bedroom ratios.

Performance is a function of the expected hydraulic and organic loads, with periodic weekly peaks. Typically, the daily mass loading is based on the expected daily flows and actual strength. Figure 3 shows periodic peak loading capacity at a 95 percent confidence level. If the loading rate (or mass load) needs to be reduced to meet discharge limits, it's a simple matter of adding additional treatment units.

Because calculated flows can vary greatly between jurisdictions, Table 3 can be used to determine the recommended number of units per bedroom.

Table 3. Recommended Number of Treatment Units[1]

Number of Bedrooms	AX Units Recommended
4 (or fewer)	1 (AX20)
5	2 (AX20)
6	2 (AX20)

[1] *The hydraulic loading rate for all residential AX units is 1184 L/m^2/day (29.1 gpd/ft^2). The nominal hydraulic application rate is 1017 L/m^2/ day (25 gpd/ft^2). In jurisdictions where the calculated peak hydraulic loading rate does not exceed 2000 L/day (500 gpd) nominal, a single AX20 pod may be used as long as the system's anticipated treatment levels (see Figure 3) meet local requirements. For homes with more than six bedrooms or homes that are larger than 500 m^2 (5380 ft^2), contact Orenco Systems, Inc*

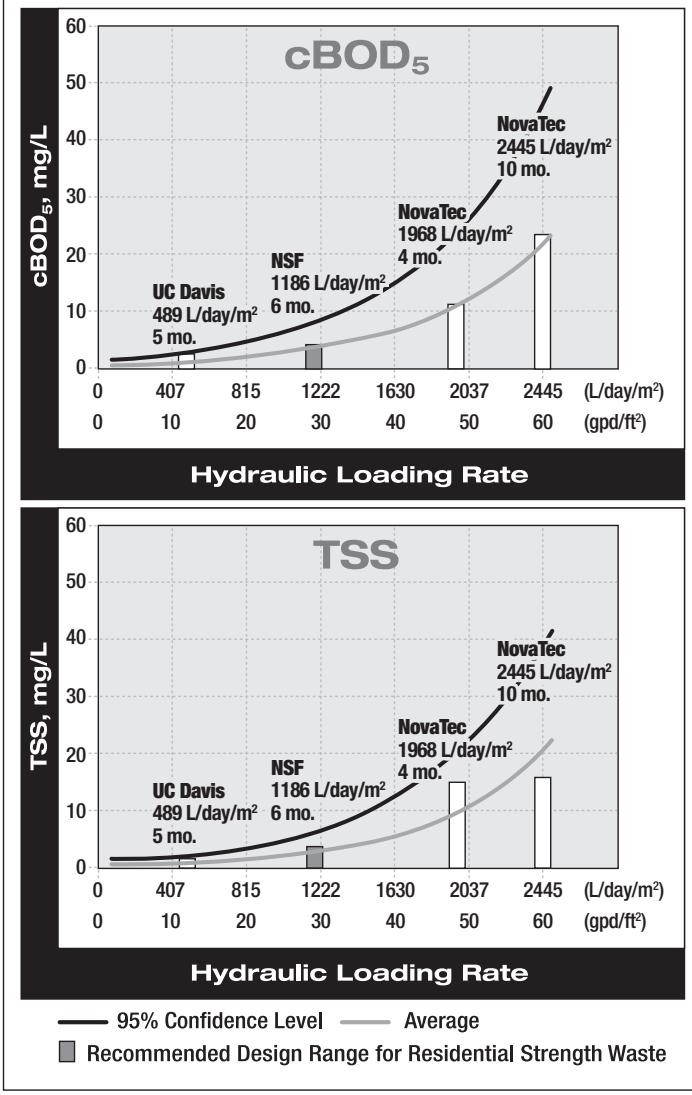
Typical Effluent Quality

Effluent quality is dependent on a number of factors, including influent characteristics and loading rates. Figures 3a and 3b below show third party, NSF/ANSI Standard 40 testing results. The results demonstrate that low-to-moderate loading rates typically produce cBOD and TSS of <5 mg/L, while higher loading rates produce cBOD and TSS in the range of 15-25 mg/L. Field testing of systems in real-world conditions shows similar results, with cBOD and TSS of <10 mg/L. (See *AX Performance Summary*, AHO-ATX-PERF-1.)

Nitrogen reduction in Mode 1 will typically exceed 60 percent, with total nitrogen in the filtrate ranging between approximately 25 and 35 mg/L. In Mode 3, nitrogen reduction can reach 70 percent or better, depending on wastewater strength and other characteristics like grease and oils, pH, and alkalinity concentrations. Nitrification can be inhibited if the buffering capacity (alkalinity) of the wastewater is too low. On a theoretical basis, 7.14 mg/L of alkalinity as $CaCO_3$ is needed to nitrify 1 mg/L of $NH4^+$.

