Land Specialists

Natural Hazard Assessment

12 Huna Road and 234A SH 30, Whakatane

Private Plan Change Request

September 2022

Report for:

12 Huna Road and 234A SH 30, Whakatane

Click here to enter text.

Our Ref: 30851-02

Prepared by: James Danby

S&L

97 Grey Street - Tauranga 3116

Telephone: 07 577 6069 - Fax: 07 577 6065 - E-mail info@sltga.co.nz

Shrimpton & Lipinski Ltd Partnership

Document Control Record

PROJECT RECORD

Client	JULIANS BERRY FARM
Project	12 Huna Road & 234A SH 30, Whakatane
S & L Project No.	20-30851-02
Document	Natural Hazard Assessment

ISSUE AND REVISION RECORD

Date of Issue	11/10/2022
Status	Draft Report
Originator	James Danby
Reviewed	Simon Parsons
Approved for Issue	Simon Parsons
Telephone	07 577 6069
Email	sparsons@sltga.co.nz

Table of Contents

LIST OF FIGURES

LIST OF TABLES

APPENDICIES

1.0 Introduction

1.1 Background

A plan change is proposed to rezone land located at 12 Huna Road and 234A State Highway 30, Whakatane (the site).

The site incorporates a land area of approximately 12ha.

The site is currently earmarked for residential use and development under the operative Whakatane District Plan through a Deferred Residential Zone and associated provisions.

The District Plan provisions anticipate that unlocking the full residential development potential of the land will be undertaken through a plan change process.

In response to growth and housing supply issues over the medium term the plan change proposes to change the zoning across the site to include both Residential Zone and Urban Living Zone.

1.2 Regional Policy Statement

Section 75(3) of the RMA requires a district plan (and therefore the plan change request) to give effect to the Bay of Plenty Regional Policy Statement (RPS).

The RPS includes a number of provisions that identify how a risk management approach is to be applied to land use planning within the region.

In particular the RPS identifies that where a proposal will change or intensify use of land that is 5ha or more then that proposal is required to undertake a natural hazard risk assessment.

The relevant policy is identified below:

> ***Policy NH 9B: Assessment of natural hazard risk at the time of subdivision, or change or intensification of land use before Policies NH 7A and NH 8A have been given effect to***
>
> Before a district or, where applicable, regional plan gives effect to Policies NH 7A and NH 8A, assess natural hazard risk associated with a development proposal to subdivide land or change or intensify land use using the methodology set out in Appendix L where:
>
> *a) The subdivision of land or the change or intensification of land use is proposed to occur on an urban site of 5 ha or more; or*
>
> *b) The relevant consent authority considers risk assessment appropriate having regard to:*
>
> *i) the nature, scale and/or intensity of the activity,*
>
> *ii) the location of the development site relative to known hazards,*
>
> *iii) the cumulative effect on risk of developments on sites less than 5 ha,*

iv) *the nature and extent of any risk assessment that may be required under, or incorporated within, the operative district or regional plan, except that the obligation to assess the risk of the natural hazard under this policy shall not arise where the risk derives from a geothermal hazard which is managed under this Statement's section 2.4 and the Geothermal Resources Policies and Methods.*

Policy NH 4B of the RPS also requires greenfield development to achieve a 'Low' level of risk.

1.3 Purpose

In response to the RMA and Policy NH 9B the purpose of this report is to undertake a risk hazard assessment in accordance with RPS requirements.

2.0 Site and Surrounds

2.1 Site and Context

The site incorporates a total area of 11.5ha of land located at the corner of Huna Road and State Highway 30. It includes two properties – 12 Huna Road and 234A State Highway 30.

Figure 1 - The site

12 Huna Road consists of the Julian's Berry Farm complex. The berry farm covers and extensive area with the majority of the land being divided up into for berry and citrus blocks. A large main building is located on the western boundary of the site which acts as a visitor centre / shop / café and accommodates the management, ablution and storage facilities

associated with the operational requirements of the farm. A large sealed carpark with access to Huna Road is located directly outside the main building.

