

Before the Hearing Panel
Appointed by the West Coast Regional Council

Under the Resource Management Act 1991

In the matter of a hearing on submissions on the proposed Te Tai Poutini Plan

Hearing Stream Rural, Rural Lifestyle and Settlement Zones

Tauranga Bay Holdings Limited

Submission Numbers: 597 / Further submission: 32

Evidence of Philippe Dumont – Environmental Engineer

4 July 2024

Introduction

- 1 My name is Philippe Dumont.
- 2 I hold a Bachelor of Science with Honors and a Master in Sanitation Engineering and I have completed Certified Environmental Practitioner certification (BAgSc(Hons) MSc, CEnvP-Gen).
- 3 I am employed by Eliot Sinclair and have held this position since October 2022.
- 4 My previous work experience includes thirty one (31) years of experience on Environmental Science and Engineering, including twenty eight (28) years of experience in wastewater treatment and disposal, and eighteen (18) years of experience in contaminated land assessments and remediation.
- 5 I have reviewed the Contaminated Land assessment issued on the 14th October 2022 (Preliminary Site Investigation **attached** as Appendix A) as well as the wastewater and stormwater statements included within the Infrastructure Requirements section of the Technical Report issued on the 3rd November 2022 (**attached** as Appendix B) supporting the submission of Tauranga Bay Holdings Limited (**the Submitters**), relating to the following land at Tauranga Bay Road, Cape Foulwind, Westport (**the Site**):
 - (a) Section 41 SO 13711
 - (b) Section 2 SO 14304
 - (c) Lot 1 DP 19769 and
 - (d) Lot 1 DP 12325
- 6 The Preliminary Site Investigation and the Technical Report were prepared respectively by Simon Pollock and Stuart Challenger who are no longer employed by Eliot Sinclair. While it doesn't alter the general conclusion of my statement, it is my professional opinion that some aspects of the reports must be nuanced.
- 7 The Submitters seek the rezoning of the Site from proposed General Rural and Rural Lifestyle Zone to Rural Residential Precinct, Rural Lifestyle and General Rural Zone as part of the Te Tai Poutini District Plan process.
- 8 This evidence provides a brief summary of my contaminated Land, wastewater and stormwater assessments.

Code of Conduct for Expert Witnesses

- 9 While this is not a hearing before the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing

my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Executive Summary

10 My assessment supports inclusion of the Site within a Rural Residential Precinct, Rural Lifestyle and General Rural Zone zones.

11 Summary

- (a) The Preliminary Site Investigation (PSI) is based on a review of Buller District Council records, West Coast Regional Council records, historical aerial images and a site visit undertaken in May 2022 and August 2022, in compliance with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health - Regulations 2011 (NES).
- (b) The PSI concludes that no activities included within the Hazardous Activities and Industry List (HAIL) have been carried on the Site. The PSI also concludes that it is highly unlikely that the proposed activity will be a risk to human health and that no further actions are required.
- (c) The PSI also included a Preliminary Conceptual Site Model (**CSM**) which is used to identify if a complete exposure pathway exists. An exposure pathway must include a contaminant source, a transport mechanism, and a receptor. If one of these components does not exist, or can be removed, then the exposure pathway is incomplete and there is little risk to human health at the specified location.
- (d) The CSM concluded that, no HAIL activities were identified on the site and that no source of contaminants have been identified. Consequently, the exposure pathway is incomplete, meaning that risks to human health are highly unlikely.
- (e) Following the review of the PSI report it is appropriate to comment that potentially contaminating activities (HAIL activities) have actually been carried out on the Site but in very minor extent and on very small areas. Those activities include the following:
 - Livestock treatment (HAIL A8);
 - Bulk storage of treated timber on bare ground (HAIL A18)
 - Disposal of waste (HAIL G3); and

- Intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment (HAIL I).
- (f) As a result, more area-specific detailed investigations under the form of Detailed Site Investigation (DSI) would have to be prepared in compliance with the NES, especially in case of future development involving change in land use and/or soil disturbance on or within the various locations of interest to be clearly identified as stated at paragraph 11(e).
- (g) If soil contamination is confirmed on the Site by the DSI, there are a number of options open to the Submitters to manage and/or remediate prior to residential development. These include a remedial action plan and the removal if required of any contaminants to a suitable disposal facility. The most appropriate methodology and remediation will be determined after completion of the DSI.
- (h) The Geotechnical Assessment based on which the Infrastructure Requirements are outlined indicates that an iron pan is present in the sub-soil at various depth throughout the site.
- (i) Although its presence can represent a hindering factor in regard to the soil capacity to infiltrate both stormwater and wastewater, infiltration tests were carried out below the iron pan and returned satisfying results. Should on-site stormwater management be required for future subdivided lots, the depth of the iron pan will have to be taken into consideration for the installation of the stormwater management infrastructures.
- (j) In terms of wastewater management, the Geotechnical Assessment report indicates that soil characteristics below the iron pan corresponds to a Category 3 as per the Australian/New Zealand Standard for On-site Domestic Wastewater Management AS/NZS1547:2012. The Geotech Assessment also indicates that groundwater was not encountered during the soil assessment.
- (k) While Category 3 soils are suitable for the disposal of treated wastewater via soil infiltration, the most important aspects to be considered are the characteristics and depth of top layer of the soil, and the depth of the groundwater. Given the high variability of the iron pan location in the soil profiles, complementary area-specific assessments of the depth and characteristics of the top layer of the soil will have to be carried out to determine the most appropriate location and technique for the disposal of treated wastewater in the soil.

12 I am not aware of any changes or updates since the time of the submission lodgement.

Conclusion

- 13 I am satisfied that the proposed rezoning is a suitable outcome for Site, provided complementary area-specific investigations in terms of soil contaminations and soil suitability for the disposal of treated wastewater are carried out, which is the normal course of actions in the frame of the next stage of development of the Site.

Dated 4 July 2024



Dumont P

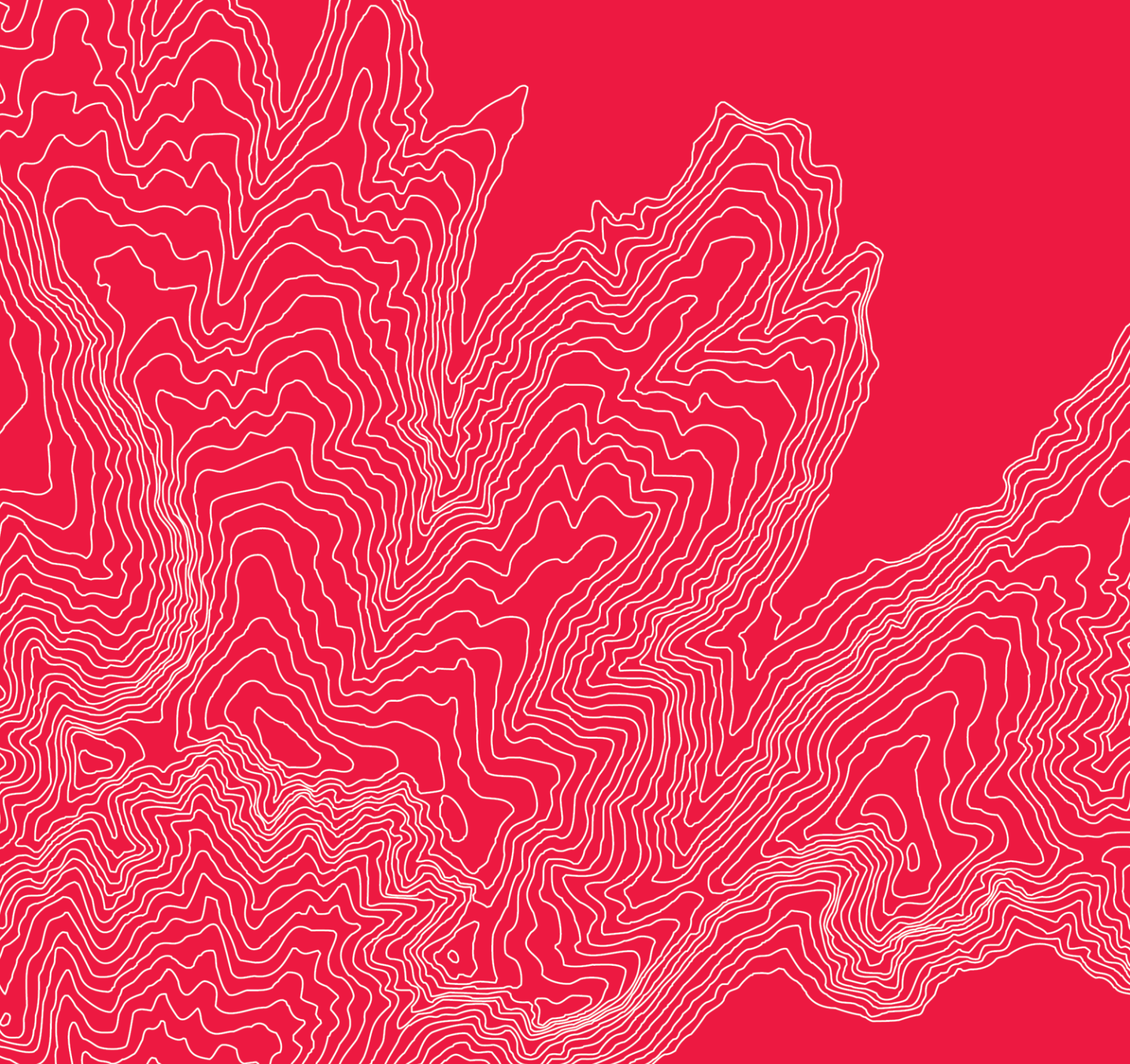
Philippe Dumont

Environmental Engineer/Scientist

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Appendix A: Preliminary Site Investigation



