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Northern Adaptation Area Risk Assessment

CAP Workshop 29 March 2023

Agenda

- Purpose
- Terminology
- Process
- Risk Assessment – by Domain
  - Built Environment
  - Ecological
  - Natural Character
  - Human
- Summary

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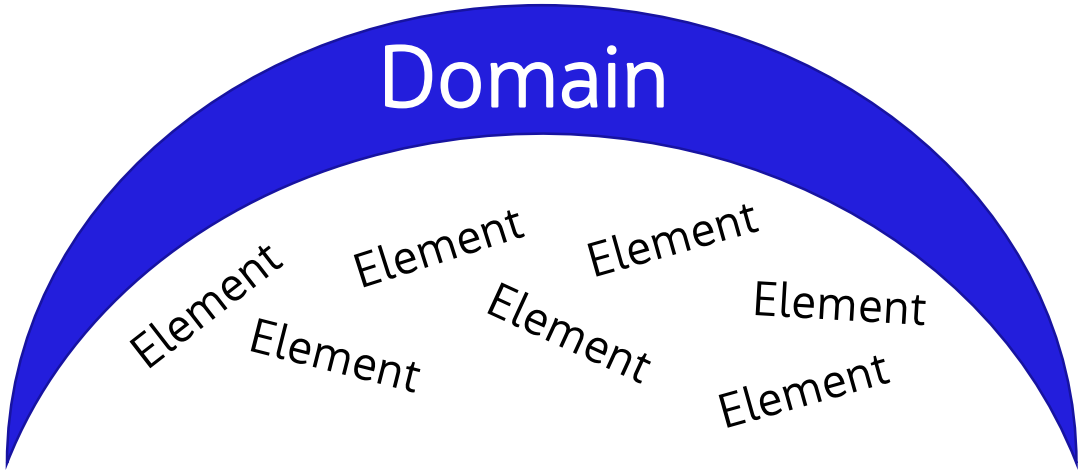
Terminology



Domain	Element
Built Environment	e.g. Roads, Property, Water Supply
Ecological	e.g. Wetlands, dunes, nesting sites
Natural Character	e.g. Areas of high natural character
Human	e.g. Daily routines, health, displacement
Cultural	**Still to be completed with Iwi input.**

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Purpose

What is a risk assessment?	Why do we need one?	What is it not?
A systematic way to assess the potential risks that may impact a person, activity, or asset from a hazard over time. It considers: - How **exposed** is an element to the hazard? - What are the **consequences** of the element being exposed? - And therefore, how **sensitive** is the element to being exposed? - Can the element **naturally adapt** with the hazard? It is a snapshot of what a 'do nothing' scenario may look like in the future. It looks at the NAA as a whole unit. It provides a 'baseline' that throughout the TK process we can use to assess our pathways against – e.g. do our pathways achieve what we need? It is based on the data we have available now, and can be built on in the future.	• To understand **what is in the Northern Adaptation Area, and what is at risk** to coastal erosion and inundation - now and in the future with SLR. • To understand **when** elements may become at risk. • To help us determine **where** we should focus our efforts to reduce risks in the future. • To help inform our objectives (what are we trying to achieve).	• Domains aren't prioritised – That is for the CAP to decide in your objectives. • It does not include economics or governance Domains– it is based on the information we have available to date. • It is not a broad climate change risk assessment, it only deals with coastal erosion and coastal inundation information available at this stage (e.g does not include AWA fluvial/pluvial-groundwater flooding). • This is not an extensive risk assessment – does not include every single council asset. It recognises the key infrastructure and values of the district and uses available data to assess the risk. • It is not going to solve all our problems today! – This will show us what is at risk. In our next few workshops we will be determining how best to reduce the risks in the future.

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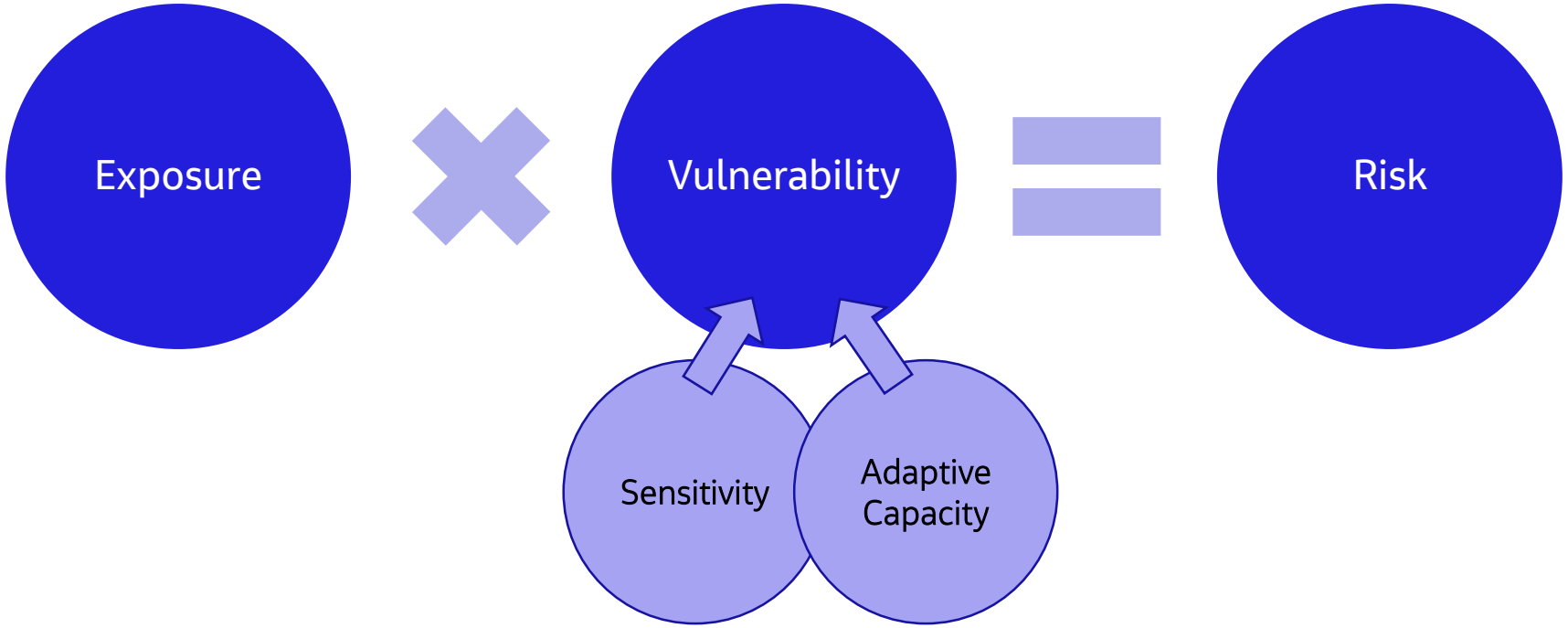
Process – Calculating Risk



