Data Collation Gap Analysis Report

Wellington Regional Climate Change Impact Assessment

Prepared for Wellington City Council
Prepared by Beca Limited

26 May 2022

Contents

Revision History

Revision Nº	Prepared By	Description	Date
1	Lucas Everitt / Henry Carthew	Final to Client	25/05/2022

Document Acceptance

Action	Name	Signed	Date
Prepared by	Lucas Everitt / Henry Carthew		25/05/2022
Reviewed by	Alex Fullerton		25/05/2022
Approved by	*Cushla Loomb*		25/05/2022
on behalf of	Beca Limited		

Executive Summary

Beca and the associated domain leads have undertaken a review of data available to inform the Wellington Regional Climate Change Impact Assessment (WRCCIA). The review of data is an iterative process with the development of the methodology for the WRCCIA. The two workstreams – data assessment and methodology development – have been progressing in tandem in order to increase efficiency for the project. Further, more detailed review of the data and its attributes will be undertaken once the methodology is confirmed and once risks have been identified and agreed for detailed assessment.

This report briefly outlines the methodology undertaken by our team to assess the spatial and non-spatial data that was shared by the councils. Significant gaps or challenges that were identified in this process are documented, along with an identification of next steps.

Owing to the significant quantity and variability of the received data, the focus of this initial data assessment has been on identifying GIS layers and information relating to two key components of the risk assessment:

1) **elements at risk** and
2) **exposure** across the Wellington Region (Figure 1).

A register is provided in Appendix C with analysis of the data undertaken by our GIS team and Domain leads. The register discusses key layers that could be used to inform exposure, along with any high-level points or information to look for within attribute tables that might inform sensitivity and adaptive capacity as it relates to vulnerability of an element at risk.

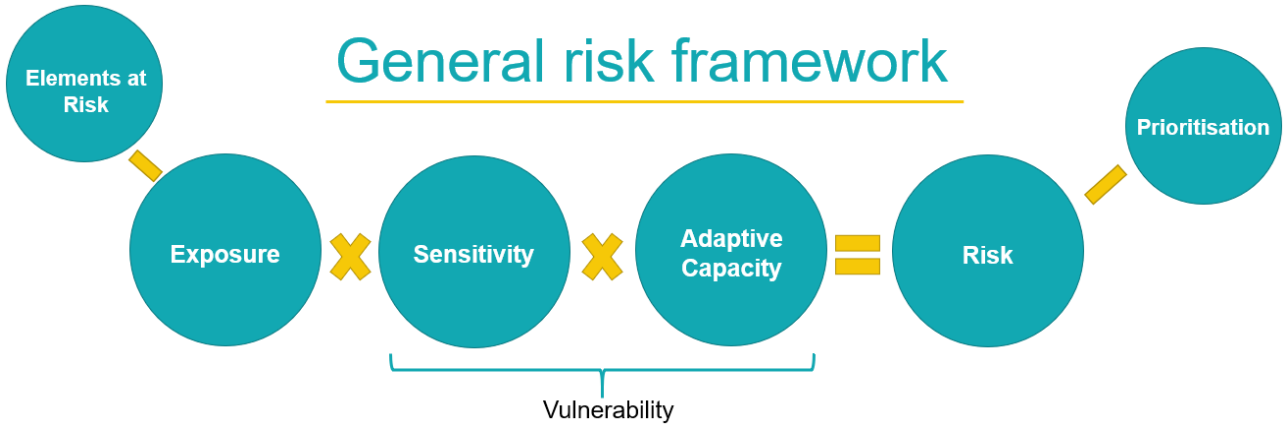

Figure 1. Risk Assessment Framework. Adapted from MfE (2021) Guide to Local Climate Change Risk Assessments

The assessment of data as it relates to vulnerability is identified as a next step following the identification, screening and prioritisation of elements at risk in order to focus on areas of greatest value.

Methodology

The methodology for the data assessment is as follows:

Data Information Request

An information request was sent to the client GIS and governance teams that identified potentially useful datasets which would help to identify and understand elements at risk across the Wellington Region. The request was informed by Domain themes and Elements as directed by the National Climate Change Risk Assessment (NCCRA):

Human | Natural Environment | Economy | Built Environment | Governance

The council teams shared over 200 datasets of potentially relevant information into a shared folder for assessment. This included spatial datasets (shared through an ArcGIS Online group) and non-spatial data (shared through a Sharepoint site). Our domain leads also contributed additional datasets that they hold or are aware of.