Preliminary Site Investigation (PSI)

**eliot
sinclair**

Title 747162, Tauranga Bay

Prepared for Tauranga Bay Holdings Ltd

510783

Preliminary Site Investigation

Title 747162, Tauranga Bay

Prepared for Tauranga Bay Holdings Ltd

510783

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
Prepared by:	Lauryn Heaton Engineering Geologist PMEG BSc (Geology) NZGS		11 August 2022
Reviewed by:	Simon Pollock Environmental Scientist MSc BSc CEnvP		14 October 2022
Directed and approved for release by:	Claire McKeever Resource Management Planner Associate BSurv(Hons) MS+SNZ MNZPI		14 October 2022
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Contents

Executive Summary	V
1. Introduction	1
1.1. Objectives and Scope	1
1.2. Site Identification	1
1.3. Proposed Site Use	3
2. Site Description	3
3. Historical Site Use	4
3.1. Review of Council Information	4
3.1.1. Selected Land Use Register (SLUS)	4
3.1.2. BDC Property Files	4
3.2. Review of Aerial Photographs	4
3.3. Owner Interview	4
4. Eliot Sinclair's Site Walkover – May 2022 and August 2022	5
5. Preliminary Conceptual Site Model	6
6. Determining resource consent requirements under the NESCS	6
7. Conclusions and Recommendations	7
8. Accidental Discovery Protocol	8
Disclaimer	9

Appendix A. Historical Aerial Imagery

Appendix B. Owner Interview

Appendix C. Site Photographs

Executive Summary

Site Address	Title 747162, Tauranga Bay
Legal Description	Section 41 SO 13711, Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325
Site Area	Total Area: approximately 100 ha
Local Authority	Buller District Council
Owners	Tauranga Bay Holdings Ltd
Proposed Activity	Proposed Change of Land Use (Re-zoning Submission)
Historical and current land uses	Historical: Rural Residential (25% produce) Current: Rural Residential (25% produce)
Proposed land use	Rural Residential (25% produce)
Current Zoning	General Rural Zone and Rural Lifestyle Zone
Adopted NESCS land use scenario	Rural Residential (25% produce)
HAIL activities identified	No HAIL activities identified
Conclusions	It is highly unlikely that a future Change of Land Use will be a risk to human health. No further actions are required as it is highly unlikely that there is a risk to human health at this site
Recommendations for site management	It is recommended that if any unusual or contaminated materials are encountered during any future works within the site that the requirements of the Accidental Discovery Protocol provided in this report are followed. This can be addressed at future development as required.
NESCS Activity Status	The NESCS activity status is permitted under the NESCS.

1. Introduction

Eliot Sinclair & Partners Ltd was engaged by Tauranga Bay Holdings Ltd to undertake a Preliminary Site Investigation (PSI) at Title 747162, Tauranga Bay ('the site').

The purpose of this PSI is to support a submission that requests rezoning of the property as part of the Te Tai o Poutini Plan Process. The land will be rezoned from General Rural Zone and Rural Lifestyle Zone to Rural Residential Precinct Zone, Rural Lifestyle Zone and General Rural Zone.

1.1. Objectives and Scope

The objective of the investigation was to prepare a PSI in general accordance with MfE's Contaminated Land Management Guidelines (CLMG) No. 1¹ and 5², and the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, Regulations 2011 (NESCS)³.

The scope comprises:

- Reviewing the West Coast Regional Council's Selected Land Use Register (SLUS).
- Reviewing historical and recent aerial images of the site taken between 1951 and 2022.
- Reviewing information on the property file held by the Buller District Council (BDC).
- Conducting an owner interview.
- A walkover inspection of the property

1.2. Site Identification

Site identification details are provided in Table 1.

Table 1. Site identification

Details	
Street address	Title 747162, Tauranga Bay
Legal description	Section 41 SO 13711, Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325
Area	Total Area: approximately 100 ha
Current site plan	Refer to Figure 1
Locality map	Refer to Figure 2

¹ Ministry for the Environment (MfE) 2011. Contaminated Land Management Guidelines No. 1. Reporting on Contaminated Sites in New Zealand. Wellington: Ministry for the Environment (Revised 2021).

² Ministry for the Environment. (2021). Contaminated land management guidelines No 5: Site investigation and analysis of soils (Revised 2021). Wellington: Ministry for the Environment (Revised 2021).

³ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 administered by the Ministry for the Environment

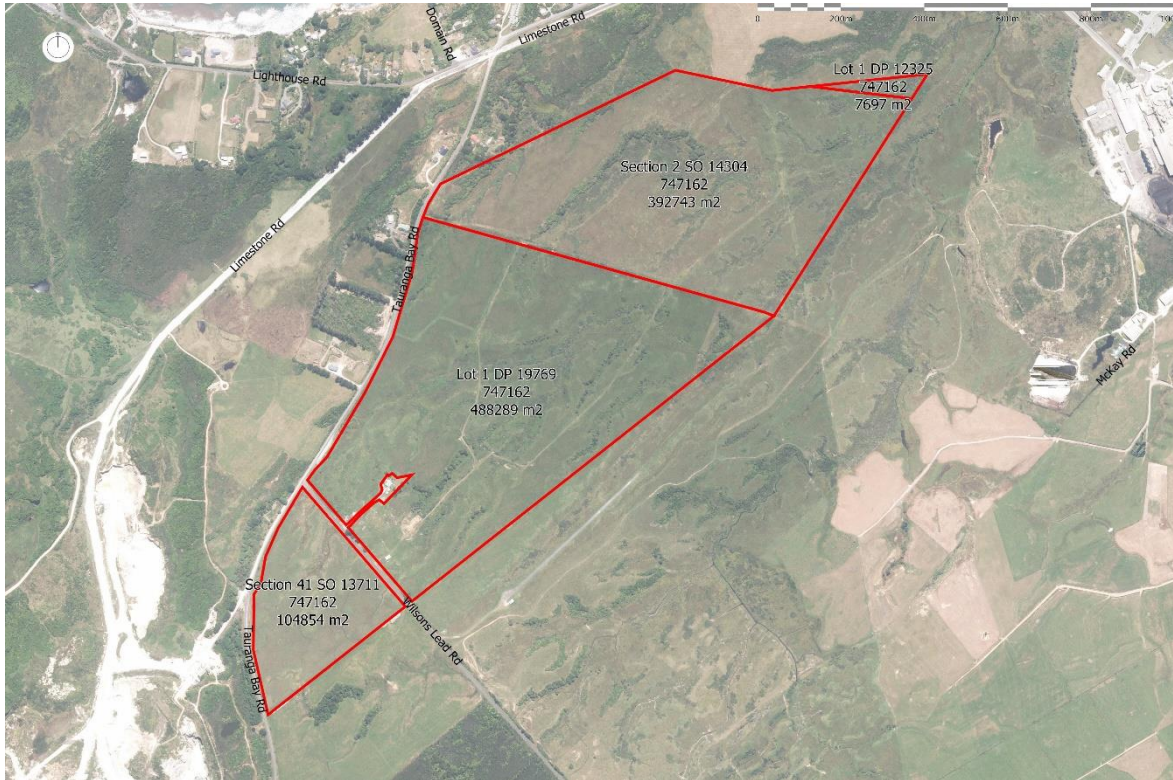


Figure 1. Site layout map.

