SUBDIVISION SUITABILITY REPORT

83 Mackesy Road

Whangarei

(Proposed subdivision of Lot 4 DP 90063)

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Consulting Engineers

SUBDIVISION SUITABILITY REPORT

83 Mackesy Road

Whangarei

(Proposed subdivision of Lot 4 DP 90063)

Report prepared for:	Paul Fancy
Report prepared by:	Matthew Jacobson
Report reviewed by:	Steve Turner
Report reference:	18012
Date:	8 October 2021

Issue	Details	Date
1	Resource Consent Issue	8 October 2021

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File: 18012
8 October 2021
Issue: 1

SUBDIVISION SUITABILITY REPORT

83 Mackesy Road, Whangarei

(Proposed subdivision of Lot 4 DP 90063)

1.0 Introduction

RS Eng Ltd (RS Eng) has been engaged by Paul Fancy to investigate the suitability of his property, Lot 4 DP 90063, to subdivide into three residential lots. The purpose of this report is to assess the suitability of the proposed residential development, assessing the geotechnical suitability, flood hazard, access, earthworks, stormwater disposal and on-site wastewater disposal.

The client proposes to subdivide Lot 4 into three lots. Lot 1 (2229m^2) will be accessed from Mackesy Road, while Lot 2 (942m^2) and Lot 3 (1620m^2) will gain access from a shared right of way.

2.0 Site Description

The site is located 75m down Mackesy Road from the Konini Street intersection and has a slight to moderate slope. An existing dwelling is located on the western side of the site. Groundcover is lawn and mature native bush. A small stormwater drain runs through the site along the proposed boundary of lots 1 and 2. Lots 2 and 3 are slight to moderately sloping, and ground cover is pasture. A small drain runs along the proposed boundary of Lots 2 and 3 and joins up with the stormwater drain. This drain is fed from a spring on the neighbouring property.

Figure 1: Lot 4 DP 90063 (WDC GIS)

3.0 Desk Study

3.1 Referenced/Reviewed Documents

The following documents have been referenced in this report:

- GNS – Geology Of The Whangarei Urban Area – White & Perrin – 2003
- GNS – Geology Of The Whangarei Area – Edbrooke & Brook – 2009
- Richardson Stevens Consultants Ltd (1996) – *"Engineering Report for Halliday Proposed 3 Lot Subdivision on Mackesy Road"* – dated 30 November 2004, report reference 5633.
- WDC – *"Building Over or Near Public Sewer and Stormwater Pipelines - Policy #0022"* dated June 2015

3.2 Site Geology

The GNS Whangarei Urban Geology Web Map indicates that the property is located within an area that is underlain by Kerikeri Volcanics, which is described as follows: "Basalt lava, volcanic plugs and minor tuff."

3.3 Aerial Photography Review

RS Eng has undertaken a review of historical aerial photography. See Figure 1 below of the 1942, 1970 and 1982 aerial images. Several notable features were observed, listed below.

- 1942 – the property is covered in rank pasture with no dwellings constructed yet. There are no signs of shallow or deep relic slope failures.
- 1970 - the property is still covered in rank pasture with no dwellings constructed. Some farming has taken place evidenced by farm tracks and fencing. There are no signs of shallow or deep relic slope failures.
- 1982 – a dwelling has been constructed on the property. Further farming has taken place evidenced by farm tracks and fencing. There are no signs of shallow or deep relic slope failures.
- 2001-2021 – no significant change has occurred on the property except for a right of way constructed around 2011 and continued vegetation growth.

Figure 2: 1942, 1970. 1982 Aerial Images *(Source: www.retrolens.nz)*

3.4 Initial Subdivision Report

The initial subdivision was reported on by Richardson Steven Ltd (1996) in a report entitled *"Engineering Report for Halliday Proposed 3 Lot Subdivision on Mackesy Road"* dated *30 November 2008, report reference.* The following is a summary of the report's key findings.

Subsoil investigations took place in October of 2004. Subsoil investigations encountered the following:

- Three hand augers were dug to depths of 2.8m to 3.6m. Undrained shear strengths ranged from 104kPa to >200kPa. Soil types were heavy clays.
- Groundwater was encountered at 1.4m within HA01. No groundwater was encountered in HA2 and HA3 however it is expected the groundwater level is at 1.4m as heavy clays mean seepage is limited.

