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Onsite Wastewater Report

Client:
Juliet Trustee Company Ltd

Located at:
Onahau Bay, Grove Arm, Queen Charlotte Sound

Date: 15 July 2015

Ref: 0234

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1. Executive Summary

1.1. Juliet Trustee Company Ltd own a property (Pt Sec 20, Queen Charlotte sound DIST) in Onahau Bay, Marlborough Sounds. The existing wastewater system treating the wastewater from the house does not adequately treat and dispose of wastewater and requires replacing.

1.2. Juliet Trustee Company Ltd has requested an appraisal of the on-site wastewater management criteria for the existing dwelling at the property.

1.3. My assessment has determined the best practical onsite wastewater management system solution for the existing house should comprise of:

- A secondary treatment unit
- Dripper line, totaling a minimum of 500m^2 area.

1.4. Installation is to be in accordance with the requirements and recommendations of AS/NZS 1547:2012.

1.5. The proposed very low rate of application the wastewater discharge over a large area is unlikely to cause instability.

1.6. The recommendations above cannot be taken in isolation and must be read with respect to the balance of this report and the context of the proposed development at the site.

2. Introduction

2.1. Juliet Trustee Company Ltd own a property in Onahau Bay, Marlborough Sounds. The existing wastewater system treating the wastewater from the house located on the property does not adequately treat and dispose of wastewater and requires replacing.

2.2. Juliet Trustee Company Ltd has requested an appraisal of the on-site wastewater management criteria for the existing dwelling at the property.

2.3. The property is located on the western side of Onahau Bay within an area of established residential property adjacent to the shoreline.

2.4. The property is legally described as Pt Sec 20, Queen Charlotte sound DIST and has an area of approximately 7.284ha.

2.5. An existing dwelling is located in on the south eastern point of the property, adjacent to the foreshore reserve as indicated on the appended site plan.

2.6. The site is shown to be within an area identified as 'unstable' hazard overlay according to the maps within the Marlborough District Council Sounds Resource Management Plan.

2.7. The dwelling and surrounding land is generally located on moderate to steep north aspect topography.

2.8. An access track winds down the hillside from the dwelling to the foreshore. There are old fences throughout the property that indicate the property was used as part of a farm some time ago.

2.9. A site walkover and investigations were carried out on 10 July 2015.

3. Site & Soil Evaluation

3.1. The cut faces associated with the existing access track provide a good representation of the underlying soil throughout the property.

3.2. In addition to the access track cut face observations, three test holes were dug to various depths in the general area of the proposed field location. The locations of the observations are shown on the site plan provided in Appendix A. The tests were conducted to determine the soil type and soil category.

3.3. Based on the soil assessment carried out, an average drainage category of 5 has been adopted. Logs of the representative soil properties are provided in Appendix C.

3.4. Groundwater was not encountered within the subsurface investigation and it is anticipated groundwater is more than 2.0m below ground level.

3.5. The site is exposed to both wind and sun, but protected somewhat by the regenerating native bush.

3.6. The property is located in an unstable hazard zone. The area is to an extent unstable and has been subject to very old global instability that forms the more gentle slopes within the property. Given the proposed very low rate of application the wastewater discharge over a large area, it is my opinion that the proposed wastewater discharge is unlikely to cause instability.

4. System Design

4.1. An assessment of the best practical option has determined that secondary treatment unit coupled a dripper line land application is appropriate for the site conditions and constraints.

4.2. The secondary treatment system must achieve the following treatment levels:

BOD after 5 days (average)	< 20 g/m^3
Suspended solids (average)	< 30 g/m^3

4.3. Any system that has been tested and meets the above standard is satisfactory, such systems include (but are not limited to) Biolytix, Oasis Clearwater Series 2000, Hynds Advanced Lifestyle, Airtech 9000. These systems are common throughout Marlborough and have been tested by the On-Site Effluent Treatment National Testing Program (OSET NTP) and have proven their compliance with the above standard.

4.4. Grid power supply is available to the property that will provide power to any blower / pump associated with the treatment unit.

4.5. A wastewater design sheet is provided in Appendix B with the design calculation based on the following criteria for the proposed wastewater system.

- 6 person permanent occupancy
- Loading of 1200 litres/day (200 litres / person / day).
- Soil category 5
- Design loading rate of 2.4mm/day (includes a 20% reduction factor)
- Standard plumbing fixtures installed.