Figure 3. Effluent Quality vs. Hydraulic Loading Rates

Third Party, NSA/ANSI Standard 40 Testing Results



Pumping Equipment: Recirculation Pump

The integrated treatment package includes an Orenco Biotube® pump package.

Residual Head Pressures

A residual pressure of 1.5 m (5 ft) is used to determine the initial timed-dosing settings. (Residual pressure may vary depending on system hydraulics and/or special treatment requirements.) Consulting with Orenco is required when the residual pressure dosing falls outside the typical range of 0.9 to 1.8 meters (3 to 6 feet).

Recirculation Ratios and Timer Settings

The AdvanTex Treatment System's initial timer settings should be established based on the expected average daily flow and a 4:1 recirculation ratio (filter recirculation ratio). If flows vary significantly from expected flows, timer settings can easily be recalculated and adjusted. See "Appendix 1: AX20 Timer Settings Worksheet" in the *Residential AX Installation Manual*, NIM-ATX-AX-1, for more information.

AdvanTex Control Systems

Critical to the success of the AdvanTex Treatment System is the method in which the effluent is loaded onto the AdvanTex textile filter. Over the past three decades, timer-controlled applications have proven to play an essential role in optimizing the performance of both fixed and suspended growth biological systems. A timer-controlled pump in the processing tank periodically doses effluent to a distribution system on top of the AdvanTex filter. Each time the filter is dosed, effluent percolates through the filter media and is treated by naturally occurring microorganisms that populate the filter. During periods of high flow, a timer override float will temporarily modify the timer settings to process the additional flow. Conversely, during periods of low flow, the timer settings can be modified to reduce loading onto the AdvanTex filter. Orenco offers two timed-dose control panels with the AdvanTex Treatment System.

Orenco's MVP (Most Versatile Panel) series control panels include an easy-to-use programmable logic unit that incorporates many timing and logic functions. The units have built-in screens that show time and date, elapsed pump run times, pump cycle counts, high-level alarm and override cycle counts, and low-level alarm counts, as well as power fault information and operating hours. In addition, there are separate screens that show the status of the panel's digital inputs and outputs. These features give operators and maintenance providers the ability to monitor individual systems on site. Alarm events active the panel's audible and visual alarms.

In some markets, Orenco offers our VeriComm® (VCOM) remote telemetry control panels as alternatives to the MVP series panels. Orenco's VCOM control panels give wastewater system operators and maintenance organizations the ability to monitor and control each individual system's performance remotely. There are several additional operational benefits associated with telemetry-based controls, including Advanced Control Logic — functions that activate in the event of component malfunction to diagnose the system using pre-established trend data and, if necessary, modify the operation of the system until it can be serviced. VCOM panels also provide additional alert and alarm functions to notify the operator/designer in the event that trend data indicate potential problem conditions (e.g., high flows or frequent alarms).

Surge Volume

For most residential applications, the recommended surge volume is approximately 570 to 950 L (150 to 250 gallons). The actual surge volume used should be approximately 50 to 100 percent of the actual average daily flow. The surge volume is the volume between the normal low liquid level and the override timer float. The normal low liquid level is the level at which 100 percent of the filtrate returns to the tank. For most residential installations, the low liquid level will be approximately 130 to 150 mm (5 to 6 inches) below the top of the RSV cage. Refer to the *Residential AX Installation Manual*, NIM-ATX-AX-1, for more information.

AdvanTex Control Systems

for details.

Reserve Volume

A typical AdvanTex Treatment System on a four-bedroom home has a 6000-L processing tank. There are about 1,500 L (400 gallons) of emergency storage between the normal operating liquid level and the inside top of the tank. Assuming that the average home produces about 950 L/day (250 gpd), the emergency storage volume in an AdvanTex system is sufficient for 1.5 days.