234A State Highway 30 directly adjoins the eastern boundary of 12 Huna Road. This property contains a dwelling at the northern end and curtilage defined by lawn areas and mature trees.

Both properties are identified as having an underlying Deferred Residential Zone.

The majority of the site is flat with the notable exception being the elevated ridge along the northern boundary.

Figure 2 - Site contours

The majority of the site is surrounded by rural land use activities spread throughout the Rangitaiki plains and characterised by a mix of dairy and arable farming, associated dwellings and ancillary buildings. The surrounding plains are crossed by a number of local and state highway roads. State Highway 30 runs southwards towards State Highway 2, Edgecumbe and Kawerau. Further east State Highway 30 crosses the Whakatane River into the township and the wider local road network. The Pacific Coast Highway runs westwards toward Matata and western Bay of Plenty. The Pacific Ocean and open coastline lies to the north of the site.

Figure 3 - Site context

3.0 Risk Assessment

3.1 Assessment Methodology

Appendix L of the RPS prescribes a methodology for assessing the risk of natural hazards and quantifying the risk and likelihood of the natural hazard occurring. This uses a '6 Step' process to analyse and evaluate risk. Steps 1 – 4 apply a primary risk analysis relating to maximum risk determined by combining likelihood and consequence. Steps 5 – 6 apply a secondary analysis to assessing the consequences of the risk sufficient to determine an overall risk classification 'low', 'medium' or 'high'.

3.2 Hazard Susceptibility

Table 20 identifies the types of hazard to be assessed and also prescribes the likelihood of the event occurring (AEP).

Table 20[11] Likelihoods for risk assessment

Hazard	Column A: Likelihood for initial analysis+ AEP (%)#	Column B: Likelihood for secondary analysis+ AEP (%)#
Volcanic hazards (including geothermal)	0.1	0.2 0.005
Earthquake (Liquefaction)	0.1	0.2 0.033
Earthquakes (Fault rupture)	0.017	0.2 0.005
Tsunami	0.1	0.2 0.04
Coastal erosion	1	2 0.2
Landslip (Rainfall related)	1	2 0.2
Landslip (Seismic related)	0.1	0.2 0.033
Flooding (including coastal inundation)	1	2 0.2

Figure 4 - Table 20, Appendix L

The assessment below provides and initial analysis of how the natural hazards identified in Table 20 relate to the site i.e. the Hazard Susceptibility Area

3.2.1 Volcanic Hazards

Volcanoes produce a wide variety of hazards that can harm people and damage property nearby as well as hundreds of kilometres away. Hazards include widespread ashfall, very fast moving mixtures of hot gases and volcanic rock, and massive lahars.

In the Bay of Plenty Region there are four active volcanic centres: the Okataina Volcanic Centre, Pūtauaki (Mt Edgecumbe), Tuhua (Mayor Island) and Whakaari (White Island).

The closest volcanic centres to the site are the Okataina caldera and Pūtauaki which are located 24km – 30km to the south west of the site.

The Okataina Volcanic Centre is a caldera volcano and produces infrequent but large volcanic eruptions. The last eruption was in 1886 and created significant impacts in the region. Moderate to large eruptions usually occur every 700-3000 years.

Pūtauaki is a young, multiple vent complex near Kawerau. Geological evidence suggests much of the cone has grown in the last 5000 years, with recent eruptions dated around 2300-3100 years ago. No activity is apparent for 1850 years.

Given the distance of these volcanic centres from the site only ashfall hazard is considered relevant. However, ashfall is highly unlikely to compromise the functionality of future residential buildings on the site or result in loss of life and there volcanic hazard

3.2.2 Earthquake (liquefaction and fault rupture)

The liquefaction risk to the site has been subject to a geotechnical investigation report (GIR)[1]. The GIR also identifies the site lies in close proximity to the Edgecumbe fault line, which is located to the north of the site running is a north-east / south-west direction. The location of the fault line as shown on the regional council GIS is shown in Figure XX.

