

WDC LIM REPORT - PART 1



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Land Information Memorandum

Sections 44A-C Local Government Official Information and Meetings Act 1987

LIM number: LM2601475

Received: 08 Sep 2026

Issued: 24 Sep 2026

Applicant

Own Real Estate
75 Forest View Road
RD 1
Kamo 0185

Site Information

Property ID: 165962

Street Address: 6 Kaymahr Lane (Pvt)
Whangarei 0179

Legal Description: LOT 10 DP 498433

Disclaimer

The information included in this LIM is based on a search of Council records only and there may be other information relating to the land which is unknown to the Council.

Please note that other agencies may also have information relevant to the use of the land, for example, the Northland Regional Council, Heritage New Zealand Pouhere Taonga, and Land Information New Zealand.

The applicant is solely responsible for undertaking comprehensive due diligence of this property.

Council records may not show illegal or unauthorised building or works on the property. Council has not carried out an inspection of the land or buildings for the purpose of preparing this LIM.

The LIM also includes information that identifies natural hazards known to Council. The existence of a natural hazard or potential natural hazard does not equal likelihood of that hazard occurring.

The LIM is not a risk assessment and does not quantify risk. The applicant is advised to seek further information to ensure that the land is suitable for a particular purpose.

A LIM is only valid at the date of issue as information is based only on information that was known to the Council at the time of that LIM application being made.

Further information about the property may be available in the Council records or the current Record of Title. The LIM and any attachments should be read together.

You may wish to seek independent advice to aid the understanding of any of the information included in this LIM.

Property details

- Location Map
- Aerial Photo
- Record of Title: 738144
- Deposited Plan: DP 165962

This property is subject to a Conservation Covenant, information attached.

- Interest Number 7813419.7 dated – 13/12/2007

This property is subject to an Encumbrance, information attached.

- Interest Number 9437225.9 dated – 21/06/2013

This property is subject to a Consent Notice, information attached.

- Interest Number 7813419.4 dated – 29/11/2007
- Interest Number 8670377.2 Variation of Consent Notice 7813419.4 dated – 30/11/2010
- Interest Number 9468879.1 Variation of Consent Notice 7813419.4 dated – 03/04/2013
- Interest Number 10241797.3 dated – 13/10/2015
- Interest Number 10578135.5 dated – 20/06/2016

s44A(2)(aa) Information identifying special features or characteristics of the land

Council records indicate that an activity listed on the Ministry for the Environment Hazardous Activities and Industries List (HAIL) may have been undertaken on this property.

Therefore, this property has been identified as potentially meeting the criteria of Section 5(7)(c) of the Resource Management Act (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulation 2011, enacted on 1 January 2012.

- The HAIL category for this property is A10.
 - GIS Aerial Map – Northland 0.4m Rural Aerial Photos 2014-2016
 - Preliminary Site Investigation by Base Consulting Group dated 18/12/2014

For the HAIL list refer:

<https://environment.govt.nz/publications/hazardous-activities-and-industries-list-hail/#hazardous-activities-and-industries-list-hail-october-2011>

For the Regulations refer:

<https://www.legislation.govt.nz/regulation/public/2011/0361/latest/DLM4052228.html>

This property is identified on the Northland Regional Council Selected Land-use Register as containing a verified activity on the Hazardous Activities and Industries List (HAIL).

- The HAIL category for this property is A10.

For further information and queries, please contact NRC at contamination@nrc.govt.nz

Information identified on a site-specific scale for this property is attached for your information.

1. Refer Consent Notice 10241797.3 dated – 13/10/2015 together with Subdivision Assessment Report by Base Group Consulting Chartered Professional Engineers dated 06/08/2014 reference 14302.
2. Refer Consent Notice 10578135.5 dated – 20/06/2016 together with Subdivision Assessment Report by Base Group Consulting Chartered Professional Engineers dated 28/09/2015 reference 14037 Revision 1.
2. Refer also copies of following reports as attached:
 - a. Wastewater Management Report by Base Group Consulting Structural & Civil Engineering dated 25/08/2016 from BC1601309 reference 16093.
 - b. Geotechnical Assessment by Base Group Consulting Structural & Civil Engineering dated 25/08/2016 from BC1601309 reference 16093.
 - c. Stormwater Management Report by Base Group Consulting Structural & Civil Engineering dated 23/11/2016 from BC1601309 reference 16093.

**s44A(2)(b) Information on private and public stormwater and sewerage drains;
s44A(2)(bb) Information Council holds regarding drinking water supply to the land**

No Whangarei District Council services are available in this area.

As-Built, House Connection and/or Drainage Plan for this property from the building file is attached.

- As Built Services Plan from BC1601309

s44A(2)(c)(ca)(cb) Information relating to any rates owing in relation to the land

Information on Valuation, Rates and Water Meter location (if applicable) for the current financial year, is attached.

For further information, please contact the Rates Department on 09 430 4200 or refer.

<https://www.wdc.govt.nz/ConservationCovenants>

**s44A(2)(d) Any permit, consent, certificate, notice, order or requisition affecting the land or buildings;
s44A(2)(daa) Information relating to non-consented small stand-alone dwellings
s44A(2)(da) Information provided under s362T of the Building Act 2004;
s44A(2)(e) Certificate issued by a building certifier;
s44A(2)(ea) Information notified under s124 of the Weathertight Homes Resolution Services Act 2006**

Copy of Building Consent and Code Compliance Certificate issued for this property is attached as listed below:

- BC1601309 – New Dwelling
Building Consent Issued – 08/12/2016
Code Compliance Certificate Issued – 19/03/2018

Council holds no current record of a swimming pool or spa at this property.

s44(2)(f) Information relating to the use to which the land may be put and conditions attached to that use

Plan Change 4A and 4C are currently progressing through the statutory planning process and may affect how the District Plan applies to this property.

Further information is available here:

<https://www.wdc.govt.nz/Services/Planning/District-Plan/District-Plan-changes/Current-plan-changes/PC4A-and-PC4C>

As part of Plan Change 4C - Minor Improvements, the Road Hierarchy mapping in the Whangarei District Plan is proposed to be updated. The updated layer identifies road centrelines and their classifications, which in turn influence various transport and setback rules in the District Plan. The proposed mapping updates can be viewed by selecting the "District Plan Changes" tile here:

<https://gismaps.wdc.govt.nz/GISMapsGallery/>

This property is located in a Large Lot Residential Zone.

See map attached and for more information search the property address on Council's ePlan:

<https://eplan.wdc.govt.nz/plan>

s44(2)(g) Information regarding the land which has been notified to Council by another statutory organisation

Whangarei District Council is not aware of any classification attached to the land or building/s.

s44(2)(h) Information regarding the land which has been notified to Council by a network utility operator pursuant to Building Act 1991 or Building Act 2004

Information relating to any utility service other than Councils such as telephone, electricity, gas and regional council will need to be obtained from the relevant utility operator.

Further information may be available from other authorities; Northpower; Spark; Vector Limited; etc.

S44A(3) Other information Council considers relevant to the land

Whangarei District Council recommends that all Whangarei District residents visit the Northland Regional Council website for information on Civil Defence hazard response:

<https://www.nrc.govt.nz>.

This information includes Tsunami evacuation zones, maps and community response plans for flooding and extreme weather events etc.

Copies of site plan, floor plan and elevations are attached for your information.

s44B(2) Natural Hazards

This LIM includes natural hazard information held by Northland Regional Council and Whangarei District Council, however:

- There may be hazards the Councils do not have information about.
- Some hazard information may be held by other organisations.
- If a hazard is not mentioned in this LIM, it does not necessarily mean the hazard does not exist.

Information about a single hazard (such as flooding, erosion, or land instability) may be included in more than one part of this report. Please check all relevant sections to ensure you have a complete understanding of the hazard.

District Plan Information about Natural Hazards

No District Plan information regarding natural hazards applies to this property.

Building Act Information about Natural Hazards

No Building Act Information about natural hazards applies to this property.

Flooding

Flooding occurs when rainfall exceeds the capacity of the river, land or urban stormwater systems to hold the water. In steep terrain or around rivers, floods can be fast-moving; in low-lying areas and wetlands, floods can cause ponding.

In coastal areas, storm surges can cause flooding affecting land.

Northland Regional Council has modelled the flood risk across Te Taitokerau Northland and maintains a monitoring and forecasting programme to predict flooding. However, the absence of flooding information contained in this report does not exclude the possibility of site flooding, including from local depressions or overland flow paths on nearby properties.

River flood maps

Modelling by Northland Regional Council does not identify a River Flood Hazard for this property.

A river flood occurs when a river, lake or stream overflows its banks due to excessive rain. The duration and intensity (volume) of rainfall in the catchment area of the river determine the severity of a river flood. Other factors include soil water saturation due to previous rainfall, and the terrain surrounding the river system. In flatter areas, floodwater tends to rise more slowly and be shallower, and it often remains for days. In hilly or mountainous areas, floods can occur within minutes after a heavy rain, drain very quickly, and cause damage due to debris flow.

To determine the probability of river flooding, models consider past precipitation, forecasted precipitation, current river levels, as well as soil and terrain conditions. Flood risk will increase with climate change with the forecast increase in rainfall. Northland Regional Council's flood hazard models include predicted climate change impacts.

Draft river flood reports

Northland Regional Council are continuing with their flood hazard modelling programme to improve the information about the potential for flooding in the region. The reports on these models are not currently published as they are going through peer review and quality checks, however they are available upon request from the Northland Regional Council.

The following reports are available:

- Whangārei Catchment Upgrade and Options Model. Project objectives include providing an appropriate modelling capability for catchment management, asset management and flood risk management. The completed model as well as the Whangārei urban areas detailed level which is closely related to the drainage system management. The report was prepared April 2023 by EWaters and updated in 2025
- Report on the Northern Wairoa Rainfall, Tidal and Storm-Surge Model is designed to simulate rainfall-induced flooding, tidal influences, and storm surge effects for the Northern Wairoa catchment, with a focus on the Dargaville area. The model has been calibrated using multiple flood events at all river gauge locations within the catchment. The report was prepared in September 2025 by Submergent Limited for Northland Regional Council.

Since 2008, Northland Regional Council has undertaken detailed flood modelling of priority catchments, i.e. those catchments and rivers determined present the highest risk to our communities. The flood extent shown on the maps are produced at a catchment scale and is not intended to depict specific flooding details for individual properties. We recommend obtaining site-specific engineering assessments to assess flood risk. Priority catchment flood maps are available on the Northland Regional Council Natural Hazards Map viewer

<https://www.nrc.govt.nz/environment/natural-hazards-portal/hazard-maps/advanced-hazard-map-viewer/>

The priority flood hazard maps include the following flood hazard zones:

- *River Flood Hazards Zone - Priority Rivers (10 year extent)*. Flood extent for the most common scenario - a flood with a 10% chance of happening in any year.
- *River Flood Hazards Zone - Priority Rivers (50 year extent)*. The extent of a flood that has a 2% annual probability of happening.
- *River Flood Hazards Zone - Priority Rivers (100 year extent CC)*. The extent of a flood that has a 1% annual probability of happening, taking the effects of climate change into account.

In 2019 - 2021 Northland Regional Council undertook regionwide flood modelling to model catchments not covered by the priority rivers programme. The flood extent shown on the maps are produced at a catchment scale and is not intended to depict specific flooding details for individual properties. We recommend obtaining site-specific engineering assessments to assess flood risk. The regionwide flood hazard maps are available on the Northland Regional Council Natural Hazards Map viewer <https://www.nrc.govt.nz/environment/natural-hazards-portal/hazard-maps/advanced-hazard-map-viewer/>

The regionwide flood hazard maps include the following flood hazard zones:

- *River Flood Hazards Zone - Regionwide models (10 year extent)*. Flood extent for the most common scenario - a flood with a 10% chance of happening in any year.
- *River Flood Hazards Zone - Regionwide models (50 year extent)*. The extent of a flood that has a 2% annual probability of happening.
- *River Flood Hazards Zone - Regionwide models (100 year extent CC)*. The extent of a flood that has a 1% annual probability of happening, taking the effects of climate change into account.

Northland Regional Council are continuing with their flood hazard modelling programme and as at October 2025 currently has draft flood models for Whangārei, Kerikeri, Northern Wairoa, Waima and Punakitere, Catchments. These models are not currently published as they go through peer review and quality checks. Flood hazards for these catchments can be requested from Northland Regional Council.

Surveyed and observed flood levels

Northland Regional Council records flood levels during flood and storm events which provides evidence of lands that are effected by flooding.

Surveyed River Flood Levels are available on the Northland Regional Council Natural Hazards Maps viewer.

<https://www.nrc.govt.nz/environment/natural-hazards-portal/hazard-maps/advanced-hazard-map-viewer/>

Information about observed Coastal Flood Levels is available on the Northland Regional Council's website.

<https://www.nrc.govt.nz/media/jtmbbgr1/historicobservedcoastalfloodlevelsnorthland2017.pdf>

Flood susceptible lands

Prior to undertaking flood modelling and mapping, Northland Regional Council identified land that could be susceptible to flooding based largely on soil type. This information should only be used where flood hazard modelling and maps are not available (upper Kaihu, upper Kerikeri and upper Rotokakahi and upper Waitangi, Waima and Punakitere catchments).

Flood susceptible land information is available on the Northland Regional Council Natural Hazards Maps viewer.

<https://www.nrc.govt.nz/environment/natural-hazards-portal/hazard-maps/advanced-hazard-map-viewer/>

River Flood Hazard Technical Reports

1. Scope of report:	Whangārei Catchments
2. Report Title:	NRC Priority Rivers Modelling Report and Whangārei Modelling Report
3. Report date:	March 2011, October 2013
4. Report prepared by:	URS
5. Report commissioned by:	Northland Regional Council
6. Purpose of the report:	This report explains the technical aspects relating to the development of the Priority Rivers Flood Risk reduction project and specifically rivers in the Whangārei catchment. The 2013 report details the work that was done to merge the Hatea and Wairarohia/Raumanaga models and to recalibrate the new Hatea model.
7. Where or how to access report:	River modelling technical reports https://www.nrc.govt.nz/resource-library-summary/research-and-reports/river-modelling-technical-reports/
1. Scope of report:	Whangārei Catchment (Catchment M01)
2. Report Title:	Design Modelling Whangarei Catchment (M01)
3. Report date:	May 2021
4. Report prepared by:	Water Technology
5. Report commissioned by:	Northland Regional Council
6. Purpose of the report:	This report documents the calibration and design modelling methodology for Whangarei Catchment (M01), noting that this catchment was calibrated to the July 2020 flood event.
7. Where or how to access report:	River modelling technical reports https://www.nrc.govt.nz/resource-library-summary/research-and-reports/river-modelling-technical-reports/

Stormwater Catchment and Flood Management

This property has been identified as having information available under Stormwater Catchment and Flood Management, see map attached.

Overland flow paths provide indicative routes of where the surface stormwater may flow during rainfall events and the direction of this flow. Depression storage areas/surface depression ponding areas provide an indicative extent of ponding that may occur if the outlet to the ponding area is blocked or where the outlet capacity is exceeded, for example, if a pipe is either blocked or the design capacity of the pipe is exceeded during a rainfall event.

The Overland Flow Paths are a useful indicator of flow direction and location of where ponding will occur frequently during smaller events and before larger flooding may occur in major rainfall events.

The Overland Flow Path information was developed using LiDAR (Light Detection and Ranging) data. If the landform had changed since the LiDAR data was collected, the indicative Overland Flow Paths and depression ponding areas may not be accurate.

Climate change could make the natural hazard worse by increasing the amount and intensity of rain, which means more water could flow over land and follow these paths, leading to a higher risk of flooding.

Whangārei Stormwater Planning - Overland Flow Paths and Depression Storage Areas district wide report by Morphum Environmental Ltd, dated 4 October 2019, provided a technical overview of the scope, methodology, issues and limitations of the mapped Overland Flow Paths and indicative extent of surface depression areas.

The report can be viewed under the Whangārei Overland Flow Paths and Depression Storage Area section on our Natural Hazards web page: <https://www.wdc.govt.nz/NaturalHazards>

Refer disclaimer with the mapped OLFP and ponding
<https://geo.wdc.govt.nz/portal/sharing/rest/content/items/73a86bc1bfed41a3baf4842efbcf9ae1/data>

Land Instability

Whangarei District Council holds indicative information on land stability hazard for Whangārei. Information on land stability.

A landslide is defined as the downslope movement of a mass of earth, rock or debris under the influence of gravity. Whangārei District is susceptible to landslides due to a combination of steep topography, subtropical climate and the underlying geology which includes weak or expansive soil, weak rock and highly weathered, clay rich soils. Landslides are often triggered by intense or prolonged rainfall (as well earthquakes, loss of vegetation cover, leaky water infrastructure and earthworks) which will increase with the effects of climate change.

It is not possible to identify all potential or actual landslides or land instability. The absence of information in this section does not necessarily indicate the absence of a landslide risk.

‘Landslide susceptibility’ is the relative likelihood of future landsliding occurring based on underlying properties compared with surrounding areas. It does not indicate the size or frequency of potential landslides, or the potential for landslides to cause damage or loss.

This LIM includes maps which indicate Landslide Susceptibility in relation to this property and its surrounds - is **low**. These maps are based on a district wide study entitled ‘Landslide Susceptibility Assessment for Whangarei District Council, October 2022.

These maps are a generalisation of available data, and do not represent site specific assessment. They are not intended to be viewed or relied upon on a property-level scale.

The Whangarei District Council may require site-specific investigations before granting future subdivision or building consent for the property, the level of investigation or assessment would depend on the level of stability risk of the area the property is in.

Technical report

1. Report Title:	Landslide Susceptibility Assessment for Whangarei District Council
2. Report date:	October 2022
3. Report prepared by:	Tonkin & Taylor Ltd
4. Report commissioned by:	Whangarei District Council
5. Purpose of the report:	The purpose and outcomes of this analysis and mapping is to: Provide a landslide susceptibility assessment and map that covers the Whangārei District and follows on from the landslide susceptibility assessment and mapping done previously but covered discrete areas of the district only.
6. Scope of report:	Whangārei District
7. Where or how to access report:	You can find the above report under the Land Instability section on our Natural Hazards webpage. Additional reports that may be relevant to Land Instability are also available at: https://www.wdc.govt.nz/NaturalHazards

Liquefaction

This property is located within an area classified as Liquefaction vulnerability category: **unlikely** and can be viewed on the Council Hazard viewer: <https://www.wdc.govt.nz/HazardsGISMap>

Please note: To view the liquefaction layer your map scale must be greater than 1:5000.

Liquefaction is a natural process where earthquake shaking increases water pressure in the ground in granular soils, resulting in temporary loss of soil bearing capacity. Liquefaction commonly leads to buildings 'sinking' on their foundations during the shaking - in line with that experienced in the 2011 Canterbury earthquakes.

Climate change is expected to cause sea level rise, and in turn an elevation of groundwater levels. Elevated ground water levels are likely to increase liquefaction susceptibility, but the extent of the increase has not been quantified by the report, nor Whangarei District Council.

Whangarei District Council commissioned Tonkin and Taylor Ltd to complete a district wide Liquefaction Vulnerability Study in August 2020. The report identifies and analyses the risk of liquefaction to help inform decisions about future development of land and buildings.

You can find the report under the Liquefaction section on our Natural Hazards web page: <https://www.wdc.govt.nz/NaturalHazards>

Tsunami

Tsunami are a series of waves, typically created by submarine or coastal earthquakes, landslides (including underwater landslides) and offshore submarine volcanic eruptions. Tsunami may travel hundreds of kilometres an hour and pass by unnoticed at sea, but slow down and grow as they move to shallow water, causing significant damage when they make landfall.

This property is located in an area identified as **Green Zone - Safe Area**

With funding from the Natural Hazards Commission Northland Civil Defence and Emergency Management have modelled the tsunami risk and created Tsunami Evacuation Zone and Safe Zone map:

<https://northlandcdem.maps.arcgis.com/apps/webappviewer/index.html?id=00bf741d369b4eb7802021004d123e3b>

Technical Report for Tsunami Evacuation Zone and Safe Zone map

1. Scope of report	Regional
2. Report Title:	Tsunami Inundation Modelling for Evacuation Planning in Northland
3. Report date:	2024
4. Report prepared by:	Orca Consulting
5. Report commissioned by:	Natural Hazards Commission
6. Purpose of the report:	The objective of this study was to produce tsunami inundation and evacuation zones for the Northland region that are compliant with guidelines set forth in the document 'Tsunami Evacuation Zones: Director's Guidelines for Civil Defence Emergency Management Groups' (MCDEM, 2016). To define these zones, numerical modelling was undertaken to determining the extents of the tsunami inundation zones for the Northland Region. The study used a Level 3/Level 4 modelling approach (as defined in MCDEM 2016) whereby a physics based numerical model was used to model the evolution of the tsunami from source through to inundation. The study used multiple sources, both local and distant.
7. Where or how to access report	A copy is available upon request from Northland Regional Council

Erosion and Landslide

Erosion is any movement of soil, rocks or sand, under the influence of wind, water or gravity. Landslides are a type of erosion. A landslide is the downslope movement of a mass of earth, rock or debris under the influence of gravity. Te Taitokerau Northland is susceptible to landslides due to its steep topography, subtropical climate, and underlying geology. Landslides are often triggered by intense or prolonged rainfall (as well as earthquakes, loss of vegetation cover, leaky water infrastructure and earthworks), which will increase with the effects of climate change. Climate change is expected to increase erosion in Te Taitokerau Northland.

Northland Regional Council has modelled the region's relative risk of erosion and sediment loss to water and these have been published as Erosion and Sediment Risk at this link -

<https://experience.arcgis.com/experience/bf65abc23bc144e2a32cd1efd6094167>

The maps are based on a predictive model created using a range of information, including LiDAR (remote sensing technology that uses lasers to create 3D maps), soil and geology type, slope and climate data. The maps are designed as a tool to help landowners manage risks to water quality as a result of sediment loss to water - they provide an assessment of the relative risk of erosion and risk of sediment reaching waterways across Northland.

The maps do not provide a geotechnical assessment of land suitability for subdivision or built development, nor do they quantify the likelihood of future landslides or slips.

Technical Reports for erosion prone land

1. Scope of report	Regional
2. Report Title:	Northland's Landscape Driven Erosion Map: A Resources for Decision-Makers and Communities
3. Report date:	2025
4. Report prepared by:	Land and Water Science
5. Report commissioned by	Northland Regional Council
6. Purpose of the report:	This report was created for people across Northland-farmers, council staff, iwi and hapū, community leaders, and planners-who want to better understand a new regional tool called the Sediment-Process Attribute Layer, or S-PAL. S-PAL does not replace older soil or geology maps. Instead, it builds on those valuable foundations by adding a new layer of information made possible through modern datasets.
7. Where or how to access report	Northland Regional Council website: https://www.nrc.govt.nz/media/tr4ng33g/northlands-landscape-driven-erosion-map-lws-2025.pdf
1. Scope of report	Regional
2. Report Title:	The S-PAL Framework: Technical User Guide for Erosion Susceptibility Assessment and Mitigation
3. Report date:	2026
4. Report prepared by:	Land and Water Science
5. Report commissioned by	Northland Regional Council
6. Purpose of the report:	This User Guide explains how to use the S-PAL v 2.0 Framework to identify land that is prone to erosion across Northland. S-PAL stands for Sediment-Process Attribute Layers - a system that combines detailed maps and measurements to show where the land is most likely to erode and shed sediment into waterways.
7. Where or how to access report	Northland Regional Council website: https://www.nrc.govt.nz/media/gkofckd2/northland-erosion-and-sediment-risk-map-technical-user-guide-11jan2026.pdf

Draft subsidence report

Northland Regional Council have commissioned work into subsidence regions. The available report is Northland Region InSAR and Differential LiDAR Study. This report presents an analysis of surface deformation across the Northland region between January 2019 and August 2021 using InSAR (Interferometric Synthetic Aperture Radar), a technique for mapping ground deformation using space-borne radar images of the Earth's surface. This report was prepared in June 2026 by Harvey Geoscience.

Drought

Drought in Te Taitokerau Northland is a complex hazard to define and detect, and its impacts vary from one area to the other.

Technical Report for Northland Drought Assessment

1. Scope of report	Regional
2. Report Title:	Droughts in Northland: A Local and Regional Analysis
3. Report date:	2024
4. Report prepared by:	National Institute of Water and Atmosphere
5. Report commissioned by:	Northland Regional Council
6. Purpose of the report:	Analysis of the development, occurrence and severity of droughts in Northland Region.
7. Where or how to access report	Envirolink website: Droughts in Northland: A local and regional analysis <https://www.envirolink.govt.nz/assets/Envirolink/2403-NLRC240-Droughts-in-Northland-A-Local-and-Regional-Analysis.pdf>

In September 2024 the Ministry for the Environment and NIWA published national climate projections.

Droughts are expected to become more frequent and more severe in Te Taitokerau Northland by 2090.

Volcanic, Geothermal and Earthquake

There are many processes associated with volcanic eruptions, and these can be hazardous when they interact with people and/or infrastructure. The type and intensity of volcanic process will vary from volcano to volcano. There are two areas of past local volcanic activity in Northland, at Puhipuhi-Whangārei and at Kaikohe-Bay of Islands. While climate change does not affect volcanic eruptions, it can affect the risk from volcanic hazards such as lahars (volcanic mudflows) because of the forecast changes in rainfall.

Earthquakes occur when stress that has built up along a fault - a break in the Earth's crust - is suddenly released. Earthquakes can cause ground shaking, fault rupture, permanent ground movement, subsidence or lateral spreading, liquefaction, landslides, rock falls and tsunamis. Although climate change does not affect earthquakes, it can make some of the problems earthquakes cause, such as subsidence, liquefaction, and landslides, more likely or more severe. This is because climate change affects rainfall and groundwater, which play roles in these hazards.

While the earthquake risk in Northland is low, there have been earthquakes recorded in the region.

Northland Regional Council does not have a map of volcanic, geothermal or earthquake risk but did commission information on volcanic hazards as part of the review of natural hazards information for Northland region. This information relates to region-wide studies and may not reflect the on-site situation or natural hazard investigations and mitigation done on a site-specific property level.

Technical Report for earthquake information

1. Scope of report	Regional
2. Report Title:	A review of natural hazards information for Northland region Section 2.0 Seismic Hazards
3. Report date:	2004
4. Report prepared by:	Institute of Geological & Nuclear Sciences Limited
5. Report commissioned by:	Northland Regional Council and Whangarei District Council
6. Purpose of the report:	The aim of this report is to assemble and present a review of existing information on natural hazards, including earthquakes. The report identifies gaps and possible future work. Please note sections on flooding and erosion prone land have been superseded by more recent work and modelling.
7. Where or how to access report:	Northland Regional Council Website https://www.nrc.govt.nz/media/2itixwuo/naturalhazards.pdf

Signed for and on behalf of Council:



P Luwes
Property Information Officer

Property Map



New Subdivisions

- Proposed Pre-223
- 223 Certificate

New subdivisions: Proposed as accepted, pre-223 and 223 Certificate with set Conditions.

23 September 2026

Land Parcel boundaries are indicative only and are not survey accurate. Area measurement is derived from the displayed geometry and is approximate. True accurate boundary dimensions can be obtained from LINZ survey and title plans.

Scale 1:1,000





This map includes New Zealand's most current publicly owned aerial imagery and is sourced from the LINZ Data Service.