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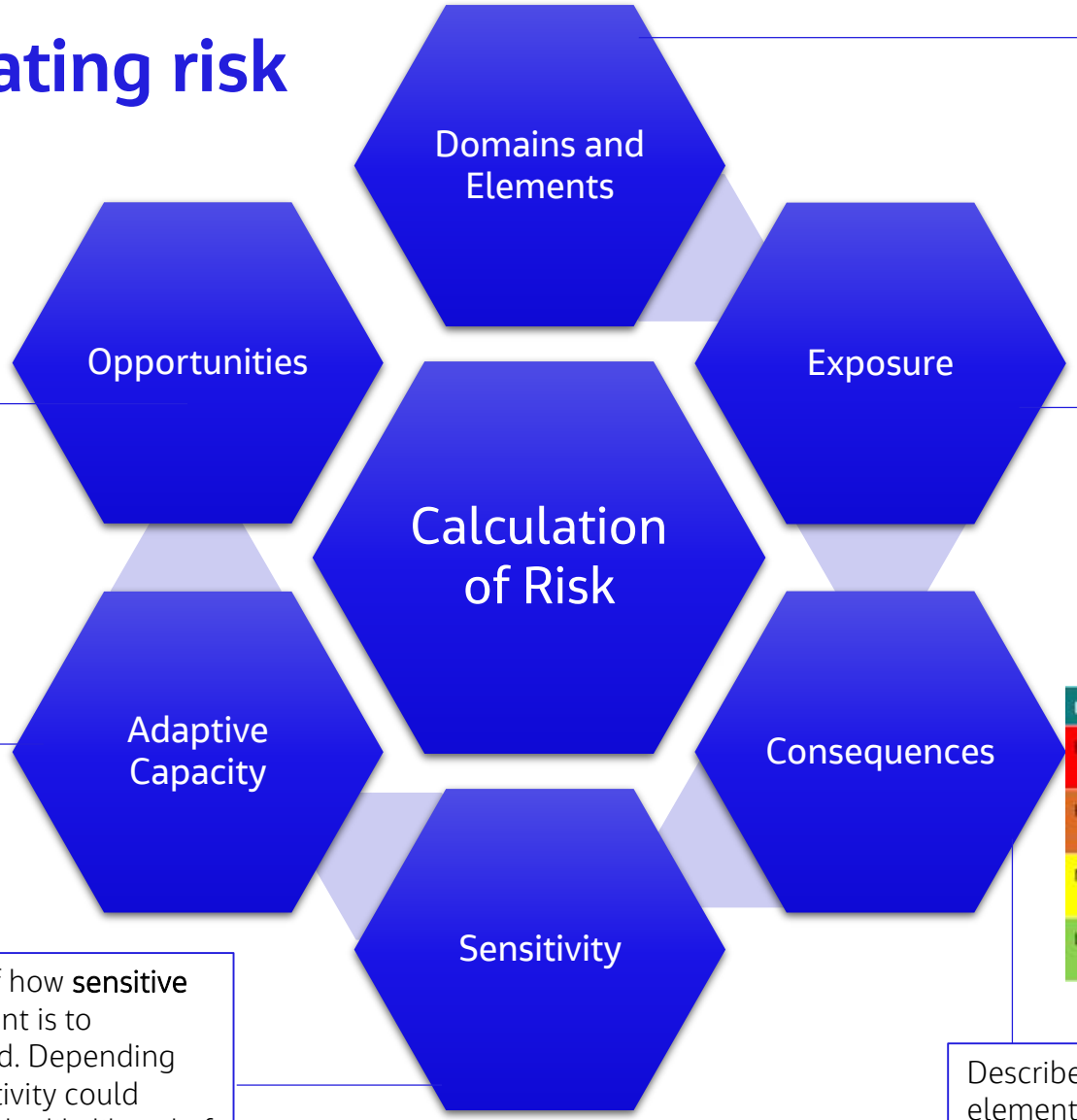
Process – Calculating risk



Identify the **domains and elements** that will be assessed.
- Built environment
- Human
- Ecological
- Natural Character
- Cultural (to be completed)

Description of potential **opportunities** there are for the element to have positive outcomes as a result of the hazard occurring, or potential opportunities outside of the adaptation planning scope to deal with the hazard.

Identify the **exposure** of the element to the hazard. Where possible, this is done using geospatial information to overlay with the hazard, and the exposure rating scale (MfE, 2017) is used, as per below. In some cases where the geospatial data was not available, these have been subjectively assessed.
Extreme, high, moderate, low ranking

A subjective measure of how easily/efficiently an element at risk can **adapt** naturally when exposed to a climate hazard.
Very low, low, moderate, high ranking

Exposure rating	Qualitative definition	Quantitative definition
Extreme	Significant and widespread exposure of elements to the hazard	>75% of sector or element is exposed to the hazard
High	High exposure of elements to the hazard	50–75% of sector or element is exposed to the hazard
Moderate	Moderate exposure of elements to the hazard	25–50% of sector or element is exposed to the hazard
Low	Isolated elements are exposed to the hazard	5–25% of sector or element is exposed to the hazard

Subjective measure of how **sensitive** (or tolerant) an element is to exposure to the hazard. Depending on the element, sensitivity could increase over time as the likelihood of exposure increases.
Extreme, high, moderate, low ranking

Describe the **consequences** of an element being exposed to the hazard.

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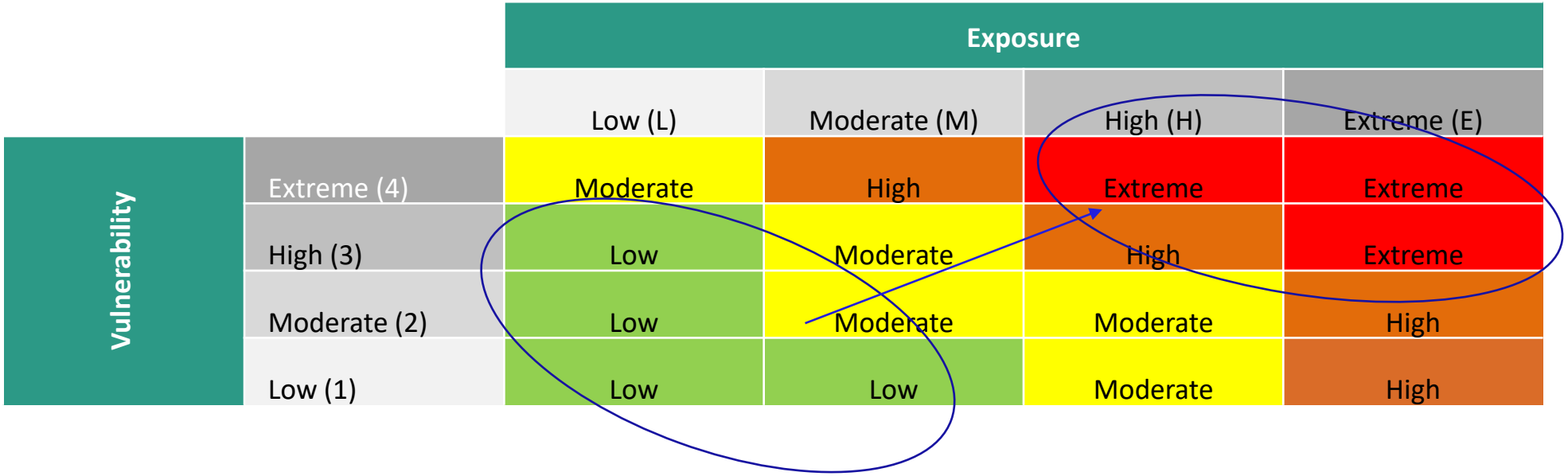
Process - Risk Ranking