The GIR describes the Edgcumbe Fault as a normal fault with an unknown slip rate and a recurrence interval of less than 2000 years. Rupture of this fault was responsible for the magnitude 6.5 Edgcumbe earthquake in 1987[2].

Figure 5 - The site (yellow) and Edgecumbe fault line (red)

Following discussion with BOPRC staff it was confirmed[3] that the fault line did not extend underneath the site and there is limited risk to future development. That is on the basis that in the event of a fault line rupture occurring the movement would be on the fault trace out by Whaakari / White Island.

[1] ENGEO Geotechncial Investgaition Ref 20136.000.001, DATED 23 May 2022
[2] GIR, section 3.1
[3] BOPRC e-mail from Mark Ivamy to Paul Howard dated 18 February 2022

In regard to liquefaction the BOPRC GIS identifies the site as being subject to 'possible' liquefaction risk. The liquefaction and lateral spread risk associated the site has been assessed in the GIR

3.2.3 Tsunami

The site is identified by Bay of Plenty Civil Defence as being locate on the periphery of a 'yellow zone'. A yellow zone includes land that would need to be evacuated in the event of a maximum impact tsunami – modelled at up to 8.5m high.

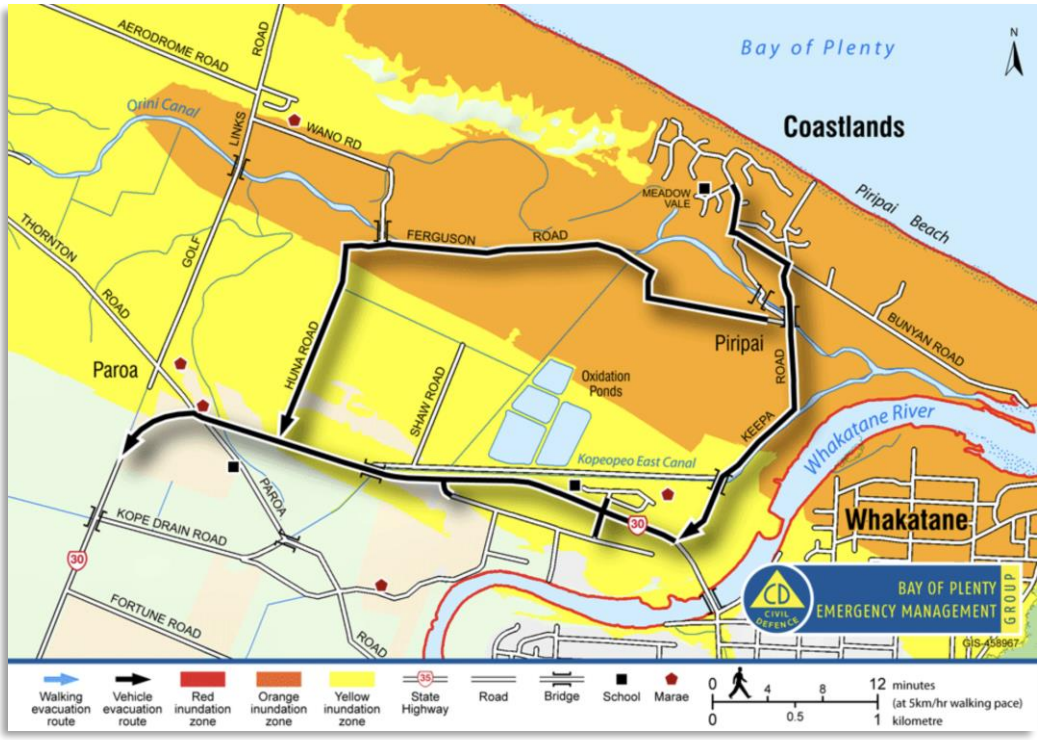

Figure 6 - Coastlands tsunami hazard and evacuation map

3.2.4 Coastal Erosion

The site is not located in an area subject to coastal erosion.

3.2.5 Landslip

The site is essentially flat and there no slip hazards have been identified in the GIR.