WestMaps Print

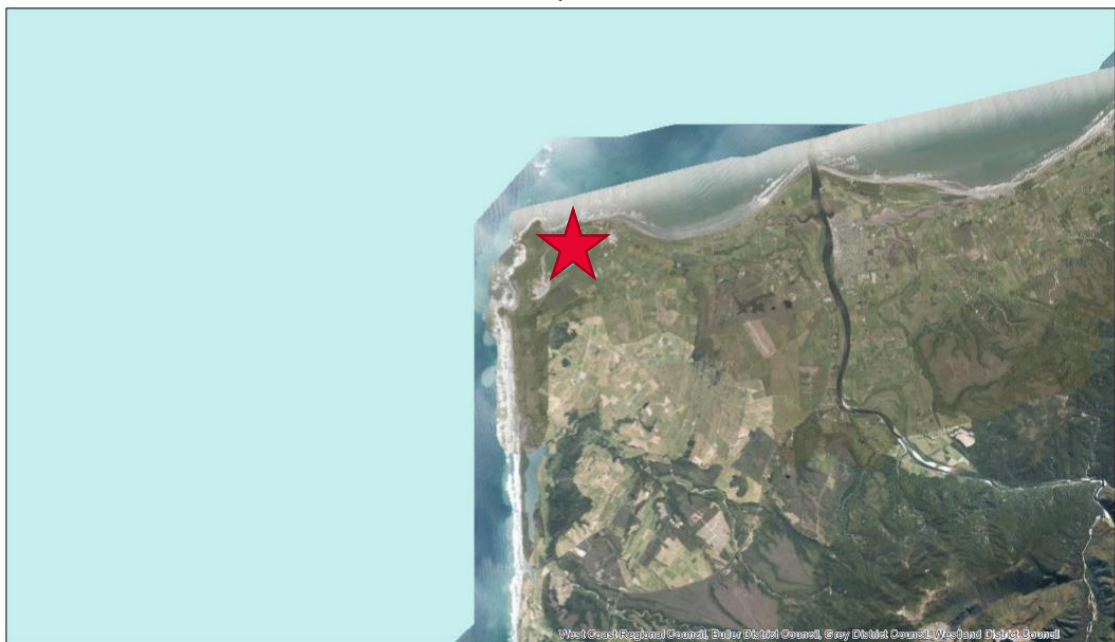


Figure 2. Locality map. Retrieved from WestMaps (August 2022).

1.3. Proposed Site Use

It is proposed that this site shall be rezoned as part of the Te Tai o Poutini Plan Process. The land will be rezoned from General Rural Zone and Rural Lifestyle Zone to Rural Residential Precinct Zone, Rural Lifestyle Zone and General Rural Zone.

2. Site Description

The site is located approximately 500 m to the South of Buller Bay in Cape Foulwind. The site is undulating with several gullies and channels running through the property and comprises a total area of approximately 100 ha. The property is bounded by Rural Residential land in all directions. The site is currently proposed to be zoned by Buller District Council as 'General Rural' and 'Rural lifestyle'

Site identification details are provided in Table 2.

Table 2. Environmental setting

Site Name	Title 747162, Tauranga Bay
Current land use	Rural Residential (25% produce)
Neighbouring land use	Northwest: Rural Residential Northeast: Rural Residential Southwest: Rural Residential, quarry Southeast: Rural Residential
District plan zoning	General Rural Zone and Rural Lifestyle Zone
Geology	GNS ⁴ has mapped the area as 'OIS5 (Late Pleistocene) ocean beach deposits'
Surface water	A few surface streams were present on the property, noted as flowing to the northwest and then turning to the north.
Groundwater	There are presently no groundwater records on the New Zealand Geotechnical Database (NZGD) which are within the vicinity of this site.
Topography	The topography is undulating with several gullies across the property.

⁴ Forsyth et al. (compilers) 2008, modified for Heron (custodian) 2018, 2020. Retrieved from <https://data.gns.cri.nz/>

3. Historical Site Use

3.1. Review of Council Information

3.1.1. Selected Land Use Register (SLUS)

The SLUS is a database containing records of contaminated, potentially contaminated and remediated (previously contaminated) sites in Canterbury. It is not an exhaustive database, i.e., an unregistered site does not confirm that there have never been any HAIL activities undertaken on the site in the past.

This property is not listed on the SLUS.

3.1.2. BDC Property Files

The Buller District Council does not have any property records for this site.

3.2. Review of Aerial Photographs

Aerial images from the Retrolens and Google Earth were reviewed to identify previous land-uses and potential HAIL activities between 1940 and 2021. The reviewed images are attached in Appendix A and the observations are summarised in Table 3.

Table 3. Reviewed aerial images (source: Google Earth, Retrolens).

Aerial date	Land use, site features, identified HAIL area(s)
1951 (Retrolens)	No HAIL activities identified.
1974 (Retrolens)	No HAIL activities identified.
1988 (Retrolens)	No HAIL activities identified.
2003 – 2005 (Google Earth)	No change to site.
2012 – 2022 (Google Earth)	No change to site.

3.3. Owner Interview

An owner interview was carried out via email correspondence) in August 2022. The following was noted:

- The property was purchased from Landcorp in February 2022. Landcorp had owned the property for many years prior to this before they subdivided it off.
- The farm has been used as a sheep and cattle farm.
- No contamination activities were identified in the owner interview.

A copy of the owner interview is attached as Appendix B.

4. Eliot Sinclair's Site Walkover – May 2022 and August 2022

A PSI walkover was undertaken to examine any visual signs of contamination on the property. The following was noted:

- Large shed that contained hay and had a dirt floor.
- Timber fence posts and other farm materials located in the southeast area of the property.
- The dirt tracks appear to be for tractor usage between paddocks (possibly for moving livestock).
- Several stockpiles noted to the east of the residential dwelling. These appear to be cleared vegetation.
- A small amount of scrap metal was found in one of the vegetation piles.
- A small burn pad was present just outside of the separate house lot. It is unclear if the burn pad is located on the property in question or within the title of the neighbouring house. It is located in an area fenced off from the property in question and appears to be maintained by the neighbouring property owner.
- The site is undulating with drainage channels, shallow gullies, and large areas of flat land. Ground very soft and swampy, several puddles present on the surface.
- No signs of contamination in the northern lot (Section 2 SO 14304), or the southern lot (Sec 41 SO 13711)

Refer to Appendix C for the site photographs and Appendix B for a map of the property with field notes.

5. Preliminary Conceptual Site Model

A conceptual site model helps to identify whether or not a complete exposure pathway exists. An exposure pathway must include a contaminant source, a transport mechanism and a receptor. If one of these components does not exist, or can be removed, then the exposure pathway is incomplete. If the exposure pathway is incomplete, then there is little risk to human health at the specified location.

As no HAIL activities were identified on the site, there is no source of contaminants and the exposure pathway is incomplete..

6. Determining resource consent requirements under the NESCS

An assessment (Table 4) to determine the resource consent requirements for activities involving subdivision or change of land use under the NESCS has been completed using Figure 3. This flow chart has been sourced from the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health User's Guide.

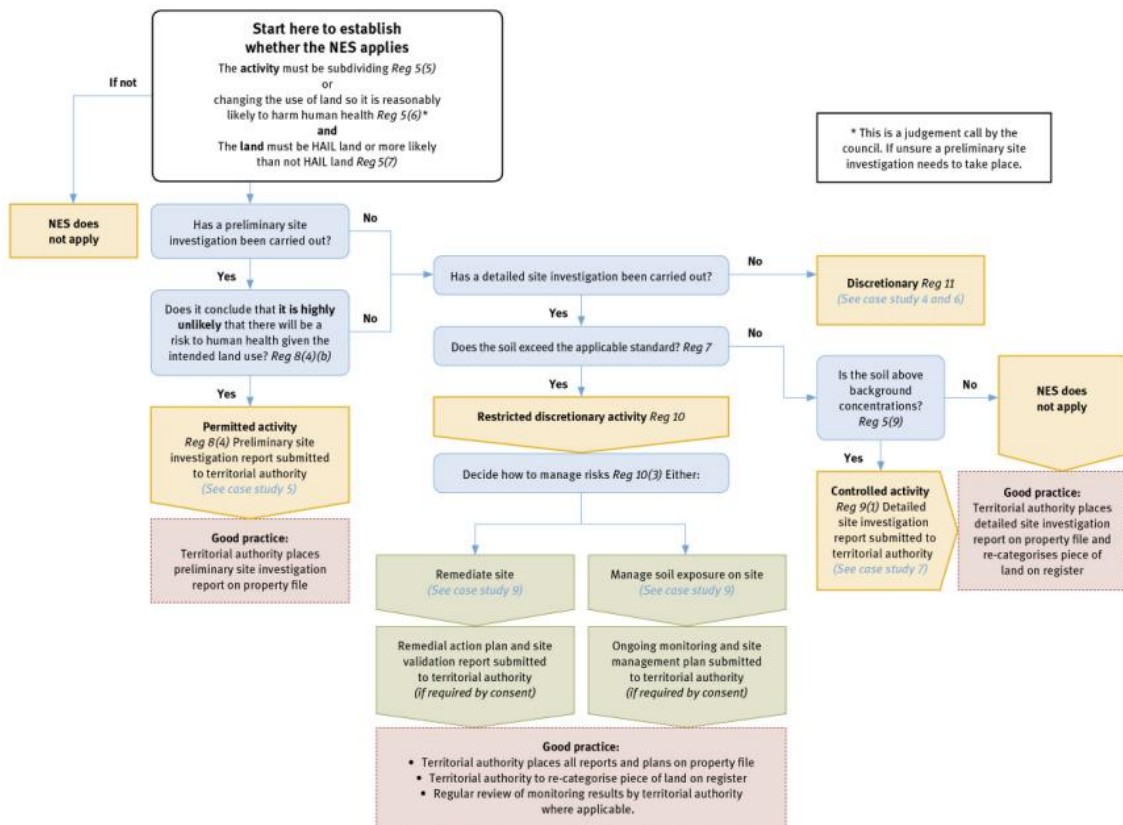


Figure 3. Reporting and consent requirements for activities involving subdivision or change of land use (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health User's Guide, 2012)

Table 4. Assessment of NES resource consent requirements

Step	Description	Comments
1	Is the activity covered by the NES? Reg 5(2) - 5(6) A	Yes, change in land use and eventual subdivision
2	Is the land covered by the NES? Reg 5(7) – 5(9); reg 6	Initial assessment was not sure, so a PSI was completed.
	A preliminary site investigation (PSI) can establish if:	
3	<ul style="list-style-type: none"> a) It is more likely than not a HAIL site Reg 5(7)c; Reg 6(3) b) It is highly unlikely that there will be a risk to human health if the activity is done Reg 8(4). 	No HAIL activities were identified on the site. It is highly unlikely that there will be a risk to human health if the activity is done.