23 September 2026

Scale 1:1,000



The information displayed is schematic only and serves as a guide. It is made available in good faith but its accuracy or completeness is not guaranteed. Parcel Information is provided by LINZ Data Service, licensed for reuse under CC BY 4.0. Other data sources: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, Whangarei District Council, Sourced from the LINZ Data Service and licensed for reuse under the CC BY



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD**

**Guaranteed Search Copy issued under Section 60 of the Land
Transfer Act 2017**



R. W. Muir
Registrar-General
of Land

Identifier 738144
Land Registration District North Auckland
Date Issued 28 September 2016

Prior References
686563

Estate Fee Simple
Area 2004 square metres more or less
Legal Description Lot 10 Deposited Plan 498433
Registered Owners
Pamela Jean Adams and Russell Turner Adams Trustees Limited

Interests

Appurtenant hereto is a right of way specified in Easement Certificate D523976.7 - produced 14.7.2000 at 3.50 pm and entered 27.7.2000 at 9.00 am

Appurtenant hereto is a right to transmit telecommunications created by Transfer 5451873.8 - 3.1.2003 at 9:00 am

7813419.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 13.5.2008 at 9:00 am

Appurtenant hereto is a right to convey water created by Easement Instrument 7813419.6 - 13.5.2008 at 9:00 am

The easements created by Easement Instrument 7813419.6 are subject to Section 243 (a) Resource Management Act 1991

7813419.7 Conservation Covenant pursuant to Section 77 Reserves Act 1977 - 13.5.2008 at 9:00 am

8670377.2 Variation of Consent Notice 7813419.4 pursuant to Section 221(5) Resource Management Act 1991 - 23.12.2010 at 11:52 am

9437225.5 Surrender of the right of way and a right to convey electricity, telecommunications and computer media over part Lot 2 DP 484464 marked A on DP 458077 created by Easement Instrument 7813419.6 appurtenant to Lot 2 DP 437647 - 21.6.2013 at 5:24 pm

9437225.9 Encumbrance to Whangarei District Council - 21.6.2013 at 5:24 pm

9468879.1 Variation of Consent Notice 7813419.4 pursuant to Section 221(5) Resource Management Act 1991 - 25.7.2013 at 2:23 pm

10241797.3 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 8.12.2015 at 3:51 pm

10241797.4 Covenant pursuant to Section 108(2)(d) Resource Management Act 1991 - 8.12.2015 at 3:51 pm

Land Covenant in Easement Instrument 10241797.6 - 8.12.2015 at 3:51 pm

Land Covenant in Easement Instrument 10241797.7 - 8.12.2015 at 3:51 pm

10578135.3 Surrender of the Land Covenant created by Easement Instrument 10241797.7- 28.9.2016 at 5:06 pm as to lot 1 DP 484464

10578135.5 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 28.9.2016 at 5:06 pm

Appurtenant hereto is a right of way, right to convey electricity, telecommunications and computer media created by Easement Instrument 10578135.7 - 28.9.2016 at 5:06 pm

The easements created by Easement Instrument 10578135.7 are subject to Section 243 (a) Resource Management Act 1991
Appurtenant hereto is a right of way- pedestrian access only created by Easement Instrument 10578135.8 - 28.9.2016 at 5:06 pm

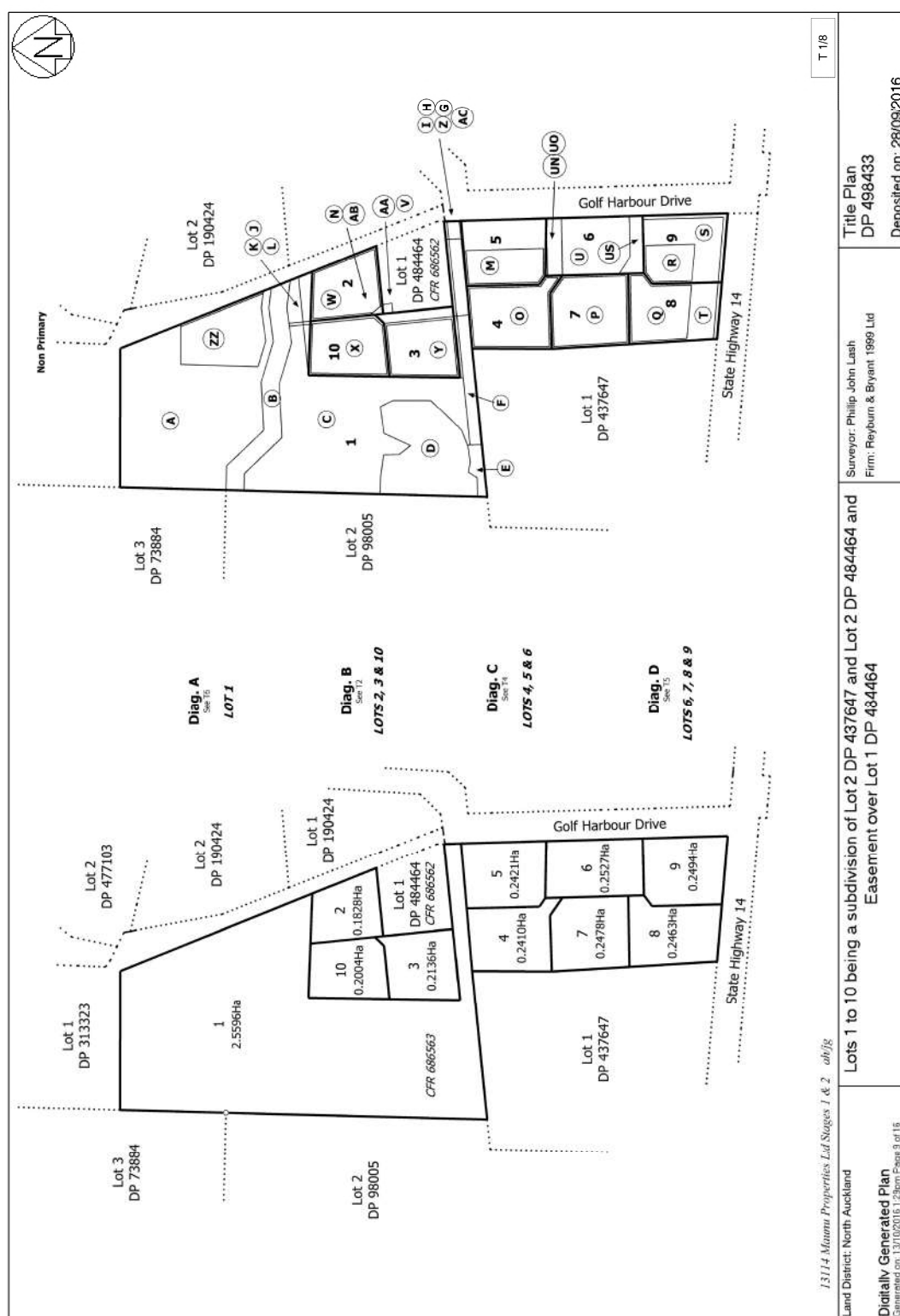
The easements created by Easement Instrument 10578135.8 are subject to Section 243 (a) Resource Management Act 1991
Appurtenant hereto is a right to convey water-firefighting purposes created by Easement Instrument 10578135.11 - 28.9.2016 at 5:06 pm

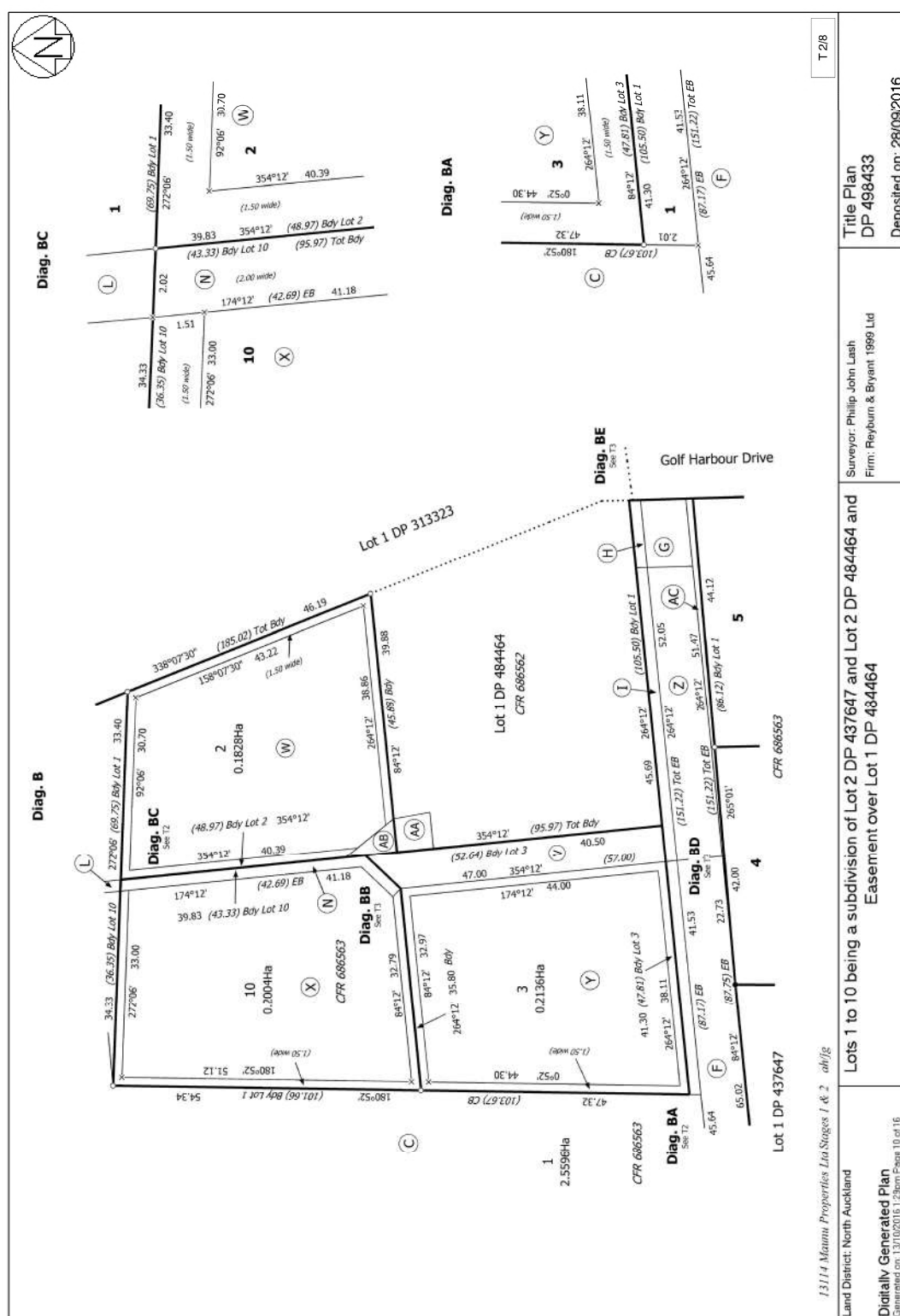
The easements created by Easement Instrument 10578135.11 are subject to Section 243 (a) Resource Management Act 1991

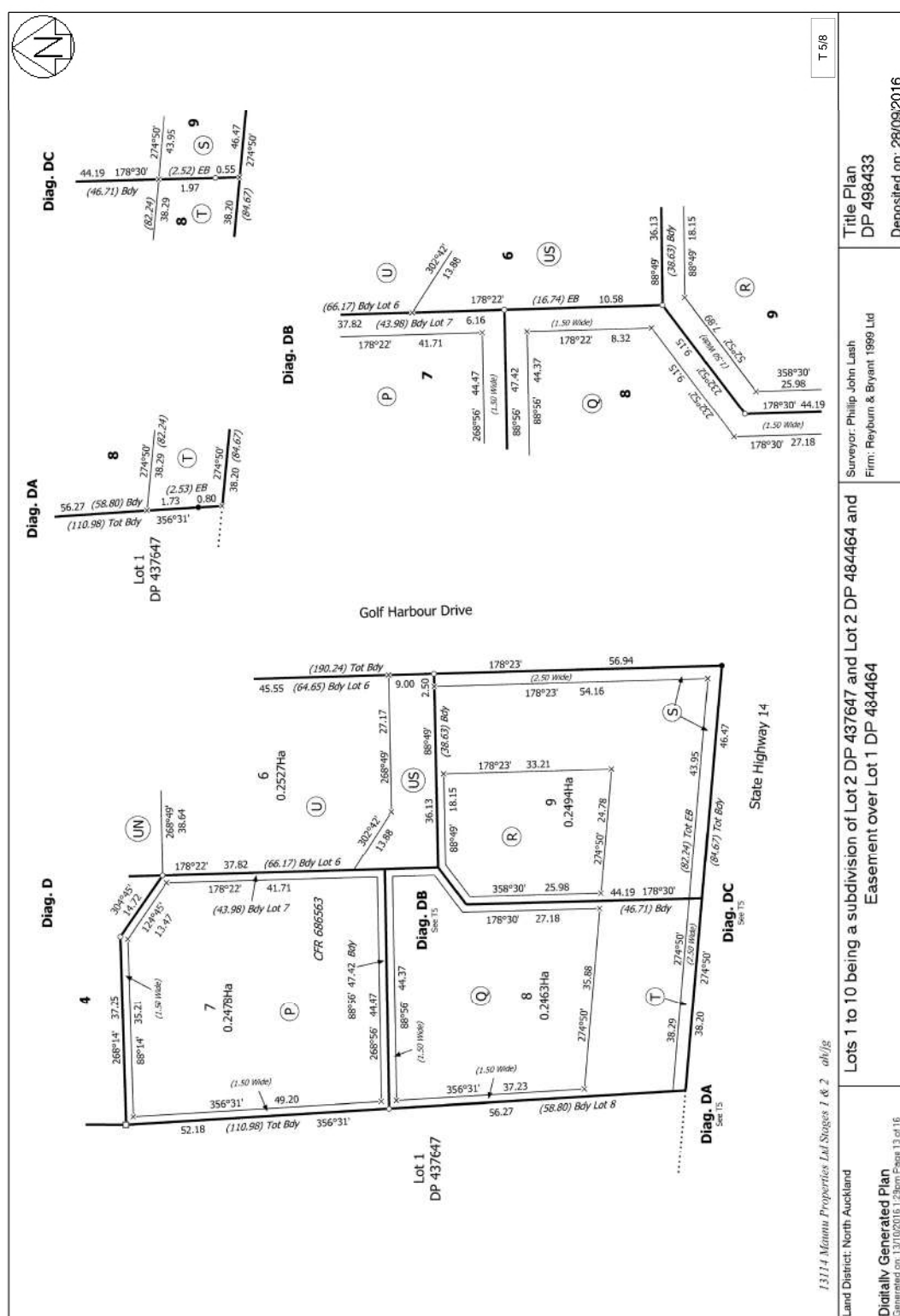
Subject to a right (in gross) to drain water over part marked N DP 498433 in favour of Whangarei District Council created by Easement Instrument 10578135.14 - 28.9.2016 at 5:06 pm

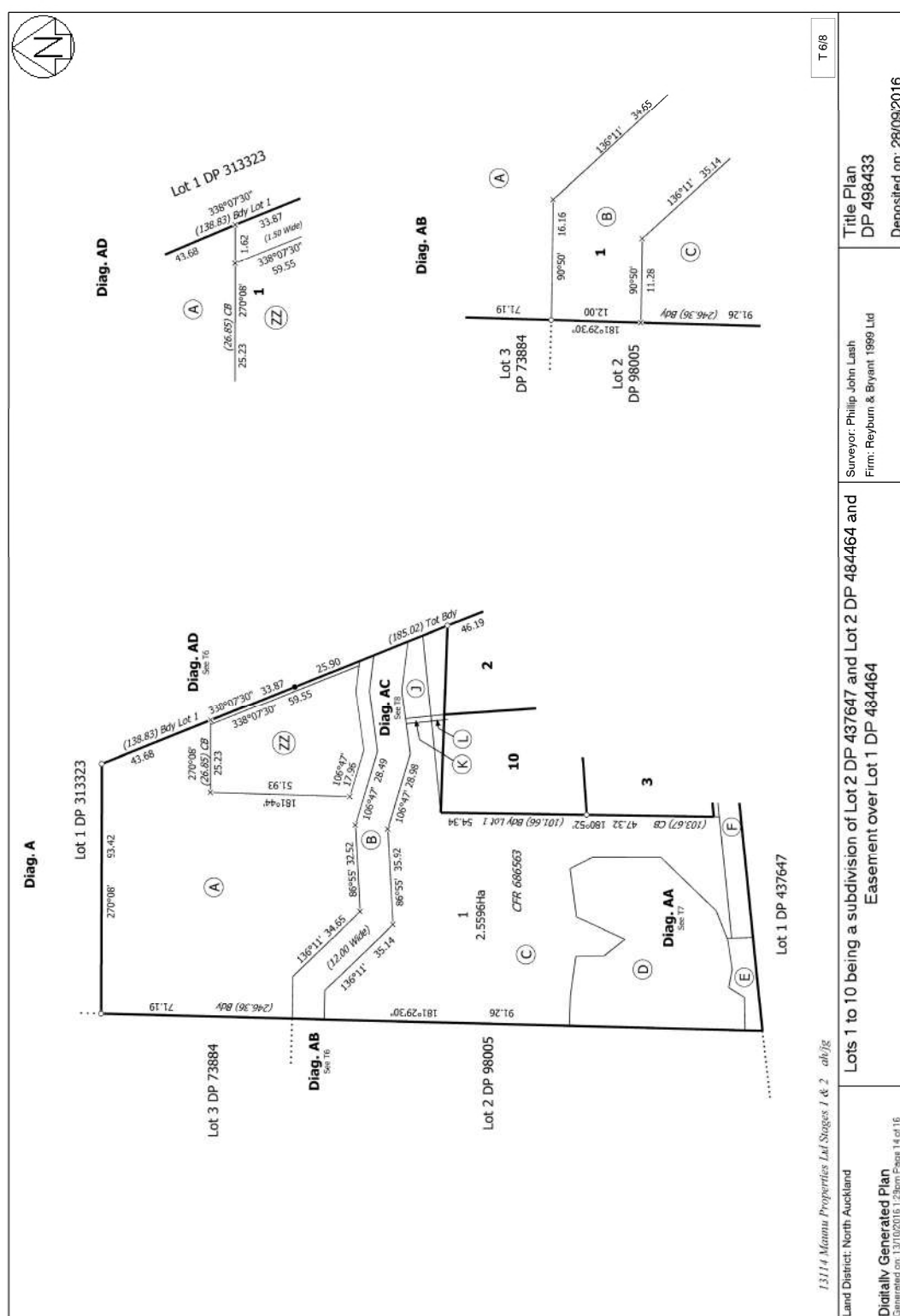
The easements created by Easement Instrument 10578135.14 are subject to Section 243 (a) Resource Management Act 1991

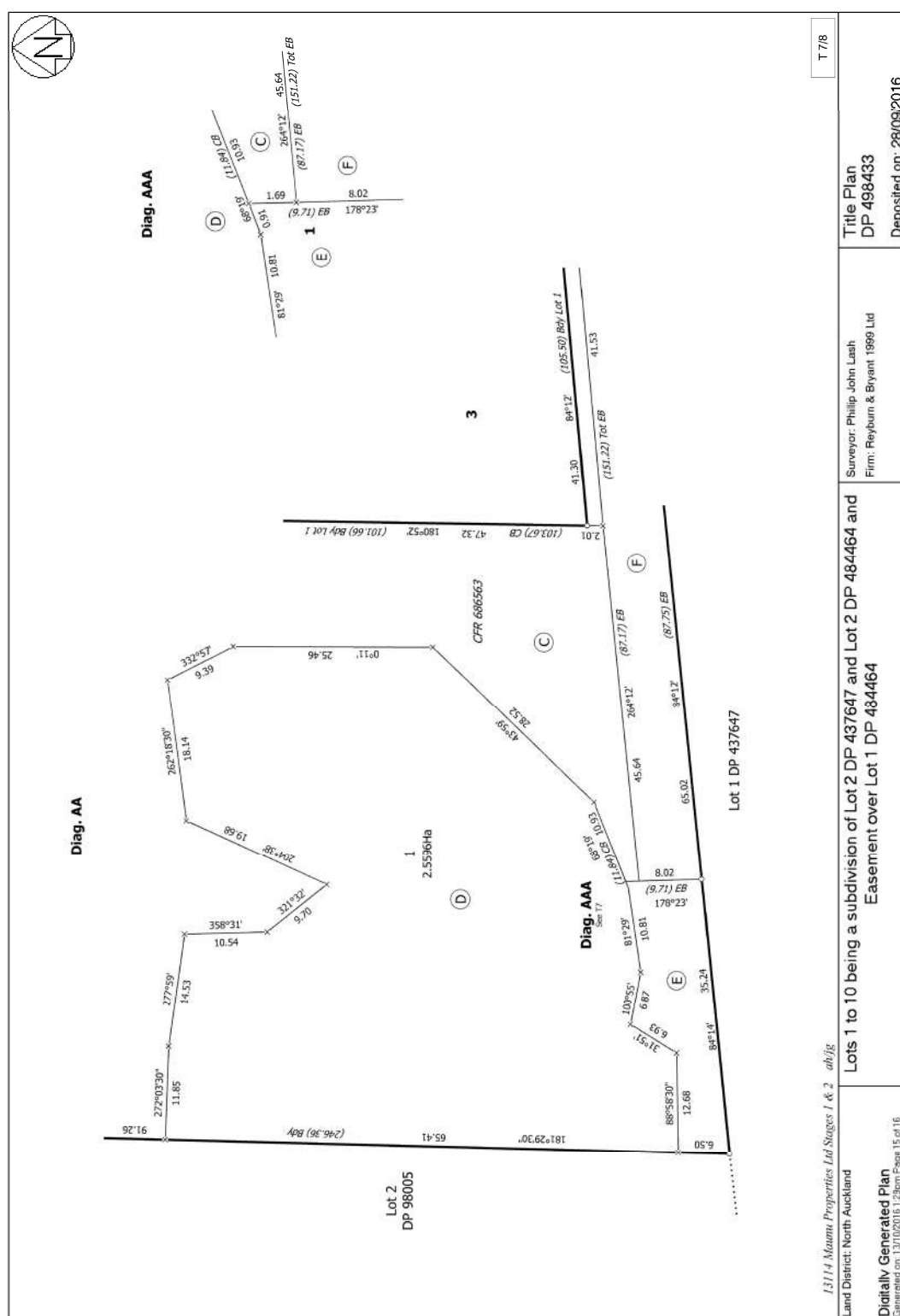
Land Covenant in Easement Instrument 10578135.16 - 28.9.2016 at 5:06 pm

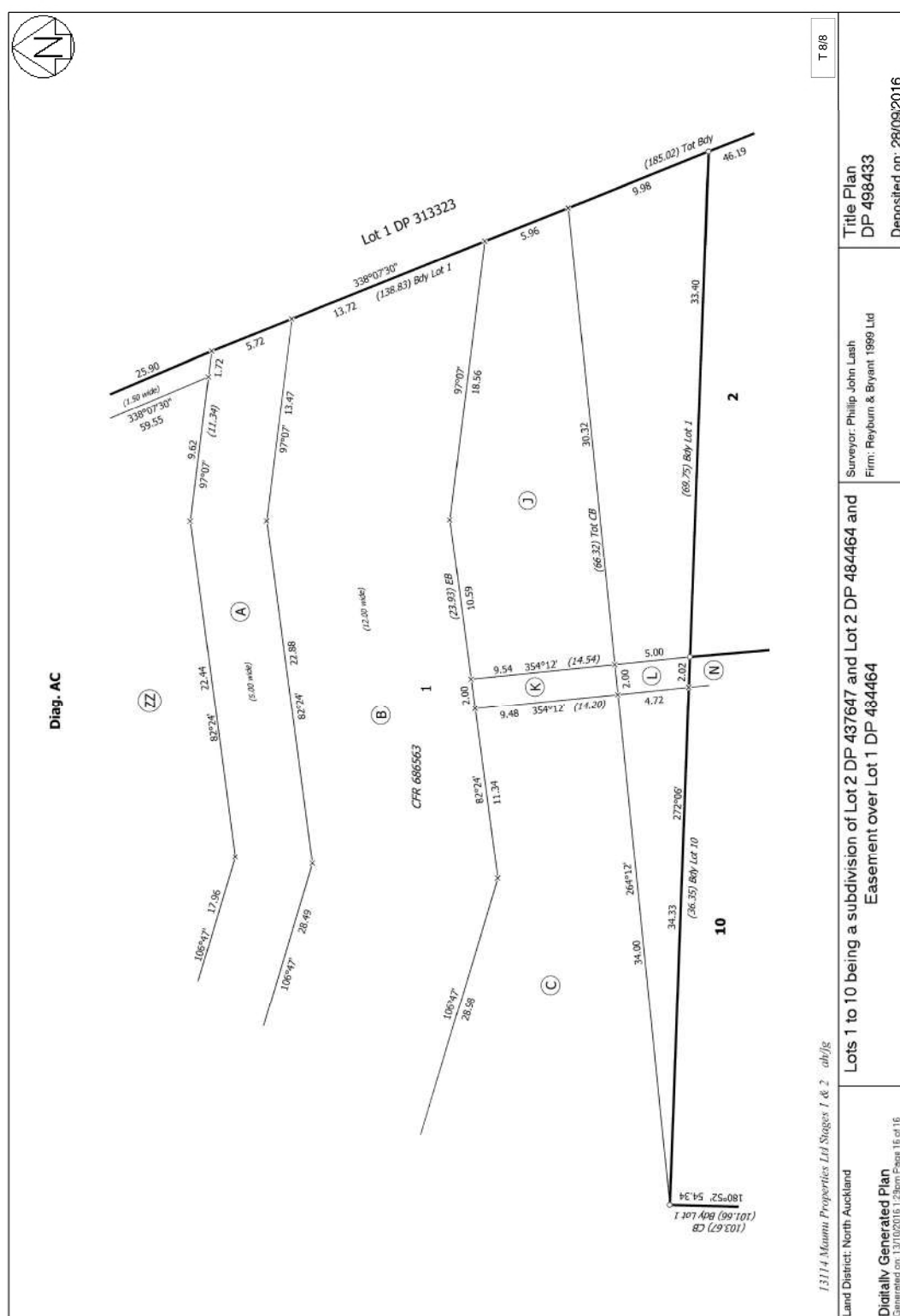












Title Plan - DP 498433

Survey Number DP 498433
Surveyor Reference 13114 Maunu Properties Ltd
Surveyor Phillip John Lash
Survey Firm Reyburn & Bryant 1999 Ltd
Surveyor Declaration I Phillip John Lash, being a licensed cadastral surveyor, certify that:
 (a) this dataset provided by me and its related survey are accurate, correct and in accordance with the Cadastral Survey Act 2002 and the Rules for Cadastral Survey 2010, and
 (b) the survey was undertaken by me or under my personal direction.
 Declared on 07 Jul 2016 04:40 PM

Survey Details

Dataset Description Lots 1 to 10 being a subdivision of Lot 2 DP 437647 and Lot 2 DP 484464 and Easement over Lot 1 DP 484464
Status Deposited
Land District North Auckland
Submitted Date 07/07/2016
Survey Class Class A
Survey Approval Date 21/07/2016
Deposit Date 28/09/2016

Territorial Authorities

Whangarei District

Comprised In

CT 686563
 CT 686562

Created Parcels

Parcels	Parcel Intent	Area	CT Reference
Lot 1 Deposited Plan 498433	Fee Simple Title	2.5596 Ha	738136
Lot 2 Deposited Plan 498433	Fee Simple Title	0.1828 Ha	738137
Lot 3 Deposited Plan 498433	Fee Simple Title	0.2136 Ha	738138
Lot 4 Deposited Plan 498433	Fee Simple Title	0.2410 Ha	738139
Lot 5 Deposited Plan 498433	Fee Simple Title	0.2421 Ha	738140
Lot 6 Deposited Plan 498433	Fee Simple Title	0.2527 Ha	Multiple
Lot 7 Deposited Plan 498433	Fee Simple Title	0.2478 Ha	738141
Lot 8 Deposited Plan 498433	Fee Simple Title	0.2463 Ha	738142
Lot 9 Deposited Plan 498433	Fee Simple Title	0.2494 Ha	738143
Lot 10 Deposited Plan 498433	Fee Simple Title	0.2004 Ha	738144
Area A Deposited Plan 498433	Land Covenant		
Area B Deposited Plan 498433	Easement		
Area C Deposited Plan 498433	Land Covenant		
Area D Deposited Plan 498433	Land Covenant		
Area E Deposited Plan 498433	Easement		
Area F Deposited Plan 498433	Easement		
Area G Deposited Plan 498433	Easement		
Area H Deposited Plan 498433	Easement		
Area I Deposited Plan 498433	Easement		

Title Plan - DP 498433

Created Parcels

Parcels	Parcel Intent	Area	CT Reference
Area J Deposited Plan 498433	Land Covenant		
Area K Deposited Plan 498433	Easement		
Area L Deposited Plan 498433	Easement		
Area M Deposited Plan 498433	Land Covenant		
Area N Deposited Plan 498433	Easement		
Area O Deposited Plan 498433	Land Covenant		
Area P Deposited Plan 498433	Land Covenant		
Area Q Deposited Plan 498433	Land Covenant		
Area R Deposited Plan 498433	Land Covenant		
Area S Deposited Plan 498433	Land Covenant		
Area T Deposited Plan 498433	Land Covenant		
Area U Deposited Plan 498433	Land Covenant		
Area V Deposited Plan 498433	Easement		
Area W Deposited Plan 498433	Land Covenant		
Area X Deposited Plan 498433	Land Covenant		
Area Y Deposited Plan 498433	Land Covenant		
Area Z Deposited Plan 498433	Easement		
Area AA Deposited Plan 498433	Easement		
Area AB Deposited Plan 498433	Easement		
Area AC Deposited Plan 498433	Easement		
Area ZZ Deposited Plan 498433	Land Covenant		
Area UN Deposited Plan 498433	Easement		
Area UO Deposited Plan 498433	Easement		
Area US Deposited Plan 498433	Easement		
Total Area		4.6357 Ha	

Schedule / Memorandum

Land Registration District

North Auckland

Plan Number

LT 498433

Territorial Authority (the Council)

Whangarei District

Council Reference

SD1500014 on P125190

Memorandum of Easements (Pursuant to s243 Resource Management Act 1991)			
Purpose	Shown	Servient Tenement	Dominant Tenement
Right of Way, Right to convey Electricity, Telecommunications & Computer Media	G, H, I & Z	Lot 1 hereon	Lots 2, 3 & 10 hereon
	V	Lot 3 hereon	Lots 2 & 10 hereon
Right of Way	UN & UO	Lot 6 hereon	Lots 4 & 5 hereon
	US	Lot 6 hereon	Lots 7, 8 & 9 hereon
Right of Way – Pedestrian Access Only	E & F	Lot 1 hereon	Lots 2, 3 & 10 hereon
	E & G	Lot 1 hereon	Lots 4, 5, 7, 8 & 9 hereon
	E	Lot 1 hereon	Lot 1 DP 484464
	AC	Lot 1 hereon	Lots 4 & 5 hereon
Right to convey Water – Fire Fighting Purposes	AA	Lot 1 DP 484464	Lots 1, 2, 3 & 10 hereon
Right to drain Water	AB	Lot 2 hereon	Lot 1 DP 484464

Memorandum of Easements in Gross (Pursuant to s243 Resource Management Act 1991)			
Purpose	Shown	Servient Tenement	Grantee
Right to convey Electricity, Telecommunications & Computer Media	F, G, H, I, Z & AC	Lot 1 hereon	Northpower Limited & Northpower Fibre Limited
	V	Lot 3 hereon	
	AA	Lot 1 DP 484464	
	UN, UO & US	Lot 6 hereon	
Right to drain Water	K & L	Lot 1 hereon	Whangarei District Council
	N	Lot 10 hereon	

Schedule / Memorandum

Land Registration District
North Auckland

Plan Number
LT 498433

Schedule of Easements			
Purpose	Shown	Servient Tenement	Dominant Tenement
Right of Way – Pedestrian Access Only	E	Lot 1 hereon	Lot 1 DP 437647

Schedule of Existing Easements			
Purpose	Shown	Servient Tenement	Created by
Right of Way, Right to convey Electricity, Telecommunications & Computer Media	F, G & Z	Lot 1 hereon	7813419.6
Right of Way, Right to convey Electricity, Telecommunications & Computer Media	G & H	Lot 1 hereon	10241797.5
Right of Way – (Pedestrian Access Only)	F, H, I & Z		

Schedule of Existing Easements in Gross			
Purpose	Shown	Servient Tenement	Created by
Right to drain Water	B	Lot 1 hereon	9437225.8

Schedule of Existing Easement to be Partially Surrendered (Subject to s243 Resource Management Act 1991)			
Purpose	Shown – Created by	Servient Tenement	Appurtenant to
Right of Way, Right to convey Electricity, Telecommunications & Computer Media	Marked G on DP 484464 – 7813419.6	Lot 2 DP 484464	Lot 2 DP 437647

Existing Conservation Covenant Schedule Pursuant to s77 Reserves Act 1977 – Created by 7813419.7		
Shown	Underlying Parcel	Area
D	Lot 1 hereon	0.3280 Ha

Land Registration District

North Auckland

Plan Number

LT 498433

Proposed Land Covenants

Buildable Areas

Areas marked M (on Lot 5 hereon); O (on Lot 4 hereon); P (on Lot 7 hereon); Q (on Lot 8 hereon); R (on Lot 9 hereon); W (on Lot 2 hereon); X (on Lot 10 hereon); Y (on Lot 3 hereon) & ZZ (on Lot 1 hereon) are to be subject to land covenants –
All building to be contained within these areas.