3.2.6 Flooding

The southern part of the site contains areas prone to flooding as identified in Appendix XXX of the Whakatane District Plan.

3.2.7 Summary

The initial screening of natural hazards above identifies the site is potentially susceptible to:

- Volcanic ashfall

- Tsunami
- Liquefaction
- Flooding (intense rainfall events)

3.3 Hazard Consequence

3.3.1 Assessing consequence

Table 21, Appendix L of the RPS identifies the consequence level for a hazard event. The overall consequence for a given hazard event is determined by taking the highest consequence level calculated for the assessed return periods.

Consequence level	Built			Lifelines utilities	Health & safety
	Social/cultural	Buildings	Critical buildings		
Catastrophic	≥25% of buildings of social/cultural significance within hazard assessment area have functionality compromised.	≥50% of buildings within hazard assessment area have functionality compromised.	≥25% of critical buildings within hazard assessment area have functionality compromised.	A lifeline utility service is out for > 1 month (affecting ≥ 20% of the town/city population) OR out for > 6 months (affecting < 20% of the town/city population).	>101 dead and/or >1001 injured
Major	11–24% of buildings of social/cultural significance within hazard assessment area have functionality compromised.	21–49% of buildings within hazard assessment area have functionality compromised.	11–24% of critical buildings within hazard assessment area have functionality compromised.	A lifeline utility service is out for 1 week – 1 month (affecting ≥ 20% of the town/city population) OR out for 6 weeks to 6 months (affecting < 20% of the town/city population).	11–100 dead and/or 101–1000 injured
Moderate	6–10% of buildings of social/cultural significance within hazard assessment area have functionality compromised.	11–20% of buildings within hazard assessment area have functionality compromised.	6–10% of critical buildings within hazard assessment area have functionality compromised.	A lifeline utility service is out for 1 day to 1 week (affecting ≥ 20% of the town/city population) OR out for 1 week to 6 weeks (affecting < 20% of the town/city population).	2–10 dead and/or 11–100 injured
Minor	1–5% of buildings of social/cultural significance within hazard assessment area have functionality compromised.	2–10% of buildings within hazard assessment area have functionality compromised.	1–5% of critical buildings within hazard assessment area have functionality compromised.	A lifeline utility service is out for 2 hours to 1 day (affecting ≥ 20% of the town/city population) OR out for 1 day to 1 week (affecting < 20% of the town/city population).	≤1 dead and/or 1–10 injured
Insignificant	No buildings of social/cultural significance within hazard assessment area have functionality compromised.	<1% of buildings within hazard assessment area have functionality compromised.	No damage within hazard assessment area, fully functional.	A lifeline utility service is out for up to 2 hours (affecting ≥ 20% of the town/city population) OR out for up to 1 day (affecting < 20% of the town/city population).	No dead No injured

Figure 7 - Consequence table (Table 21, Appendix L)

For the purpose of this assessment the proposal does not include any 'social and cultural' or 'critical' buildings; or any 'lifeline utilities'.

Therefore, in terms of the built environment, the assessment is only required to consider the residential development (i.e. 'buildings') capacity provided for through the plan change request.

The proposed Residential Zone and Urban Living Zone are anticipated to provide for a total of 100 dwelling units across the site.

To assign a consequence level for damage to buildings the number of *functionally compromised* buildings needs to be assessed. The RPS defines *functionally compromised* as when a building cannot continue to be used for its intended use immediately after an event.

In regard to health and safety consequence is determined by the number of fatalities and injuries. Based on the average household occupancy at the last census (2.7 people per household) the site development scenario includes a total of 270 people.

3.4 Assessing Risk

Appendix L includes a risk screening matrix to determine hazard risk to the proposal. This is based on likelihood and the consequence level and shown in Figure XX below.