Because the requirements of Reg 8(4) of the NESCS are met, the activity is **permitted** under the NESCS.

7. Conclusions and Recommendations

This PSI is based on a desktop investigation of various records and a site walkover:

- It is highly unlikely that this activity will pose a risk to human health.
- No further actions are required as it is highly unlikely that there is a risk to human health at this site.
- It is recommended that if any unusual or contaminated materials are encountered during any future site works within the site that the requirements of the Accidental Discovery Protocol provided in this report are followed. This can be addressed at future development as required.

8. Accidental Discovery Protocol

It is recommended that if any unusual or contaminated materials are encountered during any future site works within the site that the requirements of the Accidental Discovery Protocol provided are followed.

If any of the following materials are encountered during any future earthworks, such as:

- Stained or odorous soil (e.g., black, green, grey; or smells of rotting organic material, petroleum hydrocarbons or solvents)
- Slag, ash, charcoal
- Rubbish comprising putrescible waste, or hardfill, or treated timber, or agrichemicals, etc
- Potential asbestos containing-material (for example fragments from cement fibre sheets, or loose fibres from insulation, etc.)

Then we recommend:

- Excavation and earthworks cease, the site secured to stop people entering the area where potential contamination was encountered, and then:
- Contact a contaminated land specialist for further advice. If required, **Eliot Sinclair (03) 379 4014** can inspect the area, assess the material determine if it is contaminated or hazardous, and then determine a practical course of action.

This report does not relieve contractors of their responsibilities under the Health and Safety at Work Act 2015. Site conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes, at their own expense.

Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a preliminary site investigation report.

The report is based on:

- Desktop Review
- Site Walkover Inspection carried out in May and August 2022
- Site owner interview
- Available Council Records

Where data supplied by Tauranga Bay Holdings Ltd or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. However, the activities described on the HAIL may change in the future as knowledge about potentially hazardous activities develops over time. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of subsurface conditions and available data, to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Variations in conditions may occur between investigatory locations and there may be conditions such as subsoil strata, contaminants, and features that were not detected by the scope of the investigation that was carried out or have been covered over or obscured over time. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, or any update to the Building Act, NZBC or MBIE's Guidance may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of Tauranga Bay Holdings Ltd and the Christchurch City Council for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. Historical Aerial Imagery

Retrolens

1951



1974



1988



Google Earth

2003



2012



2017



2019



2022



Appendix B. Owner Interview

From: Tom McGaveston <tom.mcgaveston@inforceglobal.com>
Sent: Saturday, 13 August 2022 5:36 pm
To: Anthony Fisher <anthony@susant.co.nz>
Cc: crawfordf99@gmail.com; Karen Clifford <ge.kd@outlook.com>
Subject: RE: [#510783] Title 747162, Tauranga Bay - Owner Interview

Answers below, but not very helpful sorry...

1. How many years have you owned the property for? **We purchased it from Landcorp in Feb 2022 – this year. It had been in Landcorp ownership for many years prior to that. It is a small piece that they decided to cut off.**
2. Have there ever been any land uses aside from Rural Residential that you are aware of? **Has always been rural**
3. Are you aware of any potentially contaminating activities that have taken place on the property by yourself or the previous owners? (e.g. pesticide use, burning of rubbish, bulk fuel storage, etc.) **No, has been owned by the government farm (landcorp, now Pamu) and has always been a sheep and beef property**
4. Are you aware of any fill materials being used on the property? If so, do you know where they were sourced from? **No**
5. There were some stockpiles of material present in the southern lot. We identified that several of these were vegetation/removed trees. Can you confirm if any other materials are currently being stockpiled on the site. **Not aware of any**
6. Have there been any other historical stockpiles on the property that you are aware of? **Not that we are aware of**
7. Has there ever been a sheep dip or spray race operations on the property? **Races are flat concrete, so unlikely to have done sheep dipping there**
8. Are you aware of any asbestos-based materials being used on this property? **No**

We have reviewed historical imagery of the property and noticed a large, vegetated area, as shown below: **Not sure what that would be but highly unlikely to be an orchard considering the climate**

Appendix C. Site Photographs











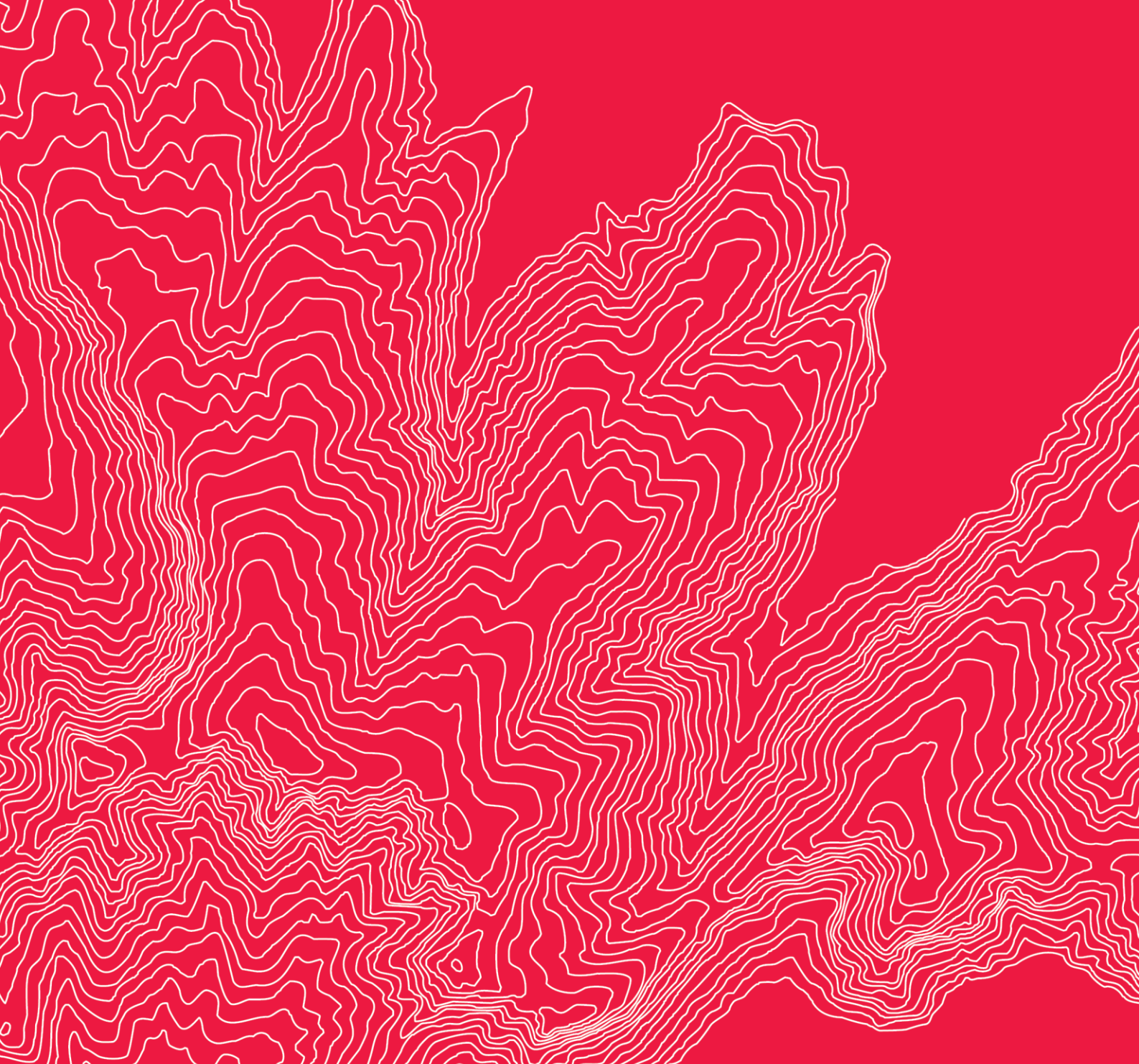








Appendix B: Technical Report



Technical Report – TPP Zone Change

**Sec 2 SO 14304, Sec 41 SO 13711, Lot 1
DP 19769 & Lot 1 DP 12325**

Prepared for Tauranga Bay Holdings
510783

**eliot
sinclair**

Technical Report – TTPP Zone Change

Sec 2 SO 14304, Sec 41 SO 13711, Lot 1 DP 19769 & Lot 1 DP 12325

Prepared for Tauranga Bay Holdings

510783

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
Prepared by:	Shannon Hopkins Survey Technician		19 September 2022
Reviewed by:	Stuart Challenger Civil Engineer Branch Manager, Hokitika BE NatRes BSc CMEngNZ CPEng		18 October 2022
Directed and approved for release by:	Claire McKeever Resource Management Planner Associate BSurv(Hons) MS+SNZ MNZPI claire.mckeever@eliotsinclair.co.nz		3 November 2022
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Contents