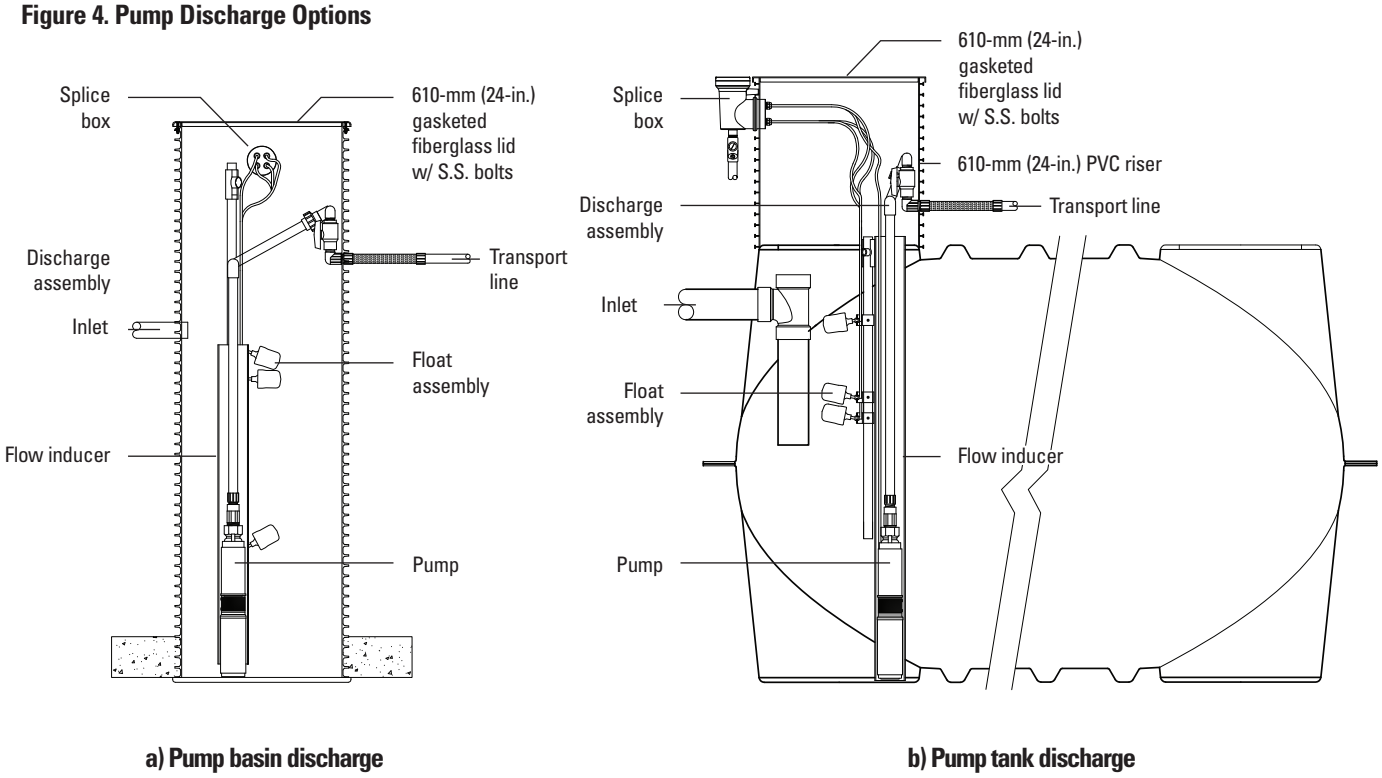
Power outage: During a power outage, water usage will be significantly reduced because water heaters, dishwashers, and laundry equipment will not be used. Under these conditions, it is realistic to estimate that water usage will be reduced by 50 percent to around 473 L/day (125 gpd). Therefore, in a power outage, the emergency storage capacity available in an AdvanTex system increases to approximately three days' worth. Because power outages typically last no more than one day, the emergency storage of an AdvanTex system is adequate.

Mechanical component failure: Failure of a pump or electrical component may cause the system to stop operating, requiring some amount of emergency storage volume. For MVP Series control panels, once an alarm level is detected, the MVP Series panel will immediately activate the local audible and visual alarms. For VCOM control panels, the VeriComm Monitoring System immediately notifies the Service Provider of the alarm condition and indicates the cause of the alarm. This helps Service Providers bring the right replacement components. In most cases, no more than 950 L (250 gallons), or one day's worth of reserve, would be needed for the Service Provider to respond and get the system running again.

Discharge Equipment

There are two discharge options: gravity and pump. When discharging by pump, an Orenco pump basin (Figure 4, example a)

Figure 4. Pump Discharge Options



a) Pump basin discharge **b) Pump tank discharge**

can be used. Alternatively, some designs may call for pumping out of a tank (Figure 4, example b).

All tanks must meet Orenco's minimum structural requirements, be completely watertight, and pass a watertight test including the riser/tank connection. For detailed specifications, see structural and watertightness criteria in Orenco's General Specifications, NDA-DG-SPEC-1, and tank specifications checklist in Orenco's Concrete Tank Questionnaire, NCL-TNK-TNK-1.