Shelter Belt Protection

Areas marked S (on Lot 9 hereon) & T (on Lot 8 hereon) are to be subject to a land covenant –
Protection and maintenance of existing shelter belt.

Existing Land Covenants to Remain

No build areas – created by 10241797.6

Areas marked A, B, C, F, G, H, I, J, K & Z (on Lot 1 hereon) and U, UN & US (on Lot 6 hereon) are subject to an existing land covenant.

Existing Land Covenant to be Surrendered

No build area – created by 10241797.7

The land covenant shown as area marked K on DP 484464 over Lot 2 DP 484464 is to be surrendered – (To be replaced by proposed land covenant marked X over lot 10 hereon)

Amalgamation Condition

(Pursuant to s220 Resource Management Act 1991)

That Lot 6 hereon (legal access) be held as to five undivided one-fifth shares by the owners of Lots 4, 5, 7, 8 & 9 hereon as tenants in common in the said shares and that individual computer registers be issued in accordance therewith.
See Linz CSN 1369603

Cancellation of Existing Amalgamation Condition

(Pursuant to s241(3) Resource Management Act 1991)

The Whangarei District Council cancels the amalgamation condition requiring Lot 2 DP 484464 and Lot 2 DP 437647 (CFR 686563) to be held in the same computer register

Schedule / Memorandum

Land Registration District

North Auckland

Plan Number

LT 498433

Territorial Authority (the Council)

Whangarei District

Council Reference

SD1500014 on P125190

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Right of Way – Pedestrian Access Only	E & F	Lot 1 hereon	Lots 2, 3 & 10 hereon
	E & G	Lot 1 hereon	Lots 4, 5, 7, 8 & 9 hereon
	E	Lot 1 hereon	Lot 1 DP 484464
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	AA	Lot 1 DP 484464	
	UN, UO & US	Lot 6 hereon	
Right to drain Water	K & L	Lot 1 hereon	Whangarei District Council
	N	Lot 10 hereon	

Schedule / Memorandum

Land Registration District

North Auckland

Plan Number

LT 498433

Schedule of Easements

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Right of Way – (Pedestrian Access Only)	F, H, I & Z		

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Pursuant to s77 Reserves Act 1977 – Created by 7813419.7

Shown	Underlying Parcel	Area
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Land Registration District

North Auckland

Plan Number

LT 498433

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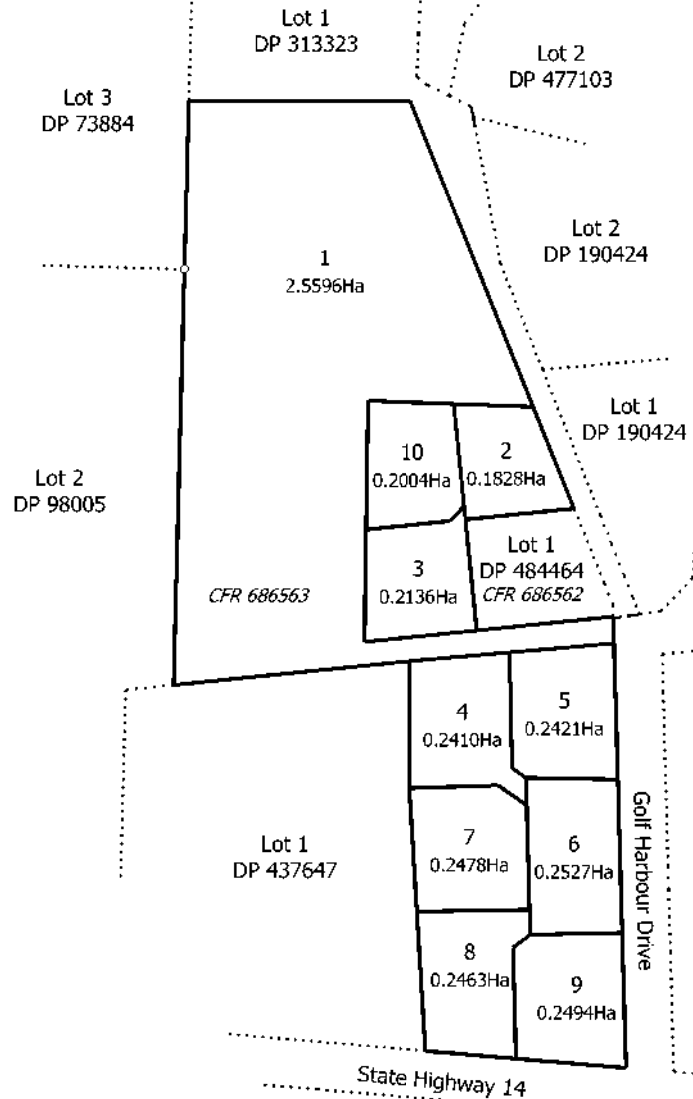
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LOT 1

LOTS 4, 5 & 6

DT 75004

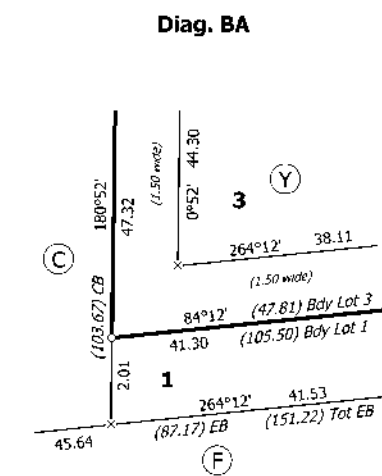
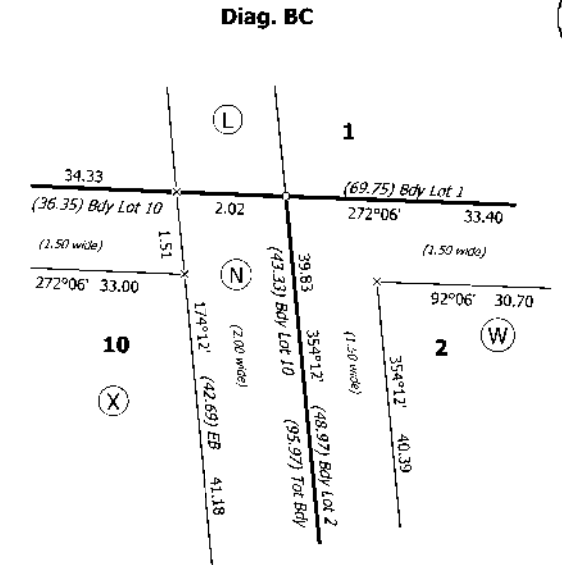
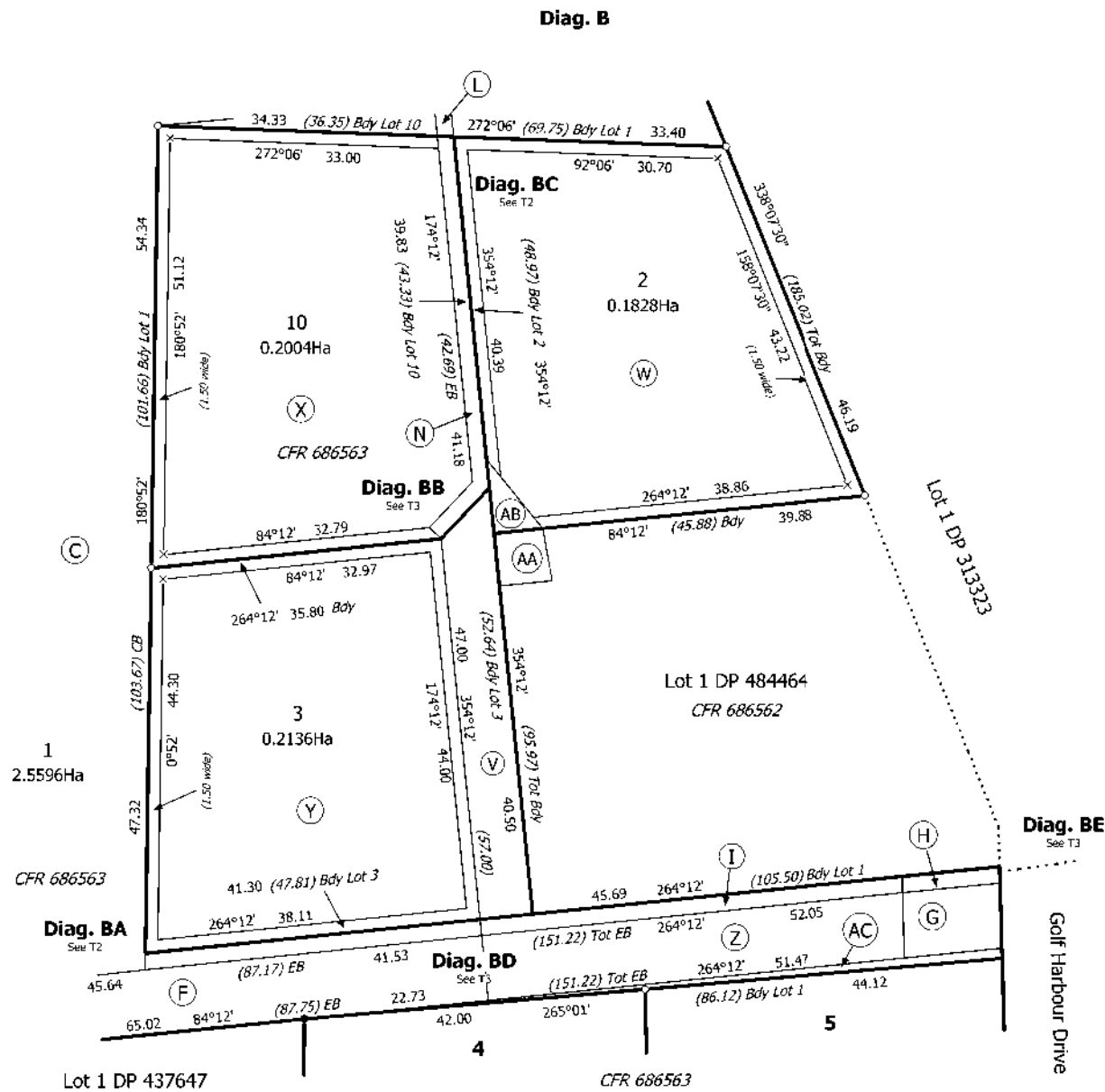
Lot 3
DP 73884

Lot 2
DP 98005

Lot 1
DP 437647

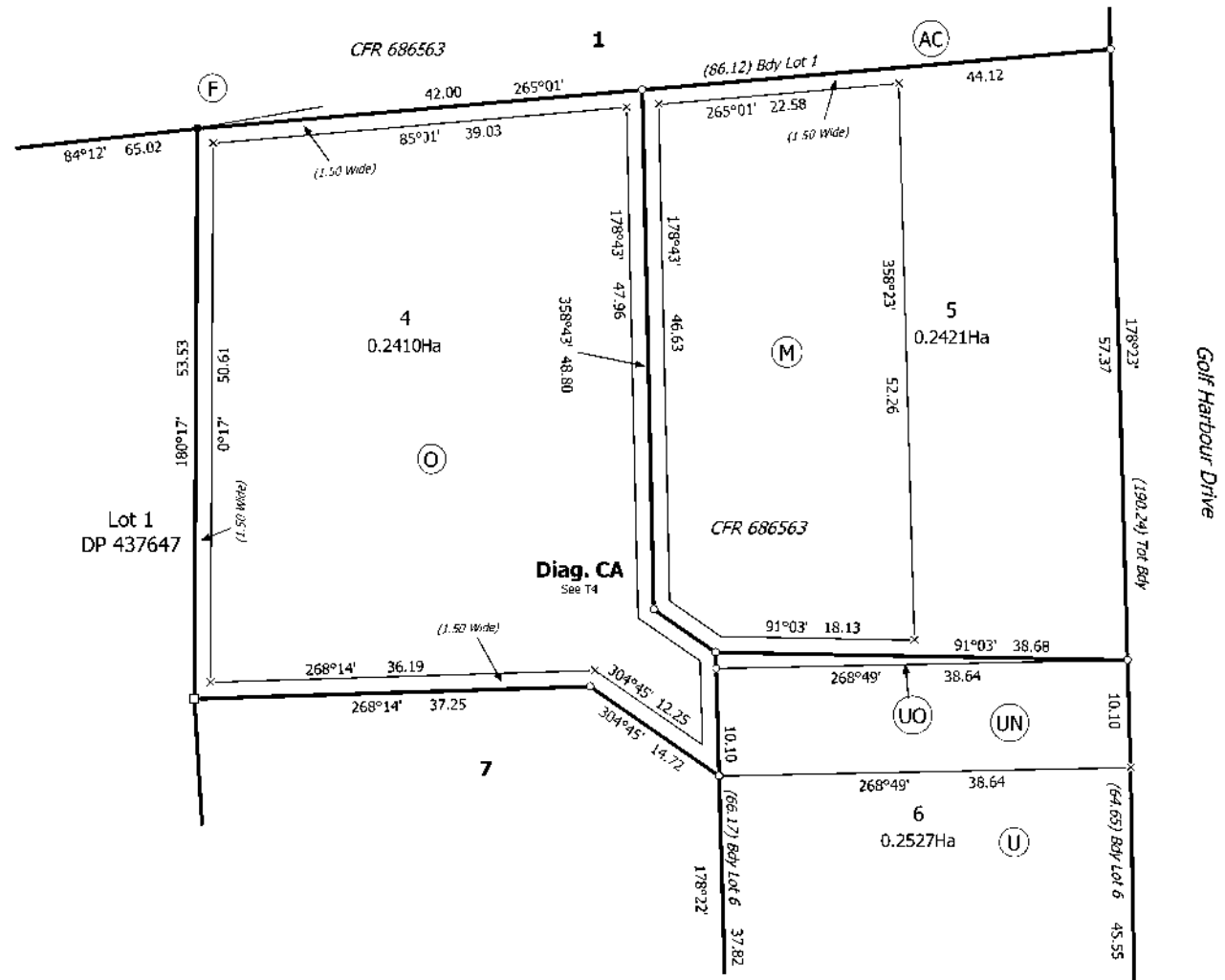
State Highway 14

T 1/8

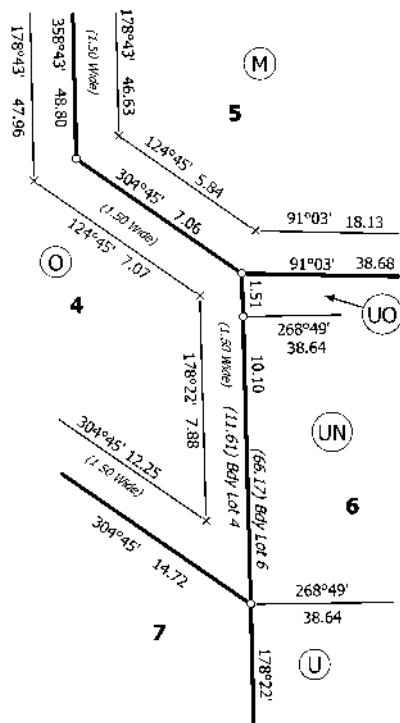




Diag. C



Diag. CA



13114 Maunu Properties Ltd Stages 1 & 2 - ah/jg

T 4/8

Land District: North Auckland

Lots 1 to 10 being a subdivision of Lot 2 DP 437647 and Lot 2 DP 484464 and
Easement over Lot 1 DP 484464

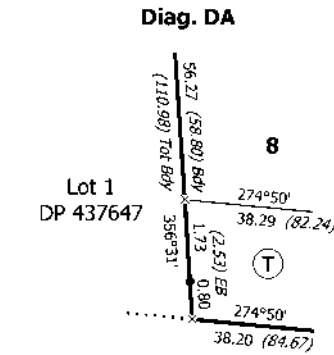
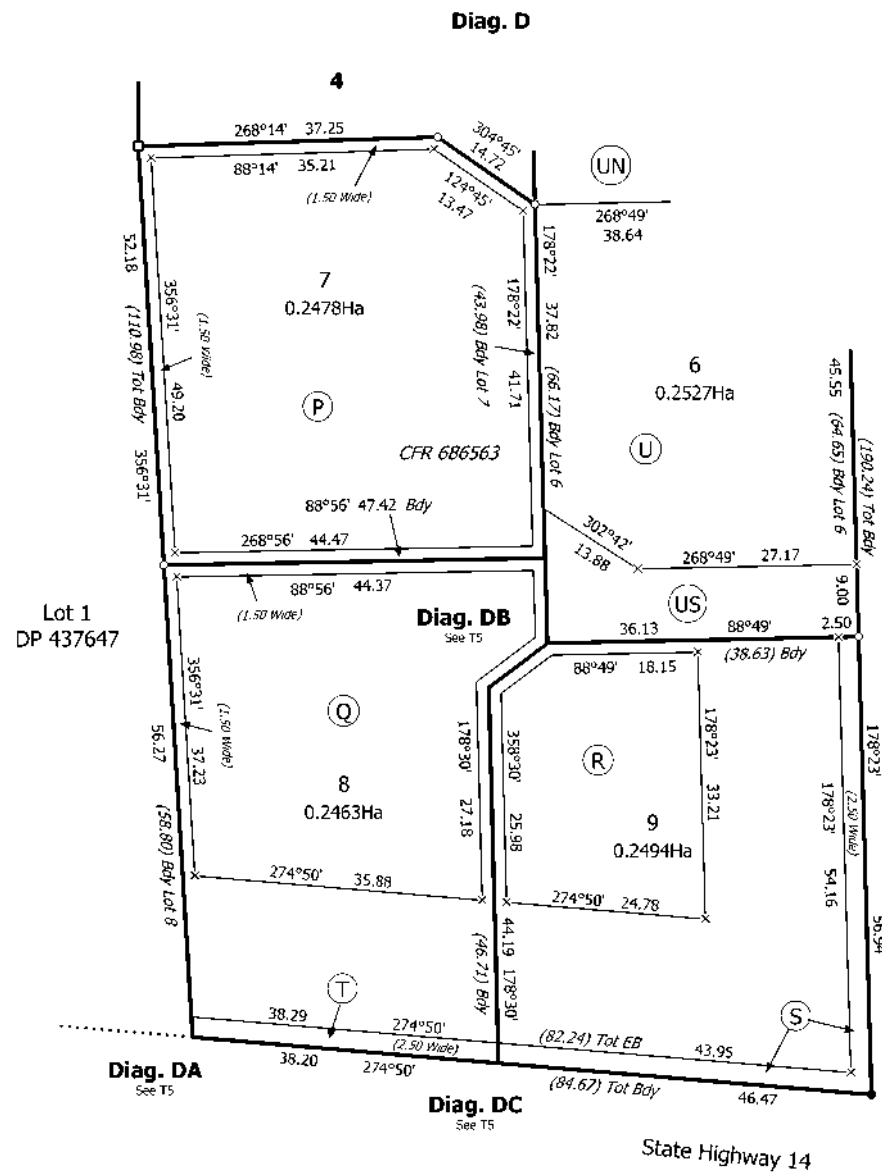
Surveyor: Phillip John Lash
Firm: Reyburn & Bryant 1999 Ltd

Title Plan
DP 498433

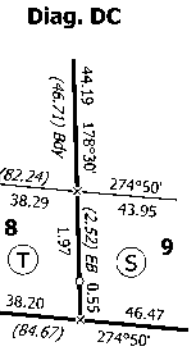
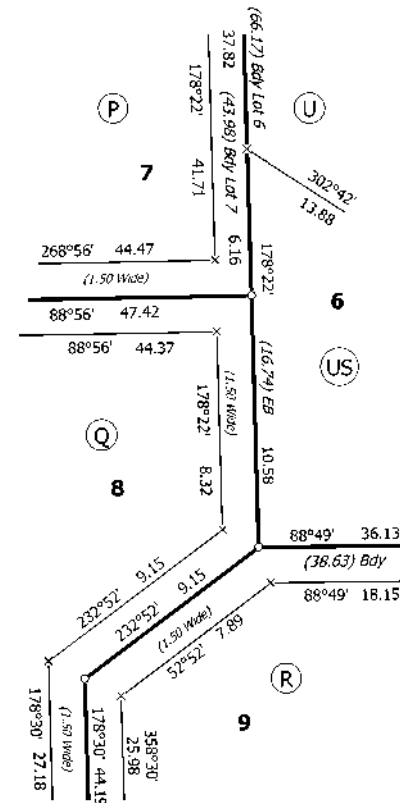
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Diag. DB



Golf Harbour Drive

13114 Maunu Properties Ltd Stages 1 & 2 ah/jg

T 5/8

Land District: North Auckland

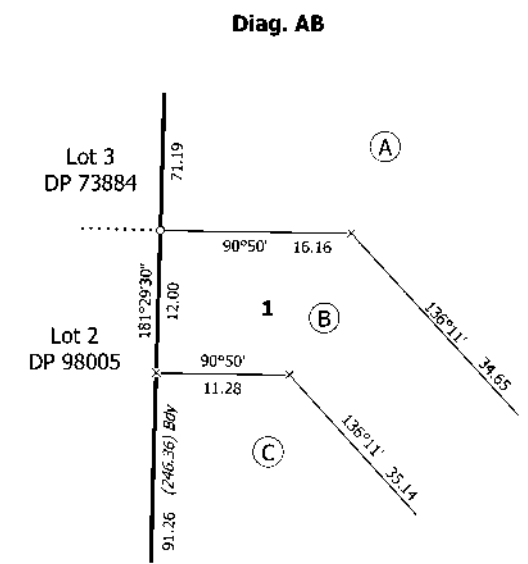
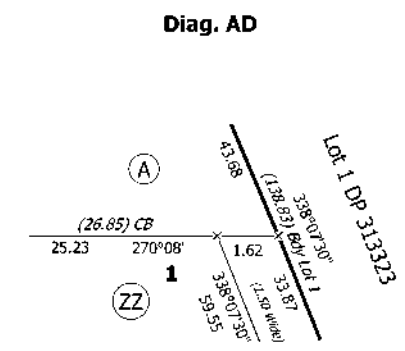
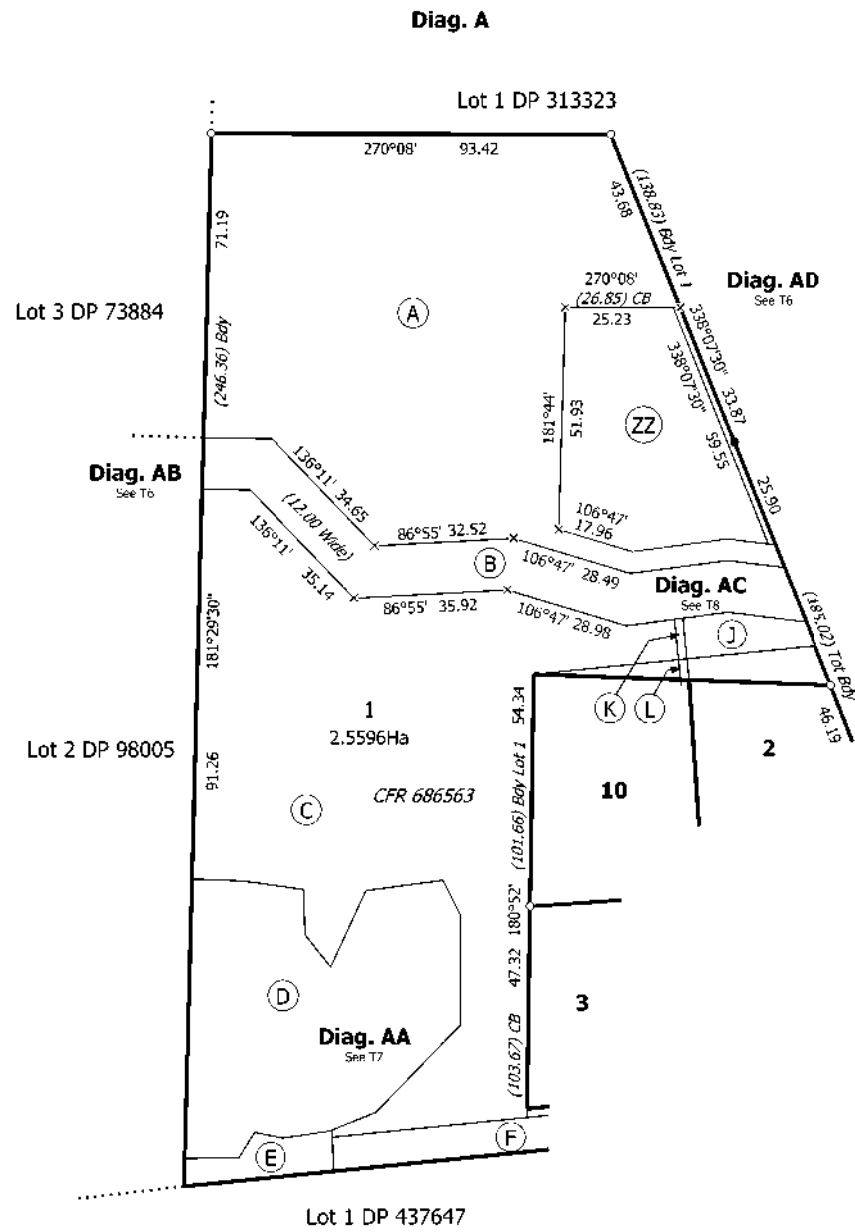
Lots 1 to 10 being a subdivision of Lot 2 DP 437647 and Lot 2 DP 484464 and Easement over Lot 1 DP 484464

Surveyor: Phillip John Lash
Firm: Reyburn & Bryant 1999 Ltd

Title Plan
DP 498433

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Generated on: 13/10/2016 1:29pm Page 13 of 16

Deposited on: 28/09/2016



13114 Manu Properties Ltd Stages 1 & 2 uh/jg

T 6/8

Land District: North Auckland Digitally Generated Plan Generated on: 13/10/2016 1:29pm Page 14 of 16	Lots 1 to 10 being a subdivision of Lot 2 DP 437647 and Lot 2 DP 484464 and Easement over Lot 1 DP 484464	Surveyor: Phillip John Lash Firm: Reyburn & Bryant 1999 Ltd	Title Plan DP 498433 Deposited on: 28/09/2016
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Generated on: 13/10/2016 1:29pm Page 16 of 16



IN THE MATTER

of a Conservation Covenant entered
into pursuant to Section 77 of the
Reserves Act 1977

WHEREAS

- A. **ERROL FRANK KEAY, ELAINE RUTH KEAY, BRIAN GILLESPIE MOYLE and GRANT LINDSAY CURRIE** ("the Covenantors") are the registered proprietors of an estate in fee simple in that piece of land comprised in Certificate of Title NA29D/421 (hereinafter called "the land").
- B. **WHANGAREI DISTRICT COUNCIL** ("the Council") is the local authority within whose district the land is situated.
- C. The Council is authorised by Section 77 of the Reserves Act 1977 ("the Act") to obtain conservation covenants in respect of private land for the purposes of managing such land so as to preserve the natural environment, or landscape amenity, or wildlife or fresh water life or marine life habitat or historical value of such land.
- D. The Covenantors have agreed to grant to the Council a conservation covenant for the purpose and intent of preserving the natural environment of the land and to satisfy a condition in this regard of the Council's consent to a subdivision as evidenced by Deposited Plan 392286 ("the plan").

NOW THEREFORE in pursuance of this authority the Covenantors HEREBY GRANT to the Council Conservation Covenants pursuant to Section 77 of the Act over an area comprising 3280 square metres more or less being that part of lot 1 on the plan as is shown marked thereon with the letter "F" (such area being hereinafter referred to as "the conservation area") to the intent that this covenant shall have effect in perpetuity or until the Council shall resolve to release this covenant.

THE Covenantors and the Council with the intent and so as to bind part Lot 1 on the plan into whosoever hands such may come mutually covenant at all times to observe and perform the respective duties and obligations imposed upon them pursuant to the provisions of the Act and any statutory amendment or re-enactment thereof or any Act or Acts passed in substitution therefore.

THE COVENANTORS COVENANT WITH THE COUNCIL :

1. TO undertake pest and weed control measures within the conservation area should the need arise including the removal of weeds identified in the Northland Regional Council publication '*Environmental Weeds, Delightful but Destructive*'. The conservation area is to be maintained predominantly free from noxious weeds.

2. TO undertake restoration and/or enhancement and/or pruning of vegetation cover in the conservation area should the need arise provided prior approval has been obtained from the Council's Parks Division.