Vulnerability	Exposure			
	Low (L)	Moderate (M)	High (H)	Extreme (E)
Extreme (4)	Moderate	High	Extreme	Extreme
High (3)	Low	Moderate	High	Extreme
Moderate (2)	Low	Moderate	Moderate	High
Low (1)	Low	Low	Moderate	High

From: Ministry for the Environment. 2021. *He kupu ārahi mō te aromatawai tūraru huringa āhuarangi ā-rohe / A guide to local climate change risk assessments.* Wellington: Ministry for the Environment.

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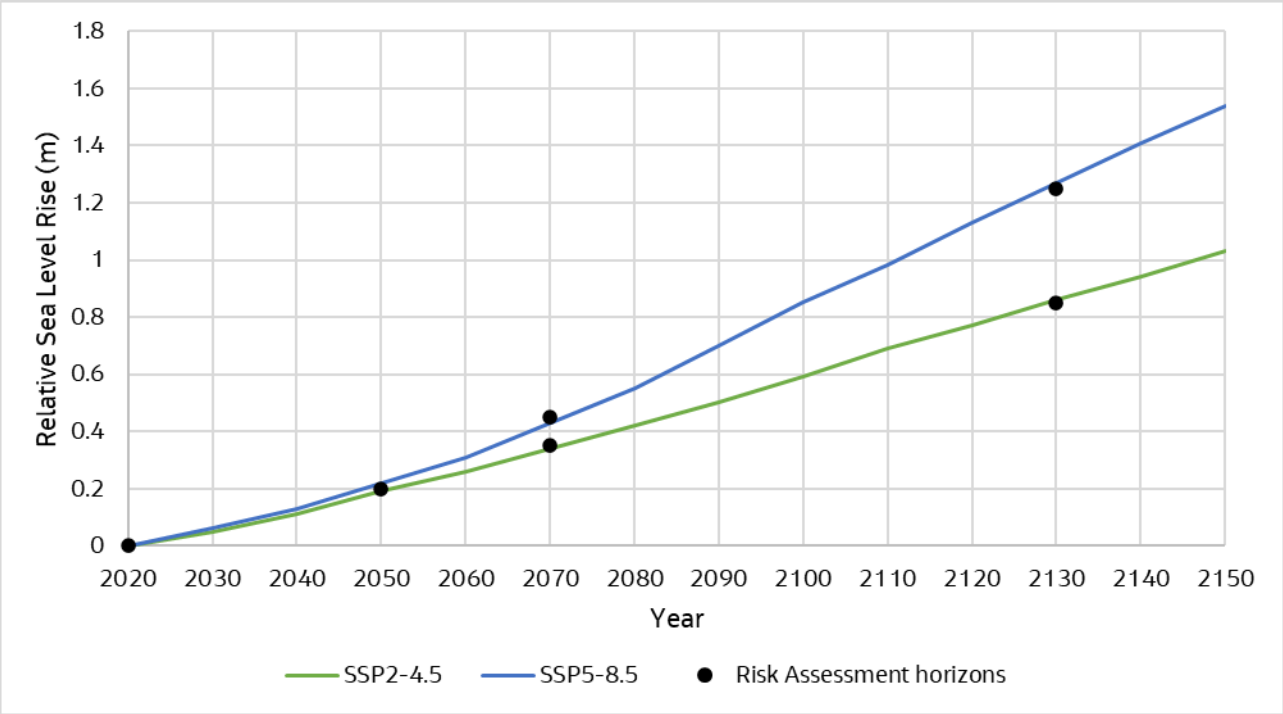
Process – Likelihoods and Scenarios



Updated Scenarios to account for:
- NZSeaRise Data (1 mm/yr VLM)
- National Adaptation Plan, 2022

Timeframe	Sea level rise scenario	Erosion Hazard Probability Used	Inundation Hazard Probability Used
Present Day	0m RSLR	10% Probability of shoreline exceeding landward limit of mapped extent (e.g. P10)	1% Annual Exceedance Probability storm event
2050 (30 years)	0.2 m RSLR (SSP2-4.5 & SSP5-8.5)		
2070 (50 years)	0.35 m RSLR (SSP2-4.5) 0.45 m RSLR (SSP5-8.5)		
2130 (110 years)	0.85 m RSLR (SSP2-4.5) 1.25 m RSLR (SSP5-8.5)		

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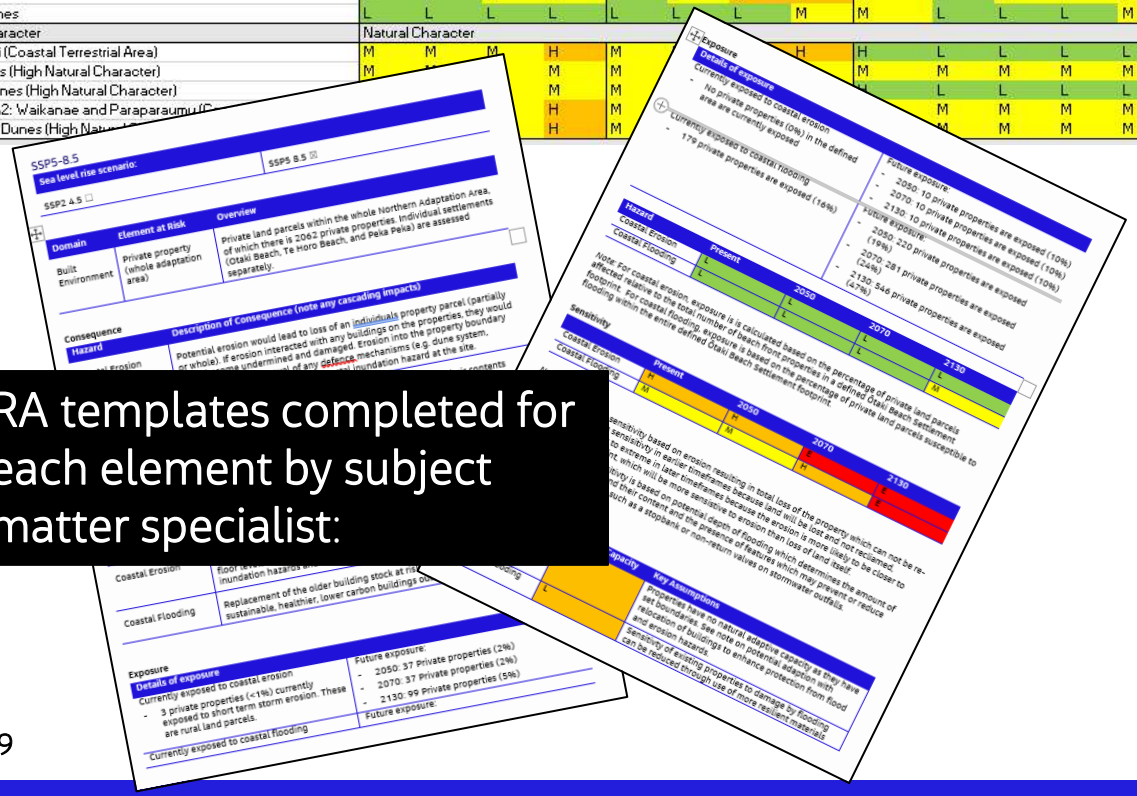
What does it look like?