4.6. Based on the criteria above, the minimum total area of the application field is 500m^2.

4.7. The house, property boundaries and sea restrict the location of the field, it is recommended that the field be positioned up slope of the house with a 20m minimum offset from the sea mean high water. Details of the application field are shown in Appendix A.

4.8. There is extensive leaf matter and organic material on the existing ground surface. The dripper lines are to be pinned to the ground surface and covered as best as possible with leaf matter. It is my experience that the leaf matter and organic material will natural cover the majority of dripper line over time.

4.9. No vehicular access is available, it is expected that the system will be maintained and serviced by boat from Onahau Bay.

5. Alternative Systems

5.1. Alternative systems have been considered, the reasons why dismissed are listed below:

5.2. Primary treatment (septic tank) – Not suitable for dripper line (clogging) and considered not a suitable level of treatment given the proximity to water courses and foreshore.

5.3. Trenches, Beds, ETS & Mound Field - Uneconomical given the proximity of the property to suitable gravels, the steep slopes on the property and the dense vegetation (large amount of clearing of vegetation and earthworks would be required).

6. Assessment of Environmental Effects

6.1. An onsite wastewater system is required as there is no reticulation in the area.

6.2. Due to the following reasons I do not envisage the wastewater becoming an environmental risk:

- Substantial improvement from the existing system, (that does not appear to have caused any environmental impact to date).
- Remote location
- Secondary treatment
- Low application rate
- The environmental buffering capacity of land

6.3. The proposed wastewater treatment system generally complies with AS/NZS 1547:2012 and the Council Guidelines.

6.4. Public health risks from an underperforming on-site system in this location would come from unlikely contamination of the surface water / sea.

6.5. The disposal area has been designed specifically to accommodate wastewater where the soil is of lower permeability.

6.6. The property is a holiday home and will be largely occupied during the summer months. The irrigation rate of 2.4mm/day is similar to the evapotranspiration during this time, therefore very little wastewater will actually be absorbed by the soil.

6.7. In this instance the dripper line pinned to the surface is a suitable alternative to burying them 150mm below ground level (not practical). The field is not easily accessed and the thick organic layer will assist with absorption of the wastewater and covering the dripper line.

6.8. There are suitable offsets from water courses and the sea. The environmental buffering capacity of land is sufficient to treat the wastewater to a suitable standard to avoid risk to public health. Coliform numbers, the indicators used to measure the various pathogens present in sewage effluent are not considered to be a concern. Bacterial, (and viral etc), numbers are reduced exponentially with passage of effluent through mid-range textured soils. The proposed field assists in the effectiveness of this by reducing the quantity of effluent required to be treated by the soil in a single location. This will also provide a greater safety margin for accommodation of any fluctuations in discharge that may not be able to be accommodated or adequately treated by the soil within the existing field. It is generally accepted that a path length of 0.3 – 0.4 metres is sufficient to reduce bacterial numbers to insignificant levels in normal soils i.e. soils that are of a mid-range texture, not too sandy or too clayey, and not saturated all the time. The topsoil soil on the property falls into this mid-range soil category. It is therefore my opinion that no significant adverse effect on the environment due to a suitable offset being achieved (20m).

6.9. In the unlikely event of the system failure the effects will be less than minor, it is likely the wastewater will saturate the slope. There will be an unpleasant odour and saturated unusable areas. The effects will be easily identifiable, inhibit the applicant's use of the land and be generally unpleasant. The owner will want to address the failure and repair / install a new wastewater system. The property is relatively large and there are reserve areas available to relocate the field should the field fail. The land in the location of the field predominately falls towards the

foreshore. Probable infiltration into the topsoil before reaching these features as well as the environmental buffering capacity of the land between the field and the foreshore will produce very minor effects.

6.10. Regular maintenance and inspection by the owner / owner's contractor will ensure the onsite wastewater system is operating to a suitable standard.

7. Recommendations / Conclusions

7.1. The existing wastewater system should be decommissioned.

7.2. The new wastewater management system should comprise of a secondary treatment unit. The treated effluent is to be discharged to a dripper line field of at least 500m^2 in size.

7.3. It is confirmed that there is sufficient area available for the adequate treatment and application of domestic effluent provided that the conditions and recommendations specified in this report are implemented.

7.4. Regular maintenance is required on any onsite wastewater treatment system to ensure the system operates properly. Maintenance is the responsibility of the owner.

7.5. The proposed very low rate of application the wastewater discharge over a large area is unlikely to cause instability.