1. Introduction	5
1.1. Scope of Works	5
2. Site Description	5
2.1. Legal Description	5
2.2. Proposed Plan Zone Change	6
2.3. Geology	7
2.4. Topography	7
3. Geotechnical Investigation	8
3.1. Investigation of Sec 41 SO 13711	8
3.2. Investigation of Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325	8
3.3. Geotechnical Summary	12
3.4. Geotechnical overview by Area	12
4. Natural Hazards	13
4.1. Earthquake Shaking	13
4.2. Earthquake Fault Rupture	14
4.3. Liquefaction	14
5. Foundation Recommendations	14
6. Infrastructure Requirements	15
6.1. Potable Water	15
6.2. Stormwater	15
6.3. Wastewater	15
6.4. Vehicle Access	15
6.5. Power Reticulation	16
6.6. Telecommunications	16
7. Conclusion	17
Figure 1. Figure showing location of site (Eliot Sinclair, 2022)	5
Figure 2. Intended zoning of site under the TTPP (draft TTPP 2022, https://westcoast.isoplan.co.nz/eplan/)	6
Figure 3. Geology of the area (Geology of the Greymouth Area, Institute of Geological and Nuclear Sciences, 2002, Pg 12)	7
Figure 4. Aerial photo showing vegetation on site and gullies running through the site	8
Figure 5. Aerial of the site indicating the areas investigated (Eliot Sinclair, 2022).	9

Figure 6.	Test location areas investigated (Eliot Sinclair, 2022)	9
Figure 7.	Test location areas investigated (Eliot Sinclair, 2022)	10
Figure 8.	Test location areas investigated (Eliot Sinclair, 2022)	10
Figure 9.	Test location areas investigated (Eliot Sinclair, 2022)	11
Figure 10.	Additional test pits undertaken on 8th August 2022	11
Figure 11.	Spark 4G coverage in the area (https://www.spark.co.nz/shop/mobile/network/)	16
Figure 12.	Vodafone Rural Broadband coverage (https://www.vodafone.co.nz/network/coverage/)	17
Table 1.	Summary of depth to iron pan encountered in each area investigated	12
Appendix A.	Site photographs	

1. Introduction

1.1. Scope of Works

Eliot Sinclair has been engaged by Tauranga Bay Holdings Ltd to undertake a geotechnical investigation on Section 41 SO 13711, Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325, Tauranga Bay Road, Cape Foulwind. The purpose of the investigation was to:

- Assess the site's environmental hazards to determine site suitability for future development, to support an application for a zone change in relation to the proposed Te Tai Poutini Plan.
- Investigate the shallow ground conditions to determine minimum foundation requirements for future dwellings.
- Provide information in relation to the provision and availability of services to the site.

2. Site Description

2.1. Legal Description

The legal description of the sites is Section 41 SO 13711, Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325. The sites are all held in one record of title at present being RT 747162. The four sites have a total area of nearly 100 ha. (Note that the whole of the RT is not included as there is a current subdivision application in progress for Sec 39 SO 13711) The sites are located on the south-eastern side Tauranga Bay Road and front Wilsons Lead Road, extending approximately 380m on either side of the road from the turn off. The site is in Cape Foulwind, which is roughly 12km west of Westport. Figure 1 below illustrates an overview of the site location.



Figure 1. Figure showing location of site (Eliot Sinclair, 2022)

2.2. Proposed Plan Zone Change

The sites are at present located within the Rural Environment Zone under the operative District Plan.

The proposed Te Tai Poutini Plan (TPPP) shows the intended zoning of the site as Rural Lifestyle and General Rural Zone. There is proposed areas of Rural Residential located to the north and west of the site. This technical report is being undertaken to provide supporting information in relation to rezoning areas of the site as Rural Residential. Figure 2 below is an overview of the proposed zoning from the TPPP.

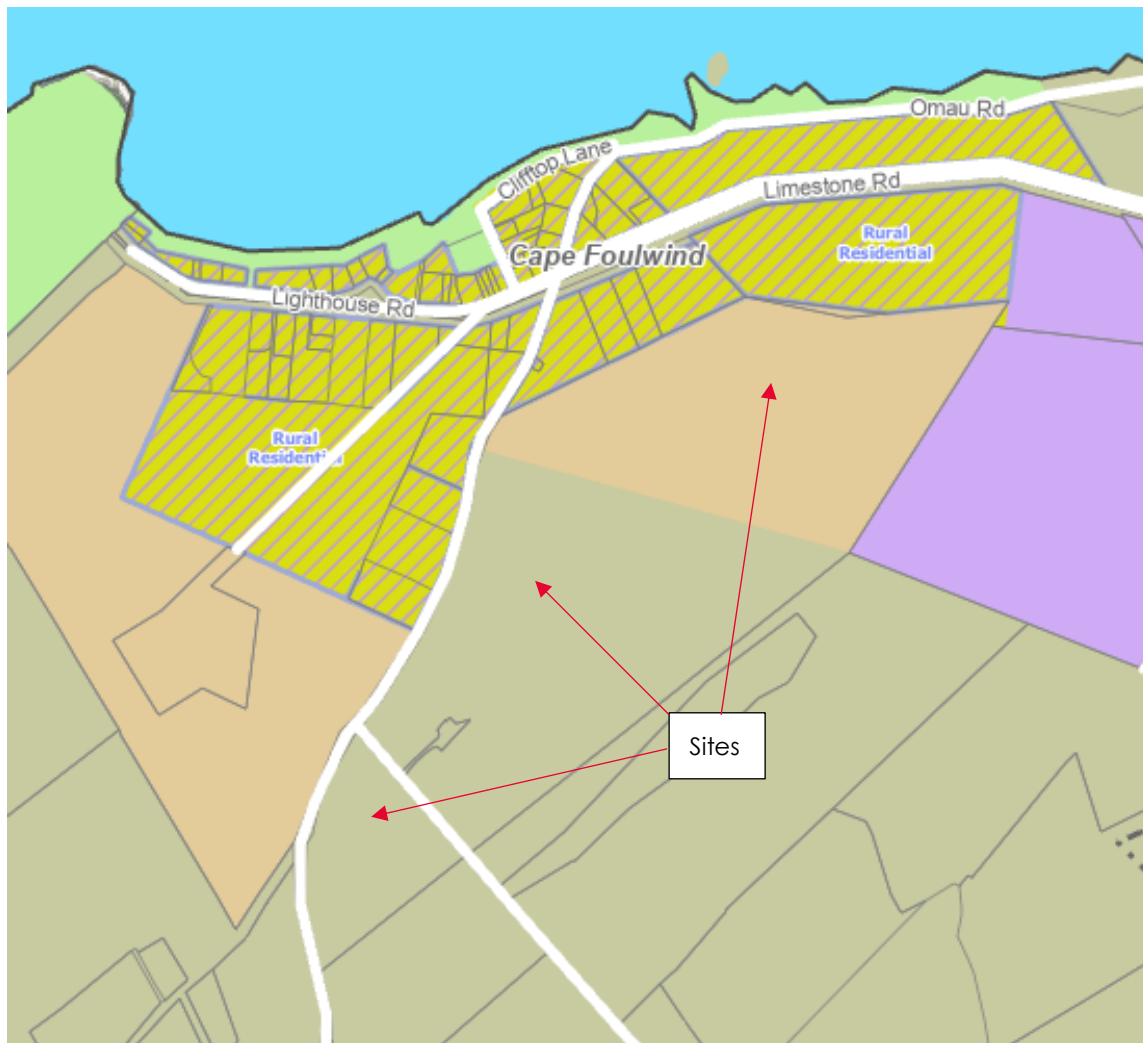


Figure 2. Intended zoning of site under the TPPP (draft TPPP 2022, <https://westcoast.isoplan.co.nz/eplan/>)

2.3. Geology

Geological mapping¹ of the area notes the site is underlain with Late Pleistocene shoreline deposits (Q5b) consisting of marine sand and gravel.

