On-site wastewater management report, 55 Onahau Road, Queen Charlotte Sound, Marlborough

December, 2012

see SUSTAINABLE ENVIRONMENTAL ENGINEERING LTD

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RD 1,

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EXECUTIVE SUMMARY

Under the Marlborough District Council's Marlborough Sounds Resource Management Plan all new discharges of domestic wastewater to land are a discretionary activity and therefore require resource consent. Sustainable Environmental Engineering Limited (SEE Ltd) were commissioned by the owners of the site to investigate and evaluate the site conditions and constraints associated with the property in order to design a suitable on-site wastewater management system that complies with Marlborough District Councils 'Guidelines for New On-Site Wastewater Management Systems' and A.S. /N.Z.S. 1547:2012 'On-Site Domestic Wastewater Management'.

This report is for a new wastewater management system comprising secondary treatment to drip irrigation to replace and improve the current wastewater management system for the dwelling on site. The wastewater application area has been designed for a three bedroom dwelling with a roof water supply. The wastewater application area is located on the crest and west facing slopes of a north south trending ridge away from any gullies and is not subject to stormwater runoff. We consider that, given appropriate installation, operation and maintenance, any potential adverse environmental effects will be less than minor and will provide a significant improvement on the current system.

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1. INTRODUCTION

Under the Marlborough District Council's Marlborough Sounds Resource Management Plan all new discharges of domestic wastewater to land are a discretionary activity and therefore require resource consent. It is essential that the nature of any new on-site wastewater management system is appropriate to the site conditions in order to ensure that all domestic wastewater is treated and contained on-site.

Sustainable Environmental Engineering Limited (SEE Ltd) were commissioned by the owners of the site to investigate and evaluate the site conditions and constraints associated with the property in order to design a suitable on-site wastewater management system that complies with Marlborough District Councils 'Guidelines for New On-Site Wastewater Management Systems' and A.S. /N.Z.S. 1547:2012 'On-Site Domestic Wastewater Management'.

The owner of the site proposes to upgrade the current primary treatment wastewater management system on site and install a secondary treatment system that will service the main three bedroom dwelling on site.

This report is therefore for a new wastewater management system comprising secondary treatment to drip irrigation located on the west facing slopes east of the dwelling.

2. SITE INFORMATION

2.1 Locality

The property, Lot 38 DP 1728 is located on the eastern side of Onahau Bay in the Queen Charlotte Sound (see Lightfoot Design NZ Ltd Drawing SEE10 C1.0 attached in Appendix 1).

2.2 Site Description

The Lot is located on the eastern side of Onahau Bay in the Queen Charlotte Sound and has a three bedroom dwelling on it. The proposed wastewater application area is located in the eastern part of the site on gently sloping (10 ° to 12 °) west facing slopes of a broad north south trending ridge. The slopes are covered in well established native plants.

Currently the three bedroom dwelling is connected to a small septic tank and a pipe that appears to be directed into the sea.

Figure 1: Aerial view of the residential property and proposed wastewater application area

2.3 Published geology

The Institute of Geological and Nuclear Sciences geological map (Map 10, Scale 1:250,000) indicates that the underlying geology comprises of Marlborough Schist consisting of undifferentiated well bedded, grey sandstone-siltstone with thick sequences of grey /green sandstone.

2.4 Climate

Warm, dry and settled weather predominates during summer. Winter days occasionally start with a frost, but are usually mild overall. Typical summer daytime maximum air temperatures range from 20°C to 26°C, but occasionally rise above 30°C. Late winter and early spring is normally the most unsettled time of the year. Typical winter daytime maximum air temperatures range from 10°C to 15°C. The annual rainfall averages between 2000mm and 2500mm per year. Good evapotranspiration rates will exist on site.

2.5 Intended Water Supply

The owner proposes to use roof water to supply the property.