Initial Data Review

An initial, high-level review of the information provided was undertaken, which focused on organising the data into groupings relevant to the NCCRA domains (as above) and reviewing whether anything is available for the various elements and climate risk indicators. This was followed by a workshop with the clients GIS teams to understand if there was additional data they were aware of beyond what was provided.

Data Consolidation

A spreadsheet of the datasets for each Domain was generated to record responses from the Domain leads, this included both the spatial and non-spatial information that was provided by the council teams.

As an additional tool to assess the spatial data, an interactive map viewer was generated for each of the Natural, Human and Built Environment Domain themes. Map viewers for Economic and Governance domains were not generated as datasets were predominantly non-spatial and often found to be integrated with the spatial data of the other domains.

The map viewers can be accessed using the following links (note that a login to WCC GIS will be required to view these):

- Natural Environment Domain
- Human Domain
- Built Environment Domain
- Climate Hazards Domain

Data Analysis

The map viewers and the Domain spreadsheets were used as a tool for the Domain leads to assess the data with a focus on commenting on:

- Spatial coverage – National, Regional, TLA or other
- Type of dataset – Point, line, polygon, grid, etc.
- Priority – Usefulness and usability
- Alternative or additional information sources

The Beca-led team worked through the information with each Domain lead to populate the spreadsheet with relevant commentary on the above points. The collated data sets were appraised for whether they would:

- be sufficient to guide qualitative scoring of climate hazard exposure at regional/district scale, and
- provide insights at a finer resolution within the cascading risks assessment step.

The Governance assessment considered the governance and strategy contents listed in Appendix A.

The existence and applicability of climate projection data to support assessment of Climate Hazard impacts was reviewed by representatives from NIWA. The list of climate hazards was drawn from the primary and secondary climate drivers from the NCCRA. This assessment is presented in Appendix B.

Data Analysis

Commentary on the listed datasets and information for Natural, Human and Built Domains can be found in Appendix C, along with a high-level identification of preferred datasets.

Identified data gaps or specific requests or queries of the councils are shown in Table 1 below.

Table 1. Data gaps identified by domain leads

Natural Domain	Team Responsible	Priority
Additional data considered helpful can be requested from Department of Conservation. We consider this request is best coming from council.	Council GIS Leads	
Is there regional threat status documents for indigenous species in Wellington? Otherwise, national status designations can be used.	Council Ecology Leads	
Built Domain		
Standardised zoning maps across the region (e.g. Residential, Commercial, Industrial) to inform building use types.	Council Planning Team	
Private infrastructure assets which support the region; electricity supply assets (poles, underground cables; e.g. from Wellington Electricity), telecommunications services (cabinets, exchanges, underground, e.g. Chorus, Spark), port and marina assets (e.g. Centreport).	Council GIS or Beca	
Unified set of coastal protection structures (private, council) across the region.	Council GIS	
Human Domain		
Data that shows the number of medical facilities per population. We note that this could be generated by overlaying medical facilities and population datasets if found at later stages to be important for the detailed assessment	Council GIS Leads	
Economic Domain		
Additional data from the councils regarding the value of assets (e.g., QV data used for determining rates; separated for the value of land, and of dwelling).	Council Rates Databases	
Spatial information about the sectoral breakdown of economic activity. Possibly able to be obtained from each council in the aggregate (i.e. not broken down geographically within councils).	Council GIS Leads	
There are likely further asset value datasets that might be useful, with respect to public infrastructure. We will contact Waka Kotahi and others to see if we can source.	Beca	
Additional key datasets from alternate sources such as LINZ, StatsNZ etc.	Beca	
Governance Domain		
How the Councils fund maintenance/whether they have a record of cleaning up after climate events and capital costs of protection works across coasts, rivers, other damage from pluvial flooding. Drought costs (these will be both council and council area based (or regional) and MPI or other Government agency costs. This may also include costs to outdoor Council workers e.g. hours lost to heat? Alternatively, it would be good to know if a system exists to gather this sort of information.	Council Project Leads	
How the councils monitor risks to council business (this may not yet be monitoring climate change risks). This would give an idea of how councils currently manage risks / who is responsible / how risk information is kept. (e.g. is it regularly reported and accessible for reporting? / who is the steward and how frequently do councils have risks reported to them?)	Council Project or Risk Management Leads	