8. Limitations

8.1. This report is valid for five years from the date of issue and covers the wastewater treatment for the existing house for the Juliet Trustee Company Ltd at Pt Sec 20, Queen Charlotte sound DIST in Onahau Bay. Any other areas are outside the scope of this report.

8.2. This report relies on the regular maintenance by a recognised maintenance contractor and regular inspection maintenance of the wastewater system and disposal field by the owner.

9. References

9.1. NZS 1547:2012 On-site Domestic Wastewater Management.

9.2. Marlborough Sounds Resource Management Plan.

9.3. Marlborough District Council Guidelines for New On-site Wastewater Management Systems, July 2005.

9.4. Marlborough District Council DEKHO (GIS mapping).

9.5. Begg, J.G. and Johnston, M.R. (compilers) 2000. New Zealand Geological Map 10: Geology of the Wellington area, 1:250,000.

9.6. Guideline for the Field Classification and Description of Soils and Rock for Engineering Purposes NZ Geotechnical Society Inc. December. 2005.

Khalid Suleiman
CPEng, MIPENZ, BEngTech(civil) NZCE(civil)
Civil Engineer

15 July 2015

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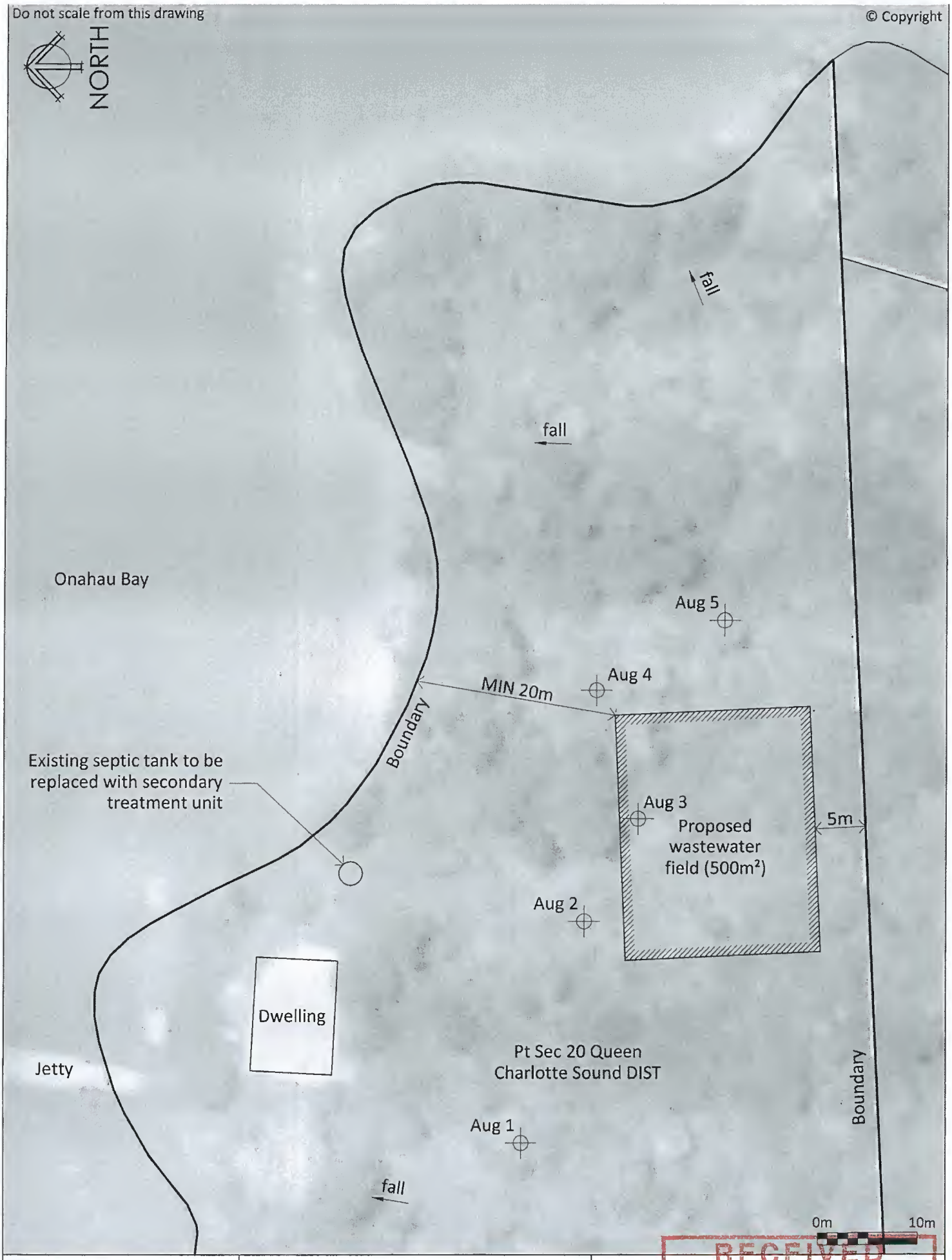
Appendix A – Site Plan & Field Details



