

28 May 2015

Consents Officer
Tasman District Council
Private Bag 4
Richmond 7050

Dear Sir or Madam,

**ENGINEERING REPORT – WASTEWATER DISPOSAL – ANDREW STRANGE –
PROPOSED NEW SUBDIVISION – ANISEED VALLEY**

Tasman Consulting Engineers was engaged by Andrew Strange and Jane Bryan-Strange to report on on-site disposal of wastewater for the proposed new subdivision development at 686 Aniseed Valley Road, Aniseed Valley.

The legal description of the property is LOTS 1 2 DP 12751. The mapping coordinates of the property are Latitude: -41.390962 Longitude: 173.180024.

1 General

The proposed Subdivision is zoned Rural 2 (R2). As such the wastewater system is required to comply with the discharge conditions for that zone, *Rule 36.1.2.4 Discharge of Domestic Wastewater*.

This report will consider the following:-

- The suitability for on-site wastewater disposal of each of the ten proposed new lots.
- The location of wastewater disposal areas within each lot (assuming that on-site disposal of wastewater is possible).

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2 Site & Soil Assessment

2.1 Geology & Soil Mapping

2.1.1 Geological Mapping

The GNS Geological Mapping soil type for the site consists of two distinct profiles:

- 1) Late Pleistocene river deposits (**Q2a**), described as clay bound gravels and minor fan deposits forming lowest aggradation surfaces above major rivers
- 2) Basement (eastern province) sedimentary rocks (**Tms**), described as variably bedded sandstone-siltstone with conglomerate lenses and limestone blocks locally fossiliferous.

The lots are generally located on type (2), with the river deposit areas generally classified as productive land not for development. Mapping information was obtained from 'Geology of the Nelson Area – GNS'.

2.1.2 Soil Mapping

The Soil mapping is Lee steepland soils (**LeS**) which is described as having a typical soil profile of: *200 mm grey silt loam with fine rock fragments, friable, moderately developed medium nutty and fine granular structure; over 250 mm pale yellowish brown silt loam with many rock fragments, firm, weakly developed medium blocky structure; over weathered rock with silty filling.* The soil mapping information has been obtained from 'Soils and Agriculture of Waimea County New Zealand by the DSIR dated 1966. (More recent soil mapping was not available).

2.2 Climate

The annual rainfall for the site is approximately 1.1 m based on interpolation of rainfall data supplied by NIWA (Tasman Median Annual Total Rainfall 1981-2010).

The annual 'raised pan' evaporation rate for the Nelson region is approximately 1.25 m, based on information supplied by Matheson. An approximate conversion to the Evaporation/Transpiration potential based on the raised pan evaporation rate using a factor of 0.7 provides a figure of 0.85 m per year. While a water balance calculation has not been carried out for this site, the rainfall depth and the likely evapo-transpiration rates have been taken into account when selecting a Daily Irrigation Rate.

2.3 Existing Wastewater Systems in the Area

There are no existing dwellings therefore no associated wastewater systems in the vicinity of the proposed development.

2.4 Exposure

The subdivision area is exposed to winds from all directions. Some shelter is provided by rising ground to the south, which will lessen the impact of wind from the southerly quarter.

2.5 Vegetation

The land is currently grassed pasture. In the future it is expected that the main ground cover will be grass with landscape planting of trees and shrubs.

2.6 Soil Category

Six test pits were dug throughout the proposed subdivision for the purpose of wastewater evaluation (TP1 to TP6 on the attached site plan) using a hydraulic excavator. An assessment of the test pits logs confirms the Geological and Soil mapping typical to the area.

The soil profile across the site is broadly similar for the purposes of wastewater disposal. Topsoil depths vary from 200 mm to 350 mm across the site, with the underlying soils typically being moderate to high plasticity gravelly CLAYs. GRAVELs were encountered at depth on TP4 and TP6. TP2 is an exception with the topsoil directly overlying a clayey, poorly graded, angular GRAVEL which grades to highly weathered broken ROCK.



Figure 1 Typical soil profile from TP4 - topsoil over gravelly CLAY (left) and TP2 - topsoil over clayey GRAVEL grading to weathered ROCK (right).