3. ON-SITE EVALUATION

3.1 Work Undertaken

An investigation was carried out in accordance with ASNZS 1547:2012 "On-Site Domestic Wastewater Management" and the Marlborough District Council's "Guidelines for New On-Site Wastewater Management Systems". Site notes are shown in Appendix 2.

Our investigation included:

- a general visual inspection;
- excavation of test pits to evaluate the soil properties;
- an assessment of the potential environmental effects; and
- a review of previous investigations carried out in this area.

3.2 Topography

The proposed wastewater application area is located in the eastern part of the site on gently sloping (10 ° to 12 °) west facing slopes of a broad north south trending ridge

3.3 Site Exposure

The slope of the proposed wastewater application area is west facing, with good exposure to the sun and wind, is vegetated with well established native plants providing very good evapotranspiration assistance.

3.4 Surface water

The proposed application area is not subject to surface water runoff.

3.5 Groundwater

The proposed wastewater application area is not located over any useable aquifers.

3.6 Environmental Concerns

Secondary treatment of the wastewater and a well designed wastewater application area will mitigate against any environmental impact on the local environment. The secondary treatment system will be a significant improvement on the current system.

3.7 Site Stability

The Marlborough Sounds Resource Management Plan indicates that the site is in a natural hazard zone for instability. A geomorphological walkover survey was undertaken across the wastewater application area. Only minor signs of instability were noted. The risk of the wastewater discharge initiating instability on the proposed area is considered to be low.

3.8 Drainage Controls

The proposed application area is not subject to surface water runoff and no drainage controls are required.

3.9 Availability of Reserve Areas

A 100% reserve area has been allocated and is located to the west of the proposed wastewater application area.

4. SOIL INVESTIGATION

A soil investigation was carried out in accordance with ASNZS 1547:2012 "On-Site Domestic Wastewater Management" and the Marlborough District Council's "Guidelines for New On-Site Wastewater Management Systems". Refer to the site notes in Appendix 2.

4.1 Soil Profile

Three test pits were excavated to a maximum depth of 700mm below ground level (bgl) and the soil profile logged.

The soil profile of the test pits comprised of 100 to 125mm of dark brown, organic rich, slightly moist, slightly sandy, silty, clayey topsoil over a brown, moist, firm, slightly sandy, silty, clay. Refer to the site notes and logs in Appendix 2.

4.2 Estimated Soil Category

Ribbon length tests were undertaken on samples from the silty clay soil horizon. The soil had a ribbon length that varied from 45mm to 65mm. The ribbon lengths, very slightly gritty, plastic nature, resistance to shearing and rate of drying of the soil indicate that the soil is a Category 5 sandy clay/light clay.

5. DESIGN

Wastewater application systems should be kept shallow to make maximum benefit of evapotranspiration and biological activity in the upper soil.

5.1 Loading

The design wastewater loading was based on the ASNZS 1547:2012 "On-Site Domestic Wastewater Management" and has been designed for the peak load.

The design wastewater loading for the residential dwelling is detailed below.

Dwellings	Facilities	Flow Rate L/per person/per day	Totals L/per person/per day
Dwelling 3 bedroom	Roof water supply	180 minus 15l for a 11/5.5 dual flush wc	165
Total (peak) flow rate			**990L**

See Attached design sheet in Appendix 3.

5.2 Proposed Effluent Treatment System

Secondary treatment systems are designed to substantially degrade the biological content of the effluent to an acceptable level for land application and a number of systems exist including ones using media/textile filters, aeration and vermiculture. The secondary treatment system installed should produce an effluent quality equal to or better than the following standards prior to being discharged to land.

Biological Oxygen Demand$_5$ (BOD_5) – 20g/m^3

Total Suspended Solids (TSS) – 30g/m^3

5.3 Land Application System

A number of potential wastewater land application options for the site have been assessed taking into consideration the underlying geological, hydrogeological and wider environmental conditions. The most appropriate land application system in this location is considered to be secondary treatment to drip irrigation.

