
Issues identification Natural Hazards

1. Executive summary

Having examined the higher order resource management statutory documents, and through analyzing the feedback from the various place planning exercises across the district where Council staff have consulted with our communities on the District Plan review, the following key issue topics stand out with respect to Natural Hazards:

- Hazards
- Natural processes
- Rules
- Urban development
- Land use

These issue topics are the fundamental basis from which outcomes and objectives will be drafted through the District Plan review for the Natural Hazards district wide chapter.

It is anticipated that the issue topics identified for Natural Hazards will resonate in other chapters of the District Plan. Natural Hazards, one of the primary issues identified in the Regional Policy Statement for Northland (RPS), will encompass a variety of land uses and zones in the District Plan.

New coastal hazard mapping from the regional council can help better understand and respond to issues in relation to hazards and climate change. Natural hazard risk can be increased by allowing further built development in hazard prone areas and undertaking activities that could increase the severity of an event.

Understanding the relationship of these issues across the District Plan will be an exercise that can take place once the issues are identified for each of the topics or chapters for the District Plan review. This will ensure the issue topics are succinct, better understood and duplication will be reduced.

2. Natural Hazards

The Far North district is subject to a number of hazards with Flooding and coastal hazards the most significant natural hazard risk. Other hazards are projected to increase as a result of the changing climate those include droughts, high wind events and wildfire. The Far North is unique in that we have an expansive coastline with small settlements dotted around the coast and in low lying areas prone to flooding.

The New Zealand Coastal Policy Statement 2010 (NZCPS) and the RPS outline the legal requirement for council to provide an assessment of flooding and erosion hazards on our coast. Objective 5 and Policies 24-27 of the NZCPS relate specifically to the management of coastal hazards. Section 7 of the RPS contains policies on natural hazards for northland. The Northland Regional Council (NRC) has released draft coastal hazard maps that identify land potentially at risk of flooding or erosion by the sea. Time-frames assessed for the mapping include current day, as well as 50 years and 100 years into the future. The District Plan is required to give effect to the RPS in accordance with section 75(3)

of the Resource Management Act 1991 (RMA). The ministry for the environment has produced guidance on preparing for climate change that can assist local government decision making.

The topic of Natural hazards overlaps with a multitude of other topics or areas in the District Plan and it is not necessarily married to a particular zone or activity, it is location based. The following zones and topics are considered to be the more significant overlaps for natural hazards:

- Urban environment
- Rural environment
- Recreation and conservation environment
- Landscape and natural features

3. Introduction

The purpose of this paper is to understand the issue topics as they relate to Natural Hazards. Specifically this paper looks at the higher order resource management statutory documents and the broader issues that fall out of them. It looks at a number of district level documents and analyses the feedback from the various place planning exercises undertaken across the district with our communities, which sought to understand the issues as they relate to the Far North communities.

It is important to recognize that the documents and feedback received have been interpreted for the purposes of identifying the issue topics that relate specifically to Natural hazards. These issue topics have been sorted into the following categories, which through the analysis cover the range of issues that relate to natural hazards.

Some of these issues have their own topics or chapters in the District Plan so there will be a degree of crossover. Furthermore, the analysis has only considered these topics where it is inferred that it is specific to natural hazards.

The issue topics have been categorized into the following:

Coastal access	Coastal amenity	Connectivity	Design	Economic development	Flora and fauna protection
Hazards	Health and safety	Infrastructure provision	Land use	Landscape protection	Maori/Tangata whenua values
Natural character	Natural processes	Reverse sensitivity	Rules	Tourism	Urban development

4. The Resource Management Act 1991 (RMA)

The following sections in Part 2 of the RMA are considered relevant to understand the issues that relate specifically to natural hazards:

- Section 5 (2) – sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while – (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.
- Section 7(i) - Have particular regard to the effects of climate change.

From these sections the following broad issue topics can be identified that are relevant to Natural hazards:

- Health and safety
- Land use
- Rules
- Climate change/Hazards

5. New Zealand Coast Policy Statement (NZCPS)

In terms of understanding the issues that underpin the objectives found in the NZCPS, the following sections are considered relevant:

- Objective 1 - Safeguarding the integrity, form, functioning and resilience of the coastal environment and sustaining ecosystems.
- Objective 2 - Mapping areas where subdivision use and development would be inappropriate and protecting those areas.
- Objective 2 - Encouraging restoration of the coastal environment.
- Objective 4 – Maintain and enhance public open space and recreation opportunities in the coastal environment, including access.
- Objective 5 – Manage coastal hazard risks and climate change
- Objective 6 – To enable people and communities to provide for their social, economic, and cultural wellbeing and their health and safety, through subdivision, use, and development.

From these sections the following broad issue topics can be identified that are relevant to natural hazards:

- Natural processes
- Flora and Fauna protection
- Land use
- Urban development
- Coastal access
- Climate change/Hazards
- Health and safety

6. Northland Regional Policy Statement (RPS)

The following issues have been identified in the RPS that are relevant to natural hazards:

- Issue 2.1(b) – Fresh and coastal water - Climate change.
- Issue 2.6(l) - Issues of significance to tangata whenua – natural and physical resources - The impacts of climate change.
- Issue 2.7 – Natural hazards - Natural hazards, particularly flooding and coastal erosion and inundation have the potential to create significant risk to human life, property, community and economic wellbeing in Northland. This risk is projected to increase as a result of a changing climate.
- Issue 2.8(a) & (c) – Natural character, features/landscapes and historic heritage - Many of Northland's natural features and landscapes, natural character, and historic heritage have been compromised and remain at risk as a result of the impacts of inappropriate subdivision, use and development. The primary activities of concern are built development, earthworks,

significant water extractions / discharges to water, vegetation clearance and coastal structures, and inconsistent identification and protection.

The issue topics identified in the RPS can be summarized as follows:

- Climate change/Hazards
- Land use
- Flora and Fauna protection
- Landscape protection

7. Draft Northland Regional Plan (DNRP)

The DNRP has only one objective and it is non specific. It is therefore difficult to glean from it any specific issues in relation to natural hazards. The headings for the policies however give an indication of the underlying issue topics in the DNRP with respect to natural hazards. They are considered as follows:

- Landscape protection
- Coastal access
- Rules
- Land use
- Hazards

8. Operative District Plan Provisions (DP)

The following issue topics are identified in the Natural Hazards chapter (chapter 12.4) of the District Plan:

- Natural processes
- Hazards
- Land use
- Urban development
- Landscape protection
- Flora/Fauna Protection
- Rules

9. Our Voices Our Vision – Far North District Council Strategic Vision (OVOV)

The overall District Vision is - *He Whenua Rangatira* – A District of Sustainable Prosperity and Wellbeing. While there are no issues identified in this vision it identifies Tikanga (Values) and Tumanako (Expectations). With respect to natural hazards the following Tumanako are considered relevant:

- He wahi ataahua - Valuing the outstanding beauty of our District
- Oranga taiao, oranga tangata - Nurturing the environment so it nourishes us
- Oranga Kainga - A thriving, sustainable local economy
- Mana I te whenua - The role of tangata whenua is valued and respected
- Tangata whai ora - Happy, healthy, safe and purposeful people
- He waka hourua - Fit for purpose infrastructure underpinning success

These Tumanako may look to be addressing the following issue topics:

- Landscape protection
- Coastal amenity
- Land use
- Urban development
- Health and safety

10. Iwi and Hapu

While all communities were invited to participate and contribute to the PPE across the district, tangata whenua were also engaged separately. An issues identification paper specific to tangata whenua will provide the relevant resource management issues of concern to Maori, including an audit of current iwi and hapu management plans currently lodged and held with council. This issues identification paper will identify issues that are of relevance to Natural hazards.

11. Long Term Plan 2015-25 (LTP)

The following issue topics, relevant to natural hazards, can be gleaned from the strategic planning and policy group section of the LTP:

- Urban development
- Health and safety

TABLE 1: ISSUES MATRIX: PLANNING DOCUMENTS

Table 1 illustrates a matrix of the issue topics and their connection with the planning documents identified in sections 4 - 11 above.

Issue Topic	RMA	NZCPS	RPS	DNRP	DP	OVOV	IWI	LTP
Coastal access		x		x			?	
Coastal amenity						x	?	
Connectivity							?	
Design							?	
Economic development							?	
Flora and fauna protection		x	x	x	x		?	
Hazards	x	x	x	x	x		?	
Health and safety	x	x				x	?	x
Infrastructure provision							?	
Land use	x	x	x	x	x	x	?	
Landscape protection			x		x	x	?	
Māori/Tangata whenua values							?	
Natural character							?	
Natural processes		x			x		?	
Reverse sensitivity							?	
Rules	x			x	x		?	
Tourism							?	
Urban development		x			x	x	?	x

The issue topics that stand out from the analysis of these planning documents are land use, hazards, flora/fauna protection, landscape protection, health and safety, rules, urban development, coastal access, natural processes and coastal amenity.

There is a reasonable correlation of the issues across the planning documents in line with the NZCPS and the RPS, this is to be expected as statutory resource management plans are required to 'give effect' to these documents¹. Further, the District Plan needs to ensure that it is not inconsistent with the DNRP².

12. The place planning exercise (PPE)

The district planning team undertook a consultation exercise with Far North communities in 12 locations across the District, at a number of A&P shows and via appointment in the pop up shop at the John Butler Centre in Kerikeri in the first seven months of 2016. The purpose of these exercises was to understand first hand from our communities what their issues are and what was working or not working with respect to the District Plan. Table 2 summarises the feedback from the PPE and has categorized it into the issue topics consistent with Table 1.

TABLE 2: ISSUES MATRIX: PLACE PLANNING EXERCISE

Issue Topic	Kaero	Kaikohe	Kaitaia/Ahipara	Kawakawa/Moerewa	Kerikeri/Waipapa	Mangonui/Doubtless Bay	Opononi/Omapere	Paihia/Opua	Pukenui	Rawene	Russell	Whatuwhiwhi	
Connectivity	0	0	0	0	0	0	0	0	2	0	0	0	2
Design	0	0	1	0	8	0	0	2	0	1	0	0	13
Rules	1	7	0	0	10	0	7	0	1	2	0	0	28
Landuse	1	0	1	1	2	0	0	1	1	1	1	1	11
Economic development	0	0	0	0	0	0	0	1	0	0	0	0	1
Natural Processes	2	0	1	2	2	1	6	1	3	0	2	0	20
Flora/fauna	0	0	0	0	0	0	0	1	0	0	0	0	2
Infrastructure provision	0	0	0	3	0	2	0	2	0	0	1	1	9
Hazards	5	10	2	6	24	2	14	5	5	4	3	5	85
Landscape Protection	0	0	0	0	0	1	0	0	0	0	0	0	1
	9	17	5	12	46	6	27	13	12	8	7	10	
											TOTAL		172

The locations where we received the most feedback from the PPE regarding Natural Hazards are:

1. Kerikeri/Waipapa
2. Opononi/Omapere
3. Kaikohe
4. Paihia/Opua
5. Pukenui
6. Kawakawa/Moerewa

The most common issue topics in order of frequency for natural hazards are:

1. Hazards

¹ RMA section 75(3)

² RMA section 75(4)

The issues relating to hazards include sea level rise / coastal inundation, coastal erosion, drainage and flooding issues, managed retreat, effects and response to climate change, acid sulphate soils, fire risk, mining and unstable land.

2. Rules

This topic addresses the rules as they are currently applied in the District Plan. Examples of feedback relating to rules includes development and use of land in hazard area and rules around infrastructure requirements.

3. Natural processes

Comments on natural processes are very similar to those of hazards; issues were associated with sand dunes and the control of beach access and issues regarding climate change

4. Design

The issues relating to design include that of practical solutions to manage the effects of hazards, design in hazard areas such as managed retreat, policies around subdivision planning and ways to encourage the use of green technology in conjunction with urban design.

5. Land use

This topic is closely related to rules and design and includes comments relating to the type of development allowed in hazard areas. Comments around private erosion control methods and the identification of hazard prone areas. Climate change also needs to be considered before rezoning of land. Built development is seen to be creating greater hazard issues.

6. Infrastructure Provision

Infrastructure provision issues include that of drainage not functioning in flood events, roads being eroded, state highways that are located in areas vulnerable to coastal hazards should investigate alternative routes and comments around wharf and breakwater development.

7. Connectivity

Comments relating to connectivity include those of protection of walkways in coastal areas and comment around access to 90 mile beach that is being affected by hazards.

8. Flora and Fauna Protection

Flora / fauna protection is identified as an issue in relation to hazards as comments include retention of vegetation to help mitigate erosion and hold water and retain wetlands. Comment that wetland development is important in coastal areas.

9. Economic development

A comment around breakwater development and how a breakwater can reduce the effects of waves and promotion of a marina development at Paihia.

10. Landscape protection

Comment on protection of the landscape include suggestion of looking of alternative routes for state highways to protect coastal and sensitive landscapes

13. Outcomes

The purpose of identifying the issues for natural hazards is to accord with and in some instances give effect to higher order resource management statutory documents, and to consider the issues experienced by Far North communities for which the District Plan serves. It is important to recognize that a number of the topics identified through this examination of the issues for natural hazards will surface in other parts of the District Plan review. In some cases these topics will have their own chapter in the District Plan, examples being Flora and Fauna and Maori/Tangata whenua. How the

issue topics are illustrated globally across the District Plan and its respective chapters is yet to be addressed and will be an exercise that falls out of the topic or portfolios assessments of issues for the District Plan review.

Table 3 below is a matrix that combines the previous two matrices looking at the planning documents and the feedback received through the PPE. Taking into consideration the how the issues topics combine with the PPE has determined whether the issues topics warrant inclusion for consideration for natural hazards or should be addressed primarily in another chapter of the District Plan.

TABLE 3: COMBINED ISSUES MATRIX

Economic development infrastructure provision connectivity

Issue Topic	RMA	NZCPS	RPS	DNRP	DP	OVOV	IWI	LTP	PPE
Coastal access		x		x					0
Coastal amenity						x			0
Connectivity									2
Design									13
Economic development									1
Flora and fauna protection		x	x		x				2
Hazards	x	x	x	x	x				85
Health and safety	x	x				x		x	0
Infrastructure provision									9
Land use	x	x	x	x	x	x			11
Landscape protection			x	x	x	x			1
Natural processes		x			x				20
Rules	x			x	x				28
Urban development		x			x	x		x	0

Where the issue topics is coloured green it will be included as an issue for natural hazards, where it is coloured red it will either be addressed in another chapter in the district plan or the support for it is not considered sufficient to be addressed in the natural hazards chapter. An explanation of each of the issues and the rationale for their inclusion has been included below.