No groundwater was observed in the test holes.

Soil samples were taken from TP1, TP2, TP4 and TP6 of each soil type within the pits and analysed using the guidelines of NZS1547:2012. The soils analysis for TP1 and TP2 were found to be typical for all locations are appended.

The governing soil layer in all cases is the light to medium CLAY and as such the soil category for this site is **Category 5**. The recommended Daily Irrigation Rate (DIR) as taken from NZS 1547:2012 for Category 5 soil is **3 mm / m² / day**.

3 Disposal Areas

3.1 Disposal Area Size

The disposal area for a typical four bedroom house has been determined using the following assumptions.

- Daily Flow Allowance per person is 200 litres.
- Number of people for a 4 bedroom house is 6.
- Average daily flow is therefore 1200 litres.
- For a Daily Irrigation Rate of 3 mm / m² / day the required irrigation area is 400 m².

Where the disposal area is located on ground with an average slope of greater than 5 degrees a 20% reduction in the DIR has been allowed for resulting in a 500 m² disposal area. Slopes exceeding 11 degrees have a 50% reduction in DIR, resulting in an 800 m² disposal area.

In addition to the primary disposal area of, a further provision for minimum a reserve irrigation area of 50% of the primary disposal area is considered desirable. This allows for expansion of the disposal field should the calculated size be inadequate, or a larger than assumed dwelling be constructed.

3.2 Lot Specific Wastewater Disposal Areas

Each lot has been generally assessed for suitability to dispose of domestic wastewater. The attached site plan indicates the suggested wastewater area for each lot (including 50% reserve area), as detailed in the following table:

Lot Number	Average Slope (degrees)	Major Aspect	Reduction in DIR due to slope	Total Disposal Area (m ²)
1	13	West	50%	1200
2	10	West	20%	750
3	4	North	0%	600
4	11	North	20%	750
5	10	West	20%	750
6	3	North	0%	600
7	4	North	0%	600
8	5	North	0%	600
9	5	North-east	0%	600
10	18	North-east	50%	1200

4 Treatment System

Since the soil category in the proposed disposal area is Cat 5, we recommend utilising a *Secondary Treatment* system to ensure compliance with the requirements of NZS 1547:2012.

The most common treatment systems capable of complying with the secondary treatment standards are Aerated Wastewater Treatment Systems (AWTS). These may be further subdivided

into *suspended growth* (air is bubbled through a chamber containing filtered wastewater prior to pumping out to the irrigation field) or *attached growth* (air is bubbled through filtered wastewater in a chamber containing a media with a high surface area to volume ratio prior to pumping out to the irrigation field). Such systems are typically certified by their manufacturer to achieve the following standards:-

- 5 day Biochemical Oxygen Demand (BOD₅) not exceeding **20 g per m³**
- Total Suspended Solids (SS) not exceeding **30 g per m³**

5 Conditions of TRMP 36.1.2.4 – Discharge of Domestic Wastewater

The proposed Subdivision is zoned Rural 2 (R2). As such discharge of domestic onto land is a permitted activity provided the discharge complies with the conditions for that zone, *Rule 36.1.2.4 Discharge of Domestic Wastewater*. An assessment of compliance follows:

- a) *Any discharge first commencing after 19 September 1998 is not in any Special Domestic Wastewater Disposal Area.*

The discharge is not in the Special Domestic Wastewater Disposal Area (complies).

- b) *Any discharge first commencing after 20 December 2003 is not within the Wastewater Management Area.*

The discharge is not in the Wastewater Management Area (complies).

- c) *The volume of effluent discharged is not more than a weekly averaged flow of 2,000 litres per day.*

The discharge from a typical four bedroom dwelling is 1200 litres per day (complies).

- d) *There is no discharge or run-off of effluent into surface water.*

Correct design and construction of sub-surface irrigation will prevent discharge of effluent at the ground surface and hence prevent any potential run-off (complies).

- e) *The disposal field is located not less than:*
- 20 metres away from any surface water body, or the coastal marine area;*
 - 20 metres from any bore for domestic water supply;*
 - 1.5 metres from any adjoining property.*

The proposed disposal areas meet all location requirements (complies).