A stability evaluation was undertaken and the findings are summarised below:

- Inspection showed no signs of previous instability.
- Visual inspection concluded the soils were moderately expansive.
- Foundations should be specifically designed by a Chartered Professional Engineer at the building consent stage.

An evaluation of the flood hazard was carried out. The following is a summary of the findings:

- The property is partially within a flood hazard zone.
- During storm with an annual recurrence interval of 5 years or greater the existing culvert under the proposed right of way will reach capacity and overflow.
- Richardson Stevens concludes buildings will not flood provided they are built on the elevated portions of the sites.

Earthworks recommendations were as follows:

- Minor earthworks in the form of stripping topsoil and widening the existing farm track will be required.

Stormwater recommendations were as follows:

- Two small stormwater drains run through the property.
- Stormwater from the right of way will be collected in a stormwater sump and piped into the existing stormwater drain. An existing 575mmø culvert under the farm track will need to be upgraded as scouring has displaced portions of the culvert.
- Due to the presence of an elevated groundwater level and due to the poor drainage properties expected from the soils on-site, all stormwater from the roofs and driveways should be collected and discharged into the stormwater drain which runs through the property.

Recommendations for water use were as follows:

- Lots 2 and 3 will be connected to the WDC water supply.
- Connection to this system will be off an existing 100mmø water main that runs along the western side of Mackesy Road.
- A new fire hydrant will need to be provided opposite the right of way.

Recommendations for wastewater disposal were as follows:

- The proposed lots will need to connect to the Whangarei District Council Sewer System.
- Lots 2 and 3 will require a private pump station discharging to this sewer line or alternatively the lots may be able to connect directly to the sewer. This will be confirmed at the preparation of the construction drawings.

4.0 Field Investigation

A technician from RS Eng visited the property on 10 September 2021 to undertake a walkover inspection and a further two Hand Augers. The walkover inspection did not observe any signs of concern at the building site in relation to the proposal. An area of seepage was observed between the proposed lots, with another noted on the property to the north.

The hand augers were dug to a maximum depth of 3m. Pilcon Shear vane readings were taken at regular intervals throughout the borehole with In-situ Undrained Shear Strengths ranging from 126kPa to greater than 196kPa.

Scala Penetrometer tests were performed at the base of each hand auger and reached 10-13 blows/50mm at 3.5mbgl.

5.0 Subsoil Conditions

Interpretation of subsurface conditions are based on the investigations shown on the drawings in Appendix A. The conditions are summarised below;

- Topsoil extended to a depth of 0.15mbgl.
- Residual soils of Kerikeri Volcanic Group consisted of very stiff, clayey silts and sandy silts, extended to depths greater than 3.9mBGL. In-situ Undrained Shear Strengths generally exceeded 158kPa.
- Groundwater was not encountered during the investigation. Seepage was observed at 1.8mBGL and 2.3mBGL in HA01 and HA02, respectively.

In accordance with NZS 1170.5:2004, Section 3.12.3 the site has been assessed for its Site Subsoil Class. Based on the observation listed above RS Eng considers the site soils lie within Site Class C *"Shallow Soil Site".*

6.0 Geotechnical Assessment

6.1 Slope Stability

The Whangarei District Council has designated this property as being within a zone of low, medium and high instability hazards, however the identified suitable building areas on proposed Lots 2 and 3 within the low and medium instability hazard zones. The following is a definition of the medium Instability Hazard Zones; *"Land exhibits evidence of past slippage or erosion, and could be subject to inundation from landslide debris and slope deformation. Geology, slope and/or geomorphic evidence of past or ancient landslippage suggest the land should be developed carefully."*

The land at the property is underlain by basaltic flow of the Kerikeri volcanic group. This flow is thought to have erupted from a vent around Kohe Street. Flowing south towards Onerahi, since eroded away by the Hatea River, and the Waioneone and Awaroa Creeks.

The investigation completed by RS Eng at this property and on neighbouring projects, observed materials consistent with weathered products of the Kerikeri Volcanic Group. The materials observed are very stiff to hard clays, silts and silts sands.

The landform is suggestive of one being formed by normal erosion with the influence of the seepage areas on this and the neighbouring property to the north evident. No features consistent with slope instability were observed at or adjacent to the property.

The identified building areas are elevated some 5m above the base of the open drain to the north, with ground slopes being 15°. Further to the south, slopes of a similar orientation fall steeply into the water course, being over 10m high, not displaying signs of significant slope instability.