The principle of the drip irrigation system is irrigation into the topsoil at a low application rate for evapotranspiration uptake by the bush covering the area.

5.4 Recommended DIR

For secondary treated effluent to drip irrigation underlain by Category 5 soil, a Design Irrigation Rate (DIR) of 3mm per day should be used. The drip irrigation will be installed on a slope of around 10° therefore an adjustment of factor of 20% has also been taken into account. The DIR used on site is therefore 2.4mm per day.

5.5 Detailed Design

For a total daily flow of 990L/person/day and a Design Irrigation Rate (DIR) of 2.4mm, a minimum of 420m of drip irrigation is required. The best distribution option incorporates the use of pressure-compensating drip irrigation laid into the undergrowth of the bushclad areas. We would recommend that the driplines are laid at 1.0 m maximum spacings, around the site on an even contour.

5.6 Distribution

The effluent will be distributed to the wastewater application area by pump dose. Distribution by pump ensures even loading throughout the whole field. The designer of the Wastewater Management system will take responsibility for ensuring equal distribution.

5.7 Installation, operation and maintenance

Sustainable Environmental Engineering Ltd (SEE Ltd) have undertaken a site investigation and designed a Wastewater application system in accordance with current Marlborough District Council and New Zealand codes and modern practice.

Appropriate operation and maintenance of the wastewater system is critical to its overall performance. The system should be serviced annually by a trained service technician and records sent to Marlborough District Council. The designer will inspect the pipe work prior to it being covered and undertake a pre-commissioning water test of the whole effluent field, to ensure that the system is working correctly prior to it being signed off. Construction of the irrigation pipework will be carried out by the installer of the wastewater treatment system and SEE Ltd take no responsibility for its ongoing use. Written instruction detailing the operation of the complete system will be provided to the owner by the installer or agent on completion of installation.

6. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The construction of a new wastewater system within the Marlborough Sounds Resource Management Plan is a Discretionary Activity. The following criteria will ensure that any potential adverse effects on the environment will be mitigated against:

(a) The wastewater discharge has been located on west facing slopes as far as practical away from any gullies and is not subject to flooding.

(b) There are no other properties directly down slope and the closest other (potential) land application system is at least 500 m away.

(c) The proposed secondary treatment will ensure that the discharge will not adversely affect the water quality of any streams or the sea.

(d) The land slopes gently and there are only minor instability issues. The application of wastewater on the site is unlikely to initiate any surface instability.

(e) The proposed on-site system complies with current Marlborough District Council and New Zealand guidelines.

(f) The site characteristics, design guidelines, assessment of alternatives and management proposals have been fully investigated and have been described in Sections 4 and 5 in this report.

(g) The discharge will not create offensive or objectionable odour or adversely affect the amenity values enjoyed on adjoining properties.

We consider that, given appropriate installation, operation and maintenance, any potential adverse environmental effects will be less than minor.

7. REFERENCES

ARC Environment, Technical Paper No. 58, Third Edition 'On-Site Wastewater Disposal from Households and Institutions'.

A.S./N.Z.S. 1547:2012 'On-Site Domestic Wastewater Management'.

Centre for Environment Training 'On-Site Wastewater Management Training Course', Christchurch 2001.

Crites, R and Tchobanoglous, A (1998). 'Small and Decentralized Wastewater Management Systems'.

Marlborough District Council (11 July 2005) 'Guidelines for New On-Site Wastewater Management Systems'.

Marlborough Sounds Resource Management Plan.

Disclaimer

This report has been prepared solely for the benefit of you as our client and the relevant Local Authority with respect to the particular brief given to us, and data or opinions contained in it may not be used in other contexts or for any other purpose without our prior review and agreement.

This disclaimer shall apply notwithstanding that the report may be made available to any other person in connection with any application for permission or approval, or pursuant to any requirement of law.