The GNS database² indicates the closest active fault is the Lower Buller Fault, which lies approximately 13.5km to the south-east, the Alpine Fault is located approximately 89km to the south-east of the site. The area is in the NZS3604: 2011 Zone 3 earthquake rating zone.

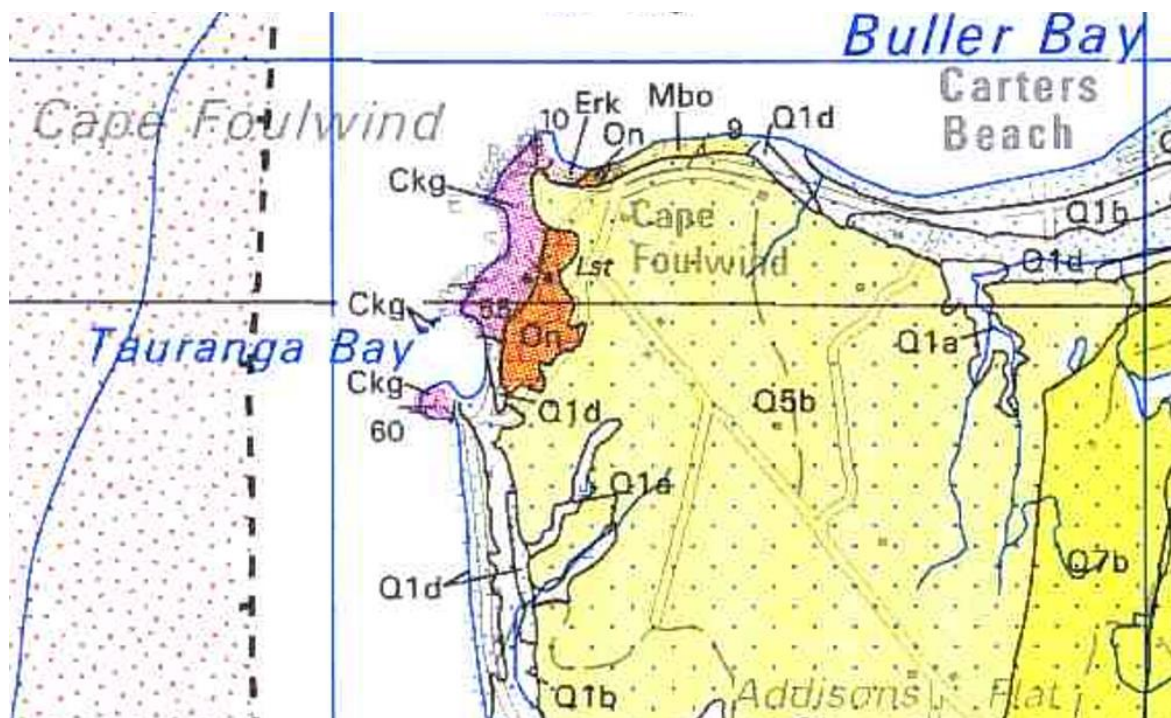


Figure 3. Geology of the area (Geology of the Greymouth Area, Institute of Geological and Nuclear Sciences, 2002, Pg 12)

2.4. Topography

The site is large with a total area of nearly 100 ha. It has been cleared and is in rough pasture. The site is undulating with drainage channels, shallow gullies, and large areas of flat land, being the areas that have been investigated in relation to the future rural residential type of use of the sites. Figure 4 below is an aerial overview of the sites.

¹ Nathan, S., Rattenbury, M.S., Suggate, R.P. (compilers) 2002. Geology of the Greymouth area. Institute of Geological and Nuclear Sciences 1: 250 000 geological map 12. 1 sheet + 58p. Lower Hutt, New Zealand. Institute of Geological and Nuclear Sciences Limited

² <https://data.gns.cri.nz/af/>



Figure 4. Aerial photo showing vegetation on site and gullies running through the site

3. Geotechnical Investigation

Two separate geotechnical investigations have been undertaken over the sites. An in-depth investigation has been undertaken on Sec 41 SO 13711 (ES Job No 510322) as it is likely to form the initial subdivision application in the future for the sites. A further broader investigation has been undertaken on Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325 being the sites located on the north side of Wilsons Lead Road to allow for reporting in support for a zone change.

An Investigation has also previously been undertaken on Sec 39 SO 13711 (ES Job No. 510402) which indicates the presence of Iron Pan at shallow depths east of the site.

3.1. Investigation of Sec 41 SO 13711

On the 3rd May 2022 we undertook our geotechnical site investigation which consisted of a site walkover, sixteen scala penetrometer tests, and the inspection of twelve machine dug test pits. The full Site Investigation Records can be found in Appendix B. Our testing was undertaken in fifteen locations, labelled A – O and illustrated in Figure 5, and through Figures 6 - 9.

3.2. Investigation of Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325

On the 8th August 2022 a geotechnical site investigation was undertaken to support the application for a zone change, this investigation included a site walkover, five machine dug test pits and measurement of percolation rates in two of the test pits. Due to the nature of the previous investigation on Sec 41 SO 13711 and another investigation on Sec 39 SO 13711 also undertaken for Tauranga Bay Holdings, this broader investigation allowed us to make informed recommendations on the site for future rural residential use. The location of our test pits can be found in Figure 10, labelled P – T.

The two Falling Head Permeameter tests were undertaken at locations P & Q.

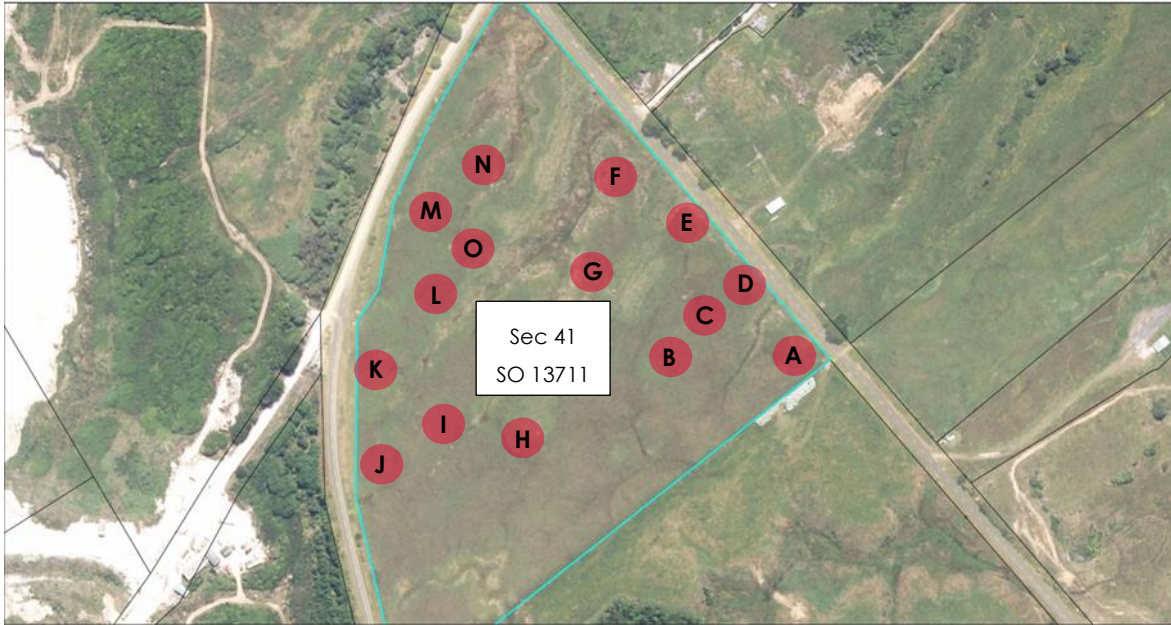


Figure 5. Aerial of the site indicating the areas investigated (Eliot Sinclair, 2022).