Coastal Erosion Hazards

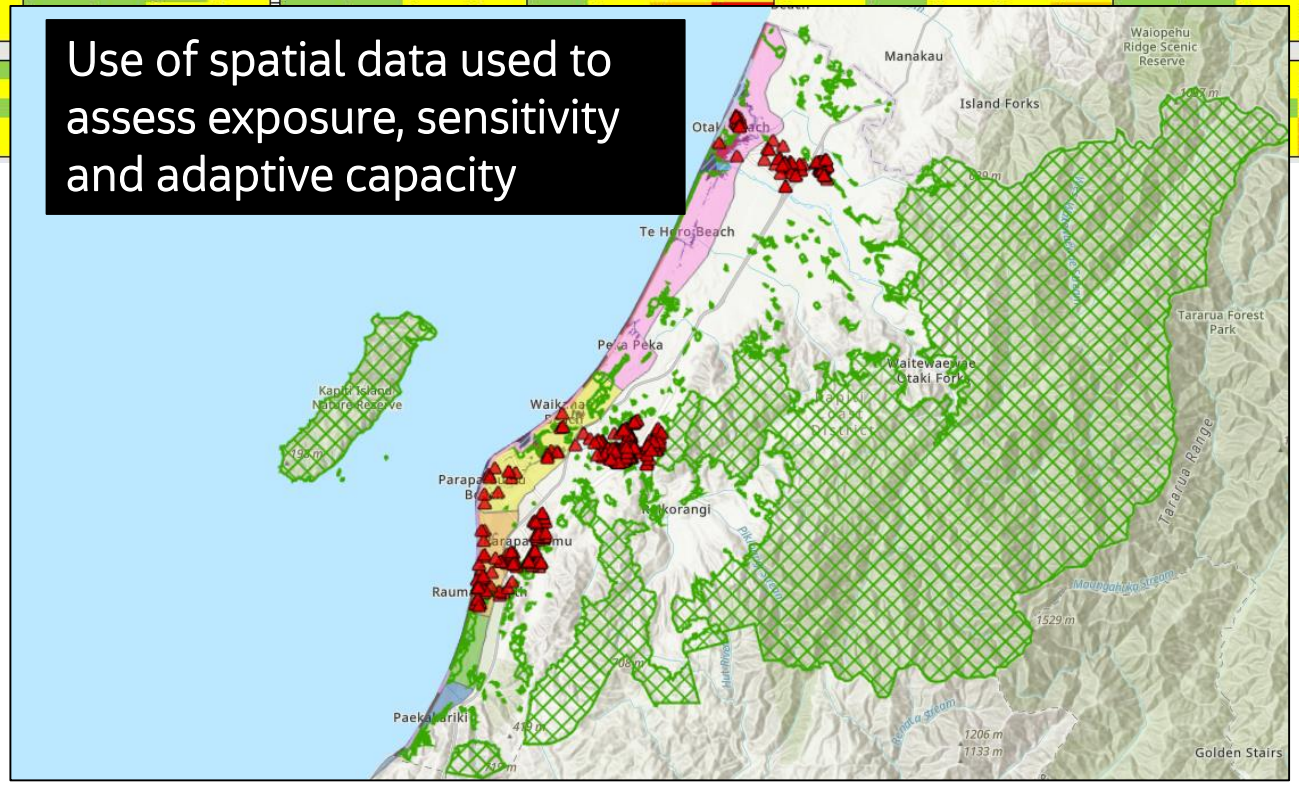
	SSP2-4.5																SSP5-8.5															
	Exposure				Sensitivity				Adaptive Capacity	Vulnerability				Risk					Exposure				Sensitivity				Adaptive Capacity	Vulnerability				Risk		
Element	Present	2050	2070	2130	Present	2050	2070	2130		Present	2050	2070	2130	Present	2050	2070	2130		Present	2050	2070	2130	Present	2050	2070	2130		Present	2050	2070	2130	Present	2050	2070
Built Environment	Built Environment																															
Properties – Whole Adaptation Area	L	L	L	L	L	M	M	M	L	L	M	M	M	L	L	L	L		L	L	L	L	L	M	M	H	L	L	M	M	H	L	L	L
Properties – Otaki Beach	L	L	L	L	L	E	E	E	L	L	E	E	E	L	M	M	M		L	L	L	M	L	E	E	E	L	L	E	E	E	L	M	M
Properties – Te Horo Beach	L	L	L	L	L	E	E	E	L	L	E	E	E	L	M	M	M		L	L	L	M	L	E	E	E	L	L	E	E	E	L	M	M
Properties – Peka Peka	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L		L	L	L	H	L	L	L	M	L	L	L	L	M	L	L	M
Water Supply Infrastructure	L	L	L	L	L	E	E	E	L	L	E	E	E	L	M	M	M		L	L	L	M	L	E	E	E	L	L	E	E	E	L	M	H
Wastewater Infrastructure	L	L	L	L	L	E	E	E	L	L	E	E	E	L	M	M	M		L	L	L	M	L	E	E	E	L	L	E	E	E	L	M	H
Stormwater Infrastructure	L	L	M	M	L	M	H	H	L	L	M	H	H	L	L	M	M		L	L	M	H	L	M	H	H	L	L	M	H	H	L	L	M
Roads and Bridges	L	L	L	L	L	M	M	H	L	L	M	M	H	L	L	L	L		L	L	L	M	L	M	M	E	L	L	M	M	E	L	L	L
Electrical Transmission and supply infrastructure	L	L	L	L	L	L	L	E	L	L	L	L	E	L	L	L	M		L	L	L	M	L	L	L	E	L	L	L	L	E	L	L	L
Natural gas supply mains	None	None	None	None															None	None	None	None												
Ecological	Ecological																															
Dunes	L	L	M	M	L	L	L	M	H	L	L	L	L	L	L	L	L		L	L	M	H	L	L	H	E	M	L	L	M	H	L	L	M
Ecological Sites	L	L	L	L	M	M	M	M	H	L	L	L	L	L	L	L	L		L	L	M	H	M	M	H	E	M	M	M	M	H	L	L	M
Wetlands	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L		L	L	L	L	L	L	L	L	M	L	L	L	L	L	L	L
Significant Bird Habitat	L	L	L	L	L	L	L	L	M	L	L	L	L	L	L	L	L		L	L	L	L	L	L	L	L	M	L	L	L	L	L	L	L
Key Indigenous Trees	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L		L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L
Human	Social																															
Displacement	L	L	L	L	L	L	L	M	M	L	L	L	M	L	L	L	L		L	L	L	M	L	L	M	M	M	L	L	M	M	L	L	M
Inequities	L	L	L	M	L	M	M	M	M	L	M	M	M	L	L	L	M		L	L	M	M	L	M	M	M	M	L	M	M	M	L	L	M
Health	L	L	M	M	L	M	H	H	M	L	M	M	M																					M
Daily Routines	L	L	L	L	L	L	L	M	M	L	L	L	M																					M
Natural Character	Natural Character																															
CTA1: Ōtaki (Coastal Terrestrial Area)	M	M	M	H	M			H	H	L	L	L	L																					M
Otaki Dunes (High Natural Character)	M			M	M				M	M	M	M	M																					M
Te Horo Dunes (High Natural Character)				M						L	L	L	L																					M
Part of CTA2: Waikanae and Paraparaumu (C				H	M					M	M	M	M																					H
Peka Peka Dunes (High Natu				H	M					M	M	M	M																					H