Considering the observation discussed herein, providing future development is supported by a project specific geotechnical assessment at the building consent stage, with consideration given to the recommendations of this report, RS Eng consider the risk of slope instability as low.

6.2 Expansive Soils

The clayey soils encountered on-site are likely to be subject to volumetric change with seasonal changes in moisture content (wet winters / dry summers); this is known as expansive or reactive soils. Apart from seasonal changes in moisture content other factors that can influence soil moisture content include:

- Influence of garden watering and site drainage.
- The presence of large trees close to buildings.

- Initial soil moisture conditions during construction, especially during summer and more so during a drought. Building platforms that have dried out after initial excavation should be thoroughly wet prior to any floor slabs being poured.

Based on the experience of RS Eng in similar materials, we expect the soil to be classified as Class H as per AS2870, however site-specific testing will be required at the building consent stage to confirm the classification, as required by NZBC B1.

6.3 Site Works

To form level building platforms, earthworks will be required. To maintain slope stability, RS Eng make the following recommendations:

- Cuts and fills are limited to a maximum depth of 1.0m and 0.5m, respectively, without further geotechnical review.
- Cut and fill batter should be sloped at angles less than 1V to 3H.
- Consideration should be given to the potential of elevated groundwater when undertaking excavations or constructing deep foundations.
- Site works shall generally be completed in accordance with NZS4431.

6.4 Foundations

Standard NZS3604 and RibRaft foundation systems are assessed as suitable, however, being modified for expansive soil. Shallow soil creep may be evident on the steeper slope at the building sites, although not observed during the RS Eng investigation.

For specific design of foundations RS Eng has assessed the following (based on NZBC B1/VM4):

- Ultimate Bearing Capacity 300kPa
- Dependable Bearing Capacity (ϕ=0.5) 150kPa

7.0 Flooding Susceptibility

The WDC have mapped a flood hazard across the low-lying part of the property, shown in Figure 3 below. This flood hazard is associated with the overland flow path / open drain which runs through the western end of the property.

Figure 3: WDC Flood Hazard

The identified building areas on proposed Lot 2 and 3 are well elevated above the overland flow path, having a free board greater than 5m. RS Eng assess the risk of inundation to the identified building areas on the proposed lots as low.

The access to the proposed lots crosses the existing overland flow path. At the design stage, the capacity of the existing culvert should be confirmed, and upgraded if required. The culvert will need to be suitably sized to allow safe use of the access during a 10%+CC AEP rainfall event. Consideration will also need to be given to the potential of erosion or scour during larger rainfall events.

8.0 Whangarei District Council Services

8.1 Sanitary Sewer

Access the available to the WDC sanitary sewer in the elevated south eastern corner of the property via an easement. Low pressure connections to the sewer will need to be provided as part of the subdivision construction.

8.2 Stormwater

8.1.1 Attenuation

In accordance with the WDC EES, stormwater attenuation will be required at the building consent stage for new impervious surfaces.

No new impervious surfaces are proposed as part of the subdivision development.

8.1.2 Disposal

Stormwater from new impervious surface shall be discharge to the open drain on proposed Lot 1. RS Eng recommend a connection be provided to both proposed Lots 2 and 3. No stormwater should be discharge in an uncontrolled manner.

8.3 Water

It is proposed that Lots 2 and 3 will be connected to the Whangarei District Council water supply. Connection to this system will be off an existing 100mmø water main that runs along the western side of Mackesy Road.

An existing fire hydrant is located on the western side of Mackesy Riad, adjacent to the right-of-way to proposed properties. Complying with SNZ PAS 4509:2003 the proposed lots are within 135m of the existing fire hydrant.

9.0 Conclusions

It is the conclusion of RS Eng Ltd that identified building areas on proposed Lots 2 and 3 are suitable for residential development provided the recommendations and limitations stated within this report are adhered to. At the building consent stage a site / project specific geotechnical investigation and assessment should be completed.

We also conclude that in terms of Section 106 of the Resource Management Act 1991 and subject to the recommendations of this report that:

(a) the land in respect of which a consent is sought, or any structure on the land, is not or is not likely to be subject to material damage by subsidence, slippage or inundation from any source; and

(b) any subsequent use that is likely to be made of the land is not likely to accelerate, worsen, or result in material damage to the land, other land, or structure by subsidence, slippage or inundation from any source and,

10.0 Limitations

This report has been prepared solely for the benefit of our client and the Whangarei District Council. The purpose is to determine the engineering suitability of the proposal, in relation to the material covered by the report. The reliance by other parties on the information or opinions contained therein shall, without our prior review and agreement in writing, do so at their own risk.