The effectiveness of how councils work with iwi Māori and what the risk of litigation is and impact on adaptive capacity if councils do not regularly engage and partner with iwi Māori. This information likely to come through talking to the Māori groups and/or the councils. There may be a difference in perception which in itself could be a risk.	Council and Beca Mana-Whenua Engagement Leads	

Red – Needs further investigation

Orange – Nice to have

Identified data gaps in the climate change hazards information are included in Table 2 below. Generally, information on the direct atmospheric changes (temperatures, winds, rainfall) are spatially available and comprehensive as per NIWA and GWRC's recent investigations and publications. However, there are still some research outputs and projections which are non-spatial.

We note that much of the fluvial and coastal hazard assessment information is only available at varied model resolutions and with inconsistent coverage around the region. This is because specific studies have been commissioned for a specific purpose (e.g. specific modelling of a single catchment flood hazard compared to a region-wide flooding assessment). This will result in inconsistencies in hazard exposure identification where, for example, a coarse model shows a property is inundated, but a fine model does not.

Table 2. Climate Hazard data gaps analysis

Climate hazard	Team Responsible	Priority
Gridded climate indicator data – gaps at coast. The downscaled climate projections from NIWA (available in GWRC viewer) are at 5 km grids with gaps in coverage at coastal areas. Filling the gaps is important to providing regional coverage of climate hazards for the assessments. The data will be interpolated by NIWA to cover all land area within the region.	NIWA	Underway
Sea-level rise and salinity stresses on brackish and aquifer systems and coastal lowland rivers.	NIWA, GNS, Council Hazards teams	
Increasing coastal erosion of cliffs and beaches. Inconsistent regional coverage of coastal erosion hazard projections (e.g. compare KCDC and Wairarapa availability).	Council Hazards teams	
Marine heatwaves: more persistent high summer sea temperatures	NIWA	
Ocean chemistry changes: nutrient cycling and pH changes. Projections not available.	NIWA	

Red – Needs further investigation

Orange – Nice to have

Key Points and Next Steps

It is generally agreed across the domain leads that the collated information is more than sufficient to assist with completing the initial exposure assessment of elements at risk. The sheer quantity of data was noted as the major challenge rather than identifying any major gaps. As such, identification of the preferred datasets was a focus for domain leads as presented in Appendix C.

Overall, for the purposes of the qualitative assessment (refer methodology) the domain leads identified that national or regional datasets were preferrable as they provide consistent information for regional and intra-district qualitative assessment of hazard exposure and impact. However, the detailed information provided

will be essential for the cascading assessment and quantitative assessment steps, and as a viewer of climate hazard exposure.

Attribute details from each of the datasets were also noted where it is considered they could inform **adaptive capacity** and **sensitivity** as it relates to vulnerability. This is noted as the next phase of the impact assessment methodology where the first phase will inform the prioritisation of which datasets will be taken forward into the quantitative assessment.

Table 1 and 2 presents the specific requests by Domain leads along with who we have identified might be best suited to take responsibility for closing out the request. The relevant Beca personnel will follow up in the coming weeks to support.