- f) *The design and operation of the system must result in the depth of unsaturated soil between the effluent disposal field and the average winter level of groundwater or of the basement rock being no less than 500 millimetres or sufficient to ensure that the discharge does not result in any bacterial contamination of groundwater beyond the property boundary.*

Test-pitting in the proposed disposal areas did not encounter any ground water. The generally low permeability ground would indicate that high groundwater levels are unlikely; hence the required separation will be achieved (complies).

g) There is no discharge of effluent from the disposal field to the ground surface.

Competent design and construction of sub-surface irrigation will prevent discharge of effluent at the ground surface (complies).

h) The septic tank must be regularly desludged so that the liquid volume (excluding sludge and scum) is maintained at not less than one-third of the tank volume.

Regular maintenance of the treatment system in accord with the manufacturers specifications includes provision for desludging as required (complies).

i) The discharge does not create an offensive or objectionable odour discernible beyond the property boundary.

The use of a secondary treatment system utilising aeration of the wastewater to reduce BOD and suspended solids ensures that the by-products of treatment do not include CH₄, H₂S, NH₃ and PH₃ which are the typical odorous products of anaerobic treatment in a septic tank system. Instead the typical products created during the treatment tend to be CO₂, SO₂, PO₄, NO₃, and H₂O which are not associated with strong odours. In addition competent design and construction of sub-surface irrigation will prevent discharge of effluent at the ground surface (complies).

j) An access point to allow sampling of the effluent being discharged to the disposal field must be provided with any on-site wastewater disposal system installed after 19 September 1998.

Installation of a sampling point can be specified on any secondary treatment system that disposes of wastewater via sub-surface irrigation (complies).

k) The quality of the effluent being discharged into the disposal field does not exceed the following standards:

- | | |
|------------------------------------|---------------------------------|
| <i>i. BOD-5:</i> | <i>150 milligrams per litre</i> |
| <i>ii. Total suspended solids:</i> | <i>150 milligrams per litre</i> |

Typical secondary wastewater treatment systems are rated to achieve a BOD-5 of 20 milligrams per litre and TSS of 30 milligrams per litre (complies).

6 Summary of On-Site Disposal of Wastewater

An assessment of soil samples from test using the guidelines of NZS 1547:2012 indicated that the soil classification for the disposal areas on the proposed new lots is Category 5. This corresponds with a Daily Irrigation Rate of 3.0 mm per square metre per day. Reductions in the irrigation rate by 20% have been allowed for where the disposal area is located on sloping ground.

Use of a Secondary Treatment System such as an Aerated Wastewater Treatment System will enable full compliance with TDC requirements for wastewater discharge. The wastewater system for each site will require specific engineering design to suit the house size and proposed usage -

typically for a 4 bedroom home this will require a 400 to 500 m² irrigation field when using secondary treatment and subsurface irrigation.

It is recommended that the wastewater system for each of new lots include the following:-

- A Secondary Treatment system shall be used to treat the wastewater from any new house, prior to disposal on-site through an appropriately designed sub-surface irrigation system. The system used shall be certified in writing by its manufacturer to be capable of meeting Secondary Treatment standards under normal domestic operating conditions.
- The required area of the sub-surface irrigation field shall be calculated using the Daily Flow Rate for the proposed new house *and* a Daily Irrigation Rate **3** mm / m² / day. The DIR is to be reduced where the disposal area is situated on sloping ground as per Table M2, NZS1547:2012.

7 Limitations

This report is furnished to the Tasman District Council alone. It is acknowledged that the council is entitled to provide information contained in this report pursuant to section 217 of the Building Act 2004 and section 44A of the Local Government Official Information and Meetings Act 1987.

Yours faithfully,

Tasman Consulting Engineers Limited

per:



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BE(Hons)(Civil), GIPENZ
Civil Engineer

Reviewed:



Ron O'Hara
BE(Civil) MIPENZ
Senior Engineer

Encl.