Risk Matrix



RA templates completed for each element by subject matter specialist:

Use of spatial data used to assess exposure, sensitivity and adaptive capacity

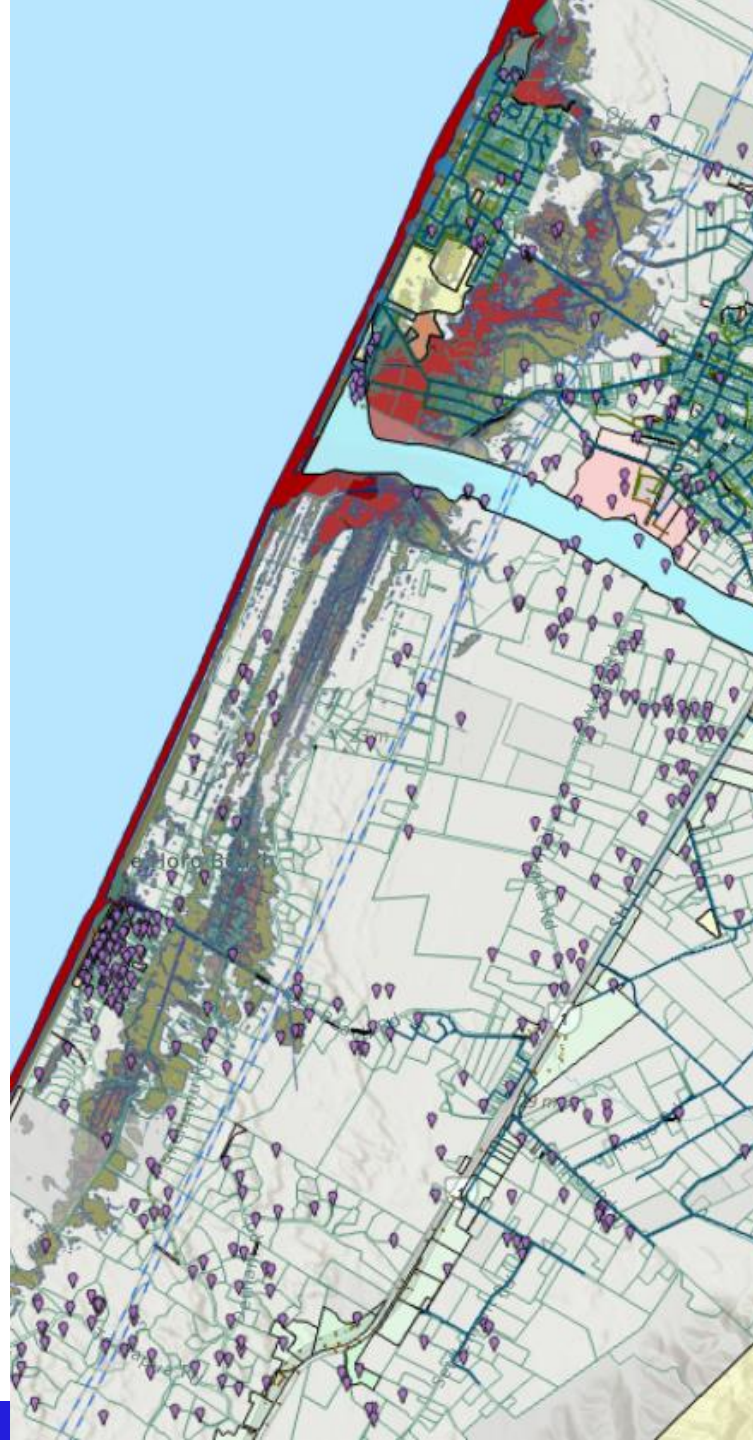


Built Environment Domain

The built environment encompasses assets, infrastructure and property that provide a service or critical function to the livelihood of the community.

Elements assessed:

- Private property
- Roads and bridges
- Wastewater services (pump stations, pipes)
- Water supply services (pipes, bores, treatment plants, pump stations)
- Stormwater services (pipes, outfalls, pump stations)
- Electrical supply and transmission (overhead and underground transmission lines)
- Natural gas supply



Built Environment Domain - Risk

	Risk											
	Coastal Erosion						Coastal Inundation					
Sea level rise scenario	Both		SSP2-4.5		SSP5-8.5		Both		SSP2-4.5		SSP5-8.5	
Element	Present	2050	2070	2130	2070	2130	Present	2050	2070	2130	2070	2130
Properties - Whole Adaptation Area	L	L	L	L	L	L	L	L	M	M	M	E
Properties - Ōtaki Beach*	L	M	M	M	M	H	L	L	L	H	M	E
Properties - Te Horo Beach*	L	M	M	M	M	H	L	L	M	M	M	M
Properties - Peka Peka*	L	L	L	L	L	M	L	L	L	M	L	M
Water Supply Infrastructure	L	M	M	M	M	H	L	L	L	L	L	L
Wastewater Infrastructure	L	M	M	M	M	H	L	L	L	L	L	H
Stormwater Infrastructure	L	L	M	M	M	H	L	L	L	M	L	H
Roads and Bridges	L	L	L	L	L	H	L	L	L	H	L	E
Electrical Transmission and supply infrastructure	L	L	L	M	L	H	L	L	L	L	L	M
Natural gas supply mains	No Exposure						L	L	L	L	L	M

*For coastal erosion this is based on the number of beachfront properties impacted; For coastal inundation this is based on a broader settlement footprint.