Issues to be included in for natural hazards

Hazards

This topic has a notable presence in the higher order resource management statutory documents and is proposed through the RMA reform to be a matter of national importance in section 6 of the RMA. The issue of hazards can be split into land based hazards and coastal hazards. Issues regarding land based hazards include identification of hazard areas, development of flood plains, fire fighting provisions. Coastal hazard comments include options for managed retreat and erosion control.

Natural processes

This topic is closely linked to ‘Hazards’ and is picked up in the NZCPS in so far that it looking to safeguard the integrity, form, functioning and resilience of the coastal environment and sustaining

ecosystems. The District Plan identifies natural processes as an issue because of the effect on subdivision, use and development and its relationship to the management of hazards.

Land use

Land use is an important issue for the District Plan for natural hazards as it is identified through each of the higher order resource management statutory documents. It is identified as an issue through the strategic direction partly under He waka hourua.

Rules

Rules as they apply to natural hazards are relatively generic as they control subdivision, use and development. Rules are a mechanism used in District Plans to achieve sustainable management of natural and physical resources in accordance with section 5 of the RMA. Rules are considered an issue in both the DNRP and the District Plan. Further, the PPE has identified rules as the second most prevalent issues topic for natural hazards.

Urban development

Urban development is tied in closely with the issue topics of land use and rules in so far that it is concerned with the development and/or subdivision of urban land. This has been considered an issue in the NZCPS, being important to identify the most appropriate places for urban development. Urban development is also an issue currently in the District Plan and is considered to be an issue through the Far North's strategic vision under a combination of Oranga Kainga and He waka hourua. The topic of urban development is in the top half of issues identified through the PPE for natural hazards.

Issues not to be addressed specifically for natural hazards

Health and safety

Providing for people and communities health and safety falls under the meaning of sustainable management in the RMA and is something the Far North communities have unillustrated as important through the strategic vision under Tangata whai ora, but is considered best addressed in another section of the plan.

Landscape protection

Landscape protection of natural hazards ties in with coastal amenity and natural character. The protection of outstanding natural landscapes, coastal or non-coastal, is a matter of national importance in section 6 of the RMA. Landscape protection is recognized through the RPS and the DNRP

Coastal access

Coastal access is a matter of national importance in section 6 of the RMA, it is identified as an issue in the NZCPS and is currently identified in the District Plan. This is an issues best addressed as part of the coastal environment section.

Coastal amenity

While amenity is generally identified in section 7 of the RMA coastal amenity is not specifically recognized in the higher order resource management statutory documents. Regardless, coastal amenity currently features as an issue in the District Plan and is implied through Council's strategic vision under He wahi ataahua. Coastal amenity is best addressed in the coastal environment section.

Connectivity

Connectivity is important generally, but it is better addressed in the transportation and the Recreation/Conservation section of the District Plan. As an issue it is not considered in the higher order resource management statutory documents nor does it feature highly through the PPE.

Design

There is a degree of crossover with the 'Rules' topic, however design is generally something that is considered more for our urban environments, some of which are located in the hazard areas, but is not necessarily something that is specific to natural hazards. As an issue it is not considered in the higher order resource management statutory documents nor does it feature highly through the PPE.

Economic development

Economic development in the coastal environment does not feature strongly in this assessment either through the higher order resource management statutory documents or the PPE. While there are elements of economic development that will apply to natural hazards it is a topic better addressed in urban and rural environments.

Flora and fauna protection

This topic has a notable presence in the higher order resource management statutory documents and is generally considered a matter of national importance in section 6 of the RMA. However, protection of flora and fauna is not specific to natural hazards and the District Plan has a chapter devoted to it. The flora and fauna chapter is the more appropriate location to address flora and fauna holistically as an issue across the district.

Māori/Tangata whenua values

This topic has a notable presence in the higher order resource management statutory documents and is a matter of national importance in section 6 of the RMA. However, recognition and provision for the relationship with Māori is not specific to natural hazards and the District Plan has a chapter devoted to it. The Tangata whenua chapter is the more appropriate location to address Maori/Tangata whenua values holistically as an issue across the district.

Far North District Council - District Plan Review

Natural Hazards Options Assessment

10 June 2019

Background

Far North District Council (Council) is undertaking a review of its District Plan. 4Sight Consulting has been engaged to prepare a section and associated provisions relating to natural hazards, being primarily:

- Flooding;
- Coastal erosion and inundation;
- Instability; and
- Wildfire.

In accordance with the methodology that was provided, 4Sight has: reviewed the operative and draft proposed plans, reviewed the Northland Regional Policy Statement (NRPS) and a range of other district plans (primarily recent plans/plan changes that provide different approaches to managing natural hazards and associated risks), and undertaken a workshop with Council staff to understand the local 'context'. The next stage in the process is to identify 'high level' options for managing natural hazard risks to discuss with Council staff.

Purpose of Document

The purpose of this options assessment is to present high level options for managing natural hazard risk in the Far North District. In this context, high level means indicative plan options for each hazard – in particular mapping or other approaches – and the general nature of the provisions that align with each option (note that these will be subject to more detailed consideration/optioning once the high level approach is confirmed). The aim of this is to get general guidance and agreement on the form of the future natural hazards framework, prior to further work on the detail of the provisions, to ensure that it fits with the wider plan structure and Council expectations and to minimise revision at a later stage.

This document, and the subsequent discussions on options, provides a component of the plan development process as part of the wider evaluation required under section 32 of the Resource Management Act, 1991 (RMA).

Context for Options for Managing Natural Hazards

To ensure that the options that are presented are reasonable and relevant to the Far North and consistent with the statutory direction, the following provides a brief overview of the higher order statutory direction provided by the RMA, relevant national policy statements and the RPS; and our understanding of the issues and aspirations of the Council in respect of natural hazard management.

Resource Management Act (1991)

A natural hazard is defined in section 2 of the RMA as:

“Natural hazard means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, 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”

The RMA provisions relevant to the management of natural hazards (in relation to a district plan) are provided in Attachment A.

New Zealand Coastal Policy Statement 2010 (NZCPS)

A district plan must give effect to a national policy statement and any NZCPS [RMA s75(3)].

The NZCPS recognises that activities in the coastal environment are susceptible to the effects of natural hazards such as coastal erosion, flooding and tsunami and that some natural hazards will be exacerbated by climate change and will increasingly threaten existing infrastructure, public access and other coastal values as well as private property.

The relevant objectives and policies relating to natural hazards are also provided in Attachment A. However, in summary, the NZCPS seeks to ensure that coastal hazard risks, taking account of climate change, are managed by locating new development away from areas prone to such risks, considering responses, including managed retreat, for existing development in this situation; and protecting or restoring natural defences to coastal hazards.

Policies 24 to 27 direct a range of actions to identify and manage natural hazard risk in the coastal environment.

Northland Regional Policy Statement

A district plan must give effect to any regional policy statement [RMA s75(3)].

The NRPS requires subdivision and land use and development to minimise the risk of natural hazards, with a particular focus on activities within flood plains and areas affected by coastal hazards. NRPS includes a range of directive policies and methods (Attachment A) that require the assessment of subdivision, land use activities and infrastructure that may be affected by natural hazards, associated design requirements and that the risks of natural hazards are assessed before new areas are zoned to enable intensification.

Far North District Draft Plan

The Far North District area covers a geographical area of some 7,300 km² – the third largest city/district in New Zealand by land area – and a coastline of some 1,800 km. However, in contrast, the district’s population is relatively small – 64,400 people (2018) dispersed over a cluster of towns and small settlements on the west and east coasts. The largest town is Kerikeri with a (2018) population of 6,507 followed by Kaitaia (4,887) and Kaikohe (3,915).

Population growth is primarily focused in Kerikeri, while the east coast in particular is subject to increasing development along the coastal margin.

Natural hazard resilience and climate change has been identified (in engagement on the draft plan) as one of nine key resource issues facing the district:

Our communities are vulnerable to a number of natural hazards. The problem is exacerbated by our historic and cultural association with areas of the landscape that are most vulnerable to the risks of existing natural hazards and climate change. For example, historically communities settled in flood plains and coastal areas.

Inadequate identification of the risks, and lack of sufficient controls, has resulted in greater exposure to the effects of natural hazards and climate change. Existing infrastructure that is located in these

vulnerable places is at risk of hazard events, which – in turn – impacts on the health, safety and resilience of our communities.

Aspirations outlined in Council's draft plan include:

- Natural hazard provisions to control the development of land affected by hazards such as flooding;
- New provisions that promote the use of natural buffers and adaptive management to improve community resilience;
- National and regional direction, which place more emphasis on a precautionary approach when dealing with land affected by natural hazards.

Far North Context – Workshops with Staff/Other Information

Workshops with staff identified a range of issues and aspirations relevant to the management of natural hazards:

General

- Northland Regional Council (NRC) focus on river flooding in discussion as district plans have historically been light on this.
- LIDAR project underway for entire region, but has been delayed due to weather. Mapping may be ready by end of this year.
- Flooding is currently the biggest natural hazard issue in the district. There are some issues with instability and coastal erosion and these are expected to become greater over time.
- Technical info on natural hazards can generally be obtained, but then there is no clear guidance in the ODP on what the outcome might be.

Flooding

- Flood mapping in the Operative District Plan (ODP) is out of date. In practice, mapping is treated as a live document with use of the best possible info available at the time.
- Site inspections used to assess on the ground conditions, knowing that mapping isn't perfect.
- Council has in-house mapping system, which has historically compiled data from other sources. Now moving away from that to directing people to the source of the information e.g. regional council mapping.
- For building floor heights, reliance is placed on existing mapping to the extent possible. In areas that have no mapping additional assessment may be required.
- Technical staff would like to see better protection measures to prevent development in certain areas.
- Existing issue of development occurring in flood areas and minimal means to prevent it (especially where existing subdivisions have already been approved).
- Where possible (at subdivision stage), access issues are taken into account e.g. expectation from people in residential zones that they should be able to access at all times – this may include provision for full access in a 1 in 50 or even 1 in 100 year event. In a rural environment, temporary limited access is generally seen as more acceptable.
- Flow and depth requirements for access are included in council engineering standards. Flow depths & velocities are available from the NRC mapping. Floor level standards also sit in engineering standards.
- Council has tried but not been able to refuse subdivision under S106.
- Secondary flow paths need most protection – some definition of those in engineering standards. Subdivision plans are supposed to identify overland flow paths.

- Council looking at revising and creating a stronger SW bylaw, but hasn't happened yet. The bylaw currently focuses on council infrastructure.
- Development in the district is typically small scale – 2 to 3 lot subdivision. This results in a piecemeal approach to stormwater with a lot of private drainage infrastructure as developers don't want to pay for the larger scale required to vest in council. The flip side is that council doesn't necessarily want or have funding to manage new facilities.
- Council could look at developing design standards for infrastructure to be vested.
- Council's Maximum Probably Development (MPD) maps are being used by developers to argue that it shows an acceptable level of development.
- There is an ability to require attenuation through consent conditions. However, the link to the ODP for this is tenuous. The perceived notion that things will be ok is problematic.
- There is a general assumption that stormwater is being managed on a holistic basis, but that is not necessarily the case. It is being managed on roads.
- Council has been sued for damage to property sustained during flood events e.g. 2007 floods in Puketona & Waipapa.

Coastal

- ODP has Coastal erosion hazard 1 and 2 for some areas – not sure if these are erosion, flooding or both. More extensive coverage than NRC mapping – and different where both are mapped.
- NRC has currently mapped coastal inundation in selected areas for 1 in 50 and 1 in 100 year storm events taking into account sea level rise for 50/100 years respectively.
- TAs didn't want regional council to map 150yr climate change line (level 3 coastal hazard).
- Intent is for NRC to undertake coastal inundation mapping for the entire region based on the new Lidar, but the timing is unclear – scheduled to be completed by 2020 (NRC website).
- ODP maps of coastal hazard areas 1 and 2 are used as triggers for subdivision and land use consents, but most up to date information would be used in assessment.
- Historic approach has been an assumption that council infrastructure will go into the hazard area, meaning council assumes highest risk in terms of its infrastructure – not enough protection in ODP to avoid this.
- Like to see more robust provisions:
 - Could have more direction re progressive retreat;
 - More restrictions on development – build setbacks, moveable buildings etc;
 - Greater consideration of infrastructure.
- One house in Taupo Bay built to allow storm surge to flush through it.
- There is a functional need for some infrastructure to be in coastal erosion areas. Need to facilitate maintenance/operation of existing infrastructure in hazard zones.
- Coastal hazard provisions need to deal with accessibility issues e.g. access stairs.
- ODP includes existing setback requirements from water bodies and the coast.
- There are other areas of coastal hazards that aren't mapped ie. hazards don't stop at town boundaries. How to deal with that – could be a generic 20m (e.g.) line that extends outside those areas. Or could extend mapping beyond towns, but not necessarily the full extent of the coastline.

Instability

- Landslides are an ongoing geological hazard in Northland.
- The dominant trigger is intense or prolonged rainfall which initiates many landslides annually.

- A number of landslides have been recorded in the Far North, including in Taipa and Manganui in March 2003, which was estimated to cause more than \$500,000 of damage.
- The Far North has large areas of poor ground and this is an issue for subdivision.
- Site visits are currently the main means of identifying instability issues, but there are some known areas of instability (e.g. Russell) – this is based on local knowledge rather than mapping. Current practice is to look at hazard maps on internal GIS to identify potential areas in conjunction with site visit.
- Generally seek to ensure there is a stable building platform within the subdivided site.
- Would only want to map or model something that is used in the DP as a rule trigger.
- Coopers Beach has essentially all been subdivided but is subject to slow moving sub-surface landslide and is moving into the tide.
- Instability may not necessarily be mapped from the outset, but specifically mapped areas such as Coopers Beach may be introduced and these are the provisions that would apply.
- Mapping would be beneficial, but council would need to have a better understanding of costs and complexity of mapping land instability.
- Roading network at risk from slips, but usually some alternative route.