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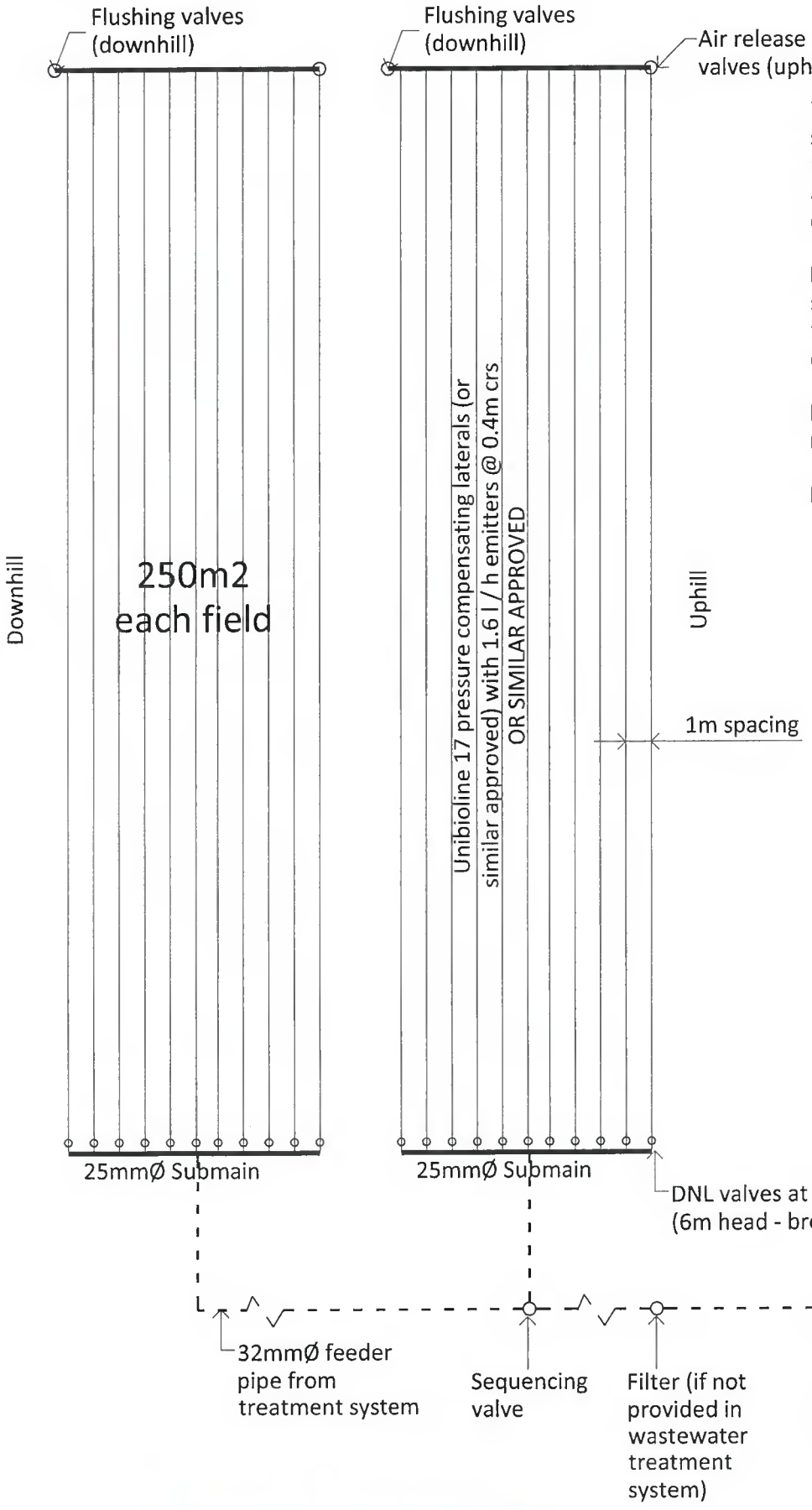
PROJECT
WASTEWATER SYSTEM
ONAHAU BAY
FOR JULIET TRUST COMPANY LTD

DRAWING
SITE LAYOUT

SCALE (A4)	DATE	DWG No.	REV
1:500	15 JULY 15	0234-01	0



The wastewater from the house should not contain anything other than human waste, toilet paper and food material (such as may go down a kitchen sink drain).