This report is based on conditions found on site at the time of the site investigation and is consistent with standards currently being applied. The soil sampling undertaken provides an understanding of the conditions present but conditions may vary considerably over relatively small areas due to the nature of the site.

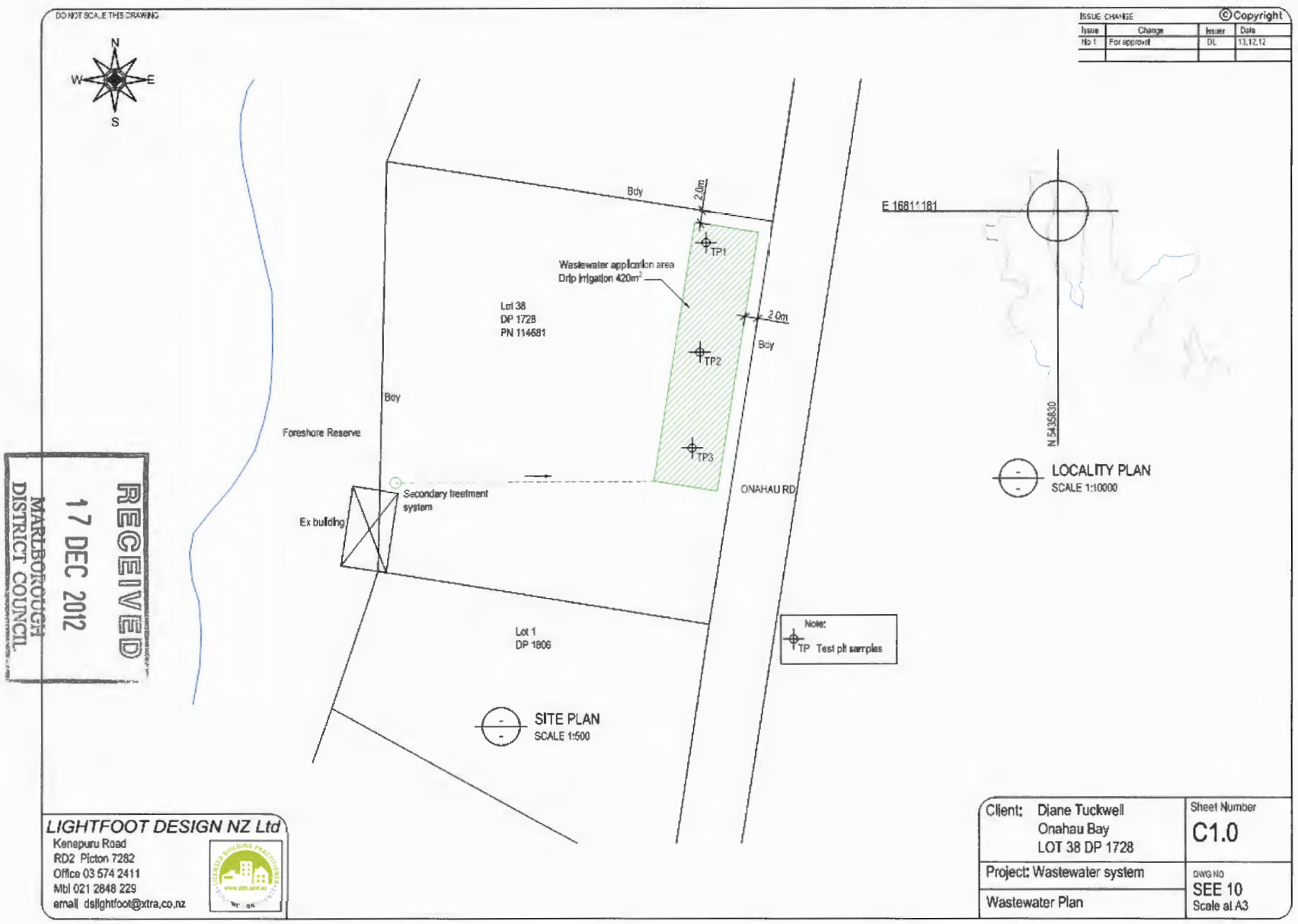
Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by SEE Ltd for incomplete are inaccurate data supplied by others.