Wild Fire

- ODP contains requirements for fire fighting water supply and separation distances between residential units and vegetation. These have not always been implemented.
- Applications for infringement of the rules are typically dealt with by processing planner – there may be some development engineering input on subdivision applications or where there are access challenges, looking at water supply, access, capacity and extent affected.
- Discretionary activity consent is required if compliance with the 20m setback requirement from vegetation is not met. However, this rule doesn't work well as the plan provides no guidance (to either planning staff or applicants) on relevant considerations.
- A lack of understanding of key risk factors, and where variation to the standards might be appropriate / acceptable, has led to inconsistent outcomes in terms of consent conditions.
- There is an ability for applicants / council to seek advice from the NZ Fire Service on the circumstances in which non-compliance with standards may be acceptable – a request form is available. A better link in the DP to the Fire Service may assist in this regard.
- Council is also uncertain whether the Fire Service has the capacity / understanding to deal with District Plan type requests on an ongoing basis.
- It would assist to have better guidance on wildfire / water supply etc issues in the district plan
- Wildfire is a real issue in the district eg. Karikari peninsula has fires every year, and fatalities have occurred.

Planning – General Approach to Draft Plan

- Exact structure of natural hazards provisions is yet to be finalised. Likely have subdivision and earthworks provisions in separate chapters with other provisions in a natural hazards chapter, but slightly open on this e.g. where might fire hazard rules sit?
- Timeframes – initially wanted to notify by end of the year. Now looking to adopt a strategic framework by July 2020 and so will notify after that. Aim to have 1st draft of s32 and provisions by end of year to consult with iwi. Two months set aside for that.
- Iwi management plans – Ngati Kuri most recent one and does have a climate change element – based up north and affected by SLR.
- Iwi traditionally more affected by hazards – often in rural production and coastal zones.

- Proposing to create a zone for land in Maori freehold tenure (Maori Purpose Zone) to allow for more intensive residential development.
- Council does have an appetite to consider a policy approach of reduction in risk, but is concerned there is too much development happening in flood risk areas.
- There is a need to clarify and enforce s106 requirements through plan provisions.
- A land use planning framework for flooding is needed.
- Draft plan needs to be clear on the key concerns being addressed by the natural hazard provisions e.g. health & safety, damage to property, displacement of effects resulting in damage to other property or infrastructure.
- Need to be able to set the scene in terms of clarifying limitations of the mapping and the implications of that e.g. is information still required outside an identified flood area.
- Intent of draft natural hazard Policy 1 is to say if a hazard isn't mapped, then you'll be expected to provide an assessment of hazard risk.
- Potentially every site in the district would have some natural hazard – would support a clear direction in the plan that every application needs an engineering assessment – except rural production subdivision where land will continue to be used for rural purposes.
- Support inclusion of contextual text to clarify that information is best available at the time, but is being updated over time.
- Criticism that the ODP is an effects based plan and provides no certainty plus internal alert layers are seen as lacking clarity and undermining community trust in council.
- Intent is to agglomerate growth around 3 waters infrastructure – a discretionary activity consent status for subdivision in natural hazard areas could act against that in urban areas. Might be able to treat as a controlled activity criteria to demonstrate specific mitigation is achieved.
- Enabling framework for flood protection works could fit into critical infrastructure provisions for public works.
- RPS requires management of hazardous substances in flood risk areas. Hazardous facilities in FNDC include Nga Wha power plant, which has land instability issues, otherwise service stations and industrial, airport storage.

Council Infrastructure

- FNDC only modelling stormwater in urban areas – in process of updating. Catchments will be prioritised over the next 6 months.
- Richmond in Tasman DC has a good catchment management plan that FNDC is looking to achieve.
- 2010 modelling of the stormwater network included ED – what was there at the time using aerial photography – MPD was also modelled using plan thresholds e.g. 50% coverage in residential and 100% in commercial.
- Need level of confidence that NRC data is appropriate to use as the basis for land use planning controls.
- Catchment management plans are used, and likely to be continued to be used, for council infrastructure purposes rather than to be taken into account in a RC application.
- How could attenuation be reflected in the plan – catchment analysis, link to what's happening on the ground.
- Currently an ability to do that e.g. require attenuation where a catchment plan indicates there is a specific problem.
- –Practise in consent processing has typically been to rely on applicants engineering reports peer reviewed by council dev engineers – usually addressed as part of a general report unless specific info requested by council.

- Potential to require a specific risk assessment for anything in a mapped area, or anywhere in the district.
- Operation, maintenance and removal of infrastructure currently permitted – could this be extended to include ‘upgrade’ and how is that defined.

Assessment of High Level Options

Table 1 provides an assessment of high level options for the four key hazard types. At this stage the assessment primarily seeks to define options for the approach to each hazard, particularly in relation to mapping or other criteria. It is noted that in some cases the detailed provisions and rules will be largely the same across different mapping options – it is just the extent of mapping that varies. However, in other instances the provisions will depend on the approach that is confirmed.

Table 1: High Level Options Assessment

Option Description	Hazard Mapping/Technical Requirements	Indicative Plan Framework	Example of Approach	Pros	Cons	Consistency with NZCPS/RPS
Flooding						
F1 – Status quo - indicative mapping of flood hazard only as per current district plan maps	<p>Existing maps showing areas susceptible to flooding at a scale of 1:50,000. Acts as an alert layer with disclaimer that mapping may include land that is not susceptible to flooding and/or exclude land that is susceptible to flooding. Plan users are referred to the FNDC Hazard Register or NRC for more accurate information</p> <p>Likely Cost: Low – uses existing indicative mapping</p>	<p>Flooding issues identified in natural hazards section and policy framework, but no specific rules. Inundation issues largely managed through subdivision. Assessment criteria require s106 assessment to have regard to effects of fill on inundation, drainage patterns & adjoining land; flood plain management, protection of adjoining properties from changes to drainage, adequacy of outfalls; and any need for retention basins to regulate rate & volume of surface runoff</p>	FNDC Operative	<p>Status quo, with some capacity for improvement</p> <p>Process currently used by Council and community</p> <p>Where flood assessment is triggered, most recent flood hazard information can be taken into account as the mapping acts as an alert layer only i.e. new NRC flood maps could be taken into account</p>	<p>Difficult for council to successfully manage and avoid land use development in flood hazard areas</p> <p>Land that is not identified on district plan maps but is in fact prone to flooding may not be identified and assessed through a RC process.</p> <p>Limited to assessment of subdivision applications. No separate land use controls</p> <p>Does not distinguish between the level of risk experienced during a flood event (e.g. depth / velocity of flood waters)</p> <p>Uncertainty in relationship between various flood maps (district plan, Far North Maps, regional mapping)</p> <p>Internal alert layers are seen as lacking clarity and undermining community trust in council.</p> <p>Limited ability to manage flooding issues on a catchment wide basis.</p> <p>Existing approach has seen an increase in the number of people and properties at risk from flood events</p> <p>Reliance on other Acts, like the Building Act to avoid risks</p>	<p>Does not give effect to RPS requirements in Policy 7.1.2</p> <p>Not a precautionary approach (Pol 7.1.1e)</p> <p>Not using best available information (Pol 7.1.1a)</p>
F2 – Mapping of 10 and 100 year flood extents – priority catchments only	<p>Adoption of NRC flood mapping of priority catchments and underlying parameters.</p> <p>No mapping of flood risk for other catchments.</p> <p>Likely Cost: Low – mapping of 10 and 100 year flooding has been undertaken by NRC</p>	<p>For mapped catchments, framework aligns to assessed / mapped level of risk, generally more restrictive where risks are greater.</p> <p>Generic rules applied for unmapped catchments e.g:</p> <ul style="list-style-type: none"> In South Taranaki the Waitotara Flood Hazard Area is mapped on the planning maps and controls are placed on structures or activities for a 0.5% AEP flood event. In all other parts of the district, new dwellings within 50m of a 'significant water body with flood hazard potential' require consent. Other plans (e.g. Kaipara District Plan) include generic rules that apply to specific activities in any 100 year flood risk area 	South Taranaki District Plan Kaipara District Plan	<p>Use existing NRC mapping</p> <p>Avoid costly mapping of catchments with low development pressure</p> <p>In mapped catchments, provisions can be targeted to risk</p> <p>Case by case assessment of development on unmapped sites enables more customised management of flood risk</p>	<p>May impose unnecessary regulatory costs on those with a low level or no flood risk.</p> <p>May not provide sufficient control over development in areas with high flood risk (e.g. in relation to the South Taranaki example, flood risk may extend further than 50m from a water body)</p> <p>Puts onus on council to ensure flood effects are appropriately assessed for development in areas that are not mapped.</p> <p>May result in ad hoc approach to development in areas that are not mapped</p>	<p>More precautionary approach</p> <p>Utilises current information</p> <p>Consistent with expectations of RPS for mapped catchments</p>

		irrespective of whether it is mapped.				
F3 – District wide mapping of 10 and 100 year flood extents – all catchments	Adoption of regional flood mapping and underlying parameters for priority catchments. Further detailed investigation and mapping of flood risk areas undertaken for remaining (non-priority) catchments Likely Cost: High – mapping of remaining (non-priority) catchments required. May be being undertaken by NRC	Framework aligns to assessed / mapped level of risk, generally more restrictive where risks are greater. For example, the Taupo District Plan manages certain land use and development in identified high, medium and low risk flood hazard areas	Taupo District Plan	Targets management to risk Easy for development community – able to check on map/GIS Ensures a higher level of protection for further development – reducing long term flooding problems Better knowledge about spatial extent and nature of flood hazards assists to make better decisions on managing associated risks Enables greater level of consistency in managing development across the district	May restrict development in some existing urban areas Knowledge about site-specific flooding hazards is likely to remain limited, meaning the level of information / assessment required at a consenting stage may still be high	More precautionary approach Extends existing regional modelling
F4 – District wide mapping of 10 and 100 year flood extents including FNDC stormwater data for urban areas	More detailed mapping of flood risk undertaken in urban areas to take account of stormwater management networks. Timing as per FNDC timetable for this work and introduced into the plan Likely Cost: Medium – requires detailed assessment of effect of council stormwater network of flood risk in urban catchments	As above for NRC mapped areas	As above	As above – further increases area of mapped flood plains Increased understanding of the role of the stormwater network in flood risk and extent and role of stormwater network in a flood event Uses best information available	May be a need for future plan change/s to introduce additional information once it becomes available. Risk that interim approach may impose unnecessary regulatory costs if updated mapping shows reduction in flood extents / risk Potential that risk is underestimated for some locations prior to update mapping	More precautionary approach Extends existing regional modelling to incorporate urban stormwater modelling
F5 – Mapping of overland flow paths (in conjunction with option F2, F3 or F4)	Development of suitable criteria and mapping of overland flow paths within which certain activities would be controlled	Rules based on protecting flow paths from blockage / impediments and location of structures in flow paths where the consequences of flood flows may be more severe than in the remainder of a flood risk area.	Auckland UP (in GIS layers outside the district plan)	Ability to integrate floodplain management with overland flow path management Better understanding of how land / property may be affected by flood waters during a flood event Ability to target management to risk	Onus on council to get mapping right Accurate mapping likely to be difficult where flow paths have been altered and/or are subject to ongoing development pressure Potential for ongoing change to overland flow paths as result of development and consequential need to update mapping	More precautionary approach
F6 – Use definitions of land subject to flooding and overland flow paths with mapping provided in GIS layers outside the district plan	Suitable terms and criteria would need to be developed that would be relevant to the Far North. For example the Auckland UP defines ‘floodplains’ on the basis of inundation area and flow rates from a specific event and ‘overland flow paths’ on the basis of catchment size. In comparison, the decisions version of the Proposed Northland Regional Plan defines ‘flood hazard area’ and ‘high-risk flood hazard area’ as land having a 1% and 10% (respectively) chance of flooding on an annual basis and ‘overland flow paths’ on the basis of accommodating a 1% rainfall event	Rules based on definitions of flood hazards	Auckland UP Proposed Northland Regional Plan (decisions version)	Removes/reduces requirement to map areas This approach has been subject to recent decision by high level panel (Auckland UP) Ensures that assessment is focussed on areas of potential risk – as indicated by criteria Can develop criteria to be as precautionary as desired Enables flood information to be updated without going through a statutory plan change process e.g. to take account of specific stormwater modelling done in urban areas or the effects of flood protection scheme upgrades on flood extents	Criteria are ‘best estimate’ and may give false confidence Criteria approach may be new to community and council Always matters of detailed application that will need to be addressed Would likely need to have estimate of land affected by criteria to understand scope and application of rules Potential lack of awareness of land affected by flooding issues if mapping sits outside district plan	Can be made as precautionary as desired through criteria Utilises best information at a site level (through geotechnical assessment) Doesn’t necessarily use best district information (ie areas of existing slips)