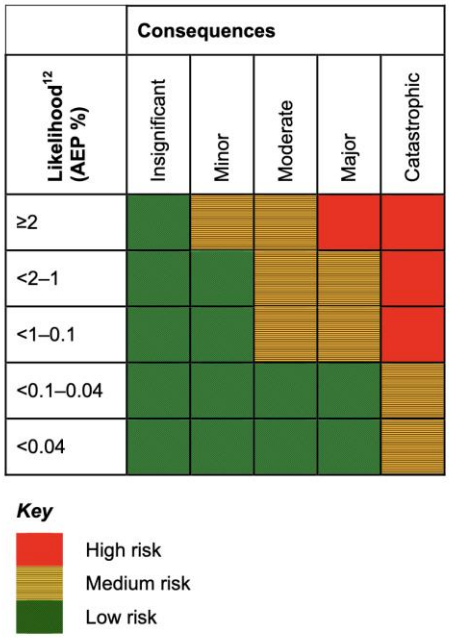

Figure 8 - Risk screening matrix (Appendix L)

Appendix L requires risk to be subject to a primary (or initial) analysis in the first instance. Where the primary analysis results in a 'low' or 'medium' risk then a secondary analysis is required. The analysis relies on the likelihood identified in Column A and Column B in Table 20.

Where a secondary analysis is required Appendix L, Steps 5 and 6 identifies how this is to be completed. This is includes assessment of the annual individual fatality risk (AIFR) using the required formula[4] where a medium risk category is identified

The hazard risks identified as being relevant to the site have been assessed using the matrix and Steps 5 and 6 below.

3.4.1 Volcanic (ashfall)

Risk

At present there are no models the quantify ashfall effects over the site. Although the site is located 25km+ distance from the nearest volcanic features it lies downstream of the prevailing winds. Although the site could be exposed to ashfall during an event with prevailing winds it is unlikely the ashfall would compromise the on the functionality of more

[4] Appendix L, Step 5(b)

than 1% of buildings within the site. Similarly, whilst is unlikely such an event would directly lead to deaths it is possible than people may be injured.

Table 1 - Volcanic Risk

Criteria	Consequence	Likelihood	Risk Level
Primary Analysis			
Buildings	Insignificant	0.1%	Low
Health and safety	Minor	0.1%	Low
Secondary Analysis			
Buildings	Insignificant	0.2%	Low
Health and safety	Minor	0.2%	Low

AIFR

An AIFR calculation is not required as no deaths are anticipated within the site.

Overall Risk

Low

3.4.2 Tsunami

Risk

The site is located within a 'yellow' evacuation zone based on a maximum impact tsunami modelled at up to 8.5m high. That height is at the point of impact on the coastal edge and in general terms once a tsunami hits land it will lose about 1m of height for every 300m travelled inland. The site is located approximately 2.5km from the coastal edge and 1km from the nearest point of the Whakatane River. There are several open drains and swales in between. As result depth of water is likely to be significantly reduced for this event once it reaches the site.

GNS report 2011/194[5] provides tsunami inundation modelling based on large earthquakes (Mw 9.0 and above) located along the Kermadec Trench and the northern part of the Hikurangi Margin.

In response to the modelling the report states:

> "The tsunami also inundates low-lying areas in Whakatane, however, the impacts are less severe towards Whakatane than its neighbouring areas because the incoming tsunami waves are lower, and the narrow river entrance and the elevated coastal front north to Whakatane River help shield Whakatane from direct impact of tsunami."[6]

This report shows that, for the scenarios modelled, the site may be subject to 0.5m – 1m of flow depth. The report also acknowledges the following limitation:

> "The modelling in this report was undertaken on the assumption that tsunami inundation takes place over a smooth (frictionless) landscape. In practise buildings and vegetation will impede the flow of water, limiting its penetration inland but

[5] Tsunami inundation modelling for Whakatane, Ohope and Opotiki, December 2011
[6] Ibid, page iv

potentially increasing the depth near the coast. As such the results will tend towards overestimating the area of inundation, while near-shore flow-depths may in some cases be underestimated. The flow of water around buildings and trees is very difficult to model on a large scale, and it can produce highly localized effects."[7]

In this context it is noted that the parts of the site zoned for residential development will be subject to bulk earthwork to raise existing ground level (to RL3m) in response to the need to deliver finished floor levels (FFLs) across the site that are free from inundation. Whilst this response is driven by stormwater flooding the elevated building platforms will also assist in mitigating tsunami flood risk.