3. THE liability of **BRIAN GILLESPIE MOYLE** and **GRANT LINDSAY CURRIE** is limited to the assets of the Trust and is not a personal liability.

IN WITNESS WHEREOF these presents have been executed this 13th day of *December* 2007

SIGNED by

ERROL FRANK KEAY,

ELAINE RUTH KEAY

and **GRANT LINDSAY CURRIE**

as Covenantors in the presence of :

K. Shirley
Karen Shirley
Legal Executive

WHANGAREI

SIGNED by

BRIAN GILLESPIE MOYLE

as Covenantors in the presence of :

G. E. Hannan
Gay Elizabeth Hannan
Receptionist
Whangarei

SIGNED for and on behalf of
WHANGAREI DISTRICT COUNCIL

by

.....
Authorised Officer
in the presence of:

Peter Dillon
Subdivision Officer
Whangarei District Council

.....
Witness to complete in BLOCK letters

Name:

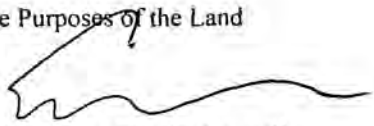
Address:

Occupation:

Julie Rowland
Legal Executive
Whangarei

CONSERVATION COVENANT

Correct for the Purposes of the Land
Transfer Act



Solicitor for Whangarei District Council

**EF & ER KEAY,
BG MOYLE & GL CURRIE**

"the Covenantors"

WHANGAREI DISTRICT COUNCIL

"the Council"

Particulars entered in the Register as shown herein
on the date and at the time endorsed below

Assistant/District Land Registrar
of the District of North Auckland

THOMSON WILSON
SOLICITORS
WHANGAREI

WDC K.172

D0709004.GJM.DOC

View Instrument Details



Instrument No 9437225.9
Status Registered
Date & Time Lodged 21 June 2013 17:24
Lodged By Wakeman, Rupert George
Instrument Type Encumbrance



Affected Computer Registers **Land District**
621727 North Auckland

Annexure Schedule: Contains 4 Pages.

Encumbrancer Certifications

I certify that I have the authority to act for the Encumbrancer and that the party has the legal capacity to authorise me to lodge this instrument ☒

I certify that I have taken reasonable steps to confirm the identity of the person who gave me authority to lodge this instrument ☒

I certify that any statutory provisions specified by the Registrar for this class of instrument have been complied with or do not apply ☒

I certify that I hold evidence showing the truth of the certifications I have given and will retain that evidence for the prescribed period ☒

Signature

Signed by Rupert George Wakeman as Encumbrancer Representative on 21/06/2013 05:20 PM

Encumbrancee Certifications

I certify that I have the authority to act for the Encumbrancee and that the party has the legal capacity to authorise me to lodge this instrument ☒

I certify that I have taken reasonable steps to confirm the identity of the person who gave me authority to lodge this instrument ☒

I certify that any statutory provisions specified by the Registrar for this class of instrument have been complied with or do not apply ☒

I certify that I hold evidence showing the truth of the certifications I have given and will retain that evidence for the prescribed period ☒

Signature

Signed by Rupert George Wakeman as Encumbrancee Representative on 21/06/2013 05:20 PM

*** End of Report ***

Encumbrance instrument
(Section 101 Land Transfer Act 1952)

2009/6232EF
APPROVED
Registrar-General of Land

Affected instrument Identifier and type (if applicable)	All/part	Area/Description of part or stratum
CFR 539646	Part	Lot 1 DP 392286

Encumbrancer

Errol Frank Keay, Elaine Ruth Keay, Brian Gillespie Moyle and Grant Lindsay Currie

Encumbrancee

Whangarei District Council

Estate or interest to be encumbered

Insert e.g. Fee simple; Leasehold in Lease No. etc.

Fee simple

Encumbrance Memorandum Number

NA

Nature of security

State whether sum of money, annuity or rentcharge and amount

Rent Charge (See Annexure Schedule)

Encumbrance

Delete words in [], as appropriate

The Encumbrancer encumbers for the benefit of the Encumbrancee the land in the above computer register(s) with the above sum of money, annuity or rentcharge, to be raised and paid in accordance with the terms set out in the [above Encumbrance Memorandum] [Annexure Schedule(s)] and so as to incorporate in this Encumbrance the terms and other provisions set out in the [above Encumbrance Memorandum] [and] [Annexure Schedule(s)] for the better securing to the Encumbrancee the payment(s) secured by this Encumbrance, and compliance by the Encumbrancer with the terms of this encumbrance.

Terms

- 1 Length of term 999 years
- 2 Payment date(s) 30 June in each year during the term of this encumbrance
- 3 Rate(s) of interest Nil
- 4 Event(s) in which the sum, annuity or rentcharge becomes payable
Upon a breach of the covenants and conditions in this encumbrance
- 5 Event(s) in which the sum, annuity or rentcharge ceases to be payable
In the event the covenants and conditions attaching to this encumbrance becoming obsolete

Covenants and conditions

Continue in Annexure Schedule(s), if required

See Annexure Schedule

Modification of statutory provisions

Continue in Annexure Schedule(s), if required

Sections 203 and 205 of the Property Law Act 2007 apply to this encumbrance but otherwise and without prejudice to the Encumbrancee's rights of action at common law as a rent chargee or Encumbrancee:

- (i) The Encumbrancee is entitled to none of the powers and remedies of encumbrancees by the Land Transfer Act 1952 and the Property Law Act 2007; and
- (ii) No covenants by the Encumbrancer or their successors in title are implied in the encumbrance other than the covenants for further assurance implied by Section 154 of the Land Transfer Act 1952.

Annexure Schedule

Page 3 of 4 Pages

2009/5043EF
APPROVED
Registrar-General of Land

Insert instrument type

Continue in additional Annexure Schedule, if required

BACKGROUND

- A. The Encumbrancer is the registered proprietor of the land comprised in CFR NA539646 ("the Land").
- B. The Council's grant of consent for the subdivision evidenced by the deposit of plan 437647 required lot 2 on DP 437647 to be amalgamated with the adjacent property being lot 1 DP 392286 ("the amalgamation covenant").
- C. The Encumbrancer has applied for and the Council has approved the cancellation of the amalgamation covenant thereby enabling separate titles to issue for first lot 2 on deposited plan 437647 and secondly lot 1 on deposited plan 392286 ("the new titles").
- D. The consent for the cancellation of the amalgamation covenant to enable the issue of the new titles was given on conditions one of which conditions required that a memorandum of encumbrance be registered on the title to the land being Lot 1 on Deposited Plan 392286 to record the restrictions and recommendations on development of such property ("Lot 1").
- E. The Encumbrancer has agreed to execute a memorandum of encumbrance in favour of the Encumbrancee to record the conditions of the consent authorising the cancellation of the amalgamation covenant.

COVENANTS

The Encumbrancer covenants that:

1. Any development of Lot 1 is to be carried out in accordance with the restrictions and recommendations identified in the Hawthorne Geddes Engineers & Architects Ltd engineering report ref: 8403 dated 30 August 2011, a copy of which is attached, unless an alternative engineering report prepared by a suitably experienced chartered professional engineer is approved in writing by the Encumbrancee.
2. The existing overland flow path on Lot 1 is to be maintained to cater for the 1% (plus 20% allowance for climate change) annual exceedance probability rainfall event flows and no modification of the existing ground profile, plantings, fencing or structures of any kind will be permitted within the overland flowpath unless a specific design has been done by a chartered professional engineer which mitigates the effects of the obstruction and is approved in writing by the Encumbrancee's Senior Environmental Engineer Officer.
(Note: Overland flow paths are to be assessed in accordance with Section 4.9 of Whangarei District Council's Environmental Engineering Standards 2010 Edition and are to be certified by an independently qualified person/chartered professional engineer.)
3. A maintenance contract for the on-site wastewater system on Lot 1 shall be in place at all times such to include inspections and maintenance of both the wastewater treatment and disposal systems.
4. Upon construction of any habitable dwelling on Lot 1 sufficient water supply for fire fighting purposes is to be provided by way of tank storage or other approved means, with this water supply be accessible by fire fighting appliances in accordance with Whangarei District Council's Environmental Engineering Standards 2010 and more particularly with the New Zealand Fire Service Fire Fighting Code of Practice SNZ PAS 4509:2008.

Annexure Schedule

Page 4 of 4 Pages

2009/5043EF
APPROVED
Registrar-General of Land

Insert instrument type

Continue in additional Annexure Schedules, if required

5. At the time of building consent for a building on Lot 1 the Encumbrancer will provide suitable evidence to illustrate that stormwater disposal across any boundaries will not exceed that which existed pre-development for storm events up to and including the 1% annual exceedance probability (+20% to accommodate for climate change).
6. The Encumbrancer will pay the costs of the preparation and registration of this encumbrance.
7. The Encumbrancer will pay to the Encumbrancee a daily rent charge in the sum of \$25.00 (such being adjusted annually by movements in the Consumer Price Index (All Groups) calculated from 1 October 2012 upon demand being made by the Encumbrancee provided always that no demand will be made if there has been no breach of this Encumbrance).
8. The Encumbrancer covenants with the Encumbrancee that the covenants in this encumbrance are of a permanent nature and the Encumbrancer shall not be entitled to a discharge of the encumbrance during the term whether by payment of the total security or otherwise.
9. The liability of the Encumbrancer under this encumbrance is limited to the obligations and liabilities accruing during the time that the Encumbrancer is the registered proprietor of Lot 1 and ceases (except for any obligation or liability which has arisen during the time as registered proprietor) upon transfer of Lot 1.
10. The liability of Brian Gillespie Moyle and Grant Lindsay Currie under this Encumbrance is not a personal liability but will be limited to the actual amount recoverable from the assets of the Michael Keay No. 2 Trust, the Colin Keay Trust, the Todd Keay Trust and the Jason Keay No. 2 Trust.

CONO 7813419.4 Consen

Cpy - 01/01, Pgs - 002, 12/06/08, 14:58



DocID: 313114452

IN THE MATTER

of the Resource Management Act 1991 ("the Act")

A N D

IN THE MATTER

of a subdivision consent as evidenced by Land Transfer Plan No. 392286

A N D

IN THE MATTER

of a Consent Notice issued pursuant to Section 221 of the Act by WHANGAREI DISTRICT COUNCIL ("the Council")

IT IS HEREBY CERTIFIED that the following conditions to be complied with on a continuing basis by the subdividing owner and subsequent owners were imposed by the Council as conditions of approval for the subdivision as effected by Land Transfer Plan No. 392286 ("the plan")

1. Horticultural activities (including spraying) take place in the vicinity and any dwelling to be constructed on Lot 1 on the plan which will utilise rainwater as a potable water supply will require a suitable water filtration system to be installed.
2. Any future purchasers of the Lots 1 and 2 on the plan are to be advised that Lots 1 and 2 on the plan share a common boundary with a golf course. *Cancelled For lot 2 DO 437647*
3. No livestock are to be kept/grazed on Lots 1 and 2 on the plan.
4. That any future subdivision of Lot 2 on the plan will require the existing access onto State Highway 14 (known as CP 98) to be permanently and physically closed. Access for any development of Lot 2 on the plan in the future is to be via Golf Harbour Drive. The closure will entail the existing crossing formation and culvert onto the state highway being removed and a fence reinstated along the property boundary.

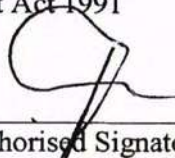
*Cancelled
by
2670377-2*

DATED at Whangarei this

29th day of November

2007

SIGNED for WHANGAREI DISTRICT COUNCIL
pursuant to the authority of the Council given pursuant
to the Local Government Act 2002 and the Resource
Management Act 1991



Authorised Signatory

IN THE MATTER of the Resource Management
Act 1991

A N D

IN THE MATTER of Consent Notice No.
7813419.4 (North Auckland
Registry) ("the consent notice")

VARIATION AND CANCELLATION OF CONSENT NOTICE

Pursuant to Section 221(3) of the Resource Management Act 1991 **WHANGAREI DISTRICT COUNCIL** on being satisfied that one condition of subdivision imposed in respect of Deposited Plan 392286 can be varied and one condition of that consent can be cancelled hereby

(1) Varies the consent notice in relation to the properties being Lots 1 and 2 on Deposited Plan 392286 in that Condition 3 of the consent notice is hereby varied to read,

3. No livestock are to be kept/grazed on lot 1 on the plan; and

(2) Cancels Condition 4 of the consent notice.

DATED at Whangarei this 30 day of November 2010.

SIGNED for and on behalf of
WHANGAREI DISTRICT COUNCIL
by

Peter Duffin
Subdivision Officer
Whangarei District Council

Authorised Officer
in the presence of:

K. Martin
Witness to complete in BLOCK letters

Name: Kate Jane Martin
Address: Whangarei District Council
Occupation: Planner

EXECUTED by ERROL FRANK KEAY,
ELAINE RUTH KEAY, BRIAN GILLESPIE
MOYLE and GRANT LINDSAY CURRIE
in the presence of:

Karen Shirley
Legal Executive
WHANGAREI



SD: 1100091 PID: 120402

Forum North, Private Bag 9023
 Whangarei 0148, New Zealand
 Telephone: +64 9 430 4200
 Facsimile: +64 9 438 7632
 Email: mailroom@wdc.govt.nz
 Website: www.wdc.govt.nz

Certified copy of Resolution

That in accordance with Section 221(3) of the Resource Management Act 1991 the Whangarei District Council hereby resolves that the **existing** condition 2 in Consent Notice registered as CONO 7813419.4 affecting CFR 539646 is hereby cancelled insofar as it relates to lot 2 DP 437647. (N/A TO PROJECT)

I, Peter Augustine Dillon, Authorised Officer of Whangarei District Council, hereby certify that the foregoing is a true and correct copy of a resolution of the Team Leader [Consents] acting under powers delegated by the Whangarei District Council pursuant to Section 34 of the Resource Management Act 1991 held on the 22nd day of December 2011.

Dated this

3rd.

day of

April

2013

A handwritten signature of Peter Dillon in black ink.

Peter Dillon
 Authorised Officer

Being subdivision for - Keay Family Trust @ Maunu

Surveyor	Reyburn & Bryant Ltd P O Box 191 WHANGAREI
Ref	12478

IN THE MATTER of the Resource Management Act
1991 ("the Act")

A N D

IN THE MATTER of a subdivision consent as
evidenced by Land Transfer Plan
No. 484464

A N D

IN THE MATTER of a Consent Notice issued
pursuant to Section 221 of the Act
by **WHANGAREI DISTRICT
COUNCIL** ("the Council")

IT IS HEREBY CERTIFIED that the following conditions to be complied with on a continuing basis by the subdividing owner and subsequent owners were imposed by the Council as conditions of approval for the subdivision as effected by Land Transfer Plan No. 484464 ("the plan")

1. Upon construction of any habitable dwelling on either Lot 1 and Lot 2 on the plan ("lots 1 and 2") sufficient water supply for fire fighting purposes is to be provided by way of tank storage or other approved means with this water supply to be accessible by fire fighting appliances in accordance with the Council's Environmental Engineering Standards 2010 and more particularly with the 'New Zealand Fire Service Fire Fighting Code of Practice SNZ PAS 4509:2008'.

Demonstration of achievement of an alternative means of compliance with this standard will be considered to satisfy this requirement but note that written approval from the New Zealand Fire Service is required.

2. Any development on lots 1 and 2 shall comply with the restrictions and recommendations identified in the Base Group Consulting engineering report reference 14032 dated 6/08/2014, a copy of which is available from the Council under reference SD1400077 on P120402, unless an alternative engineering report prepared by a suitably experienced chartered professional engineer is approved in writing by the Council.

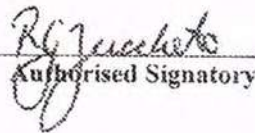
See Tim 15/95060.

- 2 -

3. At the time of application for a building consent for a building to be constructed on lot 1 on the plan suitable evidence/design is to be provided to illustrate that stormwater attenuation will be provided for all impervious surfaces to ensure compliance with Chapter 4, and more specifically Section 4.11 of the Council's Environmental Engineering Standards 2010, to the satisfaction of the Council's Senior Environmental Engineering Officer.

DATED at Whangarei this 13th day of OCTOBER 2015

SIGNED for WHANGAREI DISTRICT COUNCIL
pursuant to the authority of the Council given pursuant to
the Local Government Act 2002 and the Resource
Management Act 1991



Authorised Signatory

SUBDIVISION ASSESSMENT

GOLF HARBOUR DRIVE
WHANGAREI

For: Keay Family Trust

Ref: 14032

Date: 6 August 2014

Filename: 14032_subdivision report_050814

TABLE OF CONTENTS

1. INTRODUCTION	3
2. SITE DESCRIPTION	4
3. GEOTECHNICAL	6
3.1 Ground Investigations	6
3.2 Mapped Geology	6
3.3 Stability	7
3.4 Earthworks	7
3.5 Building foundations	8
4. WASTEWATER MANAGEMENT	9
4.1 Existing System	9
4.2 Management System	9
4.3 Site Specific Mitigation Measures	9
5. STORMWATER MANAGEMENT	11
5.1 Existing Drainage	11
5.2 Proposed Drainage	11
5.3 Flood Susceptible Areas	11
5.4 Stormwater Attenuation	12
6. ACCESS ARRANGEMENTS	14
6.1 Sight Distances	14
7. WATER SUPPLY	15
7.1 Existing System	15
7.2 Potable Water	15
7.3 Fire Fighting	15
8. SUMMARY	16
9. LIMITATIONS	17

ATTACHMENTS

APPENDIX 1: SITE PLANS

APPENDIX 2: GROUND INVESTIGATIONS

APPENDIX 3: WASTEWATER ASSESSMENT

1. INTRODUCTION

Keay Family Trust proposes to construct a two lot residential subdivision at Golf Harbour Drive, Whangarei. The subdivision site is currently held in two titles and it is proposed to undertake a subdivision and amalgamation of titles for facilitating residential development of two proposed building sites.

The proposed development includes the formation of two lots with Lot 1 being 2,000m² and positioned adjacent to Golf Harbour Drive but accessed from an existing formed ROW on the north east boundary that currently serves an existing residential dwelling. Lot 2 of the subdivision is the balance of the land and the nominated building site is located adjacent to Lot 1 but vehicle access is to be provided via an existing vehicle crossing directly from Golf Harbour Drive. Scheme plans of the proposed development are included in Appendix 1.

This report details the assessment of engineering matters relevant to the residential subdivision of the property and is intended to support Resource Consent application to Whangarei District Council (WDC) and Northland Regional Council (NRC).

This report considers the following engineering aspects of the scheme:

- The existing stability of the site
- The effect of the proposed development on stability of the site
- Geotechnical suitability for earthworks and foundations
- Access arrangements
- Natural hazards
- Stormwater management
- On-site wastewater management
- Potable water supply and fire fighting requirements

2. SITE DESCRIPTION

The site is located at Golf Harbour Drive approximately 6km west of Whangarei CBD and is positioned adjacent to State Highway 14. The legal description is Lot 1 DP 392286 and Lot 2 DP 437647 and is sized 4.88ha in total. WDC planning maps indicate that the property is located within an Urban Transition Environment and is classified as a Low Instability Hazard area. No flood susceptible areas are mapped at the subdivision site.

The property is currently used as an orchard with a majority of the site planted with avocado trees. An area of bush covenant is located on the western boundary adjacent to Sherwood Golf Course and a small area retained in pasture is located in the northeast corner of the property as visible in Figure 1 below. The property contains two farm sheds built around what was formerly a milking shed and stock yard. The timber sheds are used to house equipment and materials for use on the property and for occasional sheep management.

Vehicle access is available from Golf Harbour Drive via an existing vehicle crossing entering the site immediately adjacent to proposed Lot 1 which will form the access to proposed Lot 2. An existing formed ROW is also present along the northeast boundary, providing access to proposed Lot 1.

Figure 1 below taken from WDC GIS shows the site and surrounds including the existing vegetation, farm sheds and access arrangements.



Figure 1: WDC GIS aerial image

The site has gently rolling topography and is generally crowned in the centre, falling to the north and south. Surface water runoff from the north is discharged from the site via an existing culvert under an adjacent ROW access, while the south of the property ponds in a shallow basin adjacent to Golf Harbour Drive prior to overtopping the carriageway and draining east.

Northland Regional Council GIS maps indicate the site is being positioned within the Maunu aquifer which is classified as a semi unconfined Principal Aquifer in Taheke Basalt overlying sandstone/mudstone with a saturated thickness of 8-58m. Several water bores are mapped in proximity to the subdivision site, with one positioned within proposed Lot 2.



Figure 2: NRC GIS aerial image

3. GEOTECHNICAL

3.1 Ground Investigations

A site visit and walkover inspection of the subdivision property was carried out on 8th July 2014. On 17th July 2014 a series of shallow subsurface ground investigations were carried out consisting of two hand auger boreholes with in-situ shear vane tests and a series of six dynamic cone scala penetrometer tests.

The location of all tests within the property and results of the ground investigations are included within Appendix 2.

3.1.1 Boreholes

Two hand auger boreholes were carried out across the site, reaching only 0.6m and 0.9m before encountering rock. The boreholes revealed a general trend of moist red brown, highly plastic silty clay.

The surficial soils encountered during excavation of the boreholes were generally consistent at the two locations.

3.1.2 Shear strength

Undrained shear strengths were measured at 0.5m intervals during excavation of the hand auger boreholes to determine the in-situ shear strength properties of the surficial soils.

The results included in Appendix 2 indicate that the peak undrained shear strengths are typically 150kPa for the tests carried out. The surficial soils at the site are considered to be sensitive.

3.1.3 Scala penetrometer

A total of six dynamic cone scala penetrometer tests (SP) were undertaken within the proposed building sites to determine the available bearing capacity for foundation design. All tests were carried out from existing ground level and were taken to varying depths from 1.0m to 2.0m b.e.g.l.

SP1, 2 and 3 were carried out within proposed Lot 1 and identified a general increase in bearing resistance with depth. At normal foundation level of 0.45m b.e.g.l. an inferred allowable bearing capacity in excess of 100kPa is considered to be available.

SP4, 5 and 6 were carried out within proposed Lot 2 and identified a general increase in bearing resistance with depth. At normal foundation level of 0.45m b.e.g.l. an inferred allowable bearing capacity in excess of 100kPa is considered to be available.

3.2 Mapped Geology

The geology of the area is defined on the Institute of Geological and Nuclear Sciences Geological Map 2: Geology of the Whangarei Area as basaltic lava flows of the Kerikeri Volcanic group.

The geomorphology of the general area is that of eroded basalt flows within the Puhipuhi-Whangarei Volcanic field which usually pre-date the present topography. The distribution of volcanoes near Whangarei is partly related to the local fault pattern and has formed the young and well preserved volcanic features of shield volcanoes built up from thin lava flow

sequences, steep sided scoria cones and thick lava flows. Areas of basalt lava flows are expected to remain relatively stable unless underlain by soft rocks.

Two concealed faults are mapped in close proximity to the subdivision site with Otaika Fault to the southwest and Maunu Fault to the north. The subdivision site located on the downthrown side of the concealed Maunu fault.

New Zealand Land Inventory map NZMS 290 Sheet Q 06/07 defines the pedology as a combination of Maunu silt loam and Maunu bouldery silt loam being well to moderately well drained soils of rolling land, moderately to strongly leached red loams.

3.3 Stability

The existing topography of the site is resultant from the regional geologic events, the natural weathering and erosion processes common to a high rainfall temperate climate zone, and the underlying geological formations. The produced soil profiles have a high proportion of clay and silt components and exhibit expansive, plastic and friable properties. The flat topography of the landform has a significant influence on the stability of the site.

The geotechnical investigations show that the surficial soil profile is consistent with the geological description for the site. The Kerikeri basalt is considered to overlay a series of sedimentary lithologies including Whangarei Limestone, Ruatangata Sandstone and Kamo Coal Measures. The basement geology is greywacke sandstone. Land underlain by basalt lava flows of the Kerikeri Volcanics can be steep and are generally considered to be stable unless underlain by soft rocks. It is anticipated that at this location the thickness of the underlying Kerikeri volcanic lithology could be in the order of 20m. Water erosion and saturation of the weathered friable residual soils creating oversteepened faces has the potential to create shallow shear surfaces and slippage planes on the steeper slopes, however the site has a gentle topography and is considered stable.

Groundwater was not encountered during excavation of the boreholes but moisture content was seen to increase with depth. Given the nature of the proposed development groundwater is unlikely to present significant difficulties when developing the site.

A visual inspection of the development site did not identify any recent land instabilities and the proposed development area is considered to be safe, stable and suitable for residential subdivision.

3.4 Earthworks

Minimal earthworks will be required at the site to create suitable building platforms and vehicle access. The volcanic derived loam soils that occupy the development site tend to be friable and erosion prone. Care must be taken to ensure that all exposed bare earth is adequately protected from erosion and scour during earthworks operations. Likewise to ensure the integrity of exposed cut and fill batters consideration should be given to surface stabilisation measures such as mulching, grassing, and erosion control blankets. In the long term exposed earth areas should be regrassed and revegetated.

Any earthworks carried out at the site are to comply with relevant Northland Regional Council RWSP and Whangarei District Council EES requirements. Any earthworks carried out are to be in accordance with NZS4431:1989A1 Code Of Practice For Earth Fill For

Residential Development and all filling works are to be tested and certified by a Chartered Professional Engineer.

3.5 Building foundations

Previous testing carried out on this geological unit confirm that a liquid limit of 50% and linear shrinkage of 15% are exceeded and therefore the building sites do not meet the definition of good ground identified in the NZ Building Code. The surficial soils observed during the field investigations are considered to be expansive and are interpreted as Class M to Class H in accordance with AS2870. It is recommended that specific engineering design of all foundations for future dwellings at the site is carried out.

The scala penetrometer results included in Appendix 2 identify adequate bearing capacity for residential dwellings. It is expected that a dependable bearing capacity in excess of 150kPa will be available (an ultimate bearing capacity of 300kPa in conjunction with a strength reduction factor of 0.5).

It is anticipated that waffle raft and shallow reinforced concrete strip foundation systems will be suitable for use at the development. It is recommended that any strip or pad foundations be taken a minimum of 0.45m below finished ground level.

4. WASTEWATER MANAGEMENT

4.1 Existing System

There is currently no reticulated wastewater system available at the site and as such all wastewater generated by the proposed development will require on-site management.

4.2 Management System

Design of a specimen wastewater treatment and disposal system considered suitable for use at the site has been carried out accordance with AS/NZS 1547:2012. The system has been designed to accommodate a flow of 180 l/person/day, assuming on-site roof water tank supply is used with standard fixtures. A four bedroom dwelling is used for design purposes with a maximum occupancy of six persons. This gives a design daily flow rate of 1,080 l/day for disposal system treatment.

The soil identified during field investigations is classified as moderately structured well drained clay loam being Soil Category 4 in accordance with AS/NZS 1547:2012. For cost effectiveness and simplicity the preferred method of wastewater management is traditional septic tank achieving primary treated effluent discharging to an evapotranspiration seepage (ETS) bed system.

Where an ETS bed system is used, the primary treated effluent is piped through specially constructed beds or trenches incorporating plants. These plants absorb a proportion of the effluent through their root systems and release it to the atmosphere through their leaves during the natural process of transpiration. The ground also absorbs some of the effluent.

An ETS bed land application system has been designed based on a conservative loading rate of 12 mm/day for primary treated effluent. This requires the construction of 105m² of beds. It is recommended that 3 no. 1.75m wide x 20m long ETS beds are provided.

The septic tank should be sized 4,500 litres minimum with a suitable outlet filter fitted downstream of the outlet tee on a septic tank and which retains total suspended solids (TSS) greater than 3mm size in the tank, so preventing their carry-over into the land-application area. It is recommended that a dual chamber tank be used at the site and a dosing siphon installed to provide dose loading of the land application area, ensuring even distribution of the effluent.

The enclosed plans detail the traditional ETS bed system and provide an indication of a suitable septic tank position and location of the land application system.

4.3 Site Specific Mitigation Measures

Specific mitigation measures are recommended for use at the site and the following should be adhered to for the on-site management of wastewater:

- The system is to be constructed by a registered drainlayer familiar with the specific requirements of this type of system.
- A reserve area of 100% is to be set aside for the future extension of the land application area in accordance with NRC RWSP for primary treated effluent. The purpose of setting aside a reserve area for future extension of a land application system is to allow a factor of safety against unforeseen malfunction or failure,

perhaps following increased household occupancy or inadvertent misuse of the system. This ensures it is possible to provide additional pre-treatment or to extend the land application system if appropriate.

- The land application areas shall be mounded to shed rainwater and are to be planted with suitable high water use vegetation to aid in evapotranspiration. Surface vegetation for ETS beds/trenches shall be plants such as grasses and shrubs that tolerate wet conditions and have a high evapotranspiration capacity. Such planting should be selected on the basis of local experience.
- Dose loading of the land application area to ensure even distribution of the effluent is recommended and can be achieved by means of a dosing siphon installed in conjunction with a dual chamber septic tank.
- The septic tank shall not be sited on the slopes directly above or below the building platform. Septic tanks and the accompanying effluent disposal field should desirably be located as far offset from buildings as possible and where possible a minimum of 6 metres.
- The inlet and outlet of the septic tank shall be provided with either sliding joints or provided with one metre of corrugated flexible piping either sided of the septic tank in order to allow some ground movement to occur without breaking the pipe. Connection of the flexible pipe must develop the full longitudinal strength of the jointed pipes. The septic tank end of the corrugated pipe must be keyed into the tank wall.
- The outflow from the septic tank is to be taken away and downhill from the septic tank in sealed pipe so as to avoid any irrigated effluent draining into the septic tank excavation.
- When installing the septic tank care is to be taken to ensure that surface infiltration and any septic tank effluent cannot drain away into the surrounding soils. Septic tank construction will need to be adequate to withstand earth pressures generated by the soil materials and be able to remain intact under any anticipated creep movements.
- The disposal field should also be fenced off from stock and vehicles to prevent damage to the system.
- The ground slope at the land application area is taken as $<5.7^\circ$. The ingress of surface water into the land application area shall be controlled or prevented by means of a surface water interceptor drain constructed upslope to divert surface away from the land application area.
- A minimum clear distance of 1.0m between the beds is required and on sloping ground all beds shall be installed along the contour.
- Groundwater and surface water clearance has been confirmed to be in excess of the NRC RWSP for primary treated effluent.