Figure 6. Test location areas investigated (Eliot Sinclair, 2022)



Figure 7. Test location areas investigated (Eliot Sinclair, 2022)



Figure 8. Test location areas investigated (Eliot Sinclair, 2022)



Figure 9. Test location areas investigated (Eliot Sinclair, 2022)

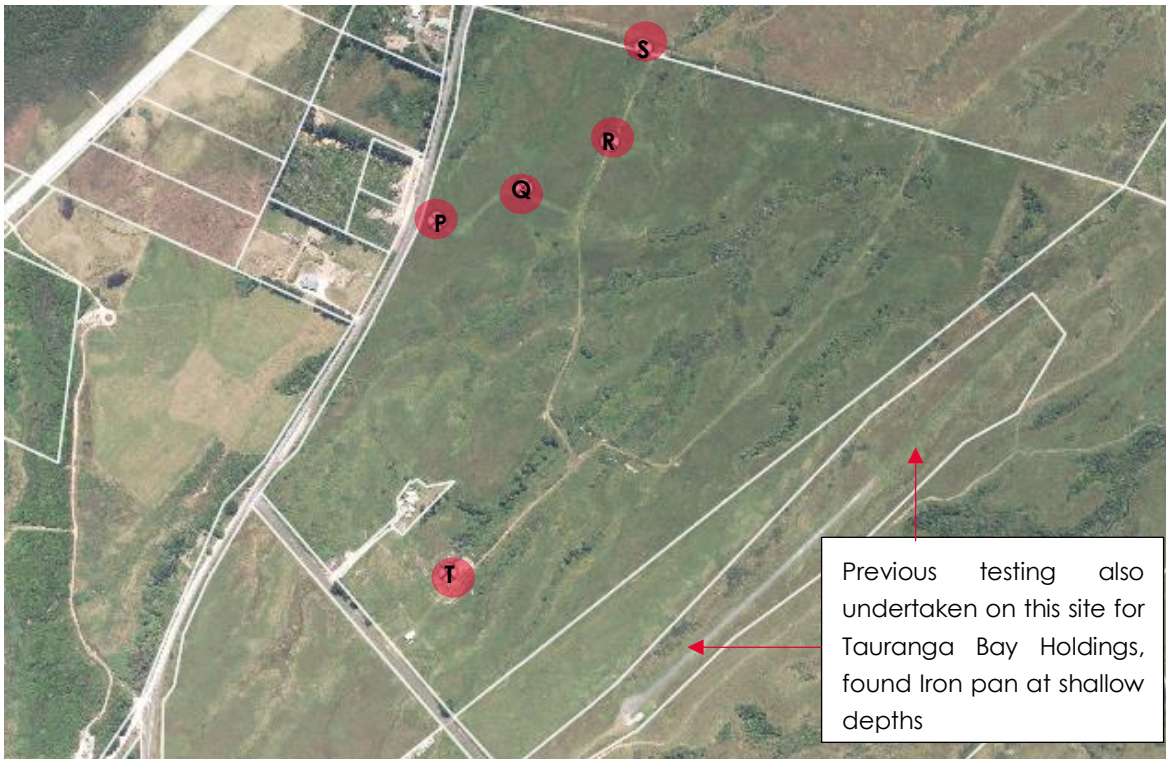


Figure 10. Additional test pits undertaken on 8th August 2022

3.3. Geotechnical Summary

3.3.1. Iron pan

From our geotechnical investigation we confirm the presence of shallow iron pan underlies the site which was encountered at each of the fifteen locations investigated on Sec 41. Iron pan was also found at shallow depths for all 5 additional Test Pits. (P – T) The iron pan was encountered at depths ranging between 0.2m – 1.55m below the existing ground level. Under the iron pan layer was dense sand which can provide strong bearing capacity greater than “Good Ground” requirements as defined in NZS3604: 2011.

Iron Pan was also located at shallow depths for the previous testing undertaken for Tauranga Bay Holdings on Sec 39 SO 13711, east of the sites and shown in Figure 10 above.

3.3.2. Groundwater

Test pits ranged in depths of between 1.4m and 2.9m below the existing ground level and groundwater was not encountered in any of the test pits.

3.4. Geotechnical overview by Area

Table 1. Summary of depth to iron pan encountered in each area investigated

Area	Test no.	Test pit depth to iron pan	Scala depth to iron pan	Depth of test pit
A	01, 02	0.6m	0.7m – 0.9m	2.2m
B	03, 04	0.45m	0.4m – 0.6m	2.4m
C	05	-	0.6m	-
D	06	0.2m	-	2.0m
E	07	1.2m	1.2m	2.3m
F	08	0.2m	0.25m	1.4m
G	09	0.3m	0.3m	2.2m
H	10	0.35m	0.4m	2.2m
I	11	0.5m	0.45m	2.2m
J	12	1.55m	1.5m	2.9m
K	13	0.8m	0.6m	2.2m
L	14	0.4m	0.4m	2.0m
M	15	0.3m	0.25m	2.0m
N	16	-	0.55m	-
O	17	-	0.3m	-
p	18	0.3m	-	2.8m
Q	19	0.4m	-	2.8m

Area	Test no.	Test pit depth to iron pan	Scala depth to iron pan	Depth of test pit
R	20	0.9m	-	1.2m
S	21	0.8m	-	2.0m
T	22	Surface	-	2.0m

4. Natural Hazards

At the time of a future subdivision application for these sites council can refuse subdivision consent if there is a significant risk from natural hazards. To determine whether there is a significant risk from natural hazards, decision-makers are guided by the requirements of RMA Section 106(1A). This requires a combined assessment of:

- The likelihood of natural hazards occurring (whether individual or in combination).
- The material damage that would result from natural hazards to land where the consent is sought, neighbouring land, or structures.
- Any likely subsequent use of the land where the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in the previous point.

Decision-makers are required to consider the magnitude of risk of natural hazards, including natural hazards that have a high impact but low probability of occurrence. This aligns the assessment with the definition of 'effect' Section 3 of the RMA.

The RMA defines natural hazards as: *Any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslide, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.*

Hazard identification is a key component of any site-specific risk assessment. The risk assessment for relevant natural hazards at the site is presented below, which considers the likelihood and consequences of the hazard at the site in the context of the proposed activity (future rural residential subdivision) as compared against the current site context.

We have considered the risk of subsidence, falling debris, erosion, tsunami, land slippage, sedimentation, wind, drought, fire, geothermal activity, climate change, sea level rise, and volcanic activity and conclude these are very unlikely to pose an unacceptable risk to life at this site.

In relation to other potential natural hazards, we comment as follows.

4.1. Earthquake Shaking

NZ is a seismically active country. New buildings and infrastructure will be designed, consented, and built to acceptable industry standards and New Zealand Building Code requirements and as such will be designed for any likely shaking as detailed in the current design codes, which will address the risk.

4.2. Earthquake Fault Rupture

There are no recorded active fault traces across the site. The site is not located within a fault hazard area or fault avoidance zone. The closest active fault is the Lower Buller Fault, which lies approximately 13.5km south-east of the site.

4.3. Liquefaction

The site is classified in the West Coast Regional Liquefaction Assessment³ as being in an area where liquefaction damage is unlikely. The site is underlain with Late Pleistocene shoreline deposits (Q5b) consisting of marine sand and gravel. This composition, which was confirmed onsite during our geotechnical investigation, is not considered susceptible to liquifying and therefore we consider there to be negligible risk of damage caused by liquefaction from a seismic event.

5. Foundation Recommendations

Based on our geotechnical investigation, we consider the shallow iron pan can provide bearing capacity in excess of that required for "Good Ground" as defined in NZS3604: 2011. Our testing confirms the twenty areas we undertook our testing are appropriate building areas. The iron pan layer in these areas investigated was encountered between the surface and 1.55m below the existing ground level.

For each of the twenty areas we investigated; A – T, we recommend That foundations in accordance with NZS3604: 2011 be used. We do not recommend the use of driven timber piles because of the iron pan layer, which may stop the piles reaching the required minimum depth, plus Area J (test 12) did not meet the requirements for driven timber piles.

Where the iron pan was encountered within the top 600mm from the surface, we consider foundations which extend into the Good Ground we consider the iron pan layer be used. We anticipate this to be the case for areas B, C, D, F, G, H, I, L, M, N, O, P, Q and T.

In the areas where the iron pan layer was encountered deeper than 600mm from the existing ground level, we recommend a gravel raft into which NZS3604: 2011 foundations can be used. Excavation to the iron pan will be required and backfilled with compacted clean sandy gravels. We anticipate this to be the case for areas A, E, J, K, R and S.

³ Beca Limited. West Coast Regional Liquefaction Assessment, 1 November 2021

6. Infrastructure Requirements

6.1. Potable Water

There is no Council reticulated water available to the site. Rainwater tanks will be required for water supply for the site. We recommended that a leaf diverter and a first flush diverter be installed.

When establishing the roof water tanks it is important that the requirements of SNZ PAS 4509: 2008 are followed. These requirements will depend on the subdivision layout and can be established following change in zoning.

6.2. Stormwater

There are no Council storm water drains in the local area, stormwater overflow from the rainwater tanks will need to be discharged appropriately without causing erosion or ponding. If onsite stormwater disposal is required, the underlying iron pan is a limiting infiltration layer and will need to be considered.

Once the iron pan layer was broken, soakage was found within the underlying sands. The Falling Head infiltration testing undertaken found soakage of between 200mm/hr and 300mm/hr (2.8m deep test pits). We consider that stormwater soak pits can be designed using a conservative soakage rate of 100mm/hr, lowest value and using a safety factor of two.

There is several existing drains and gullies on site that can also be used to manage the flow of stormwater.