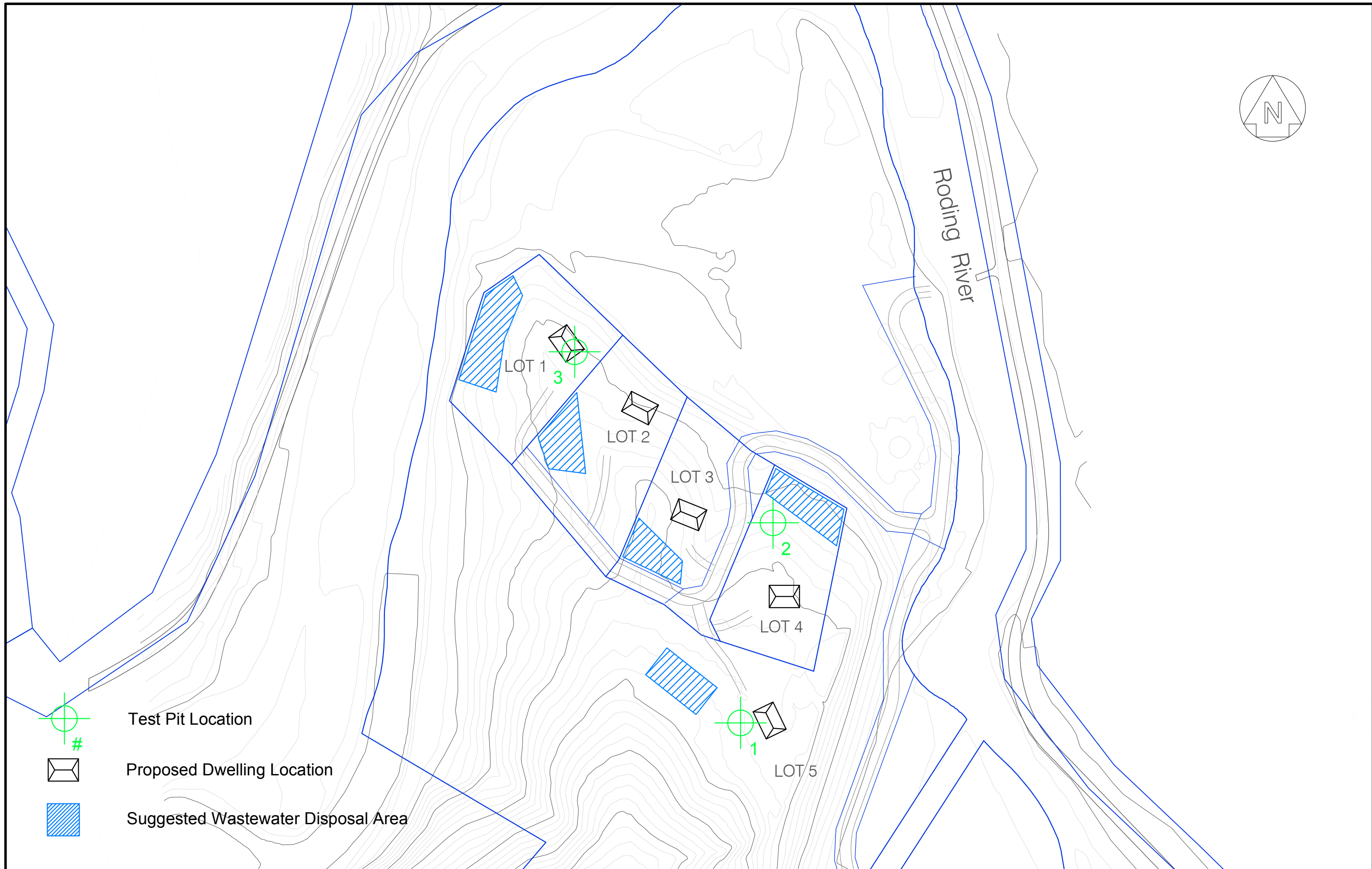
- Soil profile description TP1, TP2
- Site Plan - Wastewater

Soil Profile Description

Soil samples taken from TP1, TP2, TP4 and TP6 have been analysed to determine the soil category for each of the typical soil profiles encountered across the site. Analysis of soils from TP4 and TP6 are similar to TP1 and are not included below. As the governing soil category in each profile is the same (category 5) further analysis of other test pits not necessary.