5. STORMWATER MANAGEMENT

5.1 Existing Drainage

The existing site drainage is achieved by general surface runoff following the natural topography of the property. The subdivision site is effectively in two catchments with the north draining to an open channel passing through the site and the south ponding in a localized depression. The subdivision site has a catchment that extends beyond the property boundary and additional surface runoff is expected to enter the site from adjacent properties, particularly from the golf course and further west of Millington Road.

The site has a relatively flat topography and during extreme rainfall events localized flooding occurs in the low points is indicated in Figure 3 below.



Figure 3: Existing shallow ponding basin adjacent to Golf Harbour Drive

5.2 Proposed Drainage

The existing drainage system will not be altered by the formation of the subdivision and surface water runoff from the developed site will be directed to the northern drain via dispersed overland flow to replicate current flow paths as much as possible while achieving the water quantity and quality objectives of WDC EES.

All stormwater created from the newly formed impermeable surfaces should be collected and piped away from the building sites for disposal in a responsible manner to prevent erosion. Surface water runoff should not discharge above on-site wastewater disposal fields. Likewise all overflow and outlets from storage and attenuation tanks should be piped in a similar manner and provided with a level spreader outlet to ensure an acceptable rate of dispersed discharge at the boundary.

No evidence of erosion was identified at the site, however further concentration of stormwater flows and lack of vegetation post development may cause erosion of exposed areas if not protected.

5.3 Flood Susceptible Areas

Whangarei District Council and Northland Regional Council hazard maps do not indicate flood susceptible areas located in or adjacent to the proposed development.

The subdivision site accepts surface water runoff from adjacent properties (golf course) and beyond via concentrated flows following the natural contours of the land. The overland flow path in the north of the subdivision site is designated via an easement passing through the property, allowing surface water to be conveyed from west to east. The concentrated flow is piped under the formed ROW access on the northeast boundary via a DN600 culvert.

The flow restriction created by the limited capacity culvert and the flood basin in Figure 3 above are considered to be the primary source of flooding at the site. Both areas of surface water overtop the adjacent roadways and are unlikely to cause flooding at the proposed building platforms, however any new buildings at the property are required to have adequate free board above expected flood levels for the 100 yr CC ARI event. In accordance with WDC EES, for residential dwellings a freeboard of 0.5m above expected 100 yr CC ARI flood levels is required.



Figure 4: Existing drainage easement in proposed Lot 2 for conveying surface water



Figure 5: Existing drainage easement in proposed Lot 2 prior to being piped under ROW access

Assessment of the overland flow path running through the property indicates that the existing culvert has insufficient capacity to convey the 100year CC ARI flood flows which have been calculated to be $2.1\text{m}^3/\text{s}$. The ROW is likely to overtop during this extreme event with a flow depth approximately 180mm above the ROW.

The low point in Golf Harbour Drive where flood waters currently pond and overtop via sheet flow over the road is considered to have a nominal depth of 50-100mm.

New buildings within proposed Lots 1 & 2 should be constructed with a FFL of RL 65.68m to ensure adequate freeboard in accordance with WDC EES requirements. From site inspection the existing levels at the proposed building sites are considered to be adequately elevated above the anticipated flood levels with adequate freeboard, however these should be verified at Building Consent stage.

5.4 Stormwater Attenuation

Where there is an increase in impervious areas (roofs, hard standing and driveways) as a result of development, Whangarei District Council may require attenuation of stormwater runoff.

Proposed Lot 1 is $2,000\text{m}^2$ and runoff from the developed site is to be less than 80% of the existing site including an allowance of 20% for climate change for a 100 year rainfall event. The most convenient means to achieve this is to collect roof runoff from the new buildings

and direct to an on-site storage tank. When the storage tank is full the overflow is discharged to an attenuation tank where it is released at a slower rate to the downstream stormwater drainage system. This method can also be used to compensate for other impervious surfaces which cannot be readily collected and attenuated (i.e. driveways, paved areas, paths). Allowing for a 300m² roof area it is likely that attenuation storage between 15-20m³ will be required.

Proposed Lot 2 is greater than 1.0ha, however if the development creates more than 5% impervious area (2,340m²) then attenuation will be required.

Specific design of stormwater attenuation will be required at building consent stage when household units are constructed on the proposed lots. Stormwater attenuation design shall be in accordance with WDC Environmental Engineering Standards 2010.

6. ACCESS ARRANGEMENTS

An existing unsealed gravel vehicle access available at gentle grades is present from Golf Harbour Drive, immediately south of proposed Lot 1. This existing vehicle access will serve Lot 2 and is an existing easement (Easement H on the site plan enclosed in Appendix 1).

Vehicle access to Lot 1 will be obtained from the formed ROW adjacent to the north eastern boundary, via proposed easement I on the site plan enclosed in Appendix 1. The new crossing is available at gentle grades and minor works will be required.

6.1 Sight Distances

Golf Harbour Drive is defined as a Local Road in the District Plan which recommends a minimum sight distance of 30m for low volume crossings in a 40km/h operating environment. Golf Harbour Drive contains a sharp bend at the entrance to the subdivision site, with lane separation provided by a rock wall as visible in Figure 6 below. Given the proximity of the Lot 2 vehicle crossing and Lot 1 ROW access to the sharp bends in the road, the operating speeds of vehicles are considered to be low.

Visibility from the vehicle crossing and ROW to the east is limited by the present of the rock wall in Figure 6. A sight distance of 30m is considered available from the Lot 2 vehicle crossing and 20m from the existing ROW serving and existing dwelling and proposed Lot 1. To the south along Golf Harbour Drive visibility is unrestricted back to SH14 and a sight distance in excess of 150m will be available.



Figure 6: View of Golf Harbour Drive from Lot 2 vehicle crossing and ROW access

7. WATER SUPPLY

7.1 Existing System

At present there is no reticulated water supply at the development site and it is not expected that the reticulated supply will be made available in the near future.

7.2 Potable Water

It is considered that the most convenient method of potable water supply for new households is by means of individual household on-site rainwater harvesting which is the source of drinking water for a large part of New Zealand's rural population. The use of rainwater harvesting has the added benefit of contributing to stormwater retention and minimising the impact of post development stormwater runoff. This can provide significant benefits to the design and operation of downstream stormwater systems.

However, rainwater harvesting is not without problems and during periods of high water use and low rainfall, supply problems can be experienced.

It is important to ensure that the rainwater tanks are sized correctly to suit the household needs. Generally, the larger the tank, the more reliable and effective it is in conserving water or managing stormwater. The water tank size will depend on the volume of water needed, the amount of rainfall in the area, the area of the collection surface, and the security of the supply needed. The sizing of rainwater tanks will be household specific, but based on ARC guidelines one 25m³ tank may be suitable where rainwater harvesting is the only water supply to the home.

The viability of bore water supply at the site has not been specifically investigated though it is considered possible as the subdivision is positioned over a mapped aquifer and there are several existing bores in the surrounding area.

7.3 Fire Fighting

In the absence of a reticulated network at the subdivision site, fire fighting water supply will be provided by means of dedicated on-site storage tanks.

The SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice is a guideline only for fire fighting in a rural district and does not pose compliance requirements. However it is recommended that a dedicated water supply for fire fighting be provided as part of the development and current guidelines recommend 45m³ designated fire fighting storage volume within 90m of a dwelling or this can be reduced to 7m³ with an approved sprinkler system installed. 45m³ can be provided by means of two traditional concrete 25m³ tanks linked and provided with an appropriate fire service outlet coupling. Appropriate couplings or tank manhole access are to be more than 6m from a combustible source.

8. SUMMARY

Keay Family Trust proposes to construct a two lot residential subdivision at Golf Harbour Drive, Whangarei.

The site is considered to be safe, stable and suitable for the proposed development. A dependable bearing capacity in excess of 150kPa is considered to be available for design of new house foundations and waffle raft or shallow reinforced concrete strip foundation systems will be suitable for use. The surficial soils are considered to be expansive and are interpreted as Class M to Class H in accordance with AS2870. It is recommended that specific engineering design of all foundations for future dwellings at the site is carried out.

The site is considered suitable for construction of a new primary treatment system draining to an ETS bed land application area. For a four bedroom house a 4,500 litre septic tank draining to 3 x 1.75m wide x 20m long ETS beds is considered suitable for use. It is recommended that a dual chamber tank be used at the site and a dosing siphon installed to provide dose loading of the land application area, ensuring even distribution of the effluent. Specific design of an on-site system will be required at the time of Building Consent.

Lot 1 of the proposed subdivision will require on-site stormwater attenuation for any new houses constructed on the property. Lot 2 is in excess of 1ha and attenuation is unlikely to be required. Two sources of flooding are identified at the property and the building platforms identified within Lots 1 & 2 are considered to be adequately elevated above anticipated flood levels. The exact levels should be confirmed at Building Consent stage to confirm achieve adequate freeboard above the 100 yr CC ARI events identified in this assessment.

Access to the subdivision can be formed at gentle grades with an existing vehicle crossing to be utilised for access to Lot 2. Lot 1 will be accessed via an existing formed ROW on the north eastern boundary. Sight distances at the existing formed ROW and vehicle crossing are limited by the presence of a rock wall within the Golf Harbour Drive carriageway but the operating speeds of vehicles at this location are low given the road geometry.

Individual households will utilise rainwater harvesting to source water for household consumption. Dedicated tanks permanently filled with water will be required within the subdivision to meet the fire fighting storage volume.

9. LIMITATIONS

This report has been prepared for the benefit of Keay Family Trust as our client with respect to residential subdivision at Golf Harbour Drive, Whangarei and for Whangarei District Council approval. No liability is accepted by Base Group Consulting where other parties rely on the information or opinions contained in this report and any other person who relies upon any matter contained in this report does so entirely at their own risk. Any recommendations, opinions, or guidance provided by Base Group Consulting in this report are limited to technical engineering requirements and are not made under the Financial Advisers Act 2008.

Base Group Consulting have performed the services for this site assessment in accordance with the standard agreement for consulting services and current professional standards. No guarantees are either expressed or implied.



A S MacPherson
Chartered Professional Engineer
BE Civil (Hons), CPEng, MIPENZ, IntPE(NZ)

Ref: 14032 Filename: 14032_subdivision report_050814

Subdivision Assessment
Golf Harbour Drive, Whangarei

APPENDIX 1: SITE PLANS

LOCATION OF EXISTING FORMED ROW ACCESS
AND PROPOSED ACCESS TO LOT 1.

EXISTING OVERLAND FLOW PATH WITH
DESIGNATED COVENANT FOR CONVEYANCE OF
SURFACE WATER RUNOFF FROM ADJACENT
GOLF COURSE THROUGH PROPERTY. OPEN
CHANNEL / SWALE DISCHARGES UNDER
FORMED ROW ACCESS VIA DN600 CULVERT

EXISTING FARM SHEDS AND CATTLE YARDS
WITHIN PROPOSED LOT 2.

EXISTING BUSH COVENANT AREA

LOCATION OF EXISTING VEHICLE CROSSING
FROM GOLF HARBOUR DRIVE AND PROPOSED
ACCESS FOR LOT 2

LOCATION OF SHALLOW FLOODING BASIN
WITHIN PROPOSED LOT 2 WITH SURFACE
FLOW CONSTRAINED BY GOLF HARBOUR DRIVE
CARRIAGEWAY. FLOOD WATERS OVERTOP
CARRIAGEWAY AND DRAIN VIA ADJACENT ROW
ACCESS.

PROPOSED LOT 2
3.1932ha

PROPOSED
LOT 1
0.2ha

GOLF HARBOUR DRIVE

STATE HIGHWAY 14

STATE HIGHWAY 14

20 0 20 40 60 80 100 120 140
SCALE 1:2000



Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME

- PROPERTY BOUNDARY
- INDICATIVE BUILDING SITES
- EXISTING BUILDINGS
- SCALE PENETROMETER TEST
- HAND AUGER BOREHOLE
- LOCAL FLOODING BASIN WITHIN PROPOSED LOT 2

Rev	Description	Date	App
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CONSENT

KEY FAMILY TRUST
SUBDIVISION SUITABILITY
GOLF HARBOUR DRIVE, MAUNU

BASE GROUP
CONSULTING
Chartered Professional Engineers

PO Box 1032, Whangarei 0140, New Zealand
P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz

SITE LOCATION PLAN

Scale	Date	Drawn	Checked
1:2,000 @ A3	5 AUG 2014	AM	

Drawing No: 14032/C1

LOCATION OF EXISTING FORMED ROW ACCESS AND PROPOSED ACCESS TO LOT 1.

EXISTING OVERLAND FLOW PATH WITH DESIGNATED COVENANT FOR CONVEYANCE OF SURFACE WATER RUNOFF FROM ADJACENT GOLF COURSE THROUGH PROPERTY. OPEN CHANNEL / SWALE DISCHARGES UNDER FORMED ROW ACCESS VIA DN600 CULVERT

EXISTING FARM SHEDS AND CATTLE YARDS WITHIN PROPOSED LOT 2.

LOCATION OF PROPOSED LOT 2 BUILDING ENVELOPE SHOWN AS 14m x 14m.

PROPOSED ETS BED LAND APPLICATION SYSTEM WITH 3 NO. 1.7m WIDE x 20m LONG TRENCHES FOR USE WITH PRIMARY TREATED WASTEWATER. 100% RESERVE AREA SHOWN AS 145m². THE RESERVE AREA ALLOWS A FACTOR OF SAFETY AGAINST UNFORESEEN MALFUNCTION OR FAILURE, PERHAPS FOLLOWING INCREASED OCCUPANCY OR INADVERTENT MISUSE OF THE SYSTEM. PROPOSED LAND APPLICATION AREA WITH >20m OFFSET FROM OLPF TO MEET NRC RWSP REQUIREMENTS FOR PRIMARY TREATED EFFLUENT.

LOCATION OF PROPOSED LOT 1 BUILDING ENVELOPE SHOWN AS 14m x 14m.

PROPOSED ETS BED LAND APPLICATION SYSTEM WITH 3 NO. 1.7m WIDE x 20m LONG TRENCHES FOR USE WITH PRIMARY TREATED WASTEWATER. 100% RESERVE AREA SHOWN AS 145m². THE RESERVE AREA ALLOWS A FACTOR OF SAFETY AGAINST UNFORESEEN MALFUNCTION OR FAILURE, PERHAPS FOLLOWING INCREASED OCCUPANCY OR INADVERTENT MISUSE OF THE SYSTEM.

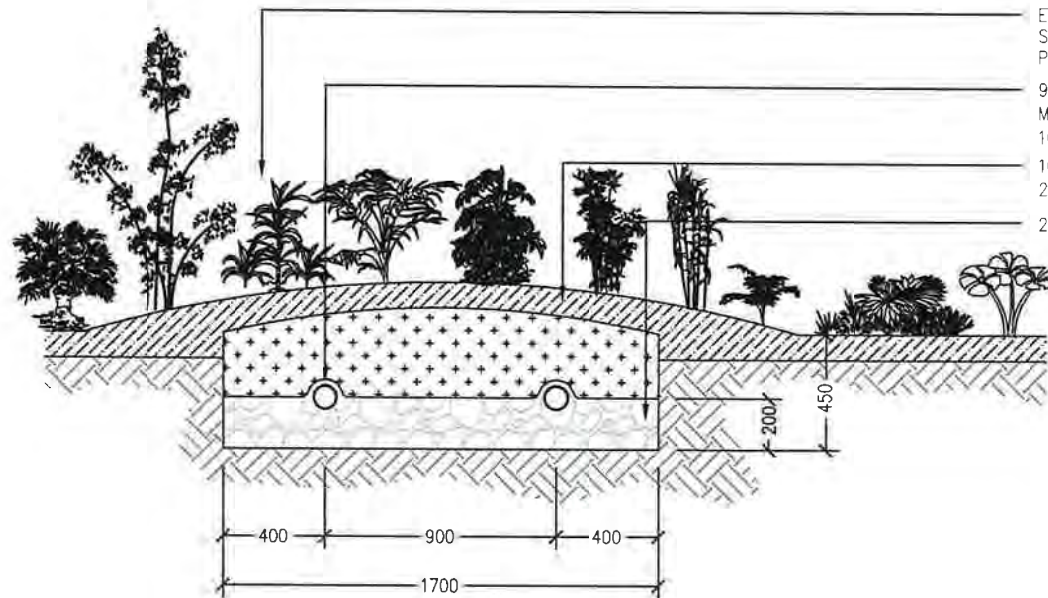
LOCATION OF EXISTING VEHICLE CROSSING FROM GOLF HARBOUR DRIVE AND PROPOSED ACCESS FOR LOT 2



Notes			
1. THIS DRAWING IS NOT TO BE SCALED.			
2. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME			
3. PROPOSED PRIMARY TREATMENT SYSTEM CONSISTING OF 4,500 LITRE DUAL CHAMBER SEPTIC TANK FITTED WITH SUITABLE OUTLET FILTER. SEPTIC TANKS TO DISCHARGE TO LAND APPLICATION AREA VIA SIPHON DOSE LOADING TO ENSURE EVEN DISTRIBUTION OF EFFLUENT WITHIN ALL TRENCHES.			

	PROPERTY BOUNDARY
	INDICATIVE BUILDING SITES
	EXISTING BUILDINGS
	SCALE PENETROMETER TEST
	HAND AUGER BOREHOLE
	ON-SITE ETS BED LAND APPLICATION SYSTEM

Rev	Description	Date	App
CONSENT			
KEYAY FAMILY TRUST SUBDIVISION SUITABILITY GOLF HARBOUR DRIVE, MAUNU			
BASE GROUP CONSULTING Chartered Professional Engineers PO Box 1022, Whangarei 010, New Zealand P 01 837 3412 E info@basegroup.co.nz www.basegroup.co.nz			
SITE PLAN			
Scale: 1:1,000 @ A3	Date: 5 AUG 2014	Drawn: AM	Checked:
Drawing No.: 14032/C2		Rev:	



- ETS PLANTING TO MOUNDED BED AND 1M DOWN SLOPE OF ETS BED. REFER TO NRC FOR SUITABLE PLANT SPECIES
- 90mm DIA PERFORATED PVC DISTRIBUTION PIPE WITH MIN 2% PERFORATION (20mm DIA DRILL HOLES @ 100mm CRS)
- 100mm MIN TOPSOIL THICKNESS OVER BED ON 200mm OF SAND (0.5-1mm) OR PAP7
- 200mm 6/25 NO FINES DISTRIBUTION AGGREGATE

0.2 0 0.2 0.4 0.6
SCALE 1:10

GENERAL NOTES:

GENERAL - THIS SECTION RELATES TO THE INSTALLATION AND MANAGEMENT OF ON-SITE DOMESTIC WASTEWATER TREATMENT SYSTEMS INCLUDING SEPTIC TANK SYSTEMS

OPERATION AND MAINTENANCE - PROVIDE TO THE OWNER AND REGULATORY AUTHORITY, SPECIFIC O & M GUIDELINES FOR THE ON-SITE SYSTEM AS DESIGNED AND INSTALLED. REFER TO AS/NZS 1547 FOR BASIC TECHNICAL INFORMATION COVERING OPERATION, MAINTENANCE AND MONITORING OF ON-SITE DOMESTIC WASTEWATER SYSTEMS

DESIGN - SPECIFIC DESIGN OF WASTEWATER TREATMENT SYSTEM HAS BEEN CARRIED OUT BY BASE GROUP CONSULTING.

STRUCTURE - CONSTRUCT FROM DURABLE MATERIALS, TO BE WATERTIGHT, IMPERVIOUS TO CONTAMINATION FROM WASTE CONTAINED WITHIN AND FROM GROUNDWATER, BE CAPABLE OF WITHSTANDING VERTICAL, LATERAL AND UPLIFT LOADS, PREVENT DIRECT FLOW OF WASTEWATER BETWEEN INLET AND OUTLET, AVOID FOUL AIR AND GASES AND PROVIDE ACCESS FOR THE REMOVAL OF WASTE CONTENTS.

QUALIFICATIONS - WORK TO BE CARRIED OUT BY TRADESMEN EXPERIENCED, COMPETENT AND FAMILIAR WITH THE MATERIALS AND TECHNIQUES SPECIFIED.

INSTALLATION CERTIFICATION - CERTIFY THE INSTALLATION TO AS/NZS 1547 AND NZBC G13/VM4. THE CERTIFICATE TO BE ISSUED TO AND HELD BY THE REGULATORY AUTHORITY.

SEPTIC TANK - TANK CONSTRUCTION TO AS/NZS 1546.1 TO HAVE MANUFACTURERS NAME AND OTHER REQUIRED INFORMATION AS PER AS/NZS 1546.1, 4. MARKING. CAPACITY OF SYSTEM FOR THE INTENDED INSTALLATION TO AS/NZS 1547 APPENDIX J. SEPTIC TANK TO HAVE 4,500 LITRE CAPACITY TO AS/NZS 1547. IT IS RECOMMENDED THAT A DUAL CHAMBER TANK BE USED AT THE SITE AND A DOSING SIPHON INSTALLED TO PROVIDE DOSE LOADING OF THE LAND APPLICATION AREA, ENSURING EVEN DISTRIBUTION OF THE EFFLUENT.

EFFLUENT FILTER - PROPRIETARY SEPTIC TANK EFFLUENT FILTER INSTALLED EITHER IN THE TANK OR OUTLET PIPE.

UPVC PIPES AND FITTINGS - UNPLASTICISED PVC PIPE AND FITTINGS TO AS/NZS 1260.

POLYETHYLENE PIPES AND FITTINGS - HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS TO AS/NZS 4130. PERFORATED PIPE FOR DISPERSAL IN LAND APPLICATION AREAS TO AS 2439 PART 2.

- BEDDING, SURROUND AND FILLING MATERIALS -
 - GRANULAR: CLEAN GRAVEL OR CRUSHED STONE OR A BLEND OF THESE. PARTICLE SIZE FROM MINIMUM 7MM TO MAXIMUM 20MM
 - SELECTED: FINE GRAIN SOIL OR GRANULAR MATERIAL SUITABLE FOR BEDDING AND EXCLUDING TOPSOIL, ORGANIC MATTER AND RUBBISH.
 - ORDINARY: TOP SOIL OR OTHER EXCAVATED MATERIALS EXCLUDING ORGANIC MATTER AND RUBBISH.

EXCAVATION - OPEN NOT MORE THAN 120 METRES OF TRENCH AT ANY ONE TIME. EXCAVATED TRENCH TO A MINIMUM WIDTH OF PIPE DIAMETER PLUS 300MM. DO NOT BATTER OR CUT THE TRENCH WIDER ABOVE THE TOP OF THE PIPE. FOR DEEP EXCAVATION, TRENCH WIDTH TO BE SUFFICIENT TO PROVIDE SAFE ACCESS AND TO ACCOMMODATE SHORING TO OSH REQUIREMENTS. WIDTH OF BOTTOM OF TRENCH UP TO 300MM ABOVE TOP OF PIPE TO BE PIPE DIAMETER PLUS 300MM. MAINTAIN FREE OF WATER AND FREE OF ALL FALLING MATERIAL TO NZBC G13/AS2, 5.6. PROXIMITY OF TRENCH TO BUILDING, WHEN BUILDINGS CONSTRUCTED TO NZS 3604 OR NZS 4229

BEDDING - PLACE TO NZBC G13/AS2, 5.0 INSTALLATION, FIGURE 7, BEDDING AND BACKFILLING, USING COMPACTED GRANULAR MATERIAL TO AVOID DIFFERENTIAL SETTLEMENT AND TO OBTAIN LONGITUDINAL SUPPORT OF THE PIPE

SURROUND AND BACKFILL - PLACE TO NZBC G13/AS2, FIGURE 7 BEDDING AND BACKFILLING, USING COMPACTED GRANULAR MATERIAL AND COMPACTED FILL. COMPACT IN LAYERS NOT EXCEEDING 100MM.

SETTING OUT - POSITION ON SITE WASTEWATER TREATMENT SYSTEM TO COMPLY WITH TERRITORIAL AUTHORITY APPROVAL. USE STRING LINE, BONING ROD OR LASER EQUIPMENT METHODS. USE SURVEYING AND LEVELLING EQUIPMENT TO ACCURATELY SET OUT DESIGN INVERT LEVELS.

LAYING AND JOINTING - LAY IN STRAIGHT LINES BETWEEN CHANGES OF LINE OR GRADE FROM THE LOWER END OF THE DRAIN WITH SOCKETS POINTING UPHILL. SET EACH PIPE TRUE TO LINE AND GRADE AND EACH JOINT COMPLETED BEFORE THE NEXT PIPE IS LAID. CAP ENDS OF UNCOMPLETED RUNS EACH DAY TO PREVENT ENTRY OF FOREIGN MATTER. TEST DRAINS AND BACKFILL PROGRESSIVELY TO MINIMISE SITE DISRUPTION. CONCRETE CAP TRENCHES TO DRAINS WITH LESS THAN 375MM COVER.

LAYING FOUL WATER DRAINS - LAY THE DRAINAGE SYSTEM FROM SOIL STACKS AND GULLY TRAPS, INCLUDING ACCESS CHAMBERS, INSPECTION CHAMBERS, BENDS, JUNCTION INSPECTIONS, BUCHAN TRAPS AND VENTS (FRESH AIR INLETS). DISCHARGE INTO THE NETWORK UTILITY OPERATOR FOUL WATER SYSTEM TO THEIR REQUIREMENTS.

DIFFERENTIAL SETTLEMENT - PROVIDE FLEXIBLE JOINTING, BEDDING AND SURROUNDING OF PIPES AT JUNCTIONS WITH MANHOLES, FOUNDATION WALLS AND OTHER POINTS WHERE DIFFERENTIAL SETTLEMENT MAY OCCUR.

INSTALL SEPTIC TANK - INSTALL TO MANUFACTURER'S REQUIREMENTS. IN SITUATIONS WHEN FLOTATION DUE TO HYDROSTATIC UPLIFT FROM A HIGH WATER TABLE IS POSSIBLE, ANCHOR THE SEPTIC TANK TO MANUFACTURER'S INSTRUCTIONS. CONNECT TO PIPE SYSTEMS.

LAND APPLICATION SYSTEM - SEPTIC TANK DISPERSAL METHOD FOR LAND APPLICATION SYSTEM TO BE VIA EVAPOTRANSPIRATION SEEPAGE (ETS) BEDS. CARRY OUT INSTALLATION OF SYSTEM TO COMPLY WITH THE SPECIFIC DESIGN REQUIREMENTS AND TO AS/NZS 1547. IT IS RECOMMENDED THAT A DOSING SIPHON BE INSTALLED TO PROVIDE DOSE LOADING OF THE LAND APPLICATION AREA, ENSURING EVEN DISTRIBUTION OF THE EFFLUENT.