Cold Weather Considerations

AX units are available with 25-mm (1-in.) insulation attached to the bottom of the lid. Installing insulation around the sides of the filter pods themselves is optional and is done on site as needed. Other cold weather considerations include standard practices used with most onsite pump systems, such as allowing all lines to drain, insulating processing tank lids, and back-filling risers with pea gravel if frost-heave is a concern. The filter vent may need to be extended above the highest level of the snowpack during winter months. Consult Orenco if supplementary options need to be considered.

On-site Effluent Treatment National Testing Programme (OSET NTP)

PERFORMANCE CERTIFICATE
Orenco AdvanTex® AX-20 Mode 3 On-site Domestic Wastewater Treatment System, OSET NTP Trial 3, 2007/2008

System Tested

AdvanTex® AX-20 Mode 3 packed bed (textile) reactor treatment unit. Rated design capacity 2,000 litres/day. Total liquid volume 6,000 litres [primary treatment 4,000 litres; secondary treatment via free draining packed bed (textile) reactor; recirculation tank 2,000 litres). Emergency storage 2,000 litres. No tertiary treatment (such as UV disinfection) is incorporated.

Test Flow Rate

The **AdvanTex® AX-20 Mode 3** was tested at 1,000 litres/day (equivalent to servicing a 3-bedroom 5 person household) over an 8 month (35 week) period November 2007 to July 2008 followed by a 1½ month (6 week) high flow test involving 5 days at 2,000 litres per day followed by 1,000 litres/day over the next 5 weeks.

Testing and Evaluation Procedures

A total of 21 daily treated effluent samples of organic matter (BOD) and suspended solids (TSS) from weeks 9, 17 and 27 were tested and evaluated as to meeting the secondary effluent quality requirements of the joint Australia/NZ Standard, AS/NZS 1547:2000.

A total of 21 daily treated effluent samples of BOD, TSS and faecal coliforms (FC) (weeks 9, 17 and 27) plus 16 samples at six day intervals of total nitrogen (TN), ammonia nitrogen (NH4-N) and total phosphorus (TP) during weeks 23 though 35 were benchmarked and rated on their median values. In addition, the energy used by the treatment system was assessed on the average of consumption levels over the 16 sample days, weeks 23 to 35.

Meeting AS/NZS 1547:2000 Secondary Effluent Quality Requirements

These requirements are that 90% of all test samples must achieve a BOD of $\leq$ 20 g/m^3 and TSS of $\leq$ 30 g/m^3. The **AdvanTex® AX-20 Mode 3** system **achieved** a performance level of **100%** for both BOD and TSS.

Benchmark Ratings

The **AdvanTex® AX-20 Mode 3** system **achieved** the following effluent quality ratings:

Indicator Parameters	Median	Std Dev.	Rating	Rating System				
				A+	A	B	C	D
BOD (g/m^3)	*3*	*2.5*	*A+*	*<5*	*<10*	*<20*	*<30*	*≥30*
TSS (g/m^3)	*8.4*	*6.0*	*A*	*<5*	*<10*	*<20*	*<30*	*≥30*
Total nitrogen TN (g/m^3)	*16.86*	*2.4*	**N/R*	*<5*	*<15*	*<25*	*<30*	*≥30*
Ammonia Nitrogen NH4-N (g/m^3)	*3.89*	*2.4*	*A*	*<1*	*<5*	*<10*	*<20*	*≥20*
Total phosphorus TP (g/m^3)	*4.69*	*0.7*	*B*	*<1*	*<2*	*<5*	*<7*	*≥7*
Faecal Coliforms FC (cfu/100mL)	*91,500*	*5.1x10^5*	*C*	*<10*	*<200*	*<10,000*	*<100,000*	*≥100,000*
Energy consumption (kWh/d)	*1.1 (ave)*		*B+*	*0*	*<1*	*<2*	*<5*	*≥5*
N/R – Not Rated [System not rated due to anomalies in the testing results for nitrogen – unit being re-tested in Trial 5]								

This Performance Certificate is specific to the **AdvanTex® AX-20 Mode 3** model as specified above when operated at a flow rate of 1,000 litres/day, and is valid for 5 years from the date below.