Coastal Erosion/Inundation						
C1 Status Quo	Low – utilises existing mapped lines	Coastal 1 and 2 zones trigger consent for subdivision and land use activities in some instances	FNDC	Easy, familiar for users Low cost	Not adequately managing hazard risk in some areas – range of concerns raised with current approach Hazard lines relate to erosion. While there are also mapped flood areas, they do not appear to be rule triggers	
C1a – enhanced status quo. Utilises existing NRC mapping of erosion/flooding and retains FNDC hazard 1 and 2 where not covered by NRC Mapping. Incorporate addition flood inundation areas when modelled by NRC	Utilises existing information. Will require some rationalisation where FNDC zones used Likely cost: Low	Enhanced suite of objectives and policies to reflect issues and statutory direction in RPS Rule triggers and assessment criteria commensurate to the degree of risk associated with different activities		Builds on existing information, hence low cost All information has been through statutory process – so lines shouldn't be contentious Enhanced provisions can address existing deficiencies	Incomplete coverage of district Existing information not updated where it has not been remapped by NRC Level of detail still has a degree of uncertainty and site-specific assessments are still often required to account for site specific activities	Can be made precautionary through restrictive rules Tends to deal with issues on a case by case basis making it hard to adapt current developments and utilise natural defences
C2 Detailed mapping – Undertake further investigations of coastal hazards across the district in settlement areas and overlay these on to forthcoming LiDAR information	Further detailed investigations of coastal erosion and inundation risk. Would focus on coastal settlement areas. Would initially undertake erosion assessments as NRC undertaking more coastal flood mapping once lidar has been collected Likely Cost: Moderate to High		Tauranga City Council have applied more detailed erosion assessments on their planning maps	Picks up risk in more detail across the district. Enables rules to be more focussed restrictions due to greater degree of confidence in information	Level of detail still has a degree of uncertainty and site-specific assessments are still often required to account for site specific features such as seawalls	Can be made precautionary through restrictive rules Tends to deal with issues on a case by case basis making it hard to adapt current developments and utilise natural defences
C3 High level mapping and/or definitions – that extrapolate existing information to areas of unknown coastal hazard risk	Use existing hazard information to develop more generalised hazard zones based upon broad coastal type (i.e. Open West Coast, Inner Harbour) Likely Cost: Low to Moderate		Auckland Unitary Plan Within the definitions section defines the Coastal Erosion hazards area (distances and heights) and the Coastal storm inundation area Rules then apply within these areas	Able to be applied to existing data set and future coastal flooding assessments Does not require all areas to be mapped as some definitions are criteria based – hence provides a wider coverage Approach accepted by high level panel	Rules would need to be inherently conservative due to the level of uncertainty associated high level map development	Can be made precautionary through restrictive rules Tends to deal with issues on a case by case basis making it hard to adapt current developments and utilise natural defences
C4 Coastal cell planning – Develop more detailed planning framework for individual coastal cells. This would involve undertaking a risk analysis within individual cells	Identify relevant scale for investigation across the district and divide the coast into respect cells. Undertake a hazard risk analysis and identify range of management responses Likely Cost: High to Very High	Rules default to the specific area plan. Triggers could be set for different rule implementation	TCDC are starting the process of developing district wide shoreline management plans	Very robust approach Allows for dynamic risk management through triggers and adaptive strategies and a wider range of management options to address issues in a more holistic manner Creates consistency across the district as opposed to singular ad-hoc type responses	Significant time and cost Would require ongoing review as new information about hazard risk evolves	Can be made precautionary through conservative trigger development More allowance to include natural defences and adapt current development to meet future challenges
Instability						NZCPS not relevant (other than coastal erosion) RPS generally silent on instability (other than general provisions)
I1. Status Quo - indicative mapping only as per current LUC maps and council information as a non-statutory layer, implemented primarily at subdivision stage, [check]	Could enhance information to support current approach - possible review of current slip information (as per GNS report) to identify additional areas for inclusion in Council's database Likely Cost: Low	Instability largely managed through subdivision – identification of a suitable building site	FNDC Operative	Status quo, with some capacity for improvement Well known and understood by Council and community May adequately manage risks – no significant indication that it isn't	Does not provide a more precautionary approach – although this may be suitable in scheme of things	Not a very precautionary approach (Pol 7.1.1e) Not using best available information (Pol 7.1.1a)

I2	District wide mapping of potential areas of instability – based on geology, land use class and identified areas of land slip. As an option, hazards could be mapped at different levels of risk (high, moderate, low)	Extensive mapping of areas based on a range of parameters Likely Cost: Moderate to high – still a ‘broad brush’ assessment	Framework aligns to assessed level of risk, generally more restrictive where risks are greater	Dunedin	Targets management to risk Easy for development community – able to check on map/GIS	Mapping tends to give false confidence that areas of instability have been identified Mapping may be broad brush and still require specific on-site assessment Is extensive mapping warranted based on scale of issue and development – or are key problems (infrastructure /development) located in coastal area	More precautionary approach Utilises current information
I3	Mapping of specific, known and confirmed unstable areas (for example Cooper Beach) as a land instability overlay and providing specific rules in these areas in addition to general subdivision and land use rules elsewhere	Mapping of specific problem areas undertaken as required and introduced into the plan. Not expected that this will be a large area Likely Cost: High as requires detailed assessment of specific areas – but could be staged.	General considerations for instability outside of risk area Specific requirements in mapped areas – technical assessment report More stringent consent activity status (sub-division & land use) in mapped areas, could be subject to outcome of geotechnical assessment	Whanganui Has investigated and mapped 7 areas as Land Stability assessment areas and has associated rules in these areas Hastings? Has rules relating in instability overlay, but no apparent map in overlay section	Provides specific detailed information on specific areas Reduces need for site specific assessment – although this may still be required to demonstrate mitigation Targets management/requirements to areas	Plan change required to bring new areas into plan Still issue of management outside of mapped areas	Precautionary approach and utilisation of best available information in problem areas
I4a	Using a definition of land that may be subject to land instability. Use as trigger for more extensive assessment and consideration	Auckland Unitary Plan, which uses this approach, has a complex definition based on a geology, slope and other factors. Adopting this approach would require the development of suitable criteria that would be relevant to the Far North Likely Cost: Low. Criteria should be relatively easy to determine based on existing information	General considerations for instability outside of risk area Specific requirements in areas subject to instability – technical assessment report More stringent consent activity status (sub-division & land use) in areas that meet definition, could be subject to outcome of geotechnical assessment	Auckland UP	Removes/reduces requirement to map areas This approach has been subject to recent decision by high level panel Ensures that assessments focussed on areas of potential risk – as indicated by criteria Can develop criteria to be as precautionary as desired Could build on existing information (ie current LUC Classes)	Criteria are ‘best estimate’ and may give false confidence Criteria approach may be new to community and council Always matters of detailed application that will need to be addressed Would likely need to have estimate of land affected by criteria to understand scope and application of rules	Can be made as precautionary as desired through criteria Utilises best information at a site level (through geotechnical assessment) Doesn’t necessarily use best district information (ie areas of existing slips)
I4b	Using a definition of land that may be subject to land instability but include mapped areas (as non-statutory layer?)	As per I4a + progressively updating mapped areas	As per I4a		As per I4a Know areas of instability included – more precautionary	As per I4a More restrictive – ie larger	As per I4a Greater use of best available information
Wildfire							
W1	Status Quo – managed through provisions in the subdivision and natural hazards chapters.	Low – no mapping or technical requirements	Setbacks managed through the natural hazards chapter. Assessment criteria for land use consents refer to adequacy of water supply and accessibility to fire service vehicles Subdivision chapter includes matters of control/direction that relate to avoiding, remedying or mitigating potential adverse effects of fire hazards, water supply (adequacy and access). Assessment criteria for discretionary activity subdivisions refer back to appropriate water supply for firefighting purposes	FNDC Operative	Status quo Well known and understood by Council and community May adequately manage risks – no significant indication that it isn’t	Provisions spread across multiple chapters No clear link to New Zealand Fire Service and the NZ Fire Service Fire Fighting Water Supplies Code of Practice SNZ PAS 4509:2008 Doesn’t take a risk based approach – i.e. Areas of high wildfire risk could be determined applying the National Rural Fire Authority New Zealand Wildfire Threat Analysis	NZCPS not relevant RPS generally silent on wildfire risk other than stating under section 31 the district council should gather and collate research on natural hazards and their risks and impacts and that this should include rural fire risk
W2	Manage through rural zone provisions	Low – no mapping or technical requirements	Controls apply to rural areas without reticulated water supply. Control building setbacks from a forest, and planting setbacks from any residential	Hastings DP	One clear set of provisions Objectives and policies picked up through zone triggers (could be lost if sit	Doesn’t pick up risk associated with subdivision of land and access arrangements	As per W1

			unit or residential zone. Control water supply – in line with the NZ Fire Service Fire Fighting Water Supplies Code of Practice SNZ PAS 4509:2008		in natural hazards chapter and no natural hazard rules triggered)		
W3	Mapping of fire risk areas included in Natural Hazards Chapter appendix rather than on the plan maps and identify Flammability of Native Plant Species	Likely cost: Moderate – utilising the National Rural Fire Authority New Zealand Wildfire Threat Analysis	Control habitable building setbacks from high to extreme fire risk areas (natural hazards chapter) Subdivision controls around managing the risk to land and building platforms from fire in recognised high fire risk areas and high fire risk situations	Whakatane DP	Ensures that assessments focussed on areas of high/extreme risk Reduces need for site specific assessment – although this may still be required to demonstrate mitigation	Mapping may be broad brush and still require specific on-site assessment Is extensive mapping warranted based on scale of issue and development?	As per W1

Matters for Discussion

Plan Structure

- Map natural hazards where available directly in the District Plan versus a definitions approach where the maps are external to the plan (ie. Auckland Unitary Plan for some hazards):
 - Flooding;
 - Coastal hazards;
 - Instability?
- Wildfire – not mapped or criteria but enhanced status quo:
 - provide a clearer link to the FFCOP in the subdivision chapter;
 - consider further controls on the location of building platforms;
 - review adequacy of current setback provisions (when triggered, and setback distance) and role of NZ Fire Service.

Flooding

- Confirm use of ARI (in preference to AEP) to align with NRPS (noting that there is some mix in the regional plan) – does Council have a preference or currently use AEP?
- Does Council have any position/process on how to ensure floor heights where there isn't mapping?
- Role of catchment management plans – mapping + other requirements (ie flood mitigation/detention etc). Are these something that we should explicitly provide for?
- The NRPS requires management of subdivision, built development and land use change within 10 year and 100 year flood hazard areas. District Plan provisions should, therefore, focus on these areas. However:
 - Is there benefit (or ability) in further defining risk within those areas e.g.
 - the Taupo District Plan defines high, medium or low risk areas within the 1% AEP flood plain, based on the expected depth and velocity of flood waters. Is flood depth and velocity information available for mapped areas in the Far North District?
 - The Palmerston North District Plan defines a Flood Protection Zone, which includes the city's network of stopbanks and applies an avoidance approach in that zone.
 - Is there a need/benefit for more precaution in any circumstances e.g. Use of a 2% AEP flood event or controls on development of land adjacent to the 10 and 100 year mapped flood hazard areas.
- Have development engineers had the opportunity to review any areas identified for upzoning to enable development in terms of flood hazard implications (e.g. Waipapa?). Should the hazards section include a method that Council will discourage up-zoning in areas subject to flooding and other hazards.
- Avoidance v mitigation – are there situations / locations in which council would support an avoidance approach i.e. no development in flood plains.
- Overland flow paths – the decisions version of the Northland Regional Plan controls the placement of obstructions in overland flow paths that divert water onto other properties (Rule C.3.1.8). Does this provide adequate protection of overland flow paths or are additional district level controls required. Is mapping of overland flow paths available / viable?

- Is some infrastructure more critical than others in terms of being resilient to flood hazards? Will 'critical infrastructure' (or similar) be defined in the plan?
- How should normal maintenance and upgrade of infrastructure in flood plains be accommodated? Will these types of terms be defined in the plan anyway?
- The NRP signals an intention to transfer powers for
- Transfer of powers/challenging existing use rights?

Coastal Erosion and Inundation

- What is expected from NRC in relation to additional mapping of coastal hazards once LIDAR has been completed? When is this likely to be available?
- Outside of the mapped areas, would Council consider a generic buffer (for site specific investigation) too conservative or restrictive?
- Managed retreat is difficult to provide for in the absence of specific information and management strategy. Is there any experience with this?
- Thoughts on strategies for reducing risk:
 - Not allowed to add value eg. Gisborne.
 - Sunset clause;
- Rule frameworks, by default, tend to address coastal hazard and management issues as singular or ad-hoc approaches. Has FNDC looked at developing a coastal management strategy and or coastal cell planning?

Instability

- Thoughts on the three key options:
 - Mapped hazards, using criteria;
 - Definitions based – puts the onus onto applicant;
 - Enhanced operative approach
- Re issue of Cooper Beach, should the plan include provision to specifically map unstable areas where these have been subject to detailed investigation?
- Technical input into criteria and the limitations of this approach?

Attachment A: Provisions of Relevance

RMA

Section 6 requires all parties exercising powers and functions under the RMA to recognise and provide for the following matters of national importance:

- h) the management of significant risks from natural hazards.

Section 31(1)(b) provides Territorial Authorities the following function:

- (b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—
 - (i) the avoidance or mitigation of natural hazards;

Section 35(5) requires local authorities to maintain records of current issues relating to the environment of the area, including:

- (j) records of natural hazards to the extent that the local authority considers appropriate for the effective discharge of its functions;

Section 62(1) specifies that a regional policy statement must state:

- (i) the local authority responsible in the whole or any part of the region for specifying the objectives, policies, and methods for the control of the use of land—
 - (i) to avoid or mitigate natural hazards or any group of hazards;

Section 106 provides that a consent authority may refuse subdivision consent in certain circumstances, including:

- (1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—
 - (a) there is a significant risk from natural hazards; or
 - (b) [Repealed]
 - (c) sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision.

(1A) For the purpose of subsection (1)(a), an assessment of the risk from natural hazards requires a combined assessment of—

- (a) the likelihood of natural hazards occurring (whether individually or in combination); and
- (b) the material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and
- (c) any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b).

- (2) Conditions under subsection (1) must be—
- (a) for the purposes of avoiding, remedying, or mitigating the effects referred to in subsection (1); and
 - (b) of a type that could be imposed under section 108.

220 Condition of subdivision consents

- (1) Without limiting section 108 or any provision in this Part, the conditions on which a subdivision consent may be granted may include any 1 or more of the following:
- (d) a condition that provision be made to the satisfaction of the territorial authority for the protection of the land or any part thereof, or of any land not forming part of the subdivision, against natural hazards from any source (being, in the case of land not forming part of the subdivision, natural hazards arising or likely to arise as a result of the subdividing of the land the subject of the subdivision consent):

Schedule 4

Schedule 4(1) requires an assessment of an activity's effects on the environment to include:

- (f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations

NZCPS

Policy 24 Identification of coastal hazards

- (1) Identify areas in the coastal environment that are potentially affected by coastal hazards (including tsunami), giving priority to the identification of areas at high risk of being affected. Hazard risks, over at least 100 years, are to be assessed having regard to:
- (a) physical drivers and processes that cause coastal change including sea level rise;
 - (b) short-term and long-term natural dynamic fluctuations of erosion and accretion;
 - (c) geomorphological character;
 - (d) the potential for inundation of the coastal environment, taking into account potential sources, inundation pathways and overland extent;
 - (e) cumulative effects of sea level rise, storm surge and wave height under storm conditions;
 - (f) influences that humans have had or are having on the coast;
 - (g) the extent and permanence of built development; and
 - (h) the effects of climate change on:
 - (i) matters (a) to (g) above;
 - (ii) storm frequency, intensity and surges; and
 - (iii) coastal sediment dynamics;

taking into account national guidance and the best available information on the likely effects of climate change on the region or district.