It is recommended that natural soaps, detergents, , plumbing fixture cleaners, drain cleaners and disinfectants are used.

Bleaches and harsh chemicals are not recommended.

Prohibited discharge to the system:

- Oil/grease from a deep frier (for example).
- Stormwater
- Petrol, oil or other flammable/explosive substances
- Garden / garage chemicals (e.g. pesticides, paint cleaners,photographic chemicals, motor oil or trade waste.
- Disposable nappies & sanitary napkins.

NOTE: INDICATIVE LAYOUT - PLUMBER / DRAINLAYER TO CONFIRM

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PROJECT
WASTEWATER SYSTEM
ONAHAU BAY
FOR JULIET TRUSTEE COMPANY

DRAWING
WASTEWATER FIELD DETAILS

SCALE (A4)	DATE	DWG No.	REV
N.T.S	15 JUL 15	0234-10	0

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Appendix B – Wastewater Design Calculations

Project:	Replacement Wastewater System				
Client:	Juliet Trustee Company Ltd				
Location:	Onahau Bay				
Ref:	0234	**Date:**	15.07.15	**Page:**	1 of 1

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Wastewater Design Calculations

In accordance with AS/NZS 1547:2012 & The Marlborough District Council Guidelines 2005

Loading

Bedrooms: 3

Occupancy: 6 *Persons*

Water Supply: Stream Supply

Household Plumbing: Standard Fixtures

Flow Allowance: 200 litres/day/ person

DRAINAGE CONTROLS:

No need for surface water collector / cut-off drains, field in close proximity to the crest of the ridge

RESERVE AREA

Reserve area available for extensions is 100% of the design area:

RESTRICTIONS

Boundaries & water courses

Design

Disposal Field Type: Irrigation

Soil Type: Light Clay - Strongly Structured

Soil Category: 5

Daily Loading Rate: 3 mm/day
Slope Reduction Factor: 20 %
Final Loading Rate: 2.4 mm/day

Calculations

DAILY FLOW: 1200 L/day
LOADING RATE: 2.4 mm/day

AREA REQUIRED: 500 m^2

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Appendix C – Soil Properties

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Soil Properties

Juliet Trustee Company Ltd – Onahau Bay

Aug 1, 2 & 5

0-200mm	Topsoil –Brown
200-600mm	As described below
Site Exposure	Exposed
Soil Colour	Yellowey brown
Soil Texture	Clay loam –Can be rolled into a ball with a rather spongy feel; slightly plastic forms a ribbon 40-50mm long
Coarse Fragments	few (<5%)
Size of Coarse Fragments	< 5mm
Structure	Massive
Soil Category	4

Aug 2

0-150mm	Topsoil –Brown
150-600mm	As described below
< 5mm	Exposed
Soil Colour	Light brown
Soil Texture	Light Clay – Smooth plastic ball that can be rolled into a rod; slight resistance to shearing between thumb & forefinger; forms a ribbon 50-75mm long
Coarse Fragments	few (<5%)
Size of Coarse Fragments	< 5mm
Structure	Massive
Soil Category	5

Aug 3 & 4

0-300mm	Topsoil –Brown
300-550mm	As described below
Site Exposure	Exposed
Soil Colour	Light brown
Soil Texture	Light Clay – Smooth plastic ball that can be rolled into a rod; slight resistance to shearing between thumb & forefinger; forms a ribbon 50-75mm long
Coarse Fragments	few (<5%)
Size of Coarse Fragments	< 5mm
Structure	Massive
Soil Category	5

Note: No groundwater encountered

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Appendix D – Loading Certificate

Project:	Replacement Wastewater System				
Client:	Juliet Trustee Company Ltd				
Location:	Onahau Bay, Grove Arm				
Ref:	0234	**Date:**	15.07.15	**Page:**	1 of 1

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Wastewater - Loading Certificate

System Capacity
The system is designed for 6 person permenant occupancy with a combined load of 1200 litres per day.