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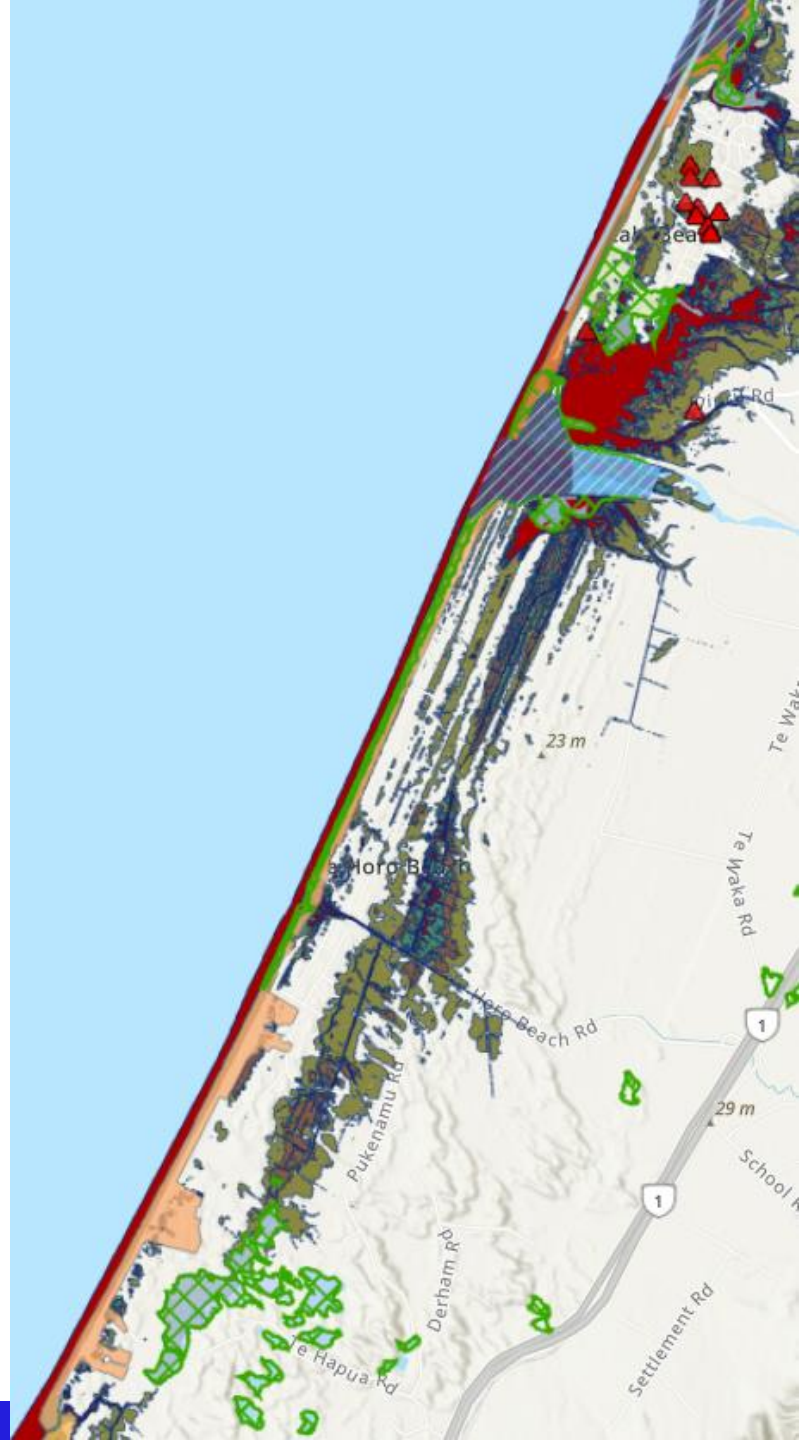
Ecological Domain

The ecological domain encompasses the natural flora and fauna of the district.

Elements assessed:

- Dunes
- Ecological Sites
- Wetlands
- Significant Bird Habitat Sites
- Key Indigenous Trees



Ecological Domain - Risk

	Risk											
	Coastal Erosion						Coastal Inundation					
Sea level rise scenario	Both		SSP2-4.5		SSP5-8.5		Both		SSP2-4.5		SSP5-8.5	
Element	Present	2050	2070	2130	2070	2130	Present	2050	2070	2130	2070	2130
Dunes	L	L	L	L	M	H	L	L	M	M	M	H
Ecological Sites	L	L	L	L	M	H	M	M	M	M	H	E
Wetlands	L	L	L	L	L	L	L	M	M	M	M	H
Significant Bird Habitat Sites	L	L	L	L	L	L	M	M	H	H	H	H
Key Indigenous Trees	L	L	L	L	L	L	L	L	L	L	L	L

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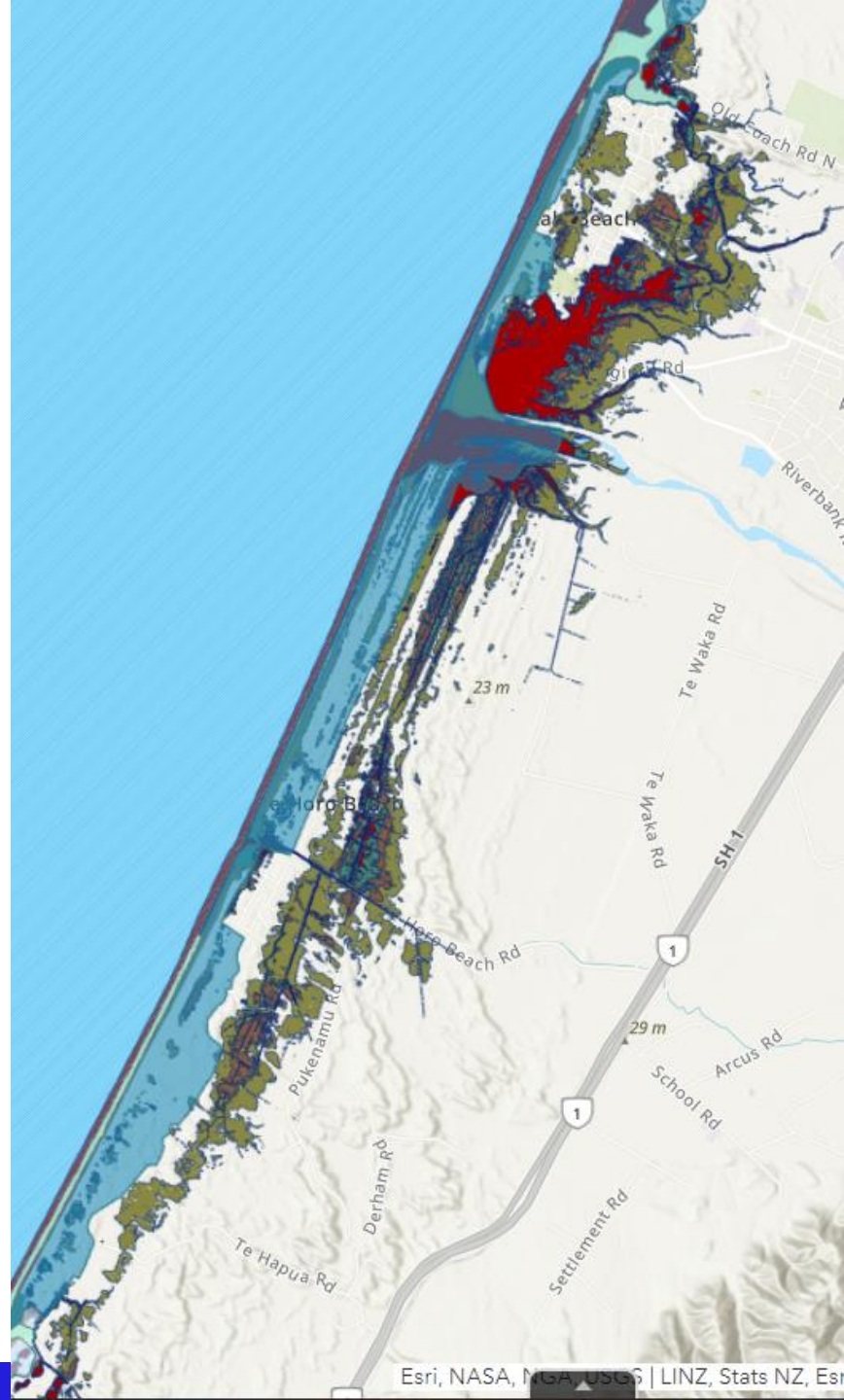
Natural Character Domain