Notes																																			
1.	THIS DRAWING IS NOT TO BE SCALED.																																		
2.	THE SYSTEM IS TO BE CONSTRUCTED BY A REGISTERED DRAINLAYER FAMILIAR WITH THE SPECIFIC REQUIREMENTS OF THIS TYPE OF SYSTEM.																																		
3.	A RESERVE AREA OF 100% IS TO BE SET ASIDE FOR THE FUTURE EXTENSION OF THE LAND APPLICATION AREA IN ACCORDANCE WITH NRC RWSP FOR PRIMARY TREATED EFFLUENT.																																		
4.	THE LAND APPLICATION AREAS SHALL BE MOUNDED TO SHED RAINWATER AND ARE TO BE PLANTED WITH SUITABLE HIGH WATER USE VEGETATION TO AID IN EVAPOTRANSPIRATION.																																		
5.	DOSE LOADING OF THE LAND APPLICATION AREA TO ENSURE EVEN DISTRIBUTION OF THE EFFLUENT IS RECOMMENDED AND CAN BE ACHIEVED BY MEANS OF A DOSING SIPHON INSTALLED IN CONJUNCTION WITH A DUAL CHAMBER SEPTIC TANK.																																		
6.	THE SEPTIC TANK SHALL NOT BE SITED ON THE SLOPES DIRECTLY BELOW THE BUILDING PLATFORM AND SHALL BE A MINIMUM OF 6 METRES FROM THE HOUSE.																																		
7.	THE DISPOSAL FIELD SHOULD ALSO BE FENCED OFF FROM STOCK AND VEHICLES TO PREVENT DAMAGE TO THE SYSTEM.																																		
8.	THE GROUND SLOPE AT THE LAND APPLICATION AREA IS TAKEN AS <5.7%. THE INGRESS OF SURFACE WATER INTO THE LAND APPLICATION AREA SHALL BE CONTROLLED OR PREVENTED BY MEANS OF A SURFACE WATER INTERCEPTOR DRAIN CONSTRUCTED UPSLOPE TO DIVERT SURFACE AWAY FROM THE LAND APPLICATION AREA.																																		
9.	MINIMUM CLEAR DISTANCE OF 1.0M BETWEEN THE BEDS IS REQUIRED AND ON SLOPING GROUND ALL BEDS SHALL BE INSTALLED ALONG THE CONTOUR.																																		
10.	GROUNDWATER AND SURFACE WATER CLEARANCE HAS BEEN CONFIRMED TO BE IN EXCESS OF THE NRC RWSP FOR PRIMARY TREATED EFFLUENT.																																		
<table border="1"> <thead> <tr> <th>Rev</th> <th>Description</th> <th>Date</th> <th>App</th> </tr> </thead> <tbody> <tr> <td colspan="4" style="text-align: center;">CONSENT</td> </tr> <tr> <td colspan="4" style="text-align: center;">KEYAY FAMILY TRUST SUBDIVISION SUITABILITY GOLF HARBOUR DRIVE, MAUNU</td> </tr> <tr> <td colspan="4" style="text-align: center;">  BASE GROUP CONSULTING Chartered Professional Engineers PO Box 1032, Wiriwiri, 0140, New Zealand P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz </td> </tr> <tr> <td colspan="4" style="text-align: center;">GENERAL NOTES AND ETS BED DETAIL</td> </tr> <tr> <td>Scale:</td> <td>1:10 @ A3</td> <td>Date:</td> <td>5 AUG 2014</td> </tr> <tr> <td>Drawing No:</td> <td>14032/C3</td> <td>Drawn:</td> <td>AM</td> </tr> <tr> <td></td> <td></td> <td>Check:</td> <td></td> </tr> </tbody> </table>				Rev	Description	Date	App	CONSENT				KEYAY FAMILY TRUST SUBDIVISION SUITABILITY GOLF HARBOUR DRIVE, MAUNU				 BASE GROUP CONSULTING Chartered Professional Engineers PO Box 1032, Wiriwiri, 0140, New Zealand P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz				GENERAL NOTES AND ETS BED DETAIL				Scale:	1:10 @ A3	Date:	5 AUG 2014	Drawing No:	14032/C3	Drawn:	AM			Check:	
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Job # 8288-009
Report # 14-716
Page # 10 of 10
Ref # 14032
Date Tested: 17-7-2014

Ref: 14032 Filename: 14032_subdivision report_050814

Subdivision Assessment
Golf Harbour Drive, Whangarei

APPENDIX 3: WASTEWATER ASSESSMENT

On-site Wastewater Management in accordance with AS/NZS1547:2012 - Individual Lot Assessment

Project Reference	14032		Assessed by	ASM	
Client	Keay Family Trust		Date Assessed	4/08/2014	
Site Location	Golf Harbour Drive, Maunu				

Site and soil evaluation					
Desktop	Legal description	Lot 1 DP 392286 & and Lot 2 DP 437647		Indicative permeability	Well/moderately well drained
	Lot size	4.88ha		Flood Susceptible	No
	Soil map	Maunu silt loam		Annual rainfall	1600mm
				Other	
Site investigations	Ground slope	<5.7		Land instabilities	None
	Ground shape	Linear		Boulders/Rock outcrops	Yes
	Ground shape	Planar		Vegetation	Grassed pasture and orchard
	Aspect	E		Watercourse	Yes
	Exposure	Sheltered		Concentrated runoff	None
	Shelterbelts	Yes		Soil surface	Soft and wet underfoot
	Topo features			Season	Winter
	Wind direction	E		Buildings	Farm shed and old cattle yards
				Services	
Soil Assessment	Colour	Reddy brown		Permanent water table	Not encountered
	Texture	Clay loams		Surface condition	Stiff, moist
	Coarse Fragments	None		Existing/Past land use	Pasture
	Structure	Moderately structured		Other	

Land Application systems					
Design parameters	Water source	Roof runoff		No. of bedrooms	4
	Daily use / person	180 litres / person / day		Design occupancy	7
	Soil category	4		Design daily flow	1.26 m ³ <3m ³ OK
Design system	Level of treatment	Primary		Area required	105 m ²
	DLR/DIR	12.0 mm/day		Width	1.75
	System type	ETS Bed		Length	20
	Design LTAR	12.0 mm/day		No. required	3.0
Clearance	Boundaries	>1.5m		Clearance to surface water	>20m horizontally
	Groundwater	>1.2m		Clearance to bores	>20m horizontally
	Buildings	>6m		Cut off drains required	No
	Reserve area	>100%	105 m ²	Surface water interceptor	Yes

Determination of Soil Category		
Gravels and sands	Very little to no coherence; cannot be moulded; single grains stick to fingers	Rapidly drained
Sandy Loams	Forms a cast but will not roll into a coherent ball; individual sand grains can be seen and felt; gives a ribbon 15-25 mm long	Well drained
Loams	As for sandy loams but cast feels spongy, with no obvious sandiness or, silkiness; may feel greasy if much organic matter is present; forms a thick ribbon about 25 mm long	Moderately well drained
Clay Loams	Can be rolled into a ball with a rather spongy feel; slightly plastic; smooth to manipulate; will form a ribbon 40-50 mm long	Imperfectly drained
Light Clays	Smooth plastic ball that can be rolled into a rod; slight resistance to shearing between thumb and forefinger; forms a ribbon 50-75 mm long	Poorly drained
Medium to Heavy Clays	Smooth plastic ball that handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to ribboning; forms a ribbon 75 mm or more in length	Very poorly drained

Determination of Soil Structure	
Massive	Coherent, with any partings both vertically and horizontally spaced at greater than 100 mm. Pieces do not break along planes of weakness but break according to stress loads
Weak	Peds indistinct and barely observable on pit face. When disturbed approx. 30 % consist of peds smaller than 100 mm
Moderate	Peds well formed and evident when disturbed but not distinct in undisturbed soil. When disturbed 30 % - 60 % consists of peds smaller than 100 mm
Strong	Peds quite distinct in undisturbed soil. When disturbed > 60 % consists of peds smaller than 100 mm

WHANGAREI DISTRICT COUNCIL

Forum North · Private Bag 9023 · Whangarei 0148 · New Zealand
Telephone (09) 430 4200 · 0800 WDC INFO · 0800 932 463 · Facsimile (09) 438 7632
Website <http://www.wdc.govt.nz> · E-mail mailroom@wdc.govt.nz



Creating the ultimate living environment

Form EES-SEW1

On-Site Wastewater Disposal Investigation/Site Evaluation Checklist for Resource Consent Application

This form is to be read in conjunction with AS/NZS 1547:2000 (or any amendments as applicable), and, in particular with Part 4: Means of Compliance

Part A - Contact Details

1 applicant

Name Keay Family Trust

Property Address Golf Harbour Drive, Maunu, Whangarei

Lot/DP Number Lot 1 DP 392286 and Lot 2 DP 437647

2 Consultant/Site Evaluator

Site Evaluator Name Aaran MacPherson

Company Name Base Group Consulting

Postal Address PO Box 1032, Whangarei 0140

Business Phone 4373432

Fax

Mobile 0272942774

Email aaran@basegroup.co.nz

IQP Registered²⁵ (See note 1 below)

☒ Yes ☐ No If no, details of suitably registered IQP who will countersign the report are to be supplied below

Name of IQP who is Countersigning Report

Company Name

Postal Address

Business Phone

Fax

Mobile

Email

²⁵ It is a requirement that the Evaluator be IQP registered to carry out on-site effluent investigations/designs. If not, then evaluation/design will need to be counter-signed by a suitably registered IQP

Part B - Site and Soil Evaluation

1 Desk Study

Requirements (✓ appropriate box)

Please complete **all** options. (If more than one option applies to land under consideration, please clarify with supporting information)

WDC Requirement	Applies to Lot(s)	Comments	
1 Hazard maps/GIS hazard layer - stability			
☒ Low instability risk	Lot 1 & 2		
☐ Medium instability risk			
☐ High instability risk			
2 GIS hazard layer – effluent on slope stability			
☐ Low disposal potential			
☐ Moderate disposal potential			
☒ High disposal potential	Lot 1 & 2	Subdivision area not mapped	
3 GIS hazard layer – effluent suitability			
☒ Medium unsuitability	Lot 1 & 2		
☐ High unsuitability			
4 GIS hazard layer – flood susceptibility			
☐ Is flood susceptible			
☐ Is partially flood susceptible			
☒ Is not flood susceptible	Lot 1 & 2		
5 GIS land resources layer - streams			
Are there streams on or adjacent to land under investigation?	☒ Yes	Lot 2	OLFP with Lot 2. Refer site plan.
	☐ No		
6 GIS land resources layer – aquifers at risk			
Is land situated over or adjacent to aquifer?	☒ Yes	Lot 1 & 2	Maunu aquifer
	☐ No		
7 Annual rainfall (HIRDS)	1,500mm		

Important Note

It is to be noted that **all** information obtained off WDC GIS/Hazard Maps is to be taken as a guide **only**.

All information obtained from the above sites is to be confirmed by a specific site investigation as localised conditions could vary substantially. However, should the above data checks indicate the potential for a hazard/non-complying activity etc, this **must** be further investigated to confirm/deny the indicated situation.

2 On-Site Evaluation

a Determination of Soil Category (refer table 4.1.1 AS/NZS 1547:2000) (✓ appropriate box)

Soil Category	Structure	Applies to lot(s)	Comments
1 Gravels & Sands	☐ Structureless (massive)		
2 Sandy loams	☐ Weakly Structured		
	☐ Massive		
3 Loams	☐ High/Moderate structured		
	☐ Weakly structured or Massive		
4 Clay loams	☒ High/moderate structured	Lot 1 & 2	moderately well drained Maunu silt loam
	☐ Weakly structured		
	☐ Massive		
5 Light clays	☐ Strongly structured		
	☐ Moderately structured		
	☐ Weakly structured or massive		
6 Medium to heavy clays	☐ Strongly structured		
	☐ Moderately structured		
	☐ Weakly structured or massive		

Notes

Refer 4.1 A4 – Soil Assessment AS/NZS 1547:2000 for assessment criteria.

Details of the method used to determine soil type etc are to be clearly stated, along with positions of boreholes/test pits etc clearly marked on a site plan. Bore logs are to be provided. Photos should be included.

The site plan should also clearly show the intended area for effluent disposal, along with any site features such as drains, water bores, overland flows etc, along with separation distance achieved.

On-Site Evaluation Continued

b Site Characteristics for Proposed Disposal Area: (if there is a marked difference between sites, please fill in a separate form for each site and clearly note which site the assessment applies to) (✓ appropriate box)

Details	Applies to Site/s
1 Flooding potential to proposed field and reserve field (refer note 1 below)	
☒ Fields will not flood, or	Lot 1 & 2
Fields will flood in:	
☐ 20% AEP event	
☐ 5% AEP event	
☐ 1% AEP event	
2 Surface water separation to proposed field and reserve field (refer note 2 below)	
☒ Main/reserve disposal field comply with NRC rules	Separation from surface water drains
☐ Main/reserve disposal field do not comply with NRC rules	
3 Winter ground water separation to proposed field and reserve field (refer note 3 below)	
☒ Main and reserve disposal field comply with NRC rules	Ground water separation in excess of 1.2m
☐ Main and reserve disposal field do NOT comply with NRC rules	
4 Slope of ground of proposed field and reserve field (refer note 4 below)	
Description	
5 Shape of ground of proposed field and reserve field (refer note 5 below)	
☐ Waxing divergent	☐ Linear divergent
☐ Waxing planar	☒ Linear planar
☐ Waxing convergent	☐ Linear convergent
Comments	
6 Intended water supply source	
☐ Public supply	
☒ Rainwater	On-site rainwater harvesting to Lot 1 & 2
☐ Bore	
7 Proposed method of disposal and recommended Daily Loading rate (DLR) (refer note 6 below)	
Description Conventional evapotranspiration seepage bed system with primary treated effluent. Design Loading Rate taken conservatively as 12mm/day	
Peak Loading factored in? (refer note 6 below) ☒ Yes ☐ No Comments Designed to AS/NZS1547 using peak daily flows from 4 bedroom dwelling	
8 Site Exposure (refer note 7 below)	
Site/s aspect	N-S
Applies to Site/s Lot 1 & 2	

Pre-dominant wind direction	East	Lot 1 & 2
Presence of shelter belts	Yes	Lot 1 & 2
Presence of topographical features or structures	No significant features	Lot 1 & 2

9 Proximity of water bores. (include adjacent properties). (refer note 9 below)

Closest water bore mapped by NRC is situated within Lot 2, approximately 90m southeast of building site and land application area

10 Visible evidence of slips/instability (refer note 8 below)

No evidence of instability at site

11 Total suitable area available for type of effluent disposal proposed (including reserve area)

In excess of 1,000m²

12 Setback areas proposed (if any) (refer note 10 below)

Notes

- 1 If the WDC hazard maps/GIS indicate a flooding susceptibility on the site being evaluated, an on-site evaluation is to be carried out to determine the effects from 20%, 5% and 1% AEP storm events. This evaluation is to include all calculations to substantiate conclusions drawn. If necessary, include a detailed contour plan and photos.
- 2 NRC Water & Soil plan defines surface water as 'All water, flowing or not, above the ground. It includes water in continually or intermittently flowing rivers, artificial watercourses, lakes and wetlands, and water impounded by structures such as dams or weirs but does not include water while in pipes, tanks, cisterns, nor water within the Coastal Marine Area'. By this definition, separation (complying with NRC rules) is to be maintained by both the proposed disposal and reserve areas from any overland flowpaths and/or swale drains etc or R/C will be required from NRC. Surface water is to be clearly marked on each site plan, showing the extent of a 1% AEP storm event, and detailing separation distances to main/reserve disposal areas.
- 3 Positions of test borehole/s to be shown, and bore logs to be provided. Separation (complying with NRC rules) is to be maintained by both the proposed disposal and reserve areas from winter ground water level or R/C will be required from NRC. If the investigation is done outside of the winter period, allowance is to be made in determining the likely winter level.
- 4 Slopes of ground are to be compared with those recommended maximums for type of system proposed (refer Appendix 4.2B AS/NZS 1547:2000). Designs exceeding those maximums will require specific design to justify the proposal, and may also need Resource Consent from NRC.
- 5 Shape of ground is important as it will determine whether there is potential for concentrated overland flows from the upper slopes and also if effluent might be concentrated at base of slope if leeching occurs. Refer Figure 4.1B2 AS/NZS 1547:2000.
- 6 The proposed system (for residential developments) should be sized to accommodate an average 3 bedroom house with 5 people. Sites in holiday areas need to take peak loading into effect in determining daily volumes. The design must state what DLR was used to determine area necessary (including reserve area). If ground conditions are marginal for type of disposal proposed, then a soil permeability test utilising the constant head method is to be carried out across the proposed disposal area. Refer Appendix 4.1F AS/NZS 1547:2000.
- 7 The site aspect is important as a north-facing site that is not sheltered from wind and sun by shelterbelts or other topographical features or structures will perform far better than a south-facing site on the lee of a hill that is shaded from wind and sun etc
- 8 If any effluent disposal area (including any reserve area) proposed has or is adjacent to areas that show signs of instability, then a full report from a CPEng (Geotech) will be required to justify the viability of the area for effluent disposal.
- 9 If there are any water bores on the subject property or adjacent properties then a site plan will be required showing bore positions in relation to any proposed effluent field(s).
- 10 If setback areas are proposed to mitigate effects, the extent and position/s need to be shown on a site plan.

IN THE MATTER of the Resource Management Act
1991 ("the Act")

AND

IN THE MATTER of a subdivision consent as evidenced
by Land Transfer Plan No. 498433

AND

IN THE MATTER of a Consent Notice issued pursuant to
Section 221 of the Act by
WHANGAREI DISTRICT COUNCIL
("the Council")

IT IS HEREBY CERTIFIED that the following conditions to be complied with on a continuing basis by the subdividing owner and subsequent owners was imposed by the Council as a condition of approval for the subdivision as effected by Land Transfer Plan No. 498433 ("the plan")

In relation to Lots 1 – 5 and 7 – 10:

1. At the time of building consent, other than on Lot 1, provide suitable evidence/design to illustrate that, stormwater attenuation will be provided for all impervious surfaces to ensure compliance with Chapter 4 and more specifically Section 4.11 of the Council's Environmental Engineering Standards 2010, to the satisfaction of the Senior Environmental Engineering Officer.
2. Any development undertaken shall comply with the restrictions and recommendations identified in the revised engineering report ref 14037 Rev. 1 compiled by Base Group Consulting Chartered Engineers dated 28 September 2015 and form EES PSI filling certification (specific foundations design, on-site wastewater management and storm water disposal recommendations), a copy of which is available from the Council under reference SD1500014 on P125190, unless an alternative engineering report prepared by a suitably experienced Chartered Professional Engineer is approved in writing by the Council. *ref 15/93150*
3. The existing/new overland flow paths are to be maintained to cater for the 1% (plus 20% allowance for climate change) Annual Exceedance Probability rainfall event flows. No modification of the existing ground profile, plantings, fencing or structures of any kind will be permitted within the overland flow path unless a specific design has been done by a Chartered Professional Engineer which mitigates the effects of the obstruction and is approved in writing by the Council's Senior Environmental Engineering Officer.

93

4. The owner shall be responsible to ensure that any further development of the site including building sites, earthworks, drainage works, effluent disposal fields and vehicle access formations will be undertaken in such a manner that will not result in the obstruction or diversion of any existing overland flow path unless specific design has been done by an Independently Qualified Person or Chartered Professional Engineer which mitigates potential adverse flooding effects on any neighbouring properties created by the obstruction or diversion and is approved in writing by the Senior Environmental Engineering Officer.

Note: Overland flow paths are to be assessed in accordance with Section 4.9 of Council's Environmental Engineering Standards 2010 Edition and are to be certified by an Independently Qualified Person /Chartered Profession Engineer.

In relation to Lots 4, 5, 7, 8 and 9:

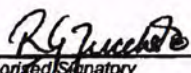
5. The owners shall be aware that the common water tanks constructed as part of subdivision works within the common access Lot 6 are for the purposes of fire fighting water supply and must be maintained full with a minimum water volume of 25m³ in accordance with the New Zealand Fire Service Firefighting Water Supplies code of Practise SNZ PAS 4509:2008.

In relation to Lots 1, 2, 3 & 10:

6. The owners shall be aware that the common water tanks constructed as part of subdivision works within the easement AA on Lot 1 DP 484446 are for the purposes of fire fighting water supply and must be maintained full with a minimum water volume of 10m³ in accordance with the New Zealand Fire Service Fire fighting Water Supplies Code of Practise SNZ PAS 4509:2008.

DATED at Whangarei this 20th day of JUNE 2016

SIGNED for WHANGAREI DISTRICT COUNCIL
pursuant to the authority of the Council given
pursuant to the Local Government Act 2002 and the
Resource Management Act 1991



Authorized Signatory
Ricardo Giovanni Zucchetto
Post Approval & Development Contributions Officer

SUBDIVISION ASSESSMENT

**GOLF HARBOUR DRIVE
WHANGAREI**

For: Keay Family Trust

Ref: 14037

Date: 28 September 2015

Filename: 14037_subdivision report_R1_280915

Revision: 1

TABLE OF CONTENTS

1. INTRODUCTION	3
2. SITE DESCRIPTION	4
3. GEOTECHNICAL	6
3.1 Ground Investigations	6
3.2 Mapped Geology	7
3.3 Stability	7
3.4 Earthworks	8
3.5 Building foundations	8
4. WASTEWATER MANAGEMENT	9
4.1 Existing System	9
4.2 Management System	9
4.3 NRC RWSP Compliance	10
4.4 Site Specific Mitigation Measures	11
5. STORMWATER MANAGEMENT	13
5.1 Design Philosophy	13
5.2 Existing Drainage	13
5.3 Water Quantity Treatment	14
5.4 Water Quality Treatment	16
5.5 Overland Flow Path	17
5.6 Flood Susceptible Areas	17
6. ACCESS ARRANGEMENTS	19
6.1 Formation Standards	19
6.2 Sight Distances	19
7. WATER SUPPLY	20
7.1 Existing System	20
7.2 Potable Water	20
7.3 Fire Fighting	20
8. SUMMARY	21
9. LIMITATIONS	22

ATTACHMENTS

APPENDIX 1: SITE PLANS

APPENDIX 2: GROUND INVESTIGATIONS

APPENDIX 3: WASTEWATER ASSESSMENT

1. INTRODUCTION

Keay Family Trust proposes to construct a ten lot residential subdivision in two stages at Golf Harbour Drive, Whangarei with Stage 1 comprising proposed Lots 4-9 being a subdivision of Lot 2 DP437647. Lots 1-3 & 10 will be constructed as Stage 2 being a subdivision of Lot 2 DP484464. The proposed development includes the formation of nine residential lots within the site, six of which are positioned at the front portion of the site adjacent to SH14 including a common access lot and four further lots located in the rear of the site. Proposed Lot 1 of the subdivision is the balance of the land. Scheme plans of the proposed development are included in Appendix 1.

This report details the assessment of engineering matters relevant to the residential subdivision of the property and is intended to support Resource Consent application to Whangarei District Council (WDC).

This report considers the following engineering aspects of the scheme:

- The existing stability of the site
- The effect of the proposed development on stability of the site
- Geotechnical suitability for earthworks and foundations
- Access arrangements
- Natural hazards
- Stormwater management
- On-site wastewater management
- Potable water supply and fire fighting requirements

2. SITE DESCRIPTION

The site is located at Golf Harbour Drive approximately 6km west of Whangarei CBD and is positioned adjacent to State Highway 14. The legal description is Lot 2 DP 484464 and Lot 2 DP 437647 and is sized 4.6357ha in total. WDC planning maps indicate that the property is located within an Urban Transition Environment and is classified as a Low Instability Hazard area. No flood susceptible areas are mapped at the subdivision site.

The property is currently used as an orchard with a majority of the site planted with avocado trees. An area of bush covenant is located on the western boundary adjacent to Sherwood Golf Course and a small area retained in pasture is located in the northeast corner of the property as visible in Figure 1 below. The property contains two farm sheds built around what was formerly a milking shed and stock yard. The timber sheds are used to house equipment and materials for use on the property and for occasional sheep management.

The subdivision is to be constructed in two Stages with Stage 1 comprising proposed Lots 4-9 and Lots 1-3 & 10 forming Stage 2. Lot 1 of Stage 2 is a large balance lot that has two nominated building areas and a future dwelling will be built at one of these locations (but not both). Proposed Lot 6 is a common access lot and is not proposed for residential house construction.



Figure 1: WDC GIS aerial image

Vehicle access is available from Golf Harbour Drive via an existing vehicle crossing bisecting the site between Lot 2 DP 484464 and Lot 2 DP 437647 which also currently serves Lot 1 DP 484464. This access is to be extended to provide ROW access for Lots 1-3 & 10. A new ROW access and associated vehicle crossings are to be formed from Golf Harbour Drive via proposed common access Lot 6 serving building sites within . An existing formed ROW is also present along the northeast boundary providing access to Lot 2 DP484464.

Figure 1 above taken from WDC GIS shows the site and surrounds including the existing vegetation, farm sheds and access arrangements.

The site has gently rolling topography and is generally crowned in the centre, falling to the north and south. Surface water runoff from the north is discharged from the site via an existing culvert under an adjacent ROW access, while the south of the property ponds in a shallow basin adjacent to Golf Harbour Drive prior to over topping the carriageway and draining east.

Northland Regional Council GIS maps indicate the site is being positioned within the Maunu aquifer which is classified as a semi unconfined Principal Aquifer in Taheke Basalt overlying sandstone/mudstone with a saturated thickness of 8-58m. NRC maps several water bores in proximity to the subdivision site, with one positioned within proposed Lot 1 as indicated in Figure 2 below. It is understood that this bore is actually positioned on the adjacent property at 670 SH14 and not within the subdivision site.

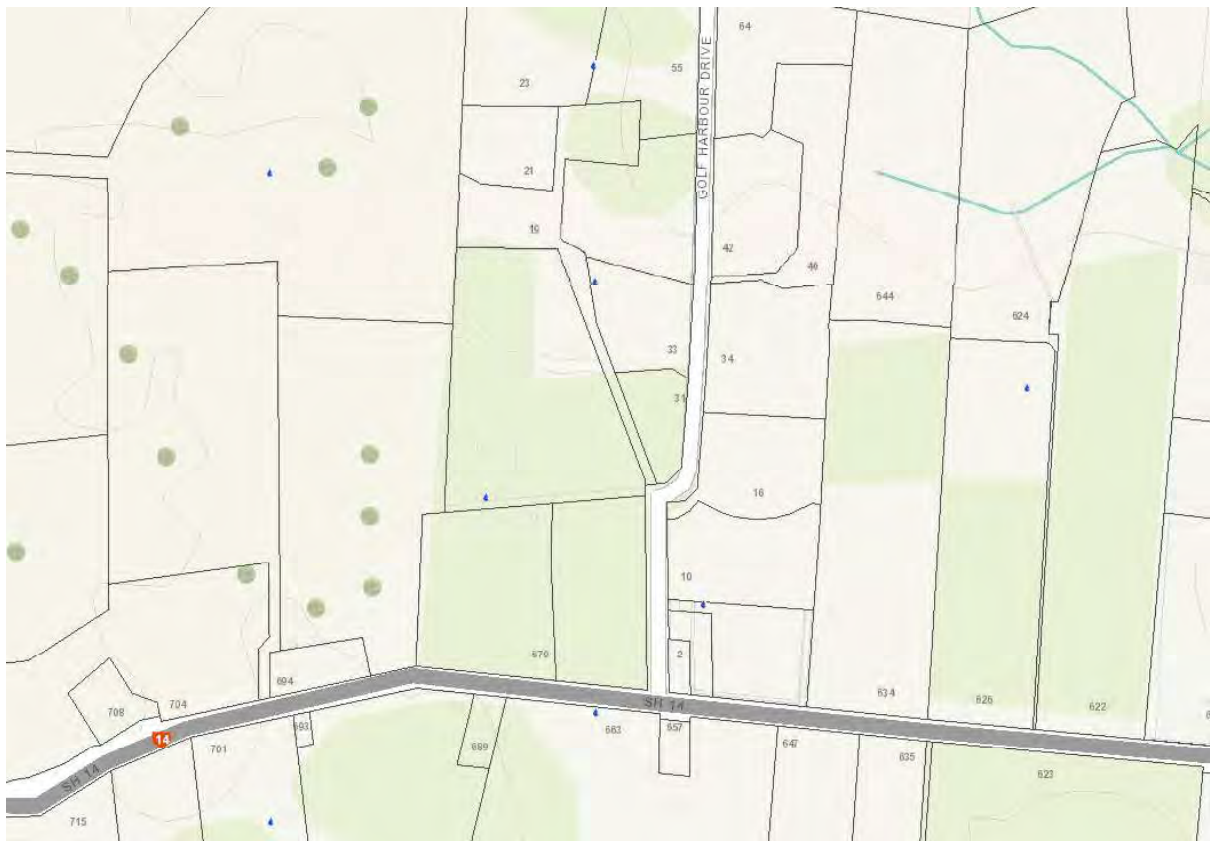


Figure 2: NRC GIS aerial image

3. GEOTECHNICAL

3.1 Ground Investigations

A series of site visits and walkover inspections of the property were carried out between 8th July 2014 and 18th November 2014. On 17th and 18th November 2014 a series of shallow subsurface ground investigations were carried out consisting of four hand auger boreholes with in-situ shear vane tests and a series of eight dynamic cone scala penetrometer tests.

The location of all tests within the property and results of the ground investigations are included within Appendix 2.

3.1.1 Boreholes

Six hand auger boreholes were carried out to 3m depth across the site, with two reaching only 0.6m and 0.9m before encountering rock. The boreholes revealed a general trend of moist red brown, highly plastic silty clay with traces of weak gravels from 2m depth. Moisture content was seen to increase with depth with very wet conditions at approximately 2.8m depth, however standing ground water was not encountered.

The surficial soils encountered during excavation of the boreholes were generally consistent across the property.

3.1.2 Shear strength

Undrained shear strengths were measured at 0.5m intervals during excavation of the hand auger boreholes to determine the in-situ shear strength properties of the surficial soils.

The results included in Appendix 2 indicate that the peak undrained shear strengths are typically in excess of 150kPa for the tests carried out, however results did vary and were as low as 63kPa in BH5. The surficial soils at the site are considered to be sensitive.

3.1.3 Scala penetrometer

A total of 14 dynamic cone scala penetrometer tests (SP) were undertaken within the proposed building sites to determine the available bearing capacity for foundation design. All tests were carried out from existing ground level and were taken to varying depths from 1.0m to 2.0m b.e.g.l.

All of the tests identified a general increase in bearing resistance with depth. At normal foundation depth of 0.45m b.e.g.l. an inferred allowable bearing capacity in excess of 100kPa is considered to be available.

The allowable bearing pressures established by the scala penetrometer testing are based on the methods described by Stockwell (New Zealand Engineering (32, 6) 15 June 1977) using a correlation of mm/blow and bearing pressure. This approach is intended to ensure against slow plastic movements of underlying soft strata and rapid local soil shear failure of the soil beneath the foundations. The inferred allowable bearing pressure includes a factor of safety of three against soil shear failure. If these allowable pressures are used, settlement should generally be within the following limits:

- (i) maximum settlement of any one of a group of footings = 25 mm
- (ii) maximum differential settlement between footings = 20 mm

These deflections are regarded as the acceptable limits a modern building can withstand without distress.

The assessed available bearing capacity does not consider gradual settlement of the foundation caused by consolidation (expulsion of air and water from the soil matrix voids) of underlying compressible strata such as peat or soft clay. Based on the findings of the subsurface investigations peat or soft clay is unlikely to be present at the site and consolidation settlement could be expected to affect the proposed buildings.

3.2 Mapped Geology

The geology of the area is defined on the Institute of Geological and Nuclear Sciences Geological Map 2: Geology of the Whangarei Area as basaltic lava flows of the Kerikeri Volcanic group.

The geomorphology of the general area is that of eroded basalt flows within the Puhipuhi-Whangarei Volcanic field which usually pre-date the present topography. The distribution of volcanoes near Whangarei is partly related to the local fault pattern and has formed the young and well preserved volcanic features of shield volcanoes built up from thin lava flow sequences, steep sided scoria cones and thick lava flows. Areas of basalt lava flows are expected to remain relatively stable unless underlain by soft rocks.

Two concealed faults are mapped in close proximity to the subdivision site with Otaika Fault to the southwest and Maunu Fault to the north. The subdivision site is located on the downthrown side of the concealed Maunu fault.