Policy 25 Subdivision, use, and development in areas of coastal hazard risk

In areas potentially affected by coastal hazards over at least the next 100 years:

- (a) avoid increasing the risk of social, environmental and economic harm from coastal hazards;
- (b) avoid redevelopment, or change in land use, that would increase the risk of adverse effects from coastal hazards;
- (c) encourage redevelopment, or change in land use, where that would reduce the risk of adverse effects from coastal hazards, including managed retreat by relocation or removal of existing structures or their abandonment in extreme circumstances, and designing for relocatability or recoverability from hazard events;
- (d) encourage the location of infrastructure away from areas of hazard risk where practicable;
- (e) discourage hard protection structures and promote the use of alternatives to them, including natural defences; and
- (f) consider the potential effects of tsunami and how to avoid or mitigate them.

Policy 26 Natural defences against coastal hazards

- (1) Provide where appropriate for the protection, restoration or enhancement of natural defences that protect coastal land uses, or sites of significant biodiversity, cultural or historic heritage or geological value, from coastal hazards.
- (2) Recognise that such natural defences include beaches, estuaries, wetlands, intertidal areas, coastal vegetation, dunes and barrier islands.

Policy 27 Strategies for protecting significant existing development from coastal hazard risk

- (1) In areas of significant existing development likely to be affected by coastal hazards, the range of options for reducing coastal hazard risk that should be assessed includes:
 - (a) promoting and identifying long-term sustainable risk reduction approaches including the relocation or removal of existing development or structures at risk;
 - (b) identifying the consequences of potential strategic options relative to the option of 'do-nothing';
 - (c) recognising that hard protection structures may be the only practical means to protect existing infrastructure of national or regional importance, to sustain the potential of built physical resources to meet the reasonably foreseeable needs of future generations;
 - (d) recognising and considering the environmental and social costs of permitting hard protection structures to protect private property; and
 - (e) identifying and planning for transition mechanisms and timeframes for moving to more sustainable approaches.
- (2) In evaluating options under (1):

- (a) focus on approaches to risk management that reduce the need for hard protection structures and similar engineering interventions;
 - (b) take into account the nature of the coastal hazard risk and how it might change over at least a 100-year timeframe, including the expected effects of climate change; and
 - (c) evaluate the likely costs and benefits of any proposed coastal hazard risk reduction options.
- (3) Where hard protection structures are considered to be necessary, ensure that the form and location of any structures are designed to minimise adverse effects on the coastal environment.
- (4) Hard protection structures, where considered necessary to protect private assets, should not be located on public land if there is no significant public or environmental benefit in doing so.

NRPS

Objective 3.13 Natural hazard risk

The risks and impacts of natural hazard events (including the influence of climate change) on people, communities, property, natural systems, infrastructure and our regional economy are minimised by:

- (a) Increasing our understanding of natural hazards, including the potential influence of climate change on natural hazard events;
- (b) Becoming better prepared for the consequences of natural hazard events;
- (c) Avoiding inappropriate new development in 10 and 100 year flood hazard areas and coastal hazard areas;
- (d) Not compromising the effectiveness of existing defences (natural and man-made);
- (e) Enabling appropriate hazard mitigation measures to be created to protect existing vulnerable development; and
- (f) Promoting long-term strategies that reduce the risk of natural hazards impacting on people and communities.
- (g) Recognising that in justified circumstances, critical infrastructure may have to be located in natural hazard-prone areas.

7.1.1 Policy – General risk management approach

Subdivision, use and development of land will be managed to minimise the risks from natural hazards by:

- (a) Seeking to use the best available information, including formal risk management techniques in areas potentially affected by natural hazards;
- (b) Minimising any increase in vulnerability due to residual risk;
- (c) Aligning with emergency management approaches (especially risk reduction);
- (d) Ensuring that natural hazard risk to vehicular access routes and building platforms for proposed new lots is considered when assessing subdivision proposals; and

- (e) Exercising a degree of caution that reflects the level of uncertainty as to the likelihood or consequences of a natural hazard event.

7.1.2 Policy – New subdivision and land use within 10-year and 100-year flood hazard areas

New subdivision, built development (including wastewater treatment and disposal systems), and land use change may be appropriate within 10-year and 100-year flood hazard areas provided all of the following are met:

- (a) Hazardous substances will not be inundated during a 100-year flood event.
- (b) Earthworks (other than earthworks associated with flood control works) do not divert flood flow onto neighbouring properties, and within 10-year flood hazard areas do not deplete flood plain storage capacity;
- (c) A minimum freeboard above a 100-year flood event of at least 500mm is provided for residential buildings.
- (d) Commercial and industrial buildings are constructed so as to not be subject to material damage in a 100 year flood event.
- (e) New subdivision plans are able to identify that building platforms will not be subject to inundation and / or material damage (including erosion) in a 100-year flood event;
- (f) Within 10-year flood hazard areas, land use or built development is of a type that will not be subject to material damage in a 100-year flood event; and
- (g) Flood hazard risk to vehicular access routes for proposed new lots is assessed.

7.1.3 Policy – New subdivision, use and development within areas potentially affected by coastal hazards (including high risk coastal hazard areas)

Within areas potentially affected by coastal hazards over the next 100 years (including high risk coastal hazard areas), the hazard risk associated with new use and development will be managed so that:

- (a) Redevelopment or changes in land use that reduce the risk of adverse effects from coastal hazards are encouraged;
- (b) Subdivision plans are able to identify that building platforms are located outside high risk coastal hazard areas and these building platforms will not be subject to inundation and / or material damage (including erosion) over a 100-year timeframe;
- (c) Coastal hazard risk to vehicular access routes for proposed new lots is assessed;
- (d) Any use or development does not increase the risk of social, environmental or economic harm (from coastal hazards);
- (e) Infrastructure should be located away from areas of coastal hazard risk but if located within these areas, it should be designed to maintain its integrity and function during a hazard event;
- (f) The use of hard protection structures is discouraged and the use of alternatives to them promoted; and
- (g) Mechanisms are in place for the safe storage of hazardous substances.

7.1.4 Policy – Existing development in known hazard-prone areas

In 10-year and 100-year flood hazard areas and coastal hazard areas, mitigation measures to reduce natural hazard risk to existing development will be encouraged. These may include one or more of the following:

- (a) Designing for relocatable or recoverable structures (when changing existing buildings);
- (b) Providing for low or no risk activities within hazard-prone areas;
- (c) Providing for setbacks (from rivers / streams or the coastal marine area);
- (d) Managed retreat by relocation, removal, or abandonment of structures;
- (e) Replacing or modifying existing development without resorting to hard protection structures (see Policy 7.2.2); or
- (f) Protecting, restoring or enhancing natural defences against natural hazards (see Policy 7.2.1).

7.1.5 Policy – Regionally significant infrastructure and critical infrastructure

New regionally significant infrastructure and critical infrastructure:

- (1) Must be designed to maintain, as far as practicable, its integrity and function during natural hazard events; and
- (2) May be considered appropriate to locate within flood and coastal hazard areas, even if it cannot meet policies 7.1.2 or 7.1.3 provided:
 - (a) There is a need to be located within the flood hazard and / or coastal hazard area; and
 - (b) infrastructure providers have demonstrated that the proposed location within the hazard area is the most appropriate (taking into account social, cultural, and economic costs and benefits) to service the needs of the community; and
 - (c) (An engineer’s assessment identifies the potential for the infrastructure to exacerbate flood and erosion hazard risk on neighbouring properties, and where the assessment shows that risk will be exacerbated; the assessment must outline ways this risk can be minimised.

7.1.6 Policy – Climate change and development

When managing subdivision, use and development in Northland, climate change effects will be included in all estimates of natural hazard risk, taking into account the scale and type of the proposed development and using the latest national guidance and best available information on the likely effects of climate change on the region or district.

7.1.7 Method – Statutory plans and strategies

- (1) The district councils shall notify a plan change to incorporate finalised flood hazard maps into district plans in the first relevant plan change following the operative date of the Regional Policy Statement or within two years of the Regional Policy Statement becoming operative, whichever is earlier. Additionally, the district councils shall incorporate new flood and coastal hazard maps into district plans as soon as practicable after such areas have been investigated, defined and mapped by the regional council.

- (2) In their respective plans, the regional and district councils shall provide objectives, policies, and methods (including rules) to give effect to Policies 7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.1.5 and 7.1.6.
- (3) District councils shall set out rules in district plans classifying the following as prohibited or non-complying activities:
 - (a) New subdivision proposals that do not comply with policies 7.1.2 and 7.1.3; and
 - (b) New proposals that do not comply with policy 7.1.2(f).
- (4) The regional and district councils shall require an engineer's assessment for new subdivision within 10-year and 100-year flood and coastal hazard areas and for new land use or built development within 10-year flood hazard areas and high risk coastal hazard areas.
- (5) The regional and district councils shall ensure that within the coastal environment:
 - (a) Any new habitable dwelling has a minimum floor level of 3.3m above One Tree Point datum on the east coast and 4.3m above One Tree Point Datum on the west coast. New non-habitable buildings will have a minimum floor level of 3.1m above One Tree Point datum on the east coast and 4.1m on the west coast; and
 - (b) An additional allowance for wave run-up shall be assessed over and above the requirements above for exposed east coast locations where ground elevation is less than 5m above One Tree Point datum, and for exposed west coast locations where ground elevation is less than 6m above One Tree Point datum.
 - (c) Clauses (a) and (b) do not apply to:
 - i) Non-habitable buildings not designed for habitation or commercial use and where the potential impact of the building being materially damaged or destroyed by a coastal hazard event (including the replacement cost) is minor (e.g. pump sheds, car ports, farm sheds and public toilets); and
 - ii) Non-habitable buildings that have a functional need to be located in the coastal marine area (e.g. boatsheds); and
 - iii) Network utility infrastructure.

Circumstances where (a) and (b) are not met will be subject to the resource consent process.
- (6) Before any new areas are zoned or identified in a district plan in ways that enable intensification of use, district councils shall ensure that the risks of natural hazards are assessed.
- (7) The regional and district councils, when setting out objectives, policies, and methods in regional and district plans, and when assessing resource consent applications, will take into account the latest national guidance and the best available information on the effects of climate change on natural hazards for sea-level rise, drought and storm rainfall intensity.
- (8) Where buildings occupied by people, animals and / or hazardous substances in 10-year flood areas and high risk coastal hazard areas have been materially damaged or destroyed by a natural hazard event, the regional council (through the relevant regional plan) will require land use consent for the repair or reconstruction of the building. The regional council will limit its discretion in determining the land use consent to avoiding or mitigating natural hazards.

7.1.8 Method – Monitoring and information gathering

- (1) The regional council will investigate and define new 10-year and 100-year flood hazard areas and areas potentially affected by coastal hazards over at least the next 100 years, progressively map them, and make this information available to the district councils for inclusion in district plans and anyone else on request.

The regional council, when undertaking its functions under section 30 of the Resource Management Act 1991, will co-ordinate the gathering and collating of research at a regional scale on flooding and coastal hazards (including tsunami) and the effects of climate change on these hazards.

- (2) The district councils, when undertaking their functions under section 31 of the Resource Management Act 1991, will co-ordinate the gathering and collating of research on natural hazards and their risks and impacts at a district scale. This shall include landslides, stormwater management and rural fire risk.
- (3) The regional council and district councils should work together to collaboratively establish and maintain an integrated natural hazards database for the region.

7.1.9 Method – Advocacy and education

- (1) The regional council will initiate, co-ordinate and promote activities that assist communities to build resilience to the effects of natural hazards.
- (2) The regional and district councils shall raise public awareness of natural hazards, including providing and publicising information on which natural hazards may occur in various locations (including the potential influence of climate change on these hazards) and what people can do to be prepared for hazard events.
- (3) The regional and district councils shall, in consultation with affected communities, investigate and initiate methods to reduce the risk to existing development on land prone to natural hazards. This may include but not be limited to:
 - (a) Property acquisition;
 - (b) Riparian works;
 - (c) Infrastructure developments or upgrades;
 - (d) Developing hazard risk reduction strategies;
 - (e) Use of esplanade reserves and other mechanisms on subdivision to secure setbacks from hazard-prone areas; and
 - (f) Any other matter identified in Policy 7.1.4.

7.2.1 Policy – Role of natural features

Recognise and protect, restore or enhance natural systems and features that contribute to reducing the impacts of natural hazard events on the built environment.

7.2.2 Policy – Establishing the need for hard protection structures

Priority will be given to the use of non-structural measures over the use / construction of hard protection structures when managing hazard risk. New hard protection structures may be considered appropriate when:

- (a) The level of hazard risk reduction that the proposed structural asset is seeking to achieve is appropriate and cannot reasonably be achieved through non-structural options;

OR

- (b) They will provide protection for concentrations of vulnerable existing development and the works form part of a long-term hazard management strategy that represents the best practicable option for the future; and
- (c) The financial costs of non-structural measures (compared to the costs of the hard protection structure that will achieve the desired level of hazard risk reduction) are too high for the community; and
- (d) It can be demonstrated that the benefits of mitigation outweigh the adverse effects and that the form and location of the hard protection structure is such that any adverse effects on the environment are minimised.

Hard protection structures, when considered necessary to protect private assets, should not be located on public land unless there is significant public or environmental benefit in doing so.

7.2.3 Policy – Protection and maintenance of structural mitigation assets

Impediments to accessing established natural hazard structural mitigation assets for maintenance purposes, and activities that may compromise the integrity or functioning of these assets, will be avoided.

7.2.4 Method – Statutory plans and strategies

- (1) When setting out objectives, policies, and methods (including rules) in regional and district plans, the regional and district councils shall recognise the role that natural features play in reducing natural hazard risk and provide for their maintenance, protection, restoration and enhancement.
- (2) The regional council will include objectives, policies, and methods in the relevant regional plan(s) to prevent the clearance of indigenous bush on erosion-prone land and the drainage of wetlands and other natural ponding areas, where such activities will increase the risk of flooding to downstream land.
- (3) The regional council will include objectives, policies, and methods (including rules) in regional plans to control activities that will dam or divert the natural flow of floodwaters across floodplains (such as stopbanks, bund walls, or artificial levees, filling of land, or siting of structures).
- (4) The regional and district councils shall give effect to Policy 7.2.2 through objectives, policies, and methods (including rules) in regional and district plans.
- (5) Regional and district plans will implement Policy 7.2.3.