Natural character is the ‘naturalness’ or degree or modification of an area, as well as an areas distinct combination of natural characteristics and qualities.

Elements assessed:

- Ōtaki: Coastal Terrestrial Area
  - Ōtaki Dunes (High Natural Character)
  - Te Horo Dunes (High Natural Character)
- Part of: Waikanae and Paraparaumu: Coastal Terrestrial Area (CTA2)
  - Peka Peka Dunes (High Natural Character)



Natural Character Domain - Risk

	Coastal Erosion						Coastal Inundation					
SLR Scenario	**Both**		**SSP2-4.5**		**SSP5-8.5**		**Both**		**SSP2-4.5**		**SSP5-8.5**	
Element	Present	2050	2070	2130	2070	2130	Present	2050	2070	2130	2070	2130
Ōtaki (Coastal Terrestrial Area)	L	L	L	M	M	M	M	M	M	M	M	M
Ōtaki Dunes (High Natural Character)	M	M	M	M	M	M	M	M	M	M	M	M
Te Horo Dunes (High Natural Character)	L	L	L	L	L	M	L	L	L	L	L	L
Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	M	M	M	M	H	M	M	M	M	M	H
Peka Peka Dunes (High Natural Character)	M	M	M	M	M	H	M	M	M	M	M	M

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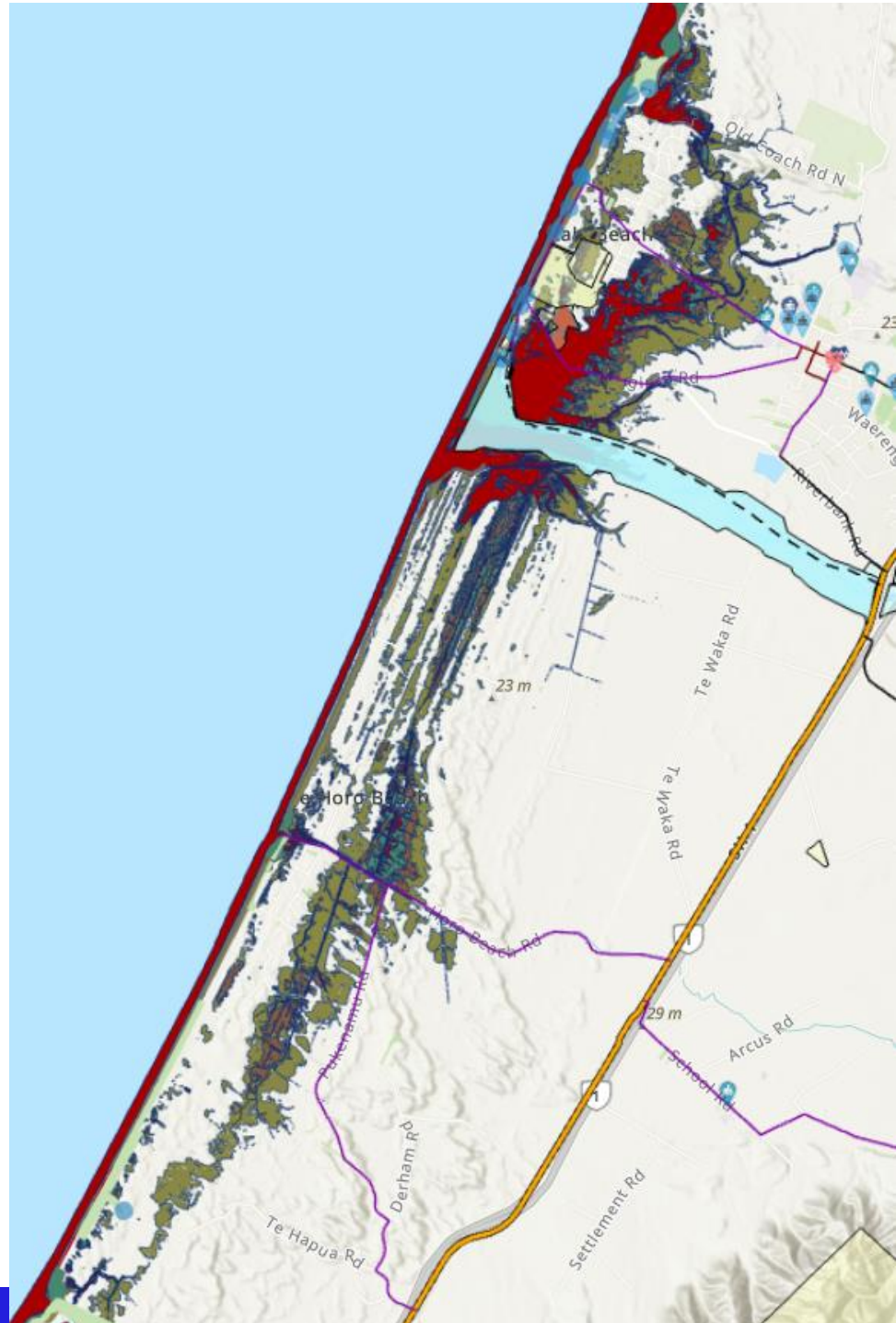
Human Domain

The human domain encompasses individual and community health and wellbeing, and disruptions to everyday life.