New Zealand Land Inventory map NZMS 290 Sheet Q 06/07 defines the pedology as a combination of Maunu silt loam and Maunu bouldery silt loam being well to moderately well drained soils of rolling land, moderately to strongly leached red loams.

3.3 Stability

The existing topography of the site is resultant from the regional geologic events, the natural weathering and erosion processes common to a high rainfall temperate climate zone, and the underlying geological formations. The produced soil profiles have a high proportion of clay and silt components and exhibit expansive, plastic and friable properties. The flat topography of the landform has a significant influence on the stability of the site.

The geotechnical investigations show that the surficial soil profile is consistent with the geological description for the site. The Kerikeri basalt is considered to overlay a series of sedimentary lithologies including Whangarei Limestone, Ruatangata Sandstone and Kamo Coal Measures. The basement geology is greywacke sandstone. Land underlain by basalt lava flows of the Kerikeri Volcanics can be steep and are generally considered to be stable unless underlain by soft rocks. It is anticipated that at this location the thickness of the underlying Kerikeri volcanic lithology could be in the order of 20m. Water erosion and saturation of the weathered friable residual soils creating oversteepened faces has the potential to create shallow shear surfaces and slippage planes on the steeper slopes, however the site has a gentle topography and is considered stable.

Groundwater was not encountered during excavation of the boreholes but moisture content was seen to increase with depth. Given the nature of the proposed development groundwater is unlikely to present significant difficulties when developing the site.

A visual inspection of the development site did not identify any recent land instabilities and the proposed development area is considered to be safe, stable and suitable for residential subdivision.

3.4 Earthworks

Minimal earthworks will be required at the site to create suitable building platforms and vehicle access. The volcanic derived loam soils that occupy the development site tend to be friable and erosion prone. Care must be taken to ensure that all exposed bare earth is adequately protected from erosion and scour during earthworks operations. Likewise to ensure the integrity of exposed cut and fill batters consideration should be given to surface stabilisation measures such as mulching, grassing, and erosion control blankets. In the long term exposed earth areas should be regrassed and revegetated.

It is expected that fill will be imported to raise the building platforms and sites contained within proposed Lots 5, 6 & 9 adjacent to Golf Harbour Drive, although some fill may be sourced from within the subdivision site. The depth of fill will be up to 0.5m deep. It is expected site sourced material will be suitable for cut to fill operations if required.

Any earthworks carried out at the site are to comply with relevant Northland Regional Council RWSP and Whangarei District Council EES requirements. Any earthworks carried out are to be in accordance with NZS4431:1989 Code Of Practice For Earth Fill For Residential Development and all filling works are to be tested and certified by a Chartered Professional Engineer.

3.5 Building foundations

Previous testing carried out on this geological unit confirm that a liquid limit of 50% and linear shrinkage of 15% are exceeded and therefore the building sites do not meet the definition of good ground identified in the NZ Building Code. The surficial soils observed during the field investigations are considered to be expansive and are interpreted as Class M to Class H in accordance with AS2870. It is recommended that specific engineering design of all foundations for future dwellings at the site is carried out.

The scala penetrometer results included in Appendix 2 identify adequate bearing capacity for residential dwellings. It is expected that a dependable bearing capacity in excess of 150kPa will be available (an ultimate bearing capacity of 300kPa in conjunction with a strength reduction factor of 0.5).

It is anticipated that waffle raft and shallow reinforced concrete strip foundation systems will be suitable for use at the development. It is recommended that any strip or pad foundations be taken a minimum of 0.45m below finished ground level.

4. WASTEWATER MANAGEMENT

4.1 Existing System

There is currently no reticulated wastewater system available at the site and as such all wastewater generated by the proposed development will require on-site management.

4.2 Management System

Design of a specimen wastewater treatment and disposal system considered suitable for use at the site has been carried out accordance with AS/NZS 1547:2012. The system has been designed to accommodate a flow of 180 l/person/day, assuming on-site roof water tank supply is used with standard fixtures. A four bedroom dwelling is used for design purposes with a maximum occupancy of seven persons. This gives a design daily flow rate of 1,260 l/day for disposal system treatment.

The development sites are constrained by available space and the provision of on-site wastewater management will require due consideration. Due to the proximity of adjacent properties and road side drainage systems it is recommended that secondary treatment systems be provided at the subdivision to meet NRC requirements ($<20\text{g/m}^3$ BOD₅ and $<30\text{g/m}^3$ SS). A nitrogen removal plant is recommended for use at the sites (to achieve TN $< 15\text{mg/l}$) and this will be achieved using an aerated treatment plant such as a suitably sized Hynds Ultimate system or similar. Specific design of individual systems will be required at time of Building Consent application.

The recommended method for disposal of the treated wastewater within the site is to be by means of a pressure compensating dripper irrigation system. The secondary treated waste water from the treatment plant is to be discharged to land using a surface irrigation system. This system utilises a low-pressure network of 16mm diameter pipe with spaced, self-compensating drippers providing a uniform distribution of the wastewater to the designated area.

For a surface irrigation system, the dripper lines are installed on the ground surface covered with a minimum of 50mm of soil topsoil and/or mulch allowed the treated effluent to be distributed into the topsoil layer.

This type of disposal system will provide further treatment to the wastewater by retaining the effluent within the aerobic soils, and enabling significant biodegradation by the soils micro organisms. Sustainable management of on-site effluent disposal should be promoted by keeping treated wastewater within the shallow soil layers where it can easily be absorbed by plants via transpiration and into the atmosphere via evaporation.

The soil identified during field investigations is classified as moderately structured well drained clay loam being Soil Category 4 in accordance with AS/NZS 1547:2012. The design irrigation rate used for determining the required land application area is 3.5 mm/day in accordance with AS/NZS 1547:2012. Each lot is required to provide a land application area of 360m² with a 30% reserve area of 108m².

The scheme plans in Appendix 1 shows the extent of available area for the irrigation system including an allowance for 1.5m offset from property boundaries and 6m offset from buildings.

4.3 NRC RWSP Compliance

The site contains a number of environmental limitations, however design of the system is carried out in accordance with AS/NZS 1547:2012 to ensure compliance with Northland Regional Council Regional Water and Soil Plan (Part 15.1.4) as a permitted activity.

The table below sets out the requirements of the RWSP permitted activity rules for secondary treated effluent and demonstrates how the proposed management system achieves compliance.

The lowest point of the disposal system is not less than 0.6 metres above the winter groundwater table.	Geotechnical investigations within the proposed land application area did not identify groundwater
Prior to being discharged to ground the effluent is treated to a standard such that: (i) the five day biochemical oxygen demand (BOD5) of any sample taken is less than or equal to 30 grams per cubic metre; and (ii) the total suspended solids (TSS) concentration of any sample taken is less than or equal to 45 grams per cubic metre	The proposed treatment plant (Hynds or similar) will exceed the requirements for secondary treated effluent. Refer to manufacturers details at time of Building Consent.
No part of the disposal area and reserve area is located within 20 metres, measured horizontally, of any existing groundwater bore located on any other property	An existing groundwater bore for potable water use is identified at the adjacent property and is positioned in excess of 20m from the land application areas
No part of the disposal area and reserve area is located within 15 metres, measured horizontally, of any surface water	There is in excess of 15m separation the surface water swale drains and road side table drains
The effluent is discharged into or onto land using a dripper system that has been designed to evenly distribute effluent and to avoid clogging by soil or root intrusion	Land application of the treated effluent is via surface pressure compensating irrigation for even distribution and to prevent clogging
The selection and sizing of the treatment and disposal system has been based on: (i) the volume of the discharge; (ii) the appropriate design loading rates for the identified soil type; and (iii) has taken into account any constraints identified by a detailed site investigation.	Design of the effluent treatment system has been carried out in accordance with the principles and procedures outlined in Australian/New Zealand Standard "On-site Domestic Wastewater Management" (AS/NZS 1547:2012) with due consideration to site constraints
There is no surface runoff of any contaminants from the disposal area.	Design of the effluent treatment system has been carried out in accordance with AS/NZS 1547:2012 utilising appropriate long term acceptance irrigation rates for the site. The PCDI is to be constructed as a surface system limiting the potential for surface runoff of contaminants.
The discharge results in no more than minor contamination of ground and surface water beyond a 20 metre separation distance measured horizontally from any part of the disposal system, or beyond the boundary of the property on which the discharge is taking place, whichever is the lesser.	Design of the effluent treatment system has been carried out in accordance with AS/NZS 1547:2012 utilising enhanced secondary treatment to reduce contaminant loading and increase soil treatment and vegetation uptake. Specific mitigation measures for the system are identified in this assessment
The volume of effluent discharged does not exceed 3 cubic metres per day, averaged over the month of	It is expected that the volume of treated effluent will

greatest discharge	not exceed 3m ³ per day for a residential dwelling
The maximum volume of effluent discharge does not exceed 6 cubic metres over any 24 hour period	It is expected that the volume of treated effluent will not exceed 6m ³ in any 24 hour period for a residential dwelling
A reserve area equivalent to 30% of the design disposal area has been allowed for and set aside	A 30% reserve area of 108m ² is allowed for within each lot and is indicated on the enclosed plans
A programmed maintenance contract for the treatment and disposal system is entered into.	The Building Consent for the on-site wastewater system should include a maintenance agreement for the treatment and land application system

Table 1: NRC RWSP permitted activity rules for secondary treated effluent

4.4 Site Specific Mitigation Measures

Specific mitigation measures are recommended for use at the site and the following should be adhered to for the on-site management of wastewater:

- The system is to be constructed by a registered drainlayer familiar with the specific requirements of this type of system.
- A service agreement between the property owner and the supplier of the treatment plant is entered into to ensure effective ongoing operation and performance. A maintenance strategy and contract for the system shall be put into place, which will include programmed inspections and maintenance of both secondary treatment systems and application areas.
- The secondary treatment systems shall be a nitrogen removal plant such as Hynds Ultimate to achieve removed TN < 15mg/l. High nutrient levels contained in domestic effluent is a significant concern, particularly in densely populated areas with sensitive receiving environments. The use of an enhanced nitrogen removal system provides a more sustainable system and reduces the risk of contaminating the receiving water.
- A reserve area of 30% is to be set aside for the future extension of the land application area in accordance with NRC RWSP for primary treated effluent. The purpose of setting aside a reserve area for future extension of a land application system is to allow a factor of safety against unforeseen malfunction or failure, perhaps following increased household occupancy or inadvertent misuse of the system. This ensures it is possible to provide additional pre-treatment or to extend the land application system if appropriate.
- The ground slope at the land application area is taken as <5.7°. The design irrigation rate should be decreased to accommodate sloping ground to minimise the risk of slope instability by applying wastewater over a large area. The design irrigation rate should be reduced by 20% for slopes in excess of 6° and 50% for slopes in excess of 12°, to ensure that effluent migration down slope is taken up adequately within the top soil and plant root system.
- The land application areas shall be mounded to shed rainwater and are to be planted with suitable high water use vegetation to aid in evapotranspiration. Surface vegetation shall be plants such as grasses and shrubs that tolerate wet conditions and have a high evapotranspiration capacity. Such planting should be selected on the basis of local experience.

- The disposal field should also be fenced off from vehicles and stock to prevent damage to the system.
- A maximum distance of 1.0m between the irrigation lines in clay soils to provide an effective even distribution of effluent over the whole of the design area and on sloping ground all irrigation lines shall be installed along the contour.
- The irrigation area shall have an adequate depth of natural good quality topsoil (or imported topsoil if necessary) to store the applied effluent and to support the growth of vegetation to maximise evapotranspiration. A minimum topsoil depth of 200 mm is required.
- Groundwater clearance has been confirmed to be in excess of 0.6m for secondary treated effluent in accordance with NRC RWSP.

5. STORMWATER MANAGEMENT

5.1 Design Philosophy

The general design philosophy for the stormwater management of the site is to replicate existing conditions and flow paths, while enhancing water quality and minimising the change in quantity of discharge from the site. It is intended to limit the post-developed runoff for the 5yr & 100yr CC ARI events in accordance with WDC EES requirements.

Stormwater will be collected in ROW access swales for collection, treatment and attenuation prior to discharge from the site. Swales and biofiltration devices are to be constructed in accordance with the requirements of WDC EES. All roof runoff from houses is to be directed to on-site attenuation tanks designed to accommodate a 100 yr CC ARI event including allowance for offset of impervious areas created by paving and hard standing.

Runoff from building roofs and trafficked areas which are a direct result of urbanisation will increase the quantity of surface water runoff. The best option for stormwater management is to avoid or minimise creation of impervious surfaces (unnecessary parking, turning and hardstand areas) resulting from the development.

Consideration is also given to secondary or overland flow paths when the capacity of the primary collection system is exceeded. The proposed common access Lot 6 and associated ROW access serving lots 4-9 will generally be constructed as a low point with the building sites graded to fall to the carriageway to act as an overland flow path away from building sites.

5.2 Existing Drainage

The existing site drainage is achieved by general surface runoff following the natural topography of the property. The subdivision site is effectively in two catchments with the north draining to an open channel passing through the site and the south ponding in a localized depression. The subdivision site has a catchment that extends beyond the property boundary and additional surface runoff is expected to enter the site from adjacent properties, particularly from the golf course and further west of Millington Road.



Figure 3: Existing shallow ponding basin adjacent to Golf Harbour Drive

The site has a relatively flat topography and during extreme rainfall events localized flooding occurs in the low points as indicated in Figure 3 above.

The localised flooding within the subdivision property is a result of Golf Harbour Drive carriageway construction. The carriageway has blocked the natural overland flow path, causing water to impound adjacent to the carriageway before overtopping the road and flowing down the natural overland flow path to the south as indicated in Figures 4 & 5 below.



Figure 4: Surface water ponding and overtopping Golf Harbour Drive viewed north along carriageway



Figure 5: Surface water ponding and overtopping Golf Harbour Drive viewed south along carriageway

At the time of construction when Golf Harbour Drive was formed culverts or clearly defined drainage paths were not provided at the intersection with SH14 or at the low point in the topography. This has resulted in surface water runoff from SH14 being intercepted and directed onto the subdivision property exacerbating the water ponding cause by Golf Harbour Drive Carriageway.

From discussions with WDC roading division it is understood that WDC has recently installed a culvert under Golf Harbour Drive to provide a clearly defined flow path that limits flooding on the subdivision property and replicates the existing flow paths.

The drainage channel in the north of the subdivision site collects runoff via surface sheet flow and is designated via an easement passing through the property, allowing surface water to be conveyed from west to east. The concentrated flow is piped under the formed ROW access on the northeast boundary via a DN600 culvert.

5.3 Water Quantity Treatment

The preliminary stormwater assessment for the subdivision has been carried out in accordance with WDC EES. Of particular relevance is the requirement to reduce stormwater runoff from increased impervious areas for the critical design events (5 yr & 100 yr ARI) including 20% climate change to less than 80% of the predevelopment discharge. Analysis has been conducted with desktop study and a hydrological model built using the modified SCS method, in accordance with ARC TP108 and NRCS TR-55 Type 1A rainfall distribution, as per WDC EES. Rainfall data is sourced from NIWA HIRDS 3.

Roof runoff from new houses (Lots 2-5 & 7-10) shall be directed to individual on-site attenuation tanks designed to accommodate the 100 yr CC ARI event where it is temporarily stored and released at a slower rate to the downstream stormwater drainage system. This method can also be used to compensate for other impervious surfaces which cannot be readily collected and attenuated (i.e. driveways, paved areas, paths). Allowing for a 300m² roof area it is likely that attenuation storage between 15-20m³ will be required. Specific design of stormwater attenuation will be required at building consent stage when household

units are constructed on the proposed lots to ensure the system is specific to the proposed development. Stormwater attenuation design shall be in accordance with WDC Environmental Engineering Standards 2010.

It is proposed to provide water quantity treatment for the new impervious surfaces created as part of the ROW access construction. This will be achieved by means of attenuation swales / dry balancing ponds provided with restricted flow outlets, underdrains and sufficient storage capacity to meet the attenuation volume requirements. The southern ROW arrangements providing access to lots 4-5 & 7-9 will create approximately 660m² of impervious area, while the northern ROW serving lots 1-3 & 10 will create 575m². Model parameters for the preliminary assessment are detailed below:

- Soil category = C
- Land cover = grassland
- SCS CN = 74 (pre-development)
- SCS CN = 98 (impervious areas)
- Time of Concentration = 10 min
- 100yr ARI 24hr Depth = 262.1mm
- 5yr ARI 24hr Depth = 142.1mm
- Climate change = 20% increase in rainfall depth
- Road impervious area = 660m² (to lots 4-5 & 7-9)
- Road impervious area = 575m² (lots 1-3 & 10)

The surface water runoff from the ROW access will be directed by over edge runoff to swale drains running parallel with each ROW having the following peak discharge attributes and requirements:

	Pre Peak (l/s)	Post Peak (l/s)	Post Peak Attenuated (l/s)
5 yr ARI	3.1	7.4	2.5
100 yr ARI	8.3	13.7	6.6

Table 2: Southern ROW pre and post development peak discharge

	Pre Peak (l/s)	Post Peak (l/s)	Post Peak Attenuated (l/s)
5 yr ARI	2.7	6.5	2.2
100 yr ARI	7.3	11.9	5.8

Table 3: Northern ROW pre and post development peak discharge

The attenuation swales take the form of a permanent dry trapezoidal drain that temporarily stores surface water runoff to control the peak rate of discharge from the post developed site. It is expected that the swales will be dry between storm events. The attenuation volume required to store the surface water runoff has been sized to achieve the run-off requirements detailed above and is estimated to be 33m³ for the southern ROW and 30m³ for the northern ROW. The attenuation storage volume can be achieved through a combination of swale drains / balancing basin storage, gravel filled underdrain, outlet chambers and underground pipes/chambers.

The restricted flow outlet from the swales can be formed using a conventional scruffy dome chamber with orifice outlet or a bunded weir arrangement discharging to the downstream system. Specific design of the outlet structures and arrangements will be carried out as part

of the engineering design of the subdivision and will be dependent on finished site levels and access arrangements.

Attenuated flow from the southern ROW and lots 4-9 shall discharge at Golf Harbour Drive road reserve for maintenance and replication of existing flow paths. Attenuated flow from the northern ROW and lots 1-3 & 10 is directed to the designated OLFP and drains to the north via a conveyance swale. Attenuation for proposed Lot 1 is not required given the site area. The location and proposed swale arrangement are indicated on the drainage plans included in Appendix 1.

All stormwater created from the newly formed impermeable surfaces should be collected and piped away from the building sites for disposal in a responsible manner. Surface water runoff should not discharge above on-site wastewater disposal fields. Likewise all overflow and outlets from storage and attenuation tanks should be piped in a similar manner and provided with a level spreader outlet to ensure an acceptable rate of dispersed discharge at the boundary in accordance with WDC EES.

5.4 Water Quality Treatment

Contaminants of concern from trafficked areas are Zinc and Copper, sediment and petroleum hydrocarbons (TPH). It is proposed that water quality objectives will be met with low impact drainage solutions comprising shallow road side vegetated swales. The overall concept of a vegetated swale is to slow stormwater flows, capture some contaminants, and allow for some reduction in the total volume of runoff. The passage of stormwater through vegetated swales utilises a number of physical, chemical, and biological factors to reduce stormwater contaminants. Primarily this will be achieved through the process of:

- Physical filtration by the dense vegetation which also improves retention of settled material
- Infiltration via gravel trench under drain (WDC EES Sheet 15 & 16)
- Chemical processes including complexing, adsorption and conversion of soluble contaminants to insoluble forms.
- Uptake of nutrients and contaminants by swale vegetation

Surface runoff from the paved ROW access to the lots will be directed via sheet flow to the road side swale drains where it will accumulate for treatment via the above mentioned processes. The swale will also act as a conveyance system for directing the runoff to the discharge locations.

Maintenance of the swale systems will be required to ensure that they function as intended with the primary objectives being a dense mat of vegetation and a swale free of obstructions such as leaf litter and significant deposits of sediment. Homeowners should also be discouraged from cutting the grass too short.

The swales are to be fully stabilised prior to accepting stormwater runoff to reduce channel erosion potential. It may be necessary to provide additional protective measures until such time as the vegetation is fully established.

Roof runoff does not require water quality treatment on the basis that exposed galvanised or copper roofing material is not used.

5.5 Overland Flow Path

The subdivision site accepts surface water runoff from adjacent properties via sheet overland flow following the natural contours of the land. Where possible, surface water interceptor drains shall be provided to intercept and divert surface water flow away from the development area, particularly along the western property boundary adjacent to lots 4,7 & 8. The diverted runoff is to be directed along the proposed southern ROW access for replication of existing flow paths and to ensure surface water is shed away from the nominated building platforms.

Where the capacity of the primary drainage systems are exceeded or there are blockages, overland flow paths will be provided to ensure the surface water is conveyed away from building sites. The front development sites (lots 4-9) will be shaped fall towards the new common access Lot 6 which will be used as a secondary overland flow path. Proposed overland flow paths are included on the plans in Appendix 1.

Globally, the existing overland flow path via the centre of the front catchment that presently discharges to the south at Golf Harbour Drive will be maintained.

5.6 Flood Susceptible Areas

Whangarei District Council and Northland Regional Council hazard maps do not indicate flood susceptible areas located in or adjacent to the proposed development.

The subdivision site accepts surface water runoff from adjacent properties (golf course) and beyond via concentrated flows following the natural contours of the land and a clearly defined flow path in the north.

The flow restriction created by the limited capacity culvert and the flood basin in Figure 3 above are considered to be the primary sources of flooding at the site. Both areas of surface water overtop the adjacent roadways and could potentially cause flooding at the low-lying proposed building platforms. Any new buildings at the property are required to have adequate free board above expected flood levels for the 100 yr CC ARI event. In accordance with WDC EES, for residential dwellings a freeboard of 0.5m above expected 100 yr CC ARI flood levels is required.

Assessment of the overland flow path running through the north of the property (proposed Lot 1) indicates that the existing culvert has insufficient capacity to convey the 100year CC ARI flood flows which have been calculated to be 2.1m³/s. The ROW is likely to overtop during this extreme event with a flow depth approximately 180mm above the ROW. Survey data provided by Reyburn & Bryant indicates a level at this location of RL 189.2m OTP Datum. From inspection of the site levels it is considered that the building platforms within proposed Lots 1-3 are sufficiently elevated above expected flood levels to satisfy WDC EES requirements.



Figure 6: Existing drainage easement in proposed Lot 1 for conveying surface water



Figure 7: Existing drainage easement in proposed Lot 1 prior to being piped under ROW access

The low point in Golf Harbour Drive where flood waters currently pond and overtop via sheet flow over the road is considered to have a nominal depth of 50-100mm. Survey data provided by Reyburn & Bryant indicates a level at this location of RL 189.0m OTP Datum.

New buildings within proposed Lots 4-9 should be constructed with a minimum FFL of RL 189.6m OTP Datum to ensure adequate freeboard in accordance with WDC EES requirements. From inspection the existing levels and the ponding evident in Figure 3 it is considered that the building platforms within these lots will need to be raised to ensure they are adequately elevated above the anticipated flood levels and provided with adequate freeboard. It is recommended that minor earthworks are undertaken within proposed lots 5, 6 & 9 to raise the ground level of the building envelopes to RL 189.5m OTP, requiring approximately 0.5m depth of fill in places.

6. ACCESS ARRANGEMENTS

A newly formed sealed vehicle crossing and access available at gentle grades is present from Golf Harbour Drive, immediately north of proposed Lot 5. This existing sealed formation will be extended to serve proposed Lot 1 with a new ROW extending from this access to facilitate vehicle access to lots 2, 3 & 10. A second vehicle access to proposed Lot 1 will be formed from the ROW along the northeast boundary of the site.

Vehicle access to Lots 4-9 will be obtained from a new ROW arrangement and vehicle crossings formed from Golf Harbour Drive as indicated on the site plan enclosed in Appendix 1. The new crossings are available at gentle grades and minor works will be required. Proposed Lot 6 is a common access lot that contains the proposed ROW formations and loop link facilitating mail delivery.

6.1 Formation Standards

It is expected that the new and existing access will be upgraded to service the proposed lots as part of the subdivision works. WDC EES requires for a private access way serving three to five lots in a Living 3 Environment to have a 4.5m wide carriageway width (4.0m sealed with 0.25m unsealed shoulder for Category D). This formation standard is also considered suitable for fire appliance use.

6.2 Sight Distances

Golf Harbour Drive is defined as a Local Road in the District Plan which recommends a minimum sight distance of 30m for low volume crossings in a 40km/h operating environment. The geometry of Golf Harbour Drive and proximity to the SH14 intersection restrict vehicle operating speeds at the site. Golf Harbour Drive contains a sharp bend at the existing vehicle crossing and northern entrance to the subdivision site, with lane separation provided by a rock wall as visible in Figure 6 below. Given the proximity of the existing and proposed ROW access to the sharp bends in the road, the operating speeds of vehicles are considered to be low.



Figure 8: View of Golf Harbour Drive from existing sealed vehicle crossing and ROW access

At the location of the new vehicle crossings and ROW access serving Lots 4-9 a sight distance north in excess of 60m is available and a sight distance south to the SH14 intersection provides a 70m sight distance.

7. WATER SUPPLY

7.1 Existing System

At present there is no reticulated water supply at the development site and it is not expected that the reticulated supply will be made available in the near future.

7.2 Potable Water

It is considered that the most convenient method of potable water supply for new households is by means of individual household on-site rainwater harvesting which is the source of drinking water for a large part of New Zealand's rural population. The use of rainwater harvesting has the added benefit of contributing to stormwater retention and minimising the impact of post development stormwater runoff. This can provide significant benefits to the design and operation of downstream stormwater systems.

However, rainwater harvesting is not without problems and during periods of high water use and low rainfall, supply problems can be experienced.

It is important to ensure that the rainwater tanks are sized correctly to suit the household needs. Generally, the larger the tank, the more reliable and effective it is in conserving water or managing stormwater. The water tank size will depend on the volume of water needed, the amount of rainfall in the area, the area of the collection surface, and the security of the supply needed. The sizing of rainwater tanks will be household specific, but based on ARC guidelines one 25m³ tank may be suitable where rainwater harvesting is the only water supply to the home.

The viability of bore water supply at the site has not been specifically investigated though it is considered possible as the subdivision is positioned over a mapped aquifer and there are several existing bores in the surrounding area.

7.3 Fire Fighting

In the absence of a reticulated network at the subdivision site, fire fighting water supply will be provided by means of dedicated on-site storage tanks.

The SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice is a guideline only for fire fighting in a rural district and does not pose compliance requirements. The standard recommends that a dedicated water supply for fire fighting with a volume of 45m³ within 90m of a dwelling be provided as part of the development. However discussion with the Fire Service indicates that it is acceptable to provide only 10m³ in a rural setting which can be achieved by means of a conventional water tank fitted with an appropriate fire service outlet coupling. Appropriate couplings or tank manhole access are to be more than 6m from a combustible source.

Proposed Lots 6-9 are to be provided with a dedicated communal water supply for fire-fighting purposes contained within Lot 9 (easement area AA on Reyburn & Bryant scheme plan) and for lots 2-5 to have a communal supply contained within Lot 1 SD1400077 (easement area AA on Reyburn & Bryant scheme plan). The balance area being Lot 1 of Stage 2 is not serviced by the communal supplies and fire fighting requirements are to be dealt with at Building Consent Stage.

8. SUMMARY

Keay Family Trust proposes to construct a ten lot residential subdivision in two stages at Golf Harbour Drive, Whangarei.

The site is considered to be safe, stable and suitable for the proposed development. A dependable bearing capacity in excess of 150kPa is considered to be available for design of new house foundations and waffle raft or shallow reinforced concrete strip foundation systems will be suitable for use. The surficial soils are considered to be expansive and are interpreted as Class M to Class H in accordance with AS2870. It is recommended that specific engineering design of all foundations for future dwellings at the site is carried out.

Provisions will be required for on-site wastewater management and preference given to systems that disperse effluent over a wide area rather than concentrating it in one location. It is recommended that a Hynds Ultimate system or similar with enhanced nitrogen removal capable of producing secondary treated effluent in conjunction with pressure compensating dripper irrigation be used at the site. Specific design of individual on-site systems will be required at the time of Building Consent.

Lots 2-5 & 7-10 shall be provided with individual on-site attenuation tanks for roof run-off from new houses, designed to accommodate the 100 yr CC ARI event including allowance for other impervious surfaces. Specific design of stormwater attenuation will be required at Building Consent stage when household units are constructed on the proposed lots to ensure the system is specific to the proposed development. Stormwater attenuation design shall be in accordance with WDC Environmental Engineering Standards 2010. Stormwater runoff from the two paved ROW's are to be provided with water quantity and quality treatment by means of an attenuation swale. The attenuation storage volume can be achieved through a combination of swale storage, gravel filled underdrain, outlet chambers and underground pipes/chambers. A 0.3m deep trapezoidal profile swale with a 1.0m wide base is considered sufficient to provide the required water quality treatment.

Two sources of flooding are identified at the property and the building platforms identified within Lots 1-5 & 7-10 are considered to be adequately elevated above anticipated flood levels. The exact levels should be confirmed at Building Consent stage to confirm adequate freeboard above the 100 yr CC ARI events identified in this assessment with a minimum FFL of RL189.6m OTP Datum.

Access to the subdivision will be formed at gentle grades with a series of sealed ROW's constructed to facilitate access. Two new vehicle crossings are to be formed from Golf Harbour Drive providing access to Lots 4-9 and the existing formed ROW adjacent to proposed Lot 5 will be extended to service Lots 1-3 & 10. Sight distances in excess of 60m are available from the vehicle crossings and access locations serving Lots 4-9.

Individual households will utilise rainwater harvesting to source water for household consumption. Dedicated tanks permanently filled with water will be required within the subdivision to meet the fire fighting storage volume.