Test Pit 1	Layer 1	Layer 2	Layer 3
Zone (from – to) mm	0 - 300	300 – 1200	1200+
Horizon	Topsoil - A	Subsoil - B	Subsoil - C
Colour (moist)	Dark brown	Orange	Light grey
Moisture	Dry	Moist	Dry
Soil strength	Firm	Firm	Stiff
Mottles	Nil	Nil	Orange
Coarse fragments (max size)	8 mm	30 mm	5 mm
Coarse fragments (%)	50%	20%	10%
Field Texture (Symbol)	LC	MC	LC
Field Texture (Description)	Light CLAY	Medium CLAY	Light CLAY
Soil Classification (Symbol)	ML	CH	CH
Soil Classification (Descr)	Organic – (moderate plasticity)	Gravelly CLAY (high plasticity)	CLAY (high plasticity)
Structure	Strong	Weak	Weak
Grittyness	Slight	Slight	Moderate
Stickiness	None	Moderate	Very
Staining	Slight	Very	Moderate
Plasticity	Moderate	Very	Moderate
Dispersion (1 – 4)	N/A	N/A	N/A
PH	N/A	N/A	N/A
1. Ribbon Length – mm	65	60	70
2. Ribbon Length – mm	65	65	55
3. Ribbon Length – mm	60	50	60
4. Ribbon Length – mm	45	70	55
5. Ribbon Length – mm	-	60	55
6. Ribbon Length – mm	-	60	65
Average Ribbon Length	56 mm	61 mm	60 mm
Soil Category	Cat 5	Cat 5	Cat 5
Other Comments	Extensive plant roots		

Test Pit 2	<i>Layer 1</i>	<i>Layer 2</i>	<i>Layer 3</i>
<i>Zone (from – to) mm</i>	0 - 350	350+	
<i>Horizon</i>	Topsoil - A	Subsoil - C	
<i>Colour (moist)</i>	Grey-brown	Light yellow-brown	
<i>Moisture</i>	Dry	Dry	
<i>Soil strength</i>	Firm	Hard	
<i>Mottles</i>	Nil	Nil	
<i>Coarse fragments (max size)</i>	15 mm	100 mm	
<i>Coarse fragments (%)</i>	30%	80%	
<i>Field Texture (Symbol)</i>	ZCL	LC	
<i>Field Texture (Description)</i>	Silty CLAY Loam	Light Clay	
<i>Soil Classification (Symbol)</i>	OL	GP	
<i>Soil Classification (Descr)</i>	Organic – (low plasticity)	Poorly graded GRAVEL	
<i>Structure</i>	Strong	Strong	
<i>Grittyness</i>	Slight	Moderate	
<i>Stickiness</i>	Slight	Slight	
<i>Staining</i>	Slight	Moderate	
<i>Plasticity</i>	Moderate	Low	
<i>Dispersion (1 – 4)</i>	N/A	N/A	
<i>PH</i>	N/A	N/A	
<i>1. Ribbon Length – mm</i>	45	55	
<i>2. Ribbon Length – mm</i>	70	55	
<i>3. Ribbon Length – mm</i>	65	55	
<i>4. Ribbon Length – mm</i>	50	50	
<i>5. Ribbon Length – mm</i>	45	30	
<i>6. Ribbon Length – mm</i>	45	65	
<i>Average Ribbon Length</i>	53 mm	51 mm	
Soil Category	Cat 5	Cat 5	
<i>Other Comments</i>	Extensive plant roots		