Mark Davies

SEE Ltd

APPENDIX 1

Drawing SEE 10 – C1.0 – Site Plan


DO NOT SCALE THIS DRAWING
ISSUE CHANGE
© Copyright
Issue | Change | Issuer | Date
No 1 | For approval | DL | 13.12.12
N
W
E
S
Bdy
2.0m
TP1
Wastewater application area
Drip irrigation 420m²
Lot 38
DP 1728
PN 114681
2.0m
Bdy
TP2
Bdy
Foreshore Reserve
TP3
Secondary treatment system
Ex building
ONAHAU RD
Lot 1
DP 1806
Note:
TP Test pit samples
SITE PLAN
SCALE 1:500
E 1681181
N 5435830
LOCALITY PLAN
SCALE 1:10000
RECEIVED
17 DEC 2012
MARLBOROUGH DISTRICT COUNCIL
LIGHTFOOT DESIGN NZ Ltd
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Client: Diane Tuckwell
Onahau Bay
LOT 38 DP 1728
Sheet Number
C1.0
Project: Wastewater system
DWG NO
SEE 10
Scale at A3
Wastewater Plan

APPENDIX 2

Site and Soil Evaluation Form

Site and Soil Evaluation Form

Job Number and Project Name	WW001
Clients Name	D Tuckwell
Client Address Details	55 Onahau Road
Lot Number	Lot 38 DP1728
Date Inspected	13th December 2012
Weather	Sunny, windy

Description of Wastewater Application area

WAA Location	On crest of ridge and west facing slopes in eastern part of the Lot
Slope angle and direction	10° to 12 ° crest of ridge and west facing slopes
Ground cover	Vegetated
Vegetation	Manuka and Kanuka and other native species
Nearby water bodies	Queen Charlotte Sound > 50m
Nearby boreholes/wells	None
Stability Considerations	Minor
Depth to Groundwater	+5m
Signs of runoff	None
Reserve area available	Yes
Comments	Due to the nature of the site low irrigation rates are considered best.

Test Pits – Soil profile

Test Pit 1							
Layer	Lower Depth mm	Colour	Organic content	Moisture	Strength or density	Soil texture – minor fraction	Soil texture – Major fraction
A	100	Dark brown	Organic rich	Slightly moist	soft	Slightly sandy, silty clay	topsoil
B	500	Brown	-	Moist	firm	Slightly sandy, silty	clay

Test Pit 2							
Layer	Lower Depth mm	Colour	Organic content	Moisture	Strength or density	Soil texture – minor fraction	Soil texture – Major fraction
A	125	Dark brown	Organic rich	Slightly moist	soft	Slightly sandy, silty clay	topsoil
B	600	Brown	-	Moist	firm	Slightly sandy, silty	clay

Test Pit 3							
Layer	Lower Depth mm	Colour	Organic content	Moisture	Strength or density	Soil texture – minor fraction	Soil texture – Major fraction
A	125	Dark brown	Organic rich	Slightly moist	soft	Slightly sandy, silty clay	topsoil
B	500	Brown	-	Moist	firm	Slightly sandy, silty	clay

Ribbon Length Tests

Test Pit 1 - Ribbon Length Tests								
Soil layer	% coarse fragments > 2mm	Soil Texture	Plasticity when wet	Does soil feel smooth or gritty	Ribbon Length (mm) Test 1	Ribbon Length (mm) Test 2	Ribbon Length (mm) Test 3	Soil Category
Layer B	<2%	Slightly sandy, silty clay	Moderately plastic	Slightly gritty	45	55	55	Category 5 Sandy clay