This is reflected in the risk assessment below (in addition to the site being located on the periphery of the yellow evacuation zone) which adopts a conservative approach based on the unpredictable characteristics of a tsunami. The assessment also assumes (based on the finished landform and development) that such an event may result in injuries but is unlikely to directly lead to deaths within the site.

Table 2 - Tsunami Risk

Criteria	Consequence	Likelihood	Risk Level
Primary Analysis			
Buildings	Minor	0.1%	Low
Health and Safety	Minor	0.1%	Low
Secondary Analysis			
Buildings	Minor	0.2%	Low
Health and Safety	Minor	0.2%	Low

AIFR

An AIFR calculation is not required as no deaths are anticipated within the site.

Overall Risk

Low

3.4.3 Liquefaction

The GIR provides a comprehensive assessment of the seismic risk which confirms the following:

- Ground shaking effects have been assessed for residential and commercial buildings (Importance Level 2) in accordance with NZS 1170.5:2004
- Level 2 buildings are required to:
- retain structural integrity for an earthquake with a 500 year return period – the Ultimate Limit State (ULS).
- Sustain little or no structural damage during an earthquake with a 25 year return period – the Serviceable Limit State (SLS).

[7] Ibid, page 30

- For the Whakatane area MBIE / NZGS Module 1 identifies 0.44g for ULS and 0.11g for SLS. This equates to 6.1 magnitude earthquake.
- Liquefaction analysis on CPT data indicates that:
  - Liquefaction is unlikely to occur during an SLS event
  - Liquefaction is will to occur during a ULS event.
- Based on existing ground conditions liquefaction induced settlement across the site ranges from 5mm – 75mm
- Predicted liquefaction and spreading effects under SLS and ULS indicate the site can be classified as Technical Category 2.
- Given earthworks recontouring is proposed the liquefaction susceptibility of the landform should be confirm through a geotechnical completion report.

Overall, it is anticipated that through the subdivision and development of the site will be subject to further geotechnical certification with each residential lot / building being subject to geotechnical review to ensure suitable foundation design.

Table 3 - Liquefaction Risk

Criteria	Consequence	Likelihood	Risk Level
Primary Analysis			
Buildings	Insignificant	0.1%	Low
Health and Safety	Insignificant	0.1%	
Secondary Analysis			
Buildings	Insignificant	0.2%	Low
Health and Safety	Insignificant	0.2%	Low

AIFR

An AIFR calculation is not required as no deaths are anticipated within the site.

Overall Risk

Low

3.4.4 Flooding (intensive rainfall events)

The site will be subject to comprehensive bulk earthworks to recontour the land and create a finished building platform of RL3m. This will result in the ground level for land zoned for residential use being raised to enable dwellings to achieve the required FFLs. In addition, the southern part of the site will be set aside for stormwater management and vested in the council.

Table 4 - Flood Risk

Criteria	Consequence	Likelihood	Risk Level
Primary Assessment			
Buildings	Insignificant	0.1%	Low
Health and Safety	Insignificant	0.1%	Low
Secondary Assessment			
Buildings	Insignificant	0.2%	Low
Health and Safety	Insignificant	0.2%	Low

AIFR

An AIFR calculation is not required as no deaths are anticipated within the site.

Overall Risk

Low

4.0 Conclusion

This assessment has been completed in accordance with the policies of the RPS and Appendix L.

Based on the assessment of likely natural hazards the natural hazard risk for the site is assessed as being low.

On that basis the proposal, being greenfield development, complies with RPS Policy NH 4B which requires:

> "…a Low natural hazard risk to be achieved on development sites after completion of the development (without increasing risk outside of the development site)…".

APPENDIX 1

Proposed Structure Plan