For the full OSET NTP report on the performance of the **AdvanTex® AX-20 Mode 3** system contact Innoflow Technologies Ltd of Albany, Auckland

Authorised By:

Ian Gunn, Acting Technical Manager, OSET NTP
9 April 2010

On-site Effluent Treatment National Testing Programme
c/- Acting Technical Manager, PO Box 17-368, Greenlane, AUCKLAND 1546
Ph: (09) 579 2327 Fax: (09) 579 2324 E-mail: ian.gunn@xtra.co.nz

On-site Effluent Treatment National Testing Programme (OSET NTP)

PERFORMANCE CERTIFICATE EXTENSION 2016
AdvanTex® AX-20 Mode 3 and Mode 3B On-site Domestic Wastewater Treatment System,
OSET NTP Trial 5, 2009/2010

System Tested

AdvanTex® AX-20 Mode 3 recirculating textile packed bed reactor treatment unit. Rated design capacity 2,000 litres/day. Total liquid volume 7,200 litres (primary treatment 4,000 litres; aeration treatment textile surface area 5,019 m^2; recirculation 2,000 litres; pump chamber 1,200 litres). Emergency storage 2,000 litres. No tertiary treatment (such as UV disinfection) is incorporated. Testing was undertaken November 2009 to August 2010

Test Flow Rate

The **AdvanTex® AX-20 Mode 3** was tested at a flow rate of 1,000 litres/day (equivalent to servicing a 3-bedroom 5 to 6 person household) over an 8 month (35 week) period followed by a 5 week high load effects period involving 5 days at 2,000 litres per day then 1,000 litres/day over the following 4 weeks.

Testing and Evaluation Procedures

A total of 16 treated effluent samples of organic matter (BOD_5), suspended solids (TSS), total nitrogen (TN) and ammonia nitrogen (NH_4-N) at generally six day intervals during weeks 23 through 40 were benchmarked and rated on their median values. In addition, the energy used by the treatment and effluent pumping system was assessed on the mean of consumption levels over the 16 sample days, weeks 23 to 35.

Meeting AS/NZS 1547:2000 Secondary Effluent Quality Requirements

These requirements are that 90% of all test samples must achieve a BOD_5 of $\leq$ 20 g/m^3 and TSS of $\leq$ 30 g/m^3 with no one result for BOD_5 being >30 g/m^3 nor no one result for TSS being >45 g/m^3. The **AdvanTex® AX-20 Mode 3** already holds a performance certificate issued on 9 April 2010 under Trial 3 (2007/2008) which states that the system **achieved** a performance level of **100%** for both BOD_5 and TSS.

Benchmark Ratings

The **AdvanTex® AX-20 Mode 3** system **achieved** the following effluent quality ratings:

Indicator Parameters	Median	Std Dev.	Rating	Rating System				
				A+	A	B	C	D
BOD_5 (g/m^3)	2.0	0.7	A+	<5	<10	<20	<30	≥30
TSS (g/m^3)	2.5	4.1	A+	<5	<10	<20	<30	≥30
Total nitrogen (g/m^3)	12.3	1.3	A	<5	<15	<25	<30	≥30
NH_4-Nitrogen (g/m^3)	0.6	0.21	A+	<1	<5	<10	<20	≥20
Energy (kWh/d) (mean)	0.92	--	A	0	<1	<2	<5	≥5

Performance Certificate Extension

In August 2016 Innoflow Technologies Ltd applied for an Extension of Time related to the Performance Certificate issued in 2011 for their **AX-20 Mode 3** plant and requested that it be applied to their **AX-20 Mode 3B** plant. They provided a signed and legally witnessed statement that there have been two changes to the mode 3 plant tested in 2011 comprising:

i. Change from a concrete tank (Mode 3) to a fibreglass tank (Mode 3B), and provided full technical drawings for review.
ii. Change from a locally sourced AXPTRO V5 control system to an Orenco MVP-AX20 B2/DM(NZ) control panel, with no change in control logic or control timer settings.

AND that these changes are not considered to have resulted in reduced performance in terms of all effluent quality parameters listed in the original OSET-NTP certification.

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On-site Effluent Treatment National Testing Programme (OSET NTP)

SWANS-MAG reviewed the changes and concurs with the Innoflow Technologies Ltd statement that no reduction in performance is expected. Hence the plants performance results and Benchmark Ratings above, as tested in 2009, can be expected to remain unchanged in 2016 for either the Mode 3 or Mode 3B plant and the previous Performance Certificate can be extended for a period of 3 years from its previous expiry date.

This Performance Certificate is specific to the **AdvanTex® AX-20 Mode 3 and Mode 3B plants** as specified above when operated at a flow rate of 1,000 litres/day, **and is valid to 22 March 2019**. The Trial 3 Performance Certificate of 9 April 2010 includes effluent quality ratings for TP (total phosphorus) and FC (faecal coliforms).

For the full OSET NTP Trial 5 report on the performance of the **AdvanTex® AX-20 Mode 3** system contact Innoflow Technologies Ltd at Dairy Flat, Auckland, on *0800innoflow*.

Authorised By:
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13 October 2016

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