Test Pit 2 - Ribbon Length Tests								
Soil layer	% coarse fragments > 2mm	Soil Texture	Plasticity when wet	Does soil feel smooth or gritty	Ribbon Length (mm) Test 1	Ribbon Length (mm) Test 2	Ribbon Length (mm) Test 3	Soil Category
Layer B	<2%	Slightly sandy, silty clay	Moderately plastic	Slightly gritty	55	50	55	Category 5 Sandy clay

Test Pit 3 - Ribbon Length Tests								
Soil layer	% coarse fragments > 2mm	Soil Texture	Plasticity when wet	Does soil feel smooth or gritty	Ribbon Length (mm) Test 1	Ribbon Length (mm) Test 2	Ribbon Length (mm) Test 3	Soil Category
Layer B	<2%	Slightly sandy, silty clay	Moderately plastic	Slightly gritty	65	65	60	Category 5 Light clay

APPENDIX 3

Wastewater Design Sheet

SUSTAINABLE ENVIRONMENTAL ENGINEERING LTD

Wastewater design sheet

Client	D Tuckwell
Location	55 Onahau Road
Designer	MTD
Date	13 December 2012

Households with Standard fixtures and 11/5.5 dual flush toilet – roof water supply	
Appliance/Fixture per Person Daily allowance	
Design wastewater flow per person per day (l/p/d)	**180**
11/5.5 dual flush toilet	**Minus 15l/p/d**
Adjusted Design wastewater flow per person per day (l/p/d)	**165**
No of Bedrooms	**3**
Equivalent Occupancy	**6**
Design Daily Wastewater Allowance (l/d)	**990**

Secondary Treatment	Yes	
Soil Category	5	
DLR	3	mm/day
DLR Adjusted by 20%, slope 10°	2.4	mm/day
Design Daily Allowance l/day	990	l/day
Line requirement (min)	420	m (min)

REFERENCES :
ARC TP # 58 Third Edition
AS/NZS 1547:2000 "On Site Domestic Wastewater Management"
MDC,11 July 2005,"Guidelines for New On -Site Wastewater Systems"

STATEMENT OF PROFESSIONAL
OPINION AS TO LAND STABILITY

DESCRIPTION: Lot 38 DP 1728

FOR: Dianna Tuckwell

I, Mark Terence Davies, of Sustainable Environmental Engineering Ltd (SEE LTD), 6 Pukenui Road, RD1 Picton 7281 hereby confirm that:

1. I am experienced in the field of soils engineering and more particularly land stability and foundations and am formally recognised by the Marlborough District Council. I am familiar with and understand the purpose of the Marlborough District Council's geotechnical reporting standards. This professional opinion is furnished to the Marlborough District Council alone, on the express condition that it will not be communicated to or be relied upon by any other person. It is based on conditions presently found on site and is consistent with standards currently being applied.

2. Site investigations have been carried out under my direction and are described in our Wastewater report dated December 2012, attached. The following professional opinion is based on the assumption that the data obtained from these investigations is specific to the wastewater tank and wastewater application areas. In my professional opinion having examined the site it is reasonable for Council to assume that the data referred to above is representative of the areas under consideration.

3. Detailed engineering drawings have been prepared for this site and are attached in the aforementioned report.

4. In my professional opinion, not to be construed as a guarantee, and having regard to the specifics of the site which I have investigated to the extent that acceptable engineering practices require giving due regard to acceptable engineering principles and practices for land and foundation stability then the area shown on the plans are suitable for the proposed secondary wastewater treatment tanks and wastewater application area, providing that the following recommendations described in our accompanying report (Wastewater Report for Lot 38 DP 1728) are adhered to:

(a) The secondary treatment tank is located to the north east of the dwelling and the wastewater application area is located on the ridge close to the eastern boundary of the Lot as shown on Drawing SEE 10 C1.0 in the aforementioned Wastewater Report.

5. This professional opinion shall remain current for a maximum of five years.

Mark Davies

SEE LTD.