A

Appendix A – Strategy and Governance Information

Strategy and Governance

Council	Related work
Wellington City Council	• Te Atakura – First to Zero Strategy Draft District Plan • 2021 NIWA Sea Level Rise Projections for District Plan • 2021 NIWA Coastal Hazards evidence for District Plan Resilience Strategy Digital Twin Bloomberg Global Mayor's Challenge Makara Beach storymap WCC_Flood_Hazard_Combine
Masterton District Council	• Asset Management Plans consider climate change impacts • NIWA/GW climate change projections and impacts • the Wellington region coastal vulnerability assessment, June 2019 • Flood maps • Critical infrastructure maps **Long Term Plan 2021-31 (PDF, 11MB)** **Wairarapa Economic Development Strategy** **Parks and Open Spaces Strategy** **MDC Wellbeing Strategy – Introduction (PDF, 3MB)** **Cultural Development Strategy (Our People, Our Land) 2018 (PDF, 3MB)** **Economic Development Strategy (Our People, Our Land) 2018 (PDF, 5MB)** **Environmental Development Strategy (Our People, Our Land) 2018 (PDF, 5MB)** **Social Development Strategy (Our People, Our Land) (PDF, 5MB)** **Education Development Strategy (Our People, Our Land) (PDF, 6.13MB)**
Carterton District Council	Ruamāhanga Climate Change Strategy 2021 Ruamāhanga Climate Change Strategy 2020 • Preliminary work on the climate related risks assessment and mitigation measures (LTP 20201-31) • GIS from planning teams • SWDC: managed retreat identified in spatial plan
South Wairarapa District Council	Ruamāhanga Climate Change Strategy 2021 Ruamāhanga Climate Change Strategy 2020 • Preliminary work on the climate related risks assessment and mitigation measures (LTP 2021-31) • GIS from planning teams • SWDC: managed retreat identified in Spatial Plan ▪ Infrastructure Strategy ▪ Financial Strategy ▪ Financial Assumptions and Statements ▪ Significant Activities and Levels of Service ▪ Schedule of Fees and Charges ▪ Summary of Environmental Scan Water pipe repair
Upper Hutt City Council	**Long Term Plan 2021 – 2031** • Upper Hutt Natural Hazards Map • Plan Change 42 – Mangaroa and Pinehaven Flood Hazard Extents • NIWA Wellington Region climate change extremes and implications report • GWRC/NIWA Wellington region climate change projections and impacts report • Further information may be available from our GIS team and Planning department on request. Sustainability Strategy 2020 Upper Hutt Natural Hazards Map Plan Change 42 – Mangaroa and Pinehaven Flood Hazard Extents NIWA Wellington Region climate change extremes and implications report GWRC/NIWA Wellington region climate change projections and impacts report **Open Space Strategy** **Land Use Strategy** **Arts Culture and Heritage Strategy** **Sustainability Strategy** **Affordable Housing Strategy**

Hutt City Council	• Preparing Coastal Communities for Climate Change (June 2019) • Infrastructure at risk work carried out for LGNZ • A climate change focussed document to support the development of the LTP **Long Term Plan for 2021-2031** • Lower Hutt Climate Change Strategy 2022 • HCC Infrastructure Strategy 2015-45 • **Central City Transformation Plan sections** • **CBD Making Places project concept summary** (PDF 107 KB) • **CBD 2030 vision** (PDF 2 MB) • **Environmental Sustainability Strategy** • **Infrastructure Strategy** • **Leisure and Wellbeing Strategy** • **Urban Growth Strategy** • **Annual Economic Profile for Lower Hutt 2021 (PDF 1.1 MB)** • **Lower Hutt - summary infographic 2021 (PDF 121kb)** • RiverLink and video - te ati awa , Flood Protection • Hutt River Floodplain Management Plan • Living with the River • Flooding Hazard Factsheet
Kāpiti Coast District Council	• NIWA/GW climate change projections and impacts (used for LTP 2021 as basis for assessing risks) • Preparing Coastal Communities for Climate Change (aka the Wellington region coastal vulnerability assessment, June 2019). Note: the variables that have been used to measure risk in this report could also be used to map vulnerability across the rest of the region, particularly in relation to flooding, ponding, and groundwater. • The 'Takutai Kāpiti: community-led coastal adaptation' project has procured updated science from Jacobs, which is about to be released. 1 'Coastal hazard susceptibility and vulnerability assessment for the Kāpiti Coast District coastline' 2**022** [PDF, 12 MB] 2 'Coastal hazard susceptibility and vulnerability assessment for the Kāpiti Coast District coastline' methodology **2022** [PDF, 32.51 MB] 3 Jacobs' presentation on 'Coastal hazard susceptibility and vulnerability assessment for the Kāpiti Coast District coastline' report **2022** [PDF, 1.56 MB] Te Moemoeā o te tāngata whenua Kāpiti Adaptation Strategies to Climate Change impacts on Māori Communities in Aotearoa: Horowhenua – Kāpiti, Dr Huhana Smith Whakarongotai o te moana, whakarongotai o te wā – Kaitiakitanga plan for Te Ātiawa ki Whakarongoai Traditional Māori weather and Climate forecasting poster (Te Reo version) https://takutaikapiti.nz/ https://takutaikapiti.nz/articles/reports-and-studies/ - Annotated Bibliography • An annotated bibliography with an extensive summary of existing coastal research for the Kāpiti Coast District from 1951 to 2019 is available on the Takutai Kāpiti website. • NIWA drafted Kāpiti Land Sea Boundary (mean high water springs) in June 2019, but this report has not been released. • Council holds the current DP flood maps, all natural hazard risk layers, and culturally significant sites in its GIS system. • Several asset management risk reports have been carried out in the past 10 years for specific activities, such as: • Outer Wellington Shared Services (KDCD, UHCC, PCC) - Assessment of potential earthquake loss to three water infrastructure. AON, August 2019. • SKM 2006 assessment of sewer affected by groundwater • 2011 report on asbestos-cement water supply pipes • GWRC continues to procure various pieces of work related to water quality and quantity for the Kāpiti Coast, particularly in relation to the whaitua process • The Waikanae Ki Uta ki Tai (from mountains to sea) knowledge committee is currently in the process of compiling summaries of existing reports. • Jacobs coastal susceptibility report for Takutai Kapiti – methodology • KCDC LTP • KCDC District Plan • **Infrastructure strategy 2021** • **Financial strategy 2021** • **Carbon and energy management plan** • **Climate Emergency Action Framework** • **Coastal Strategy** • **Community Facilities Strategy** • **Economic Development Strategy and Implementation Plan 2020–23** • **Growth Strategy | Te Tupu Pai** **and** Map – our approach to enabling sustainable growth for easy reference. Find out how this strategy was developed. • **Stormwater Management Strategy 2008** • **Sustainable Transport Strategy** • **Waste Minimisation Education Strategy**