Recommendations and opinions in this report are based on data obtained as previously detailed. The nature and continuity of subsoil conditions away from the test locations are inferred and it should be appreciated that actual conditions could vary from those assumed.

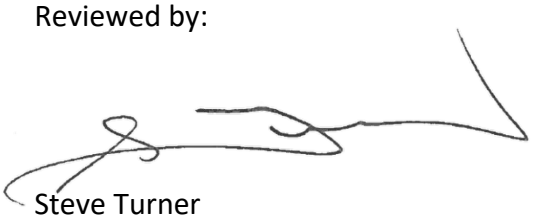
This report does not address matters relating to the National Environmental Standard for Contaminated Sites, and if applicable separate advice should be sought on this matter from a suitably qualified person.

If during the construction process, conditions are encountered that differ from the inferred conditions on which the report has been based, the site should be examined by a suitably qualified engineer to determine if any modification of the design based upon this report is required.

Prepared by:

Matthew Jacobson
Director
BE(Hons)(Civil), DipEng(Civil), CPEng, CMEngNZ

Reviewed by:



Steve Turner
Director
BE(Civil), CPEng, IntPE(NZ), CMEngNZ

RS Eng Ltd

Appendix A

Drawings

Site Plan

Scale - NTS

Client: Paul Fancy
Project: 83 Mackesy Road, Whangarei
Job: 18012
Date: 8/10/2021

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Legend

Idenfied Building Area

HA1 Hand Augered Borehole

Notes:
- Hand Auger Positions Approximate. Refer to logs to positons.

Appendix B

Subsurface Investigations

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2 Seaview Road,
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HAND AUGER LOG

HOLE NO.: HA01

CLIENT: Paul & Tracey Fancy

PROJECT: Geotechnical Investigations

JOB NO.: 18012

SITE LOCATION: 83 Mackesy Road

CO-ORDINATES: 1722484mE, 6044928mN (NZTM)

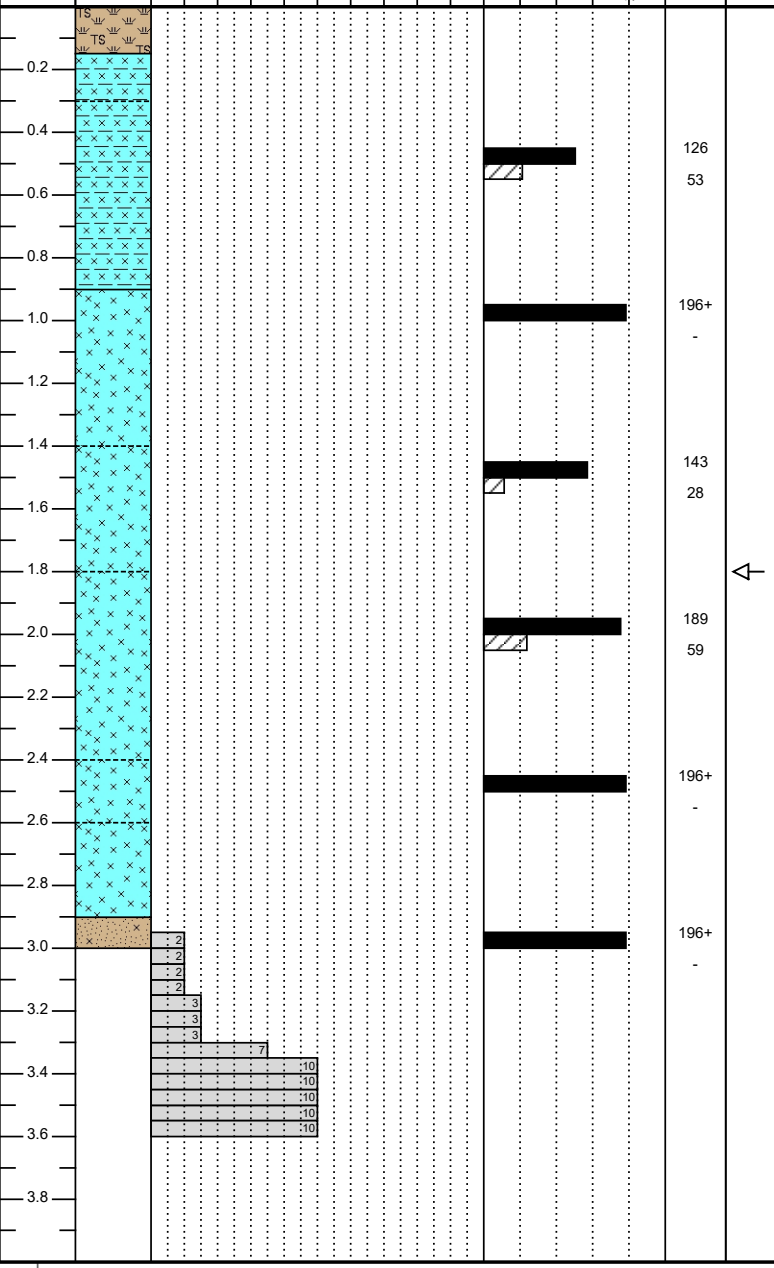
ELEVATION: 42.5m (NZVD2016)