Summary of Design Criteria
The field has been sized based on an application rate of 2.4mm/day.

Resereve Area
The reserve area is required to provide a factor of safety should the proposed wastewater field fail. It is important to maintain a suitable area as reserve area should it be required.

Plumbing Fixtures
The design of the wastewater system is based on standard plumbing fixtures with no requirement for water reduction fixtures.

Concequences of Overloading The System
The system will manage brief, short term overloading, however prolonged overloading will lead to the failure of the wastewater field and likely replacement.

Concequences of Damaging Use, Lack of Monitoring, Maintenanceand Servicing
The system will require regular maintenance.

The wastewater from the house should not contain anything other than human waste, toilet paper and food material such as may go down a kitchen sink drain.

It is recommended that natural soaps, detergents, , plumbing fixture cleaners, drain cleaners and disinfectants are used.

Bleaches and harsh chemicals are not recommended.

Prohibited discharge to the system:

· Oil/grease from a deep frier (for example).
· Stormwater
· Petrol, oil or other flammable/explosive substances
· Garden / garage chemicals (e.g. pesticides, paint cleaners,photographic chemicals, motor oil or trade waste.

Appendix E – Setback Distance Assessment

Project:	Replacement Wastewater System				
Client:	Juliet Trustee Company Ltd				
Location:	Onahau Bay				
Ref:	0234	**Date:**	15.07.15	**Page:**	1 of 1

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Wastewater Setback Distance Assessment

Item	Site/system feature	Constraint Scale Lower (1) ◄ ► Higher (10)		Sensitive Features	Score
A	Microbial quality of effluent	Effluent quality consistently producing ≤ 10 cfu/100 mL E. coli (secondary treated effluent + disinfection)	Effluent quality consistently producing ≥ 106 cfu/100 mL E. coil (primary treated effluent)	Groundwater and surface pollution hazard, public health hazard	3
B	Surface water	Category 1 to 3 soils (see Note 5) no surface water down gradient within >100 m, low rainfall area	Category 4 to 6 soils, permanent surface water <50m down gradient, high rainfall area, high resource / enviro value	Surface water pollution hazard for low permeable soils, low lying or poorly draining areas	8
C	Groundwater	Category 5 and 6 soils, low resource / environmental value	Category 1 and 2 soils, gravel aquifers, high resource / environmental value	Groundwater pollution hazard	2
D	Slope	0-6% (surface effluent application),0 - 10% (subsurface effluent application)	> 10% (surface effluent application), > 30% subsurface effluent application	Off-site export of effluent, erosion	8
E	Position of land application area in landscape	Downgradient of surface water, property boundary, recreational area	Upgradient of surface water, property boundary, recreational area	Surface water pollution hazard, off-site export of effluent	7
F	Drainage	Category 1 and 2 soils, gently sloping area	Category 6 soils, sites, visible seepage, moisture tolerant vegetation, low lying area	Groundwater pollution hazard	7
G	Flood potential	Above 1 in 20 year flood contour	Below 1 in 20 year flood contour	Off-site export of effluent, system failure, mechanical faults	1
H	Geology and soils	Category 3 and 4 soils, low porous regolith, deep, uniform soils	Category 1 and 6 soils, fractured rock, gravel aquifers, highly porous regolith	Groundwater pollution hazard for porous regolith and permeable soils	5
I	Landform	Hill crests, convex side slopes, and plains	Drainage plains and incise channels	Groundwater pollution hazard, resurfacing hazard	2
J	Application method	Drip irrigation or subsurface application of effluent	Surface/above ground application of effluent	Off-site export of effluent, surface water pollution	2

Site feature	Setback Distance	Average Score From Table Above	Guideline Setback Requirement	Achieved Setback
Property boundary	1.5m - 50m	4.3	21m	5m
Buildings / houses	2m - >6m	4.3	2m	21m
Surface water	15m – 100m	5.1	44m	20m
Bore, well	15m – 50m	3.0	N/A	N/A
Recreational areas	3m – 15m	4.0	5m	20m
In ground water tank	4m – 15m	4.0	N/A	N/A
Retaining wall / cut slope	3m	4.7	N/A	N/A
Groundwater	0.6m - ≥ 1.5m	3.5	0.3m	1m
Hardpan or bedrock	0.6m - ≥ 1.5m	7.0	0.6m	1m