Elements assessed:

- Displacement
- Inequities
- Health
- Daily Routines



Human Domain - Risk

	Coastal Erosion						Coastal Inundation					
SLR Scenario	**Both**		**SSP2-4.5**		**SSP5-8.5**		**Both**		**SSP2-4.5**		**SSP5-8.5**	
Element	Present	2050	2070	2130	2070	2130	Present	2050	2070	2130	2070	2130
Displacement	L	L	L	L	L	M	L	L	L	M	M	H
Inequities	L	L	L	M	M	M	M	M	H	H	H	E
Health	L	L	M	M	M	M	L	M	H	E	H	E
Daily Routines	L	L	L	L	M	M	L	L	M	M	M	M

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Summary by timeframe

	Coastal Erosion						Coastal Inundation					
SLR Scenario	Both		SSP2-4.5		SSP5-8.5		Both		SSP2-4.5		SSP5-8.5	
Element	Present	2050	2070	2130	2070	2130	Present	2050	2070	2130	2070	2130
Built Environment												
Properties - Whole Adaptation Area	L	L	L	L	L	L	L	L	M	M	M	E
Properties - Otaki Beach	L	M	M	M	M	H	L	L	L	H	M	E
Properties - Te Horo Beach	L	M	M	M	M	H	L	L	M	M	M	M
Properties - Peka Peka	L	L	L	L	L	M	L	L	L	M	L	M
Water Supply Infrastructure	L	M	M	M	M	H	L	L	L	L	L	L
Wastewater Infrastructure	L	M	M	M	M	H	L	L	L	L	L	H
Stormwater Infrastructure	L	L	M	M	M	H	L	L	L	M	L	H
Roads and Bridges	L	L	L	L	L	H	L	L	L	H	L	E
Electrical Transmission and supply infrastructure	L	L	L	M	L	H	L	L	L	L	L	M
Natural gas supply mains	No Exposure						L	L	L	L	L	M
Ecological												
Dunes	L	L	L	L	M	H	L	L	M	M	M	H
Ecological Sites	L	L	L	L	M	H	M	M	M	M	H	E
Wetlands	L	L	L	L	L	L	L	M	M	M	M	H
Significant Bird Habitat	L	L	L	L	L	L	M	M	H	H	H	H
Key Indigenous Trees	L	L	L	L	L	L	L	L	L	L	L	L
Human												
Displacement	L	L	L	L	L	M	L	L	L	M	M	H
Inequities	L	L	L	M	M	M	M	M	H	H	H	E
Health	L	L	M	M	M	M	L	M	H	E	H	E
Daily Routines	L	L	L	L	M	M	L	L	M	M	M	M
Natural Character												
CTA1: Ōtaki (Coastal Terrestrial Area)	L	L	L	M	M	M	M	M	M	M	M	M
Otaki Dunes (High Natural Character)	M	M	M	M	M	M	M	M	M	M	M	M
Te Horo Dunes (High Natural Character)	L	L	L	L	L	M	L	L	L	L	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	M	M	M	M	H	M	M	M	M	M	H
Peka Peka Dunes (High Natural Character)	M	M	M	M	M	H	M	M	M	M	M	M

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Summary – Present Day & 2050

	Coastal Erosion		Coastal Inundation	
SLR Scenario	Both		Both	
Element	Present	2050	Present	2050
Built Environment				
Properties - Whole Adaptation Area	L	L	L	L
Properties - Otaki Beach	L	M	L	L
Properties - Te Horo Beach	L	M	L	L
Properties - Peka Peka	L	L	L	L
Water Supply Infrastructure	L	M	L	L
Wastewater Infrastructure	L	M	L	L
Stormwater Infrastructure	L	L	L	L
Roads and Bridges	L	L	L	L
Electrical Transmission and supply infrastructure	L	L	L	L
Natural gas supply mains	No Exposure		L	L
Ecological				
Dunes	L	L	L	L
Ecological Sites	L	L	M	M
Wetlands	L	L	L	M
Significant Bird Habitat	L	L	M	M
Key Indigenous Trees	L	L	L	L
Human				
Displacement	L	L	L	L
Inequities	L	L	M	M
Health	L	L	L	M
Daily Routines	L	L	L	L
Natural Character				
CTA1: Ōtaki (Coastal Terrestrial Area)	L	L	M	M
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	L	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	M	M	M
Peka Peka Dunes (High Natural Character)	M	M	M	M

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Summary - 2070

	Coastal Erosion		Coastal Inundation	
SLR Scenario	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
Element	2070	2070	2070	2070
Built Environment				
Properties - Whole Adaptation Area	L	L	M	M
Properties - Otaki Beach	M	M	L	M
Properties - Te Horo Beach	M	M	M	M
Properties - Peka Peka	L	L	L	L
Water Supply Infrastructure	M	M	L	L
Wastewater Infrastructure	M	M	L	L
Stormwater Infrastructure	M	M	L	L
Roads and Bridges	L	L	L	L
Electrical Transmission and supply infrastructure	L	L	L	L
Natural gas supply mains	No Exposure		L	L
Ecological				
Dunes	L	M	M	M
Ecological Sites	L	M	M	H
Wetlands	L	L	M	M
Significant Bird Habitat	L	L	H	H
Key Indigenous Trees	L	L	L	L
Human				
Displacement	L	L	L	M
Inequities	L	M	H	H
Health	M	M	H	H
Daily Routines	L	M	M	M
Natural Character				
CTA1: Ōtaki (Coastal Terrestrial Area)	L	M	M	M
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	L	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	M	M	M
Peka Peka Dunes (High Natural Character)	M	M	M	M

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Summary - 2130

	Coastal Erosion		Coastal Inundation	
SLR Scenario	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
Element	2130	2130	2130	2130
Built Environment				
Properties - Whole Adaptation Area	L	L	M	E
Properties - Otaki Beach	M	H	H	E
Properties - Te Horo Beach	M	H	M	M
Properties - Peka Peka	L	M	M	M
Water Supply Infrastructure	M	H	L	L
Wastewater Infrastructure	M	H	L	H
Stormwater Infrastructure	M	H	M	H
Roads and Bridges	L	H	H	E
Electrical Transmission and supply infrastructure	M	H	L	M
Natural gas supply mains	No Exposure		L	M
Ecological				
Dunes	L	H	M	H
Ecological Sites	L	H	M	E
Wetlands	L	L	M	H
Significant Bird Habitat	L	L	H	H
Key Indigenous Trees	L	L	L	L
Human				
Displacement	L	M	M	H
Inequities	M	M	H	E
Health	M	M	E	E
Daily Routines	L	M	M	M
Natural Character				
CTA1: Ōtaki (Coastal Terrestrial Area)	M	M	M	M
Otaki Dunes (High Natural Character)	M	M	M	M
Te Horo Dunes (High Natural Character)	L	M	L	L
Part of CTA2: Waikanae and Paraparaumu (Coastal Terrestrial Area)	M	H	M	H
Peka Peka Dunes (High Natural Character)	M	H	M	M

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