FAR NORTH DISTRICT COUNCIL

CRITERIA TO IDENTIFY LAND WHICH MAY BE SUBJECT TO INSTABILITY IN THE FAR NORTH DISTRICT

Revision A: 4Sight review changes
Project Reference: 16395
18 November 2019

LDE LTD

AUCKLAND | GISBORNE | NAPIER | TAURANGA | WARKWORTH | WHANGANUI | WHANGAREI

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APPENDIX A: GEOLOGY SUMMARY TABLE



1 INTRODUCTION

LDE Limited has been engaged by the Far North District Council to develop a set of criteria to define land which may be subject to instability in the Far North District. The scope of our engagement was to:

- Consider the topographic, geomorphic, and geological conditions within the Far North District in which land is, or may potentially become, unstable.
- Consider available sources of information with which these conditions can be assessed for any given site within the Far North District and consider the merits and limitations of each.
- Develop clear, practical and easily assessed criteria to define “land which may be subject to instability”.
- Prepare a summary report including a clear outline of the criteria, a summary of their engineering geological basis, and outline of how the criteria can be assessed by council staff through desktop study and site walkover.

It is our understanding that the criteria will form part of a wider regulatory framework to manage natural hazards during the resource consent process, as part of an upcoming District Plan change. The criteria will be used to evaluate resource consents for subdivision and some land use activities.

The criteria would trigger a requirement for site specific geotechnical assessment with respect to the proposed activity. For this purpose, we consider that the criteria should be relatively conservative in nature, such that they encompass as far as possible all land which *may be* subject to instability, i.e. there should be a low likelihood that land not meeting the criteria could be subject to instability.

The criteria should be unambiguous and objective (as far as possible) in their application, such that they can be easily assessed by District Plan users and council staff with minimal engineering or geological knowledge.

2 FACTORS AFFECTING SLOPE INSTABILITY

The slope instability hazard at any given site is affected by a large range of factors. To quantify the hazard to any reasonable level of accuracy requires detailed site investigation and engineering geological assessment.

For the purpose of establishing when such assessment is warranted, the underlying geology of the site is the single best indicator. Instability is commonly associated with certain geological units within the Far North.



Within geological units, slope angles and landforms (geomorphology) are good indicators for areas of greater risk of instability. Beyond the natural condition of the site, significant site modifications such as uncontrolled cuts and fills are also risk factors for instability.

These factors and their effects are summarised in the sections below.

2.1 Geology

The geology of the Far North can be broadly divided into two groups; “Autochthonous” rocks, which were deposited in their present location, and “Allochthonous” rocks, which were deposited elsewhere and then emplaced in their present location through low angle thrust faulting.

The Autochthonous rocks include the greywacke basement rocks and overlying Eocene-Oligocene sedimentary rocks (Te Kuiti Group), more recent Miocene sedimentary rocks (Otaua Group, Parengarenga Group, Mangonui Formation), Miocene and recent volcanics (Coromandel Group, Kerikeri Volcanic Group), and recent (Pleistocene to Holocene) sediments (Awhitu Group, Kariotahi Group, Tauranga Group).

The Allochthonous rocks include a range of displaced rock groups divided into “complexes”, collectively known as the Northland Allochthon. These were originally deposited in Cretaceous to early Miocene times (100-23 million years ago) offshore, to the northeast of Northland, and were subsequently emplaced over northland through block-sliding approximately 25 to 17 million years ago. These rocks were emplaced over the basement greywacke and older (Te Kuiti Group) sedimentary rocks, and underlie much of the more recent sedimentary rocks, volcanic deposits, and recent sedimentary deposits in the region. Large blocks of autochthonous rocks have also been entrained in the allochthon during emplacement, creating allochthonous equivalents to the rock groups listed above.

In essence the Allochthonous rocks tend to be prone to instability due to their, in most cases, significant disturbance during emplacement, which has resulted in these rocks typically having a heavily sheared, shattered and/or chaotic fabric. These features are carried through into the soil structure, and along with weathering profiles and groundwater behaviour, can allow for slope instability at very shallow angles.

Slope instability most commonly occurs within the surficial regolith (the in situ soil and weak rock that develops through chemical weathering of exposed rock), and most commonly is triggered by high intensity or prolonged rainfall. The propensity for certain rock units to be unstable or marginally stable is therefore a function of the weathering and hydro-geological behaviour of that unit. These are in turn affected by rock mass characteristics and permeability, among other factors.



The appended Geology Summary Table briefly describes each of the significant geological units in the Far North District, their distribution, rock mass characteristics, weathering characteristics, typical landforms, and typical stability characteristics.

Each of these rock groups have been classified into relative stability hazard categories of Low, Moderate, and High, based on their propensity for instability or marginal stability.

2.2 Topography and Geomorphology

Slope angles, shapes and wider landforms are generally a product of the underlying geology and a function of rock mass characteristics and the resulting weathering behaviour. Similar rock units generally develop comparable geomorphologies, and for a known rock unit, qualified assessment of the geomorphology provides a good first order indication of slope stability hazard.

Regular, rounded slopes with linear or gradually changing slope angles are in general stable and unlikely to be subject to instability, although steeper sides slopes may be at some risk of soil creep and shallow instability.

Conversely, hummocky ground, irregular surface drainage paths, the presence of springs and mid-slope boggy areas, concave escarpments and sudden changes in slope can all be indicative or existing, active or historical instability.

Areas at risk of new instability are generally over-steepened and subject to erosional pressures (river or coastal settings, or as a result of site modification), or subject to changes in land use (e.g. deforestation).

The interpretation of such features can be highly subjective and can only be reliably assessed by suitably qualified engineering geologists or geotechnical engineers with experience in geomorphology, engineering geology and slope instability. Furthermore, geomorphic assessment often requires a quite detailed level of desktop study, beyond what can be reasonably expected during the review of a consent application.

Slope angle in isolation can be assessed quickly and objectively (for a given scale), provided that good topographic data is available, or a site visit is undertaken. When considered alongside the geology of the site, the slope angle can provide an indication of slopes which *may* be subject to instability. We therefore consider slope angle to be a good basis for criteria.

To ensure that the assessment of slope criteria considers the 'bigger picture', slope angle should be assessed both within and above and below any assessed development site.



In addition to slope angle, a topographic assessment should also consider the proximity to natural cliff features, which, whether above or below a site, have the potential to pose a significant hazard.

2.3 Site Modification

The modification of natural slopes through cutting or filling (earthworks) can often result in a decrease in the overall stability of that slope.

In general, cutting into a slope creates an over-steepened section and creates a 'window' for failure of the soils immediately above. In areas of existing instability (or marginal stability) cutting can remove the toe support for unstable land above and result in more significant movement, on a much larger scale than the cut itself.

Filling above natural ground level on slopes generally requires the formation of a steeper-than-natural fill slope, and the fill material is in most cases of lower strength than in its *in situ* state. Without engineering design and control on the placement methodology this can often result in slumping of the fill slopes. Although less common, filling also has the potential to surcharge the *in situ* subgrade material below. Depending on the strength and topography of the underlying ground, filling have the potential to result in activation of deep seated slope failures.

The sensitivity to slope modification generally depends on the pre-existing stability condition of the site. For a slope of marginal stability, even slight modification could result in immediate slope failure, while on a stable slope there is a greater factor of safety and hence much more tolerance to modification.

Where earthworks have been subject to documented engineering design and supervision, it can generally be assumed that the effect of the works has been qualified or quantified, and that following earthworks the site has been left in an acceptable state of stability.

Where earthworks have been carried out without engineering design or supervision, their effect on slope stability has likely not been rigorously checked, and the standard of work carried out is generally unknown. To gain any understanding of the stability of such areas, inspection and subsurface investigation by a suitably qualified person would generally be required.

Although the risk posed by the such earthworks may be mitigated by the underlying geology type, the pre-existing slope angle, and the standard of work carried out, these factors may be difficult to assess objectively by a non-qualified person. The only objective mitigating factor is the visible vertical height of the earthworks.



The presence of non-documented earthworks is considered a suitable criteria to assess land which may be subject to instability, subject to the works being 'significant' on the basis of height.

3 PROPOSED CRITERIA

Based on the factors outlined above, and specifically those that are considered objectively and quickly assessable, we recommend the following criteria to define 'land which may be subject to instability in the Far North District'.

1. Land which is underlain by 'Low Hazard' geological units (as outlined in the attached Geology Summary Table, and listed below), and is sloping steeper than 1V:3H (18°).
2. Land which is underlain by 'Medium Hazard' geological units, and is sloping steeper than 1V:5H (11°).
3. Land which is underlain by 'High Hazard' geological units.
4. Land which is overlain by boulders and is any distance downslope of slopes steeper than 1V:1H (45°).
5. Land which is within 15m of a slope greater than 1V:3H (18°).
6. Land which has been subject to, or is within 20m of land which has been subject to past modification including un-documented (non-engineered) cuts and fill slopes exceeding 1.5m in vertical height.
7. Land which is horizontally within 2 times the cliff height from the crest of cliffs and/or within 1.5 times the cliff height from the base of cliffs, where a cliff is taken as a slope exceeding 1V:1H (45°).
8. Land which is specifically known and documented to have been subject to past land slippage or inundation, on the basis of past geotechnical reports, council records, or any other reputable source of information.

The 'Low Hazard' geological units shall be defined as:

- Waipapa Group,
- Caples Terrane,
- Te Kuiti Group (Kamo Coal Measures, Ruatangata Sandstone, Mangapapa Mudstone, Whangarei Limestone),
- Houhora Complex,
- Tangihua Complex,
- Waipoua Basalt,
- Kerikeri Volcanic Group (Rhyolite Domes, Basalt, Scoria).

The 'Medium Hazard' geological units shall be defined as:

- Matatau Complex of Northland Allochthon (Taipa Mudstone, Mahurangi Limestone),
- Otatau Group (Waititi Formation, Omapere Conglomerate, Waiwhatawhata Conglomerate),



- Parengarenga Group (Paratoetoe Formation, Tom Bowling Formation, Kaurahoupo Conglomerate),
- Awhitu Group (dune sands, high terraces, alluvium),
- Tauranga Group Pleistocene and Holocene river lake and estuarine deposits,
- Kariotahi Group (dune sands, river lake and estuarine deposits).

The 'High Hazard' geological units shall be defined as:

- Mangakahia Complex (Punakitere Sandstone, Whangai Formation, Hukerenui Mudstone, Melange of Northland Allochthon),
- Mangonui Formation,
- Tauranga Group Pleistocene and Holocene hill slope deposits.

These are listed generally according to their GNS Science 'Key Name' as displayed on the NZ Geology Web Map¹ or the unit names shown on the GNS Science QMAP series 1:250,000 geology maps²:

Any units not listed above should be considered against the hazard designation of units in the same geological group if available, or should be considered as land which may be subject to instability (i.e. meeting the criteria) where no matching geological unit can be determined.

3.1 Application of Criteria

The land to be assessed under the criteria should be taken as the area to be developed under a consent application, rather than the subject property as a whole. In the case of a subdivision this would be a nominated building site within a vacant proposed lot.

When determining slope angles against the criteria, maximum angles through the assessed area and immediately above and below the area should be considered. The scope of assessment should be widened as necessary to satisfy the criteria (e.g. for Criteria 4, assessment must extend all the way upslope of the assessed land).

4 ASSESSMENT METHODOLOGY AND DATA SOURCES

4.1 Geology

Site geology should be checked against the GNS Science QMAP series geology maps. This data set is available as published physical or digital map sheets (Kaitia and Whangarei map sheets cover the Far North District), as a published GIS service on the GNS website¹, or as an

¹ <https://data.gns.cri.nz/geology/> - accessed 24/10/2019

² <https://www.gns.cri.nz/Home/Our-Science/Land-and-Marine-Geoscience/Regional-Geology/Geological-Maps/1-250-000-Geological-Map-of-New-Zealand-QMAP> - accessed 24/10/2019



integrated external data set in a separate GIS service (i.e. FNDC or NRCs mapping services) using GNS' web map service for the data.

Geology is mapped across the district at a scale of 1:250,000, and therefore unit boundaries accurately defined at the scale required to assess a development. A conservative approach should be adopted where assessing areas crossed by units boundaries, assuming the unit of the highest hazard category.

Where site specific information on the underlying geology is available, from past geotechnical reports from the site or adjacent sites, this may be used in preference to the mapped geology.

4.2 Topography

Slope angles are best determined on the basis of the regional LiDAR survey data hosted by Northland Regional Council. At the time of writing this survey covers most populated coastal areas of the Far North, and it is understood that region-wide coverage has been flown and will be published by 2020. It is therefore expected that accurate region-wide topographic data will be available by the time any proposed plan changes are in effect.

This dataset is expected to be sufficiently accurate for the purpose of assessment against the proposed criteria. The accuracy may be diminished somewhat where there is significant vegetation cover, however when averaging over the width of a development site this is unlikely to be significant.

Site specific survey data or slope profiles acquired on site may be used in preference to the LiDAR data, where available, particularly if the site is densely vegetated or has been significantly modified in the time since the LiDAR survey was flown.

4.3 Site Modification

Evidence of site modification can be identified through a review of past aerial images. Site modification is generally identifiable in aerial imagery as a disturbance to natural vegetation and the formation of large areas of exposed soil, grass or metal with well defined, square edges.

A catalogue of relatively recent aerial images if available on Google Earth Pro (desktop application). Several aerial images are also available on the council GIS service and from LINZ. Historical aerial images are also available through Retrolens³ (website), although these need to be retrieved and geo-reference individually which can be time consuming.

³ <http://retrolens.nz/> - accessed 24/10/2019



When evidence of site modification is identified, it should be determined whether there are any records of the works undertaken, either held by the council as part of a previous consent, or held by the owner.

For any non-documented works it will likely be necessary to carry out a site visit to determine the nature of works undertaken and their scale. It can then be determined whether the works are 'significant', thereby meeting the criteria and requiring specific engineering assessment.

4.4 Other Sources of Information

The proposed criteria outlined above have been specified to encompass land which *may* be subject to instability, to a high level of confidence. There is still however a possibility that sites that *are* subject to instability do not meet the criteria, and could thereby slip through without specific engineering assessment, contrary to the intentions of the proposed plan change.

To allow some of these cases to be captured within the rule, proposed Criteria 6 has been included as a catch-all for any other reputable information to be included in the assessment wherever available.

Such information could include council held documents, previous geotechnical reports from the site or adjacent properties, records of nearby land damage, and existing geomorphic mapping (including the GNS Science Landslide Database⁴).