Test Pit Location



Proposed Dwelling Location



Suggested Wastewater Disposal Area

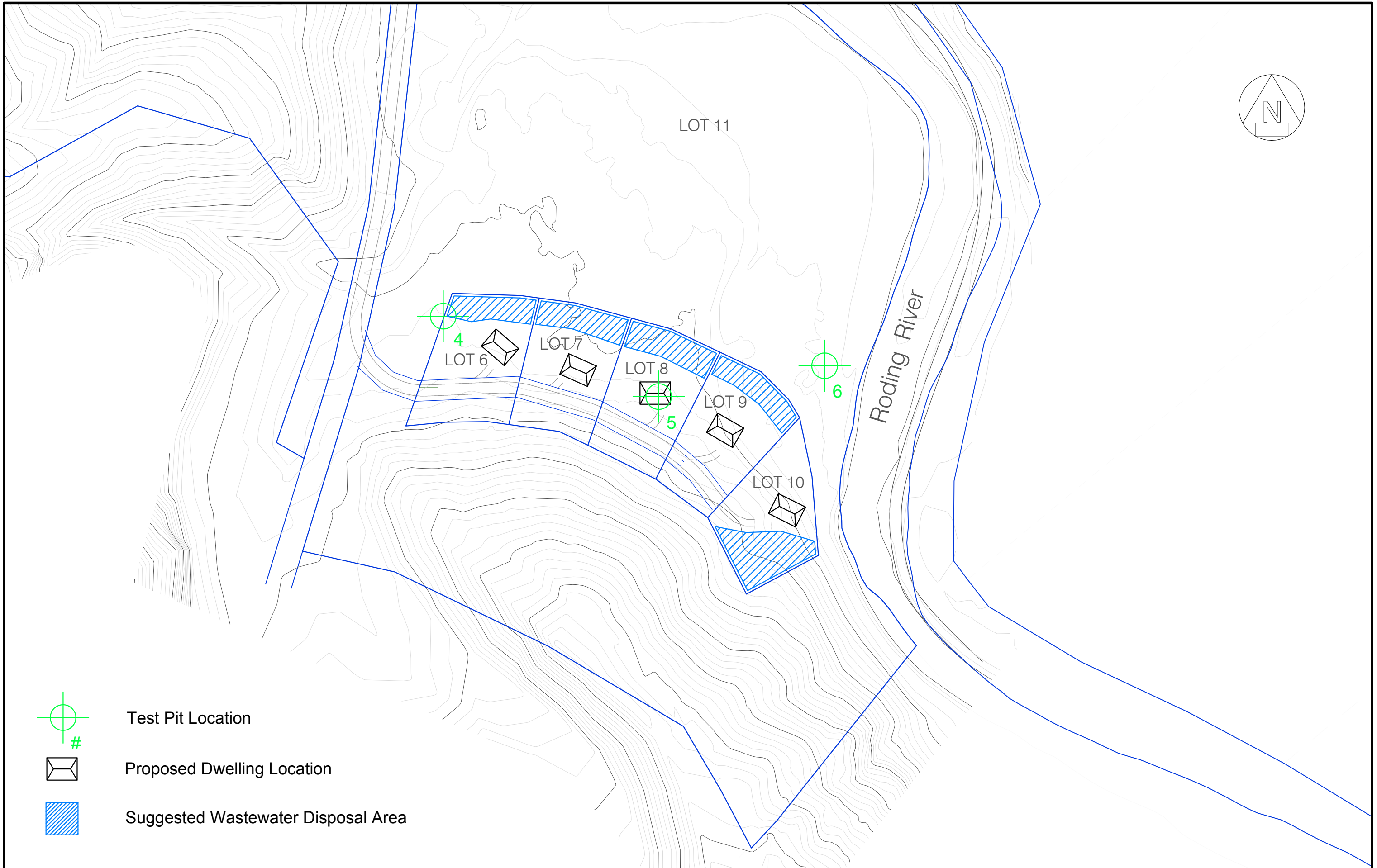
Note: Refer Aubrey Survey Plan R1052 for locality



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**PROPOSED WASTEWATER DISPOSAL AREAS: SITE PLAN
FOR ANDREW STRANGE
ANISEED VALLEY ROAD, ANISEED VALLEY**

Scale	1:2000 @ A3	Sheet	W1 of 2
Date	28-05-15	File	
Drawn	DSB		



Test Pit Location



Proposed Dwelling Location



Suggested Wastewater Disposal Area

Note: Refer Aubrey Survey Plan R1052 for locality



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PROPOSED WASTEWATER DISPOSAL AREAS: SITE PLAN
FOR ANDREW STRANGE
ANISEED VALLEY ROAD, ANISEED VALLEY

Scale	1:2000 @ A3	Sheet	W2 of 2
Date	28-05-15	File	
Drawn	DSB		