9. LIMITATIONS

This report has been prepared for the benefit of Keay Family Trust as our client with respect to residential subdivision at Golf Harbour Drive, Whangarei and for Whangarei District Council approval. No liability is accepted by Base Group Consulting where other parties rely on the information or opinions contained in this report and any other person who relies upon any matter contained in this report does so entirely at their own risk. Any recommendations, opinions, or guidance provided by Base Group Consulting in this report are limited to technical engineering requirements and are not made under the Financial Advisers Act 2008.

Base Group Consulting have performed the services for this site assessment in accordance with the standard agreement for consulting services and current professional standards. No guarantees are either expressed or implied.



A S MacPherson
Chartered Professional Engineer
BE Civil (Hons), CPEng, MIPENZ, IntPE(NZ)

APPENDIX 1: SITE PLANS

LOCATION OF EXISTING FORMED ROW ACCESS
AND PROPOSED ACCESS TO LOT 1.

ALTERNATIVE BUILDING SITE WITHIN PROPOSED
LOT 1

EXISTING OVERLAND FLOW PATH WITH
DESIGNATED COVENANT FOR CONVEYANCE OF
SURFACE WATER RUNOFF FROM ADJACENT
GOLF COURSE THROUGH PROPERTY. OPEN
CHANNEL / SWALE DISCHARGES UNDER
FORMED ROW ACCESS VIA DN600 CULVERT

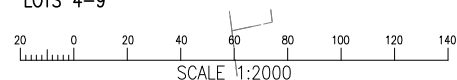
EXISTING FARM SHEDS AND CATTLE YARDS
WITHIN PROPOSED LOTS 2 & 10

EXISTING BUSH COVENANT AREA

LOCATION OF EXISTING VEHICLE CROSSING
AND PROPOSED NORTHERN ROW ACCESS
FROM GOLF HARBOUR DRIVE FOR VEHICLE
ACCESS TO LOTS 1-3 & 10

LOCATION OF SHALLOW FLOODING BASIN
WITHIN PROPOSED LOTS 5, 6 & 9 WITH
SURFACE FLOW CONSTRAINED BY GOLF
HARBOUR DRIVE CARRIAGEWAY. FLOOD
WATERS CURRENTLY OVERTOP CARRIAGEWAY
AND DRAIN EAST VIA ADJACENT ROW ACCESS.

LOCATION OF PROPOSED VEHICLE CROSSINGS
AND SOUTHERN ROW ACCESS FROM GOLF
HARBOUR DRIVE FOR VEHICLE ACCESS TO
LOTS 4-9



STATE HIGHWAY 14

GOLF HARBOUR DRIVE



Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME
3. SITE TOPOGRAPHY PROVIDED BY REYBURN & BRYANT. HEIGHTS ARE IN TERMS OF ONE TREE POINT VERTICAL DATUM 1964: BM DA7 SO 44997 RL=183.34m.

- PROPERTY BOUNDARY
- INDICATIVE BUILDING SITES
- EXISTING BUILDINGS
- SCALA PENETROMETER TEST
- HAND AUGER BOREHOLE
- ON-SITE WASTEWATER LAND APPLICATION SYSTEM
- MAJOR CONTOUR (1.0m)
- MINOR CONTOUR (0.5m)

A	SUBDIVISION STAGING, SCHEME AND LAYOUT	28-9	AM
Rev	Description	Date	App

CONSENT

KEYAY FAMILY TRUST
SUBDIVISION SUITABILITY
GOLF HARBOUR DRIVE, MAUNU



PO Box 1032, Whangarei 0140, New Zealand
P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz

SITE LOCATION PLAN

Scale:	Date:	Drawn:	Checked:
1:2,000 @ A3	22 DEC 2014	AM	

Drawing No.:	Rev:
14037/C1	A

EXISTING OVERLAND FLOW PATH WITH DESIGNATED COVENANT FOR CONVEYANCE OF SURFACE WATER RUNOFF FROM ADJACENT GOLF COURSE THROUGH PROPERTY. OPEN CHANNEL / SWALE DISCHARGES UNDER FORMED ROW ACCESS VIA DN600 CULVERT

PROPOSED BUILDING PLATFORMS SHOWN AS 14m x 14m

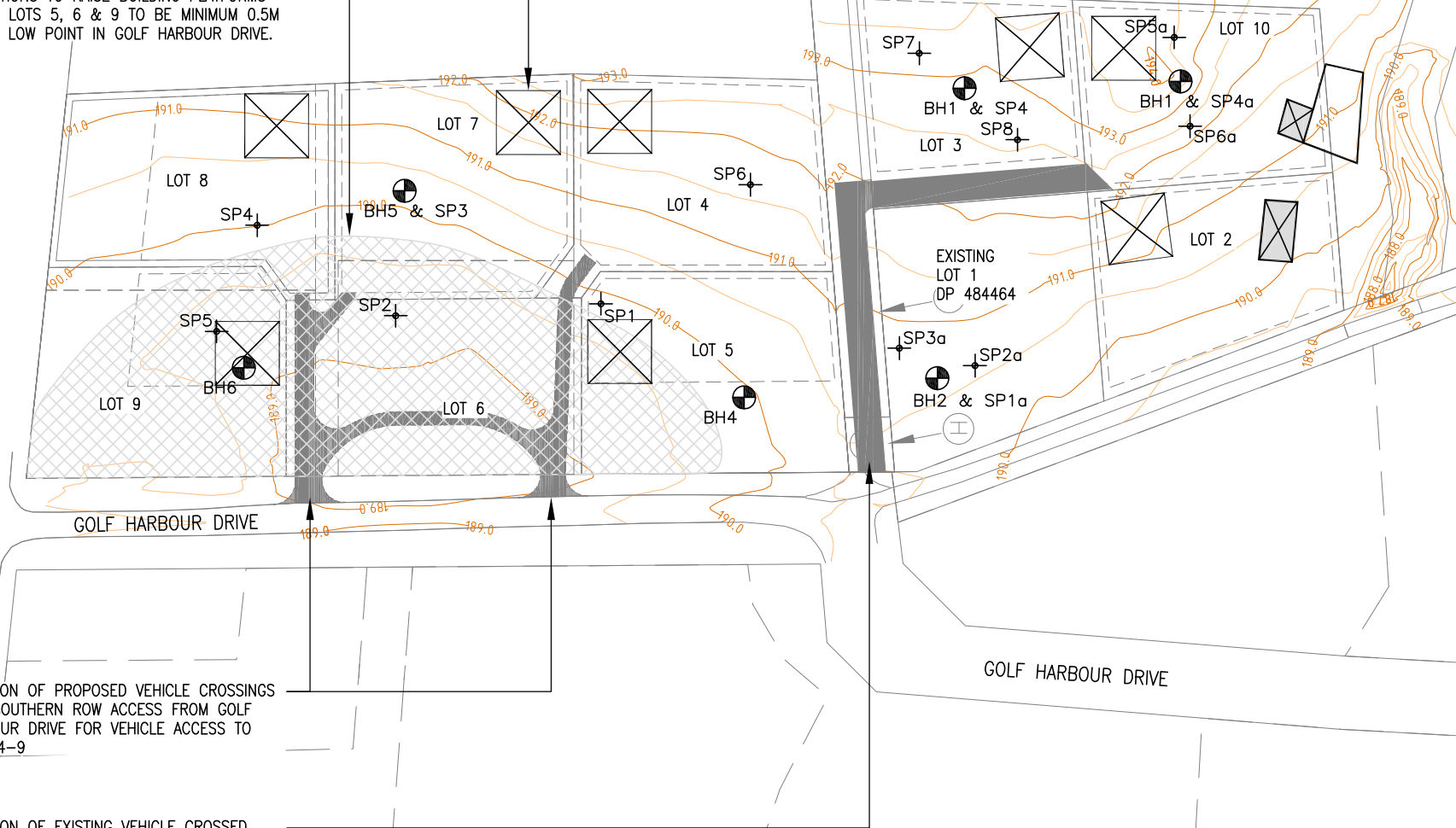
INDICATIVE EXTENT OF EARTHWORKS FILLING OPERATIONS TO RAISE BUILDING PLATFORMS WITHIN LOTS 5, 6 & 9 TO BE MINIMUM 0.5M ABOVE LOW POINT IN GOLF HARBOUR DRIVE.

STATE HIGHWAY 14

GOLF HARBOUR DRIVE

LOCATION OF PROPOSED VEHICLE CROSSINGS AND SOUTHERN ROW ACCESS FROM GOLF HARBOUR DRIVE FOR VEHICLE ACCESS TO LOTS 4-9

LOCATION OF EXISTING VEHICLE CROSSED AND SEALED ACCESS FROM GOLF HARBOUR DRIVE TO BE EXTENDED TO FACILITATE VEHICLE ACCESS TO LOTS 1-3 & 10



- Notes
1. THIS DRAWING IS NOT TO BE SCALED.
 2. SITE LAYOUT AND POSITION OF ALL SITE FEATURES ARE INDICATIVE ONLY.
 3. EASEMENT DETAILS NOT SHOWN ON THIS PLAN. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME
 4. BUILDING PLATFORMS SHOWN AS 14m x 14m
 5. SITE TOPOGRAPHY PROVIDED BY REYBURN & BRYANT. HEIGHTS ARE IN TERMS OF ONE TREE POINT VERTICAL DATUM 1964: BM DA7 SO 44997 RL=183.34m.

- PROPERTY BOUNDARY
- INDICATIVE BUILDING SITES
- EXISTING BUILDINGS
- SCALA PENETROMETER TEST
- HAND AUGER BOREHOLE
- ON-SITE WASTEWATER LAND APPLICATION SYSTEM
- MAJOR CONTOUR (1.0m)
- MINOR CONTOUR (0.5m)

A	SUBDIVISION STAGING, SCHEME AND LAYOUT AMENDED	28-9-2015	AM
Rev	Description	Date	App

CONSENT

KEYAY FAMILY TRUST
SUBDIVISION SUITABILITY
GOLF HARBOUR DRIVE, MAUNU

BASE GROUP CONSULTING
Structural & Civil Engineering

PO Box 1032, Whangarei 0140, New Zealand
P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz

SITE PLAN

Scale: 1:1,000 @ A3	Date: 22 DEC 2014	Drawn: AM	Checked:
Drawing No.: 14037/C2	Rev: A		

10 0 10 20 30 40 50 60 70
SCALE 1:1000

LOTS 2-10 SHALL BE PROVIDED WITH INDIVIDUAL ON-SITE ATTENUATION TANKS FOR ROOF RUN-OFF FROM NEW HOUSES, DESIGNED TO ACCOMMODATE THE 100 YR CC ARI EVENT INCLUDING ALLOWANCE FOR OTHER IMPERVIOUS SURFACES

INDICATIVE EXTENT OF EARTHWORKS FILLING OPERATIONS TO RAISE BUILDING PLATFORMS WITHIN LOTS 5 & 9 AND VEHICLE ACCESS TO BE MINIMUM 0.5M ABOVE LOW POINT IN GOLF HARBOUR DRIVE.

SOUTHERN ROW ACCESS PROVIDED WITH ATTENUATION SWALE DRAIN FOR WATER QUALITY TREATMENT AND ATTENUATION DISCHARGING TO ROAD BERM FOR REPLICATION OF EXISTING FLOW PATHS. ATTENUATION STORAGE VOLUME CAN BE ACHIEVED THROUGH A COMBINATION OF SWALE STORAGE, GRAVEL FILLED UNDERDRAIN, OUTLET CHAMBERS AND UNDERGROUND PIPES/CHAMBERS.

EXISTING OVERLAND FLOW PATH WITH DESIGNATED COVENANT FOR CONVEYANCE OF SURFACE WATER RUNOFF FROM ADJACENT GOLF COURSE THROUGH PROPERTY. OPEN CHANNEL / SWALE DISCHARGES UNDER FORMED ROW ACCESS VIA DN600 CULVERT

STATE HIGHWAY 14

NEW CULVERT UNDER SOUTHERN VEHICLE CROSSINGS TO FACILITATE ROAD BERM DRAINAGE. ROAD BERM TO BE GRADED AND SHAPED TO FALL TO CULVERT INLET.

NEW CULVERT UNDER GOLF HARBOUR DRIVE INSTALLED BY WDC TO FACILITATE DRAINAGE AWAY FROM SUBDIVISION PROPERTY AND ROAD BERM. ROAD BERM TO BE GRADED AND SHAPED TO FALL TO CULVERT INLET.

EXISTING OVERLAND FLOW PATH TO BE MAINTAINED VIA OVERTOPPING GOLF HARBOUR DRIVE AT LOW POINT WHEN CAPACITY OF PRIMARY SYSTEM IS EXCEEDED

NORTHERN ROW ACCESS PROVIDED WITH ATTENUATION SWALE DRAIN FOR WATER QUALITY TREATMENT AND ATTENUATION DISCHARGING TO OLFP. ATTENUATION STORAGE VOLUME CAN BE ACHIEVED THROUGH A COMBINATION OF SWALE STORAGE, GRAVEL FILLED UNDERDRAIN, OUTLET CHAMBERS AND UNDERGROUND PIPES/CHAMBERS.

NORTHERN ROW SWALE TO DISCHARGE TO EXISTING OPEN CHANNEL AND OLFP EASEMENT VIA ROCK SPALLS AND EROSION PROTECTION AS REQUIRED



Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. SITE LAYOUT AND POSITION OF ALL SITE FEATURES ARE INDICATIVE ONLY.
3. EASEMENT DETAILS NOT SHOWN ON THIS PLAN. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME
4. BUILDING PLATFORMS SHOWN AS 14m x 14m
5. SITE TOPOGRAPHY PROVIDED BY REYBURN & BRYANT. HEIGHTS ARE IN TERMS OF ONE TREE POINT VERTICAL DATUM 1964: BM DA7 SO 44997 RL=183.34m.

- PROPERTY BOUNDARY
- ⊠ INDICATIVE BUILDING SITES
- ⊠ EXISTING BUILDINGS
- ⊕ SCALA PENETROMETER TEST
- ⊗ HAND AUGER BOREHOLE
- ➔ STORMWATER OVERLAND FLOW PATH
- MAJOR CONTOUR (1.0m)
- MINOR CONTOUR (0.5m)

A	SUBDIVISION STAGING, SCHEME AND LAYOUT	28-9	AM
Rev	Description	Date	App

CONSENT

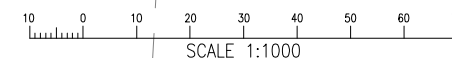
KEYAY FAMILY TRUST
SUBDIVISION SUITABILITY
GOLF HARBOUR DRIVE, MAUNU



PO Box 1032, Whangarei 0140, New Zealand
P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz

STORMWATER MANAGEMENT PLAN

Scale:	Date:	Drawn:	Checked:
1:1,000 @ A3	22 DEC 2014	AM	
Drawing No.:	14037/C3		Rev:
			A



PROPOSED LAND APPLICATION AREA FOR PRESSURE COMPENSATING SURFACE IRRIGATION SHOWN AS 360M² FOR 4 BEDROOM DWELLING WITH SECONDARY TREATED WASTEWATER. DISPOSAL FIELD TO BE PLANTED WITH SUITABLE HIGH WATER USE VEGETATION. PROPOSED LAND APPLICATION AREA SHOWN WITH 15m OFFSET WATERWAYS FOR COMPLIANCE WITH NRC RWSP PERMITTED ACTIVITY REQUIREMENTS.

PROPOSED BUILDING PLATFORMS SHOWN AS 14m x 14m. WASTEWATER LAND APPLICATION AREAS SHOWN WITH 6m OFFSET FROM BUILDING ENVELOPES

STATE HIGHWAY 14

GOLF HARBOUR DRIVE

GOLF HARBOUR DRIVE

RESERVE AREA FOR DRIPPER IRRIGATION SHOWN AS 108M² ALLOWING 30% AREA

Notes

1. THIS DRAWING IS NOT TO BE SCALED.
2. SITE LAYOUT AND POSITION OF ALL SITE FEATURES ARE INDICATIVE ONLY.
3. EASEMENT DETAILS NOT SHOWN ON THIS PLAN. REFER TO REYBURN & BRYANT FOR DETAILS OF PROPOSED SUBDIVISION SCHEME
4. BUILDING PLATFORMS SHOWN AS 14m x 14m
5. WASTEWATER LAND APPLICATION AREAS SHOWN AS 360m² FOR SECONDARY TREATMENT WITH 30% RESERVE AREA OF 108m²
6. THE IRRIGATION FIELDS ARE BASED ON A DIR OF 3.5MM/DAY FOR A 4 BEDROOM DWELLING ON RAINWATER SUPPLY. IRRIGATION TO BE USED WITH SECONDARY TREATMENT SYSTEM COMPLYING WITH NRC REQUIREMENTS
7. THE 30% RESERVE AREA ALLOWS A FACTOR OF SAFETY AGAINST UNFORESEEN MALFUNCTION OR FAILURE, PERHAPS FOLLOWING INCREASED OCCUPANCY OR INADVERTENT MISUSE OF THE SYSTEM
8. SITE TOPOGRAPHY PROVIDED BY REYBURN & BRYANT. HEIGHTS ARE IN TERMS OF ONE TREE POINT VERTICAL DATUM 1964: BM DA7 SO 44997 RL=183.34m.

- PROPERTY BOUNDARY
- INDICATIVE BUILDING SITES
- EXISTING BUILDINGS
- SCALA PENETROMETER TEST
- HAND AUGER BOREHOLE
- ON-SITE WASTEWATER LAND APPLICATION SYSTEM
- MAJOR CONTOUR (1.0m)
- MINOR CONTOUR (0.5m)

A	SUBDIVISION STAGING, SCHEME AND LAYOUT AMENDED	28-9 2015	AM
Rev	Description	Date	App

CONSENT

KEYAY FAMILY TRUST
SUBDIVISION SUITABILITY
GOLF HARBOUR DRIVE, MAUNU

BASE GROUP
CONSULTING
Structural & Civil Engineering

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P 09 437 3432 E office@basegroup.co.nz www.basegroup.co.nz

ON-SITE WASTEWATER MANAGEMENT PLAN

Scale: 1:1,000 @ A3	Date: 22 DEC 2014	Drawn: AM	Checked:
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Drawing No.: 14037/C4	Rev: A
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10 0 10 20 30 40 50 60 70
SCALE 1:1000

APPENDIX 3: WASTEWATER ASSESSMENT

WHANGAREI DISTRICT COUNCIL

Forum North · Private Bag 9023 · Whangarei 0148 · New Zealand
Telephone (09) 430 4200 · 0800 WDC INFO · 0800 932 463 · Facsimile (09) 438 7632
Website <http://www.wdc.govt.nz> · E-mail mailroom@wdc.govt.nz



Creating the ultimate living environment

Form EES-SEW1

On-Site Wastewater Disposal Investigation/Site Evaluation Checklist for Resource Consent Application

This form is to be read in conjunction with AS/NZS 1547:2000 (or any amendments as applicable), and, in particular with Part 4: Means of Compliance

Part A - Contact Details

1 applicant

Name Keay Family Trust

Property Address Golf Harbour Drive, Maunu, Whangarei

Lot/DP Number Lot 1 DP 392286 and Lot 2 DP 437647

2 Consultant/Site Evaluator

Site Evaluator
Name Aaran MacPherson

Company Name Base Group Consulting

Postal Address PO Box 1032, Whangarei 0140

Business Phone 4373432

Fax

Mobile 0272942774

Email aaran@basegroup.co.nz

IQP Registered²⁵ (See note 1 below)

☒ Yes ☐ No If no, details of suitably registered IQP who will countersign the report are to be supplied below

Name of IQP who is Countersigning
Report

Company Name

Postal Address

Business Phone

Fax

Mobile

Email

²⁵ It is a requirement that the Evaluator be IQP registered to carry out on-site effluent investigations/designs. If not, then evaluation/design will need to be counter-signed by a suitably registered IQP

Part B - Site and Soil Evaluation

1 Desk Study

Requirements (✓ appropriate box)

Please complete **all** options. (If more than one option applies to land under consideration, please clarify with supporting information)

WDC Requirement	Applies to Lot(s)	Comments	
1 Hazard maps/GIS hazard layer - stability			
☒ Low instability risk	Lots 1-9		
☐ Medium instability risk			
☐ High instability risk			
2 GIS hazard layer – effluent on slope stability			
☐ Low disposal potential			
☐ Moderate disposal potential			
☒ High disposal potential	Lots 1-9	Subdivision area not mapped	
3 GIS hazard layer – effluent suitability			
☒ Medium unsuitability	Lots 1-9		
☐ High unsuitability			
4 GIS hazard layer – flood susceptibility			
☐ Is flood susceptible			
☐ Is partially flood susceptible			
☒ Is not flood susceptible	Lots 1-9		
5 GIS land resources layer - streams			
Are there streams on or adjacent to land under investigation?	☒ Yes	Lots 1-9	OLFP with Lot 1. Refer site plan.
	☐ No		
6 GIS land resources layer – aquifers at risk			
Is land situated over or adjacent to aquifer?	☒ Yes	Lots 1-9	Maunu aquifer
	☐ No		
7 Annual rainfall (HIRDS)	1,500mm		

Important Note

It is to be noted that **all** information obtained off WDC GIS/Hazard Maps is to be taken as a guide **only**.

All information obtained from the above sites is to be confirmed by a specific site investigation as localised conditions could vary substantially. However, should the above data checks indicate the potential for a hazard/non-complying activity etc, this **must** be further investigated to confirm/deny the indicated situation.

2 On-Site Evaluation

a Determination of Soil Category (refer table 4.1.1 AS/NZS 1547:2000) (✓ appropriate box)

Soil Category	Structure	Applies to lot(s)	Comments
1 Gravels & Sands	☐ Structureless (massive)		
2 Sandy loams	☐ Weakly Structured		
	☐ Massive		
3 Loams	☐ High/Moderate structured		
	☐ Weakly structured or Massive		
4 Clay loams	☒ High/moderate structured	Lots 1-9	moderately well drained Maunu silt loam
	☐ Weakly structured		
	☐ Massive		
5 Light clays	☐ Strongly structured		
	☐ Moderately structured		
	☐ Weakly structured or massive		
6 Medium to heavy clays	☐ Strongly structured		
	☐ Moderately structured		
	☐ Weakly structured or massive		

Notes

Refer 4.1 A4 – Soil Assessment AS/NZS 1547:2000 for assessment criteria.

Details of the method used to determine soil type etc are to be clearly stated, along with positions of boreholes/test pits etc clearly marked on a site plan. Bore logs are to be provided. Photos should be included.

The site plan should also clearly show the intended area for effluent disposal, along with any site features such as drains, water bores, overland flows etc, along with separation distance achieved.

b Site Characteristics for Proposed Disposal Area: (if there is a marked difference between sites, please fill in a separate form for each site and clearly note which site the assessment applies to) (✓ appropriate box)

Page 213 of 248

Pre-dominant wind direction	East	Lots 1-9
Presence of shelter belts	Yes	Lots 1-9
Presence of topographical features or structures	No significant features	Lots 1-9

9 Proximity of water bores. (include adjacent properties). (refer note 9 below)

Closest water bore mapped by NRC is situated within Lot 1, approximately 90m southeast of building site and land application area

10 Visible evidence of slips/instability (refer note 8 below)

No evidence of instability at site

11 Total suitable area available for type of effluent disposal proposed (including reserve area)

In excess of 500m²

12 Setback areas proposed (if any) (refer note 10 below)

Notes

- 1 If the WDC hazard maps/GIS indicate a flooding susceptibility on the site being evaluated, an on-site evaluation is to be carried out to determine the effects from 20%, 5% and 1% AEP storm events. This evaluation is to include all calculations to substantiate conclusions drawn. If necessary, include a detailed contour plan and photos.
- 2 NRC Water & Soil plan defines surface water as 'All water, flowing or not, above the ground. It includes water in continually or intermittently flowing rivers, artificial watercourses, lakes and wetlands, and water impounded by structures such as dams or weirs but does not include water while in pipes, tanks, cisterns, nor water within the Coastal Marine Area'. By this definition, separation (complying with NRC rules) is to be maintained by both the proposed disposal and reserve areas from any overland flowpaths and/or swale drains etc or R/C will be required from NRC. Surface water is to be clearly marked on each site plan, showing the extent of a 1% AEP storm event, and detailing separation distances to main/reserve disposal areas.
- 3 Positions of test borehole/s to be shown, and bore logs to be provided. Separation (complying with NRC rules) is to be maintained by both the proposed disposal and reserve areas from winter ground water level or R/C will be required from NRC. If the investigation is done outside of the winter period, allowance is to be made in determining the likely winter level.
- 4 Slopes of ground are to be compared with those recommended maximums for type of system proposed (refer Appendix 4.2B AS/NZS 1547:2000). Designs exceeding those maximums will require specific design to justify the proposal, and may also need Resource Consent from NRC.
- 5 Shape of ground is important as it will determine whether there is potential for concentrated overland flows from the upper slopes and also if effluent might be concentrated at base of slope if leaching occurs. Refer Figure 4.1B2 AS/NZS 1547:2000.
- 6 The proposed system (for residential developments) should be sized to accommodate an average 3 bedroom house with 5 people. Sites in holiday areas need to take peak loading into effect in determining daily volumes. The design must state what DLR was used to determine area necessary (including reserve area). If ground conditions are marginal for type of disposal proposed, then a soil permeability test utilising the constant head method is to be carried out across the proposed disposal area. Refer Appendix 4.1F AS/NZS 1547:2000.
- 7 The site aspect is important as a north-facing site that is not sheltered from wind and sun by shelterbelts or other topographical features or structures will perform far better than a south-facing site on the lee of a hill that is shaded from wind and sun etc
- 8 If any effluent disposal area (including any reserve area) proposed has or is adjacent to areas that show signs of instability, then a full report from a CPEng (Geotech) will be required to justify the viability of the area for effluent disposal.
- 9 If there are any water bores on the subject property or adjacent properties then a site plan will be required showing bore positions in relation to any proposed effluent field(s).
- 10 If setback areas are proposed to mitigate effects, the extent and position/s need to be shown on a site plan.

On-site Wastewater Management in accordance with AS/NZS1547:2012 - Individual Lot Assessment

Project Reference	14037		Assessed by	ASM	
Client	Keay Family Trust		Date Assessed	28/09/2015	
Site Location	Golf Harbour Drive, Maunu				

Site and soil evaluation					
Desktop	Legal description	Lot 1 DP 392286 & and Lot 2 DP 437647	Indicative permeability	Well/moderately well drained	
	Lot size	4.88ha	Flood Susceptible	No	
	Soil map	Maunu silt loam	Annual rainfall	1600mm	
			Other		
Site investigations	Ground slope	<5.7	Land instabilities	None	
	Ground shape	Linear	Boulders/Rock outcrops	Yes	
	Ground shape	Planar	Vegetation	Grassed pasture and orchard	
	Aspect	E	Watercourse	Yes	
	Exposure	Sheltered	Concentrated runoff	None	
	Shelterbelts	Yes	Soil surface	Soft and wet underfoot	
	Topo features		Season	Winter	
	Wind direction	E	Buildings	Farm shed and old cattle yards	
			Services		
Soil Assessment	Colour	Reddy brown	Permanent water table	Not encountered	
	Texture	Clay loams	Surface condition	Stiff, moist	
	Coarse Fragments	None	Existing/Past land use	Pasture	
	Structure	Moderately structured	Other		

Land Application systems					
Design parameters	Water source	Roof runoff	No. of bedrooms	4	
	Daily use / person	180 litres / person / day	Design occupancy	7	
	Soil category	4	Design daily flow	1.26 m ³ <3m ³ OK	
Design system	Level of treatment	Secondary	Area required	360 m ²	
	DLR/DIR	3.5 mm/day	Width	20	
	System type	Irrigation	Length	18	
	Design LTAR	3.5 mm/day	No. required	1.0	
Clearance	Boundaries	>1.5m	Clearance to surface water	>15m horizontally	
	Groundwater	>1.2m	Clearance to bores	>20m horizontally	
	Buildings	>6m	Cut off drains required	No	
	Reserve area	>30% 108 m ²	Surface water interceptor	No	

Determination of Soil Category		
Gravels and sands	Very little to no coherence; cannot be moulded; single grains stick to fingers	Rapidly drained
Sandy Loams	Forms a cast but will not roll into a coherent ball; individual sand grains can be seen and felt; gives a ribbon 15-25 mm long	Well drained
Loams	As for sandy loams but cast feels spongy, with no obvious sandiness or, silkiness; may feel greasy if much organic matter is present; forms a thick ribbon about 25 mm long	Moderately well drained
Clay Loams	Can be rolled into a ball with a rather spongy feel; slightly plastic; smooth to manipulate; will form a ribbon 40-50 mm long	Imperfectly drained
Light Clays	Smooth plastic ball that can be rolled into a rod; slight resistance to shearing between thumb and forefinger; forms a ribbon 50-75 mm long	Poorly drained
Medium to Heavy Clays	Smooth plastic ball that handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to ribboning; forms a ribbon 75 mm or more in length	Very poorly drained

Determination of Soil Structure	
Massive	Coherent, with any partings both vertically and horizontally spaced at greater than 100 mm. Pieces do not break along planes of weakness but break according to stress loads
Weak	Peds indistinct and barely observable on pit face. When disturbed approx. 30 % consist of peds smaller than 100 mm
Moderate	Peds well formed and evident when disturbed but not distinct in undisturbed soil. When disturbed 30 % - 60 % consists of peds smaller than 100 mm
Strong	Peds quite distinct in undisturbed soil. When disturbed > 60 % consists of peds smaller than 100 mm



Northland 0.4m Rural Aerial Photos 2014-2016

Wednesday, September 23, 2026



The information displayed is schematic only and serves as a guide. It is made available in good faith but its accuracy or completeness is not guaranteed.

Scale 1:1,128



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