⁴ <http://data.gns.cri.nz/landslides/wms.html> accessed 24/10/2019



5 OTHER CONSIDERATIONS

This report has been prepared exclusively for the Far North District Council with respect to the particular brief given to us. Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent. LDE Ltd accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

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APPENDIX A

GEOLOGY SUMMARY TABLE



Group	Unit	Sub Unit	Extent	Primary composition	Typical rock mass characteristics	Typical weathering profile	Landforms	Stability	Relative hazard
Basement Rocks	Waipapa Terrane		Widespread on lower east coast from Whangaroa Harbour south, through the Bay of Islands and Oakura Coast	Greywacke (indurated sandstone) and argillite	Moderately thin bedded, closely fractured rock mass. Heavily folded and faulted. Very strong intact rock strength when fresh.	Very thick weathered rock profile, commonly up to or above 20m thick on ridgelines, thinning on steeper side slopes, capped by very stiff residual soil (clay).	Forms many of the prominent ranges. Generally smooth, elevated ridges, steep side slopes. Generally develops regular dendritic drainage patterns.	Typically forms stable hillsides with slopes up to 30° or more. Shallow slippage at base of residual soil layer on exposed steep slopes. In minor cases can develop deep seated instability within deeper weathering profile, generally associated with disturbance of natural slopes (under cutting) or due to coastal erosion. Wedge failures on persistent discontinuities in cut slopes.	Low
	Caples Terrane		Isolated to Omahuta-Puketi Range (between Kerikeri and Hokianga)	Greywacke and argillite as above, with massive basalt	As above, with basalt inclusions assumed to have less rock mass discontinuities and similar rock strength.	As above, with thinner weathering profile developing over areas of basalt due to greater bedding thickness and fracture spacing.			Low
Te Kuiti Group	Kamo Coal Measures		Sparsely distributed in the Far North, on the western margins of the Waipapa Terrane in the Kawakawa area, and on the northern and north-western fringes of the Caples Terrane, inland from and to the south of Whangaroa Harbour.	Terrestrial sedimentary rocks (mudstone, sandstone and conglomerate), with variable coal interbeds	Moderately to thick bedded. Generally weak intact rock strength. Bedding is regionally faulted and generally gently tilted, but otherwise not significantly disturbed.	Highly variable weathering profile dependant on the nature of the near surface stratigraphy. Generally weathers to clayey soils.	Forms smooth, rounded ridgelines and hillsides with moderately steep slopes and regular drainage patterns. Generally of lower relief than adjacent greywacke ranges.	Generally stable on crests and low angle side slopes. Steeper side-slopes and gully-heads may be subject to shallow instability at weathering boundaries. Deep seated instability is rare, expected structurally controlled and associated with low-strength beds within the parent rock.	Low
	Ruatangata Sandstone + Mangapa Mudstone			Slightly calcareous muddy fine sandstone, calcareous mudstone	Massive, thickly bedded with widely spaced discontinuities. Moderately weak intact rock strength.	Moderate weathering depth with ~4-7m of soil overburden (clay rich residual soil and completely weathered rock) overlying competent moderately weathered to fresh rock.			Low
	Whangarei Limestone		Isolated in very small areas to the south of Kawakawa	Crystalline limestone occasionally with calcareous sandstone interbeds	Generally massive with widely spaced jointing, sometimes "flaggy" with very thin/laminated calcareous sandstone. Strong intact rock strength. Joints open to form caverns as a result of dissolution.	Thin (1-2m) weathering profile with clay cap of residual soil transitioning directly into fresh rock.	Can form karstic landscapes with craggy surface rock outcrops, depressions and irregular surface drainage paths due to development of subsurface drainage paths and the development and collapse of caverns. Otherwise has smooth rolling hill morphology.	Generally stable with respect to slope instability, due to shallow weathering depth and rock strength. Sinkhole collapse a more significant hazard (outside scope of this report).	Low
Northland Allochthon	Houhora Complex		Whangaroa Harbour, Karikari Peninsula.	Andesite pillow lavas, ignimbrite, tuff. Greywacke.	Generally strong intact rock strength. Variably close to widely spaced discontinuities and thin to thickly bedded, dependant on underlying rock type.	Develops relatively thick profile of completely weathered rock, likely to be variable in accordance with parent rock lithology.	Generally smooth, elevated ridges, steep side slopes. Generally develops regular dendritic drainage patterns.	Similar to that of Waipapa Terrane. Generally coastally exposed, forming hard shorelines. Overlying profile of weathered soils have the potential to develop deep seated landslide movement in steeper slopes.	Low
	Tangihua Complex		Widespread in mid-north, upper west-coast to Mangonui, North Cape and Cape Reinga. Coastal promontories of Doubtless Bay.	Predominantly submarine basalt pillow-lavas, with lesser basalt breccia and argillite. Lightly hydrothermally altered in places.	Strong intact rock strength. Moderate to widely spaced discontinuities associated with "pillow" deposition. Close bedding and jointing may be associated with minor lithologies.	In stable, low relief areas can develop thick (~10m) weathering profile of very stiff to hard clay/silt soils, thinning on side slopes in proportion to steepness.	Forms steep high relief terrain with steep, linear hillsides and sharp ridgelines. Can form asymmetric valleys and irregular dendritic drainage patterns, likely related to regional tectonics and structural influence of emplacement.	Generally stable on ridge and hill crests, and on low to moderate angled side slopes. Shallow instability relatively common on steep side slopes and gully-heads.	Low
	Mangakahia Complex	Punakitere Sandstone	Extensive centrally through the lower Far North, to the north and south of the Hokianga Harbour, and inland of Whangaroa Harbour and Doubtless Bay.	Sandstone with lesser interbedded mudstones	Moderate to thick bedded sandstone with interbedded mudstone. Weak to moderately strong intact rock strength. Moderately sheared/faulted on a large scale due to allochthon movement (less so than other Mangakahia Complex units)	Thin surficial weathering profile (2-4m), of moderate to high strength clay residual soil layer overlying a transition zone of soft to firm, sheared, saturated clay with minor entrained gravel from the underlying parent rock. Soils retained sheared fabric of parent rock. Commonly significant depth (~10m) of highly variable strength rock (highly - moderately weathered) before reaching fresh rock.	Generally forms low angled (10 - 14°) hummocky slopes with poor surface drainage. Can alternatively form more prominent smooth rolling hills where larger blocks of intact (non-sheared) sandstone are present. Commonly forms asymmetric landscapes as a result of regional shear orientation	The surface mantle of weathered soils are generally in a state of marginal instability and are prone to creep/earth-flow type movement above the rock boundary during extreme rainfall events or as a result of land disturbance. Deeper seated instability can also occur on relatively shallow slopes, particularly on slopes oriented to the direction of shearing of the rock mass. Discrete, well defined landslide features are rarely seen due to the slow-moving and lobate nature of the slope movement.	High
	Whangai Formation		Siliceous mudstone occasionally with beds of sandstone and calcareous mudstone/limestone	Massive. Weak intact rock strength. Highly to pervasively sheared and shattered with fissile fabric.	Moderately thin weathering profile (up to 6-8m) associated with relatively high rock mass permeability. Typically with a surficial moderate to high strength clay residual soil layer overlying a transition zone of soft to firm, sheared, saturated clay with minor entrained gravel from the underlying parent rock. Soils retain sheared fabric of parent rock.	Forms low to moderate angled (10 - 20°), rounded, variably hummocky rolling hills. Generally with irregular or semi-regular drainage patterns. Commonly forms asymmetric landscapes as a result of regional shear orientation.	Due to marginal state of instability, any significant cutting or filling is likely to result in slope failure. Melange and Hukerenui Mudstone generally most actively unstable, followed Punakitere Sandstone and Whangai Formation. Whangai Formation more commonly prone to deeper	High	

Group	Unit	Sub Unit	Extent	Primary composition	Typical rock mass characteristics	Typical weathering profile	Landforms	Stability	Relative hazard
Northland Allochthon		Hukerenui Mudstone + Melange of Northland Allochthon		Groundmass of variable, generally non-calcareous, non-siliceous mudstone (Hukerenui Mudstone), with entrained blocks of mixed allochthonous and autochthonous lithologies (melange)	Pervasively sheared and shattered. Weak to very weak rock mass, with contorted blocks of stronger material. Shear surfaces at low angle and persistent, associated with allochthon emplacement.	Thin weathering profile (1-3m), generally with a surficial moderate to high strength clay residual soil layer overlying a transition zone of soft to firm, sheared, saturated clay with minor entrained gravel from the underlying parent rock. Soils retained sheared fabric of parent rock.	Forms very low angled (7-10°), extremely hummocky slopes often with no continuous surface drainage paths. Often small swamp-like reedy areas created by hummocks, commonly formed into farm ponds.	movement due to greater weathering depth.	High
	Matatau Complex	Taipa Mudstone	Widely distributed between Kaitaia and Doubtless Bay, and between Whanagroa and Hokianga Harbours	Calcareous mudstone with glauconitic sandstone beds	Moderately thin to thickly bedded with moderate to widely spaced jointing and thick bedding. Rare persistent shears (thrust faulting) associated with allochthon movement.	Thin weathering profile (3-5m), generally with surficial very stiff clay residual soil and very stiff to hard clay with lesser sand layers (completely weathered mudstone and sandstone). Rapid transition to fresh mudstone due to low rock mass permeability.	Generally forms smooth gentle to moderately steep rolling hills with terracettes on steeper slopes. Generally develops semi-regular dendritic drainage pattern. Occasionally develops hummocky, poorly drained, reedy landforms but generally steeper sloped than Mangakahia Complex.	Generally forms stable hillsides prone to extreme soil creep and shallow slippage in steeper areas. Occasionally forms debris flow or deep seated translational type instability more characteristic of allochthon, likely associated with unfavourably oriented shear surfaces in rock fabric.	Medium
		Mahurangi Limestone	Commonly around the fringes of Taipa Mudstone (as above) and Matatau area south of Kawakawa	Fine grained muddy limestone, locally with glauconitic sandstone	Laminated, closely fractured with closely to widely spaced, persistent jointing. Weak to moderately strong in-tact rock strength. Occasional persistent slick shear surfaces.	Generally very shallow with 1-2m of very stiff clay residual soil, becoming gravelly with depth. Sharply transitions to fresh rock.	Generally forms smooth gently rolling hills with wide flat crests. Terracettes on steeper slopes. Often with a reedy surface due to very low permeability. Sometimes has irregular jagged topography associated with block movement within allochthon. Prone to piping erosion resulting in tunnel-gully features. Commonly subject to farm quarrying.	Forms stable landforms. Thin soil mantle prone to creep and very shallow slippage on steeper slopes. Deeper seated instability relatively rare and likely associated with unfavourably oriented shear surface in rock fabric.	Medium
Miocene Sedimentary Deposits	Otaua Group	Waititi Formation Mudstone	Isolated to the mouth of the Hokiana Harbour, Waimamaku Valley	Mudstones, sandstone and conglomerates derived from the weathering of Northland allochthon and volcanic lithologies	Thin to moderately thick bedded, in places severely folded and faulted. Generally widely to closely spaced jointing.	Likely varies by lithology and as a result of variable rock mass characteristics	Moderate to steep mostly even rolling hills, in places irregular and stepped. In places forms uneven, hummocky, reedy slopes but generally isolated to steeper slopes. Variable drainage patterns.	Expected to be generally stable on low angle slopes and hill and ridge crests. Steeper slopes occasionally show creeping instability features, and some larger structurally controlled instability is evident (Otaua). Instability likely associated with interaction with underlying Northland Allochthon at unit boundaries.	Medium
		Omapere Conglomerate							Medium
		Waiwhatawhata Conglomerate							Medium
	Parengarenga Group	Paratoetoe Formation	Isolated to the northern tip of New Zealand (Cape Reinga and North Cape)						Medium
		Tom Bowling Formation							Medium
	Kaurahoupo Conglomerate							Medium	
	Mangonui Formation		Isolated to the eastern end of Doubtless Bay (Cable Bay, Coopers Beach, Mangonui)	Carbonaceous mudstone with lesser lignite, sandstone and conglomerate	Thin to moderately thick bedded, very weak to weak with some lower strength beds. Sea-ward tilted bedding.	Forms deep (>10m) regolith of stiff to very stiff soils with weaker zones of organic clay, peat, and low strength lignite.	Generally gentle, low angled rolling hills with somewhat irregular/uneven morphology. Somewhat uneven dendritic drainage patterns.	Prone to deep-seated, low angle translational instability where weaker bedding plane are at unfavourable orientation to slope (e.g. Coopers Beach Landslide). Appears prone to shallow instability on moderate slopes in inland hilly terrain.	High
Volcanics	Coromandel Group		Scattered north and south of Whangaroa Harbour. Tip of Karikari Peninsula, and North Cape	Intrusive igneous andesite and granitoid. Volcanic breccia, tuff.	Varies by lithology. Intact rock strong to very strong.	Varies by lithology from very thin to none, likely up to moderate depth depending on slope angle.	Generally steep mountainous terrain, sometimes with large prominent rock exposures (tors)	Generally in stable state, some potentially for large rockfalls although expected to be very rare. Some shallow slippage of thin weathering profile evident on steep granitoid faces.	Low
	Waitakere Group	Waipoua Basalt	South of Hokianga (Waipoua Forest)	Basalt lava flows with interbedded tuff and lapilli.	Strong to very strong. In discrete flows (very thick beds), likely discontinuously jointed at moderately wide to wide spacing.	Basalt typically weathers to very stiff silty clay soils near the surface, often becoming bouldery at depth. Weathering depth highly variable.	Forms broad elevated plateau with relatively low relief, moderately steep to steep hills. At lower elevations forms gentle, smooth flat crested hills.	General stable. Potential for instability at margins, where instability can occur due to rafting on underlying country rock (predominantly Northland Allochthon)	Medium
	Kerikeri Volcanic Group	Rhyolite domes	Scattered between Kerikeri and Matauri Bay	Rhyolite	Likely massive, but generally completely weathered away to significant depth	Develops deep weathered, hydrothermally altered halloysite clay deposits.	Low to moderate angle, isolated domes.	Expected to be stable up to moderately steep slopes.	Low
		Basalt lava flows	Kaikohe through to Kerikeri and north of Bay of Islands to Matauri Bay	Basalt, volcanic plugs and minor tuff	Strong to very strong. In discrete flows (very thick beds), likely discontinuously jointed at moderately wide to wide spacing.	Basalt typically weathers to very stiff silty clay soils near the surface, often becoming bouldery at depth. Weathering depth highly variable.	Forming flat volcanic plateaus, often with a gently undulating surface	General stable. Potential for instability at margins, where instability can occur due to rafting on underlying country rock (predominantly Northland Allochthon)	Low
	Scoria cones	Scattered throughout lava flows, predominantly Kaikohe to Waimate	Basalt scoria	Generally weak to very weak rock strength (crushable), no discernible structure	Forms thin, typically gravelly clay soils over scoria.	Forms steep sided, generally cylindrical cones, often partially collapsed on one side		Low	
	Awhitu Group dune sands, alluvium and high terrace deposits		Scatters around west coast and northern peninsula	Cemented dune sands, alluvial mudstone and sandstone, lignite	Massive, weak cemented dune sand and sandstone, and bedded, extremely weak to very weak mudstone, sandstone and lignite	Generally very little weathering of sand facies, and overall expected to have shallow weathering influence.	Predominantly forming high terraces and fixed dunes on coastally exposed hills	Expected to be stable, with instability somewhat influenced by underlying country rock at margins of elevated terraces.	Medium