START DATE: 10/09/2021

END DATE: 10/09/2021

LOGGED BY: NG

UNIT	MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)
TS	Silty TOPSOIL, with minor sand; dark brown. Firm; moist; low plasticity; sand, fine to medium.		0.0
Kerikeri Volcanics	Clayey SILT, with some sand; grey-yellow-brown. Very stiff; moist; high plasticity; sand, fine to medium.		0.2
	0.3m trace angular gravels, fine		0.4
	SILT, with some clay and sand; grey-green-yellow-brown. Very stiff; moist; low plasticity; sand, fine to medium.		1.0
	1.4m - 100mm lens of clayey SILT		1.4
	1.8m seepage; trace angular gravel, fine		1.8
	2.4m - 100mm lens of clayey SILT		2.4
	2.6m trace angular SILT-gravel, fine		2.6
	Silty SAND, with some clay; grey with black & white speckles. Medium dense; wet; low plasticity; sand, fine to medium.		2.8
	End Of Hole: 3.70m		3.0
			3.2
			3.4
			3.6
			3.8



PHOTO(S)

REMARKS

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

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HAND AUGER LOG

HOLE NO.: HA02

CLIENT: Paul & Tracey Fancy
PROJECT: Geotechnical Investigations
JOB NO.: 18012

SITE LOCATION: 83 Mackesy Road
CO-ORDINATES: 1722484mE, 6044890mN (NZTM)
ELEVATION: 44.4m (NZVD2016)
START DATE: 10/09/2021
END DATE: 10/09/2021
LOGGED BY: NG

UNIT	MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)
TS	Silty TOPSOIL, with minor sand; dark brown. Firm; moist; low plasticity; sand, fine to medium.		0.0
Kerikeri Volcanics	Clayey SILT, with trace sand; grey-brown-orange. Very stiff; moist; high plasticity; sand, fine to medium.		0.2 – 0.8
	1.0m soil becomes orange-grey-yellow		1.0 – 1.8
	2.0m minor sand, fine		2.0 – 2.2
	2.3m seepage; soil becomes blue-grey, green-grey with black & white specks; trace angular gravel, fine		2.4
	2.6m some sand; trace angular gravel; wet; sand, fine; gravel, fine to medium		2.6 – 2.8
	SILT, with some clay and sand, with minor gravel; blue-grey, green-grey with black & white specks. Very stiff; wet; low plasticity; sand, fine to medium; gravel, fine, angular. End Of Hole: 3.90m		3.0 – 3.8

LEGEND: TS

SCALA PENETROMETER (Blows / 50mm)

Depth (m)	Blows / 50mm
3.0	2, 2, 2, 2, 2
3.2	4, 4, 4
3.4	6, 5, 5
3.6	13, 10, 13, 10, 10

VANE SHEAR STRENGTH (kPa)
Vane: GEO1611

Depth (m)	Values
0.4	175
	84
1.0	196+
	-
1.4	196+
	-
2.0	196+
	-
2.4	196+
	-
3.0	158
	77

WATER: ◁ (2.4m)

PHOTO(S)

REMARKS

WATER
- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE
- [x] Hand Auger
- [ ] Test Pit