6.3. Wastewater

There is no Council sewer available to the site. Onsite wastewater treatment and disposal will be required. Whilst our test pits did not encounter groundwater within 3.0m of the ground surface, the falling head infiltration test showed an indicative permeability of between about 1 and 1.5m/day (using a safety factor of between 3 and 5 plus multiplying by 24hrs to get metres per day). From the test pits which show dense sands and the infiltration rate we assess the soils to be massive loams with a soil category of 3.

The design of any on-site wastewater system should be undertaken in accordance with AS/NZS1547: 2012 for massive loam with a soil category of 3.

The operative district plan and draft TTPP have minimum areas for non-sewered sites (1500m² and 1000m² respectively) it would be expected that any future lots have areas more than these minimum requirements to ensure sufficient space on-site to treat wastewater.

6.4. Vehicle Access

There is currently access to the sites from both Wilsons Lead Road and Tauranga Bay Road. There is a location approximately 30m south of the existing access on Tauranga Bay Road to Lot 1 DP 19769 where sight distance of more than 300m can be achieved in both directions. The existing site accesses either side of Wilsons Lead Road also have good sight distances, see attached photos in Appendix A showing sight from existing or proposed accesses.

It is expected that any future accesses to the site will be designed and built to meet the required access standards dependent on the number of allotments serviced.

6.5. Power Reticulation

Communications with Buller Network have confirmed that the 11kv line running in front of and adjacent to the sites has sufficient capacity to supply future subdivisions of a rural-residential nature, specific design would be required for each individual future subdivision dependent on layout.

6.6. Telecommunications

There is Chorus telecommunications running underground along both Tauranga Bay Road and Wilsons Lead Road. Due to the rural – residential nature of the site future subdivisions would possibly look at facilitating telecommunications via cellular coverage and satellite internet/phone reducing the need for terrestrial connections. There is a large selection of providers for both cellular phone coverage and wireless broadband. See Figures 11 and 12 below for Spark and Vodafone coverage in the area.

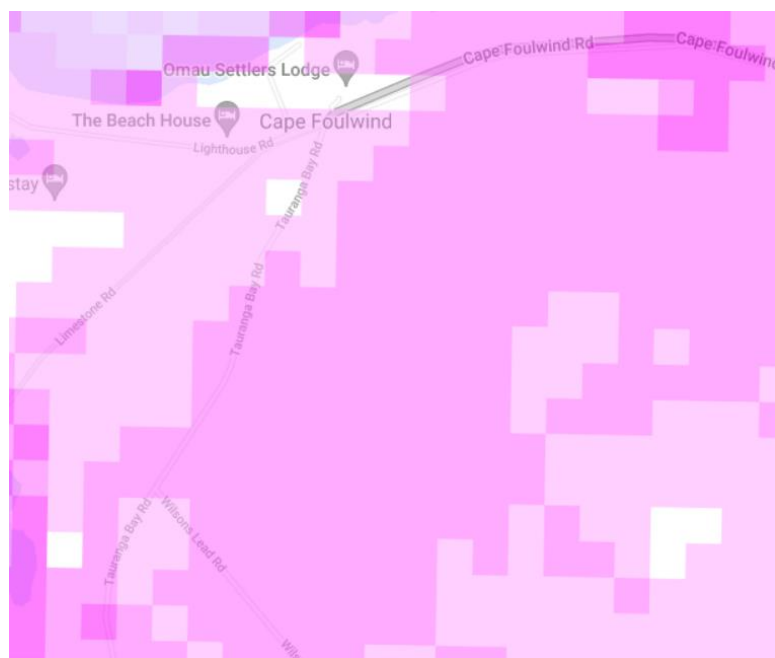


Figure 11. Spark 4G coverage in the area (<https://www.spark.co.nz/shop/mobile/network/>)

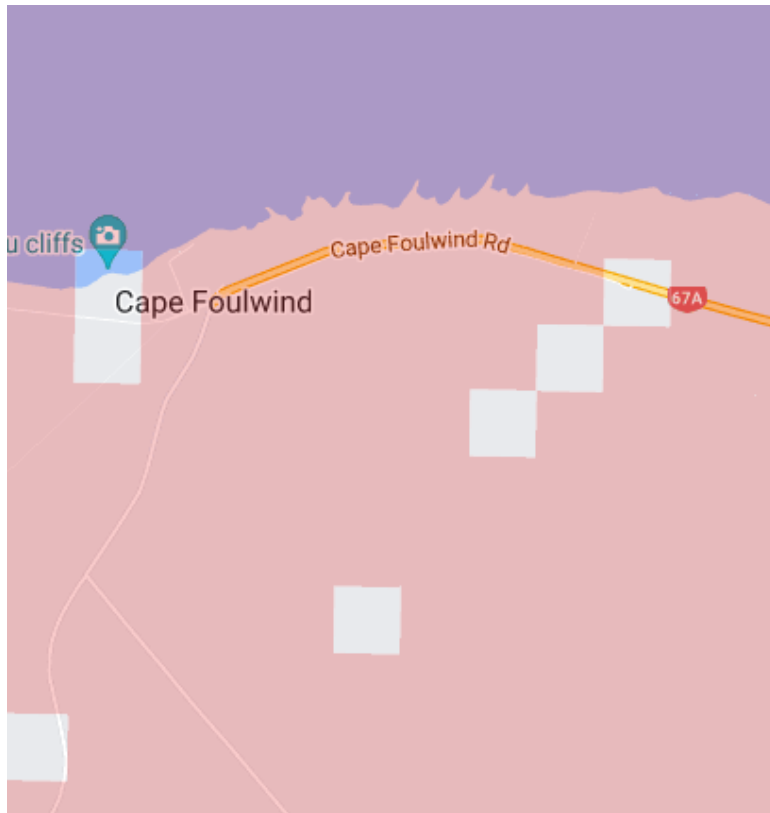


Figure 12. Vodafone Rural Broadband coverage (<https://www.vodafone.co.nz/network/coverage/>)

7. Conclusion

Based on our geotechnical investigation, we consider Section 41 SO 13711, Sec 2 SO 14304, Lot 1 DP 19769 and Lot 1 DP 12325 Tauranga Bay and Wilsons Lead Road are suitable for subdivision with allotments of a rural-residential nature being possible.

We recommend that new building foundations be in accordance with NZS3604: 2011 and extend into the Good Ground either with deep foundations or in conjunction with a gravel raft.

We do not consider the site will be subject to any natural hazards and will not create any hazards if developed under the direction of suitably qualified individuals. It is expected that any future subdivision applications will provide site specific engineering reports dealing with natural hazards and foundation requirements.

Disclaimer

This report has been prepared by Eliot Sinclair & Partners Limited ("Eliot Sinclair") only for the intended purpose as a technical supporting documentation for a resource consent application.

The report is based on Eliot Sinclair desk top review and site investigation of 14 July 2022. In addition, we have considered information from the Institute of Geological and Nuclear Sciences 1: 250 000 geological map 12 and the Te Tai o Poutini Plan.

Where data supplied by Tauranga Bay Holdings or other external sources, including previous site investigation reports, have been relied upon, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Eliot Sinclair for incomplete or inaccurate data supplied by other parties.

Whilst every care has been taken during our investigation and interpretation of subsurface conditions to ensure that the conclusions drawn, and the opinions and recommendations expressed are correct at the time of reporting, Eliot Sinclair has not performed an assessment of all possible conditions or circumstances that may exist at the site. Variations in conditions may occur between investigatory locations and there may be conditions such as subsoil strata and features that were not detected by the scope of the investigation that was carried out or have been covered over or obscured over time. Eliot Sinclair does not provide any warranty, either express or implied, that all conditions will conform exactly to the assessments contained in this report.

The exposure of conditions or materials that vary from those described in this report, or occurrence of additional strong seismicity, or any update to the Building Act, NZBC or MBIE's Guidance may require a review of our recommendations. Eliot Sinclair should be contacted to confirm the validity of this report should any of these occur.

This report has been prepared for the benefit of Tauranga Bay Holdings and the Buller District Council. for the purposes as stated above. No liability is accepted by Eliot Sinclair or any of their employees with respect to the use of this report, in whole or in part, for any other purpose or by any other party.

Appendix A. Site photographs



Figure 1. Photo showing sight distance looking SW from likely access location to northern site off Tauranga Bay Road



Figure 2. Photo showing sight distance looking NE from likely access location to northern site off Tauranga Bay Road



Figure 3. Photo showing typical ground conditions on site, these surface conditions are expected where shallow iron pan limits surface water from draining away



Figure 4. Photo showing surface conditions if topsoil and iron pan is removed, creating dry land suitable for residential use



Figure 5. Photo of test pit at location P, underlying iron pan can be seen overlying sand



Figure 6. Photo of Falling Head Permeameter testing being undertaken



Figure 7. Photo of sight distance from access to Sec 41 along Wilsons Lead Road looking NW



Figure 8. Photo of sight distance from access to Sec 41 along Wilsons Lead Road looking SE