Group	Unit	Sub Unit	Extent	Primary composition	Typical rock mass characteristics	Typical weathering profile	Landforms	Stability	Relative hazard
Recent Sediments	Tauranga Group	Pleistocene and Holocene river, lake and estuarine deposits	All flat valley floors and flood plains. Inner reaches of various harbours. Infilling behind recent volcanics where flow paths have been dammed	Predominantly unconsolidated firm to stiff clay and silt, with lesser sand, gravel and peat.	n/a	n/a	Generally forms flat linear surface.	Often unstable where sloping (generally at river banks), but generally isolated from sloping land.	Medium
		Pleistocene and Holocene hill slope deposits	Predominantly mapped around Waipoua Basalt, particularly in Waimamaku Valley	Disturbed/reworked parent material (likely basalt mixed with underlying country rock, generally Northland Allochthon)	n/a	n/a	Very large scale landslide features, typically consisting of a broad, elevated but hollowed scarp area, and characteristic debris runout lobe.	Present inherent instability risk due to nature of deposition. In most cases these large scale features are at rest, however smaller scale instability within the larger feature remains a significant hazard.	High
	Kariotahi Group	Pleistocene and Holocene dune sands, interdune, river, lake and estuarine deposits	Beaches, tombolos and barrier spits through Far North, particularly west coast.	Loose (active) to weakly cemented (fixed) dune sands, interdune deposits (peat, mud), and alluvium.	n/a	n/a	Coastal dune and back-dune landforms	Generally stable. Potential for instability where over steepened by erosion (coastal or fluvial).	Medium



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Memorandum

To: Tammy Wooster

From: Ian Mayhew, Jerome Wyeth

Date: 26 August 2021

Subject: Review of Draft District Plan Feedback – Natural hazards

Kia ora Tammy

As requested, we have reviewed the feedback on the Natural Hazards section of the Draft District Plan. While this review focussed on the Natural Hazard section itself, we note that some of the natural hazard provisions lie in other parts of the plan. Accordingly, we had a brief look at those sections as well, primarily in regard to the comments on integration and consistency that were raised by some parties (rather than the detail of those provisions). We have made recommendations in relation to infrastructure, energy and transport chapter to achieve better integration, but not in relation to the coastal environment and subdivision chapters (although some initial comments are included in the attached table). We can provide a more detailed review and recommendations of the natural hazard related provisions in those chapters if requested by Council.

Overall, there was not a substantial response to the draft Natural Hazard provisions. We have summarized the key issues raised in the attached table. This includes our initial recommendation as to the nature of changes to the plan where we consider these are warranted or could be considered. At this stage, we have not proposed specific changes to the provisions – we plan to progress that once the approach to specific issues is confirmed with you.

Having prepared the draft Natural Hazard provisions for the draft Plan, we are not entirely surprised that the most significant issue that was consistently raised in submissions was the (lack of) mapping of areas of land instability. As you may recall, this was an issue that was considered and discussed at some length during the preparation of the provisions. Instability has been raised (in some technical assessments) as a widespread and potentially significant hazard issue in the Far North District. Accordingly, LDE were engaged to advise on criteria that could be applied to identify areas of land that are likely to be at greater risk of instability and their report was incorporated into the s32 evaluation. The factors were included as 'criteria' for identifying potentially unstable land – an approach that was adopted from the Auckland Unitary Plan. However, areas were not mapped due to the number and complexity of factors that contribute to land instability, which include:

- Previously documented areas of instability.
- Geology – low medium and high hazard geological units were identified. These could be mapped, but need to be applied in conjunction with other factors – particularly slope.
- Slope – this is in part linked to geology and other factors.
- Proximity to cliffs and areas of larger cut/fill.

In light of the submissions on these provisions, it would be beneficial to discuss the approach with you and your team to confirm the approach and its practical implementation. Given the multiple contributing factors, and the need for engineering assessment/judgement, the management of instability risk is more readily assessed during consent processes (for example subdivision). However, identifying when such an assessment is required (or when isn't) is the challenge.

As above, we consider that this is the most significant issue arising from the submissions. The other points raised, and our recommendations (which we are also happy to discuss), are provided in the attached table.

Summary of key points raised in feedback on the natural hazards chapter of the Draft Far North District Plan

Issue	Submitter Feedback/Changes	Analysis and Recommendations (bullets)
General		
Strategic direction	The plan section does not provide clear 'direction' as to how the risk, climate change and other natural hazards are going to be managed in land use and subdivision	<p>We recognise that the strategic directions largely following the nine (now ten) Significant Resource Management Issues (SRMIs) that were identified from the outset. As such, they are drafted as issues rather than strategic directions. As such, we agree with the comments that have been made. We are also aware that you are considering how the strategic direction section is drafted and we would be happy to provide input into that in terms of the topics we are working on.</p> <ul style="list-style-type: none"> ▪ Redraft the statements to include the 'high level' approach to managing natural hazards. Some of this wording may be taken from the introduction to the natural hazards section and we can assist with this.
Natural Hazards Section		
Instability	Map the areas subject to land instability (multiple submissions)	<p>We have discussed this above. While this was considered during the drafting of the plan, and was the preferred approach, it was considered infeasible due to the number and complexity of the factors that contribute to instability. The approach followed that of the Auckland Unitary Plan.</p> <ul style="list-style-type: none"> ▪ Meet to discuss the current approach and whether it is able to be implemented in practice. ▪ Liaise with Auckland Council to identify how their provisions are working in practice.
	Include coastal erosion as a 'land instability' matter	Coastal erosion zones (50 + 100 year) have been mapped by NRC, these zones are subject to controls in the Coastal Environment Section (together with coastal inundation zones). Given that they are mapped, in our view that are best retained as an overlay in the coastal section. However, should the

		<p>approach to mapping land instability change, then they could be included as 'land subject to instability'.</p> <ul style="list-style-type: none"> Retain as currently drafted, subject to a decision on instability above.
Flooding	<p>There did not appear to be any major submissions or opposition to the draft provisions. A few matters of detail were raised including allowing temporary structures (associated with defence training) as a Permitted Activity (PA) and larger floor area as a PA for rural structures.</p>	<ul style="list-style-type: none"> Retain provisions largely as is, consider changes during detailed drafting assessment – but pretty minor.
	<p>Accuracy of the flood susceptible map and its relationship to the NRC mapped flood areas.</p>	<p>This issue was raised. We understand that the flood susceptible areas map (non stat) is indicative based on geology and will not continue to the notified plan. Is this correct?</p>
	<p>Adopting a PA similar to that of NH-R5, which allows activities as a PA where it is in accordance with an approved subdivision.</p>	<p>Agree with this – <i>provided that</i> matters of detail relating to flooding are dealt with at subdivision stage. That is, there is no need for duplicate processes.</p> <ul style="list-style-type: none"> Check whether flooding is dealt with in detail at subdivisions stage (ie location, overland flow paths etc). If so, then extend NH-5 to include development in flood hazard areas. If not adequately addressed, retain as is.
	<p>Support for the concept of managing vulnerable activities in flood zones</p>	<p>Noted</p>
	<p>Request for Non-complying activity status for Significant Hazardous Facilities in flood zones (as is the case for coastal inundation and erosion zones)</p>	<p>The focus of the flooding provisions have been on vulnerable activities. However, it seems reasonable that greater scrutiny should be given to high risk. We recommend that this is addressed in the Hazardous Substances which includes non-complying rules for Significant Hazardous Facilities in natural hazard overlays.</p>
	<p>Not allowing an increase in floor area for existing buildings (as a PA) in a flood hazard or instability area is overly restrictive and will require unnecessary resource consents</p>	<p>This issue was considered at length. It was considered that permitting an increase in area was likely to increase hazard risk and it was too difficult to ensure adequate mitigation as a PA.</p>

		<ul style="list-style-type: none"> Retain as drafted.
Wildfire	<p>Only a few comments were received. Two related to matters of detail and whether the rules were practical to implement:</p> <ul style="list-style-type: none"> Whether a 'building' would mean that all structures within 20 m of contiguous bush would require consent. Proximity to a fire hydrant 	<p>Our reading of the National Planning Standards is that the term 'building' does not include structures.</p> <p>It would be good to discuss how subdivision and development is managed in respect of providing water supplies for fire fighting purposes.</p> <ul style="list-style-type: none"> Retain subject to discussion.
Infrastructure (provisions in the NH section)	<p>PAs are too restrictive, should allow for (as a PA):</p> <ul style="list-style-type: none"> An increase in footprint as a PA (in a hazard area); All telecommunications infrastructure (not otherwise regulated by the NES TF); Ancillary buildings/structures in flood/instability areas (similar to that of farming – 100m²). 	<p>The issue of scale is always a difficult one as there is not clear threshold between what is minor and what is not.</p> <p>We note that the rules (NH-R3) allow small new buildings/structures of up to 10m² which would likely cover some (most?) teleco infrastructure and some power infrastructure. However, there has been no submission as to why this threshold is not appropriate. We do not consider that the comparison with farming is valid. The basis for a larger area allowed for farm structures was that any adverse effect (flooding/instability) are likely to be internalised due to the scale (area) and low development density on a farm.</p> <ul style="list-style-type: none"> Retain current limits unless a clear alternative is presented.
	<p>Waka Kotahi NZ Transport Agency suggest amendments to NH-O3 and NH-P14 to recognise that some infrastructure is designed to be temporarily un-available during hazard events.</p>	<p>Generally agree that this is a valid response – ie it may be accepted that some roads flood and that infrequent and temporary flooding may be acceptable.</p> <ul style="list-style-type: none"> Revise to provide for recognition of temporary effects.
	<p>Extend policies NH-P10 and 11 (enabling infrastructure) to provide for regionally significant infrastructure.</p>	<p>This provision was intended to capture all infrastructure which includes regionally significant infrastructure – noting that the plan definition of infrastructure is broad. We could extend the provision to say 'infrastructure, including regionally significant infrastructure', to remove any doubt. However, this depends to some extent as to how the plan deals with regionally significant infrastructure in general.</p> <ul style="list-style-type: none"> Revise as necessary.
Integration with Other Sections		

Infrastructure	A number of submissions identified overlap and/or inconsistency with the Infrastructure provisions – in particular Policy I-P5 which is similar to, but not the same as those in the NH section. In general, submitters appear to prefer the NH policies (NH-P11 in particular).	In our view, the NH provisions for infrastructure are best located in the hazards section – possibly with a cross reference – this will resolve inconsistency. Where some overlap remains, wording should be made consistent. <ul style="list-style-type: none"> ▪ Retain infrastructure provisions in the NH section and remove overlapping/inconsistent ones from the Infrastructure and Renewable Energy chapter.
Coastal Environment	Similarly, a range of matters were raised in relation to the coastal environment rules relating to coastal inundation and coastal erosion.	
	<ul style="list-style-type: none"> ▪ Complexity of the coastal hazard table and how they apply alongside the other coastal rules 	The rule table is complex as there are different categories, but may be less so when in an e-plan format. <ul style="list-style-type: none"> ▪ However, it would be beneficial to review the rules to see if their presentation can be simplified/refined.
	<ul style="list-style-type: none"> ▪ Inconsistency between the rules for coastal inundation and those for natural hazards (particularly flooding) 	The rules for coastal inundation and flooding were deliberately different due to the different nature of the inundation event and the ability to respond/manage. But, as above, the rules were complex due to the different zones and activities etc. <ul style="list-style-type: none"> ▪ Rules could be reviewed to confirm whether such fine-grained differentiation is required.
	<ul style="list-style-type: none"> ▪ The NRC has released revised coastal hazard maps for feedback – these include a coastal erosion zone 3 (100 years + rapid sea level rise) 	<ul style="list-style-type: none"> ▪ The coastal hazard/erosion maps in the plan are from NRC and should be updated accordingly (or hot linked so that they are the same). ▪ The RPS expectations for erosion zone 3 should be considered before adopting into the plan. In our opinion, planning responses need to be cautious of layered ‘worst case’ assessments.
	<ul style="list-style-type: none"> ▪ seems to be allowance for increased development in coastal erosion zones – there is a policy for the management of this issue but is it carried into zoning? 	The provisions sought to restrict development in coastal hazard zones, but this is balanced against the ability of land owners to utilise their site – noting that the RPS does not restrict further development. The provisions are not intended

		to signal that more intensive/extensive urban zoning should be applied within hazard areas – ideally this would be addressed at RPS level.
Subdivision	None that we identified	<p>We did not identify any submissions that related to the natural hazard rules that relate to subdivision – noting that there are hazard specific rules in this section. However, we note that the hazard rules were drafted in the absence of the subdivision rules and hence may not be well integrated. For example some rule SUB-R5 subdivision in an area identified as susceptible to land instability could be integrated with the general rules r2 and r3 – with matters pertaining to stability (ie an assessment of instability) being a performance standard.</p> <p>We have not analysed other rules in this section at this stage, but advise that in our opinion it is very important (ie essential) for natural hazards to be addressed at subdivision stage to avoid creating new lots (and associated expectations of subsequent development) that are at risk from natural hazards – without these risks being mitigated (or able to be mitigated). That is simply creating a future problem for Council and landowners. We also note that the land use rules for natural hazards include permitted activities provided subdivision has addressed the hazard – so it is important for these rules to work in tandem.</p> <p>SUB-P3 could also reviewed to align with the hazard section.</p> <ul style="list-style-type: none"> ▪ Review the subdivision provisions to ensure consistency with the natural hazard provisions