	• **Water Matters - Sustainable Water Management Strategy**
Porirua City Council	• Porirua City Council Climate Change Strategy • Jim Dahm coastal hazard assessment and Maps for the PDP • Wellington Water's pluvial flood hazard assessments and maps for the PDP (and other parts of the Region) • Flood maps • Proposed District Plan - ecology, landscapes & notable trees; coastal hazards & resilience; and flood modelling.
Greater Wellington Regional Council	GWRC GWRC Climate Change Models Wairarapa Water Resilience Strategy Regional Natural Hazards Management Strategy Regional SLR Trends 2012 Regional SLR Update 2018 Regional Land Transport / Public Transport assessment referred to in GW response to minister under CCRA–TBC • Wairarapa Water Resilience Strategy • Regional storm tide analysis and modelling including projected coastal inundation risk due to sea level rise • Climate Change and Variability Report Wellington Region 2017 • Wellington Region climate change extremes and implications 2019 • Preparing Coastal Communities for Climate Change 2019 • Research sitting under the Regional Natural Hazards Management Strategy • GWRC desktop assessment of GW assets at risk to natural hazards and climate change impacts • GWRC survey response to Minister for Climate Change under ZCA request for adaptation plan information • Wairarapa Water Resilience Strategy • Regional sea level trends analysis reports: http://www.gw.govt.nz/assets/Climate-change/Sea-Level-Variability-and-Trends-in-the-Wellington-Region2012.pdf • https://mapping1.gw.govt.nz/gw/slr/Sea_Level_Trends_in_the_Wellington_Region_Update_2018.pdf • Regional storm tide analysis and modelling including projected coastal inundation risk due to sea level rise • Regional Land Transport / Public Transport assessment referred to in GW response to minister under CCRA–TBC • Flood Protection Vulnerability Assessment 2021 (TBC) • GWRC review of mana whenua values statements (TBC) Whaitua https://www.gw.govt.nz/environment/climate-change/what-we-are-doing/regional-climate-plan/ https://www.gw.govt.nz/assets/Documents/1970/01/FINAL-WellNCC-projectionsimpacts.pdf https://www.gw.govt.nz/assets/Documents/2017/06/Climate-Change-and-Variability-report-Wlgtn-Regn-High-Res-with-Appendix.pdf https://www.gw.govt.nz/assets/Documents/2021/11/GWRC-2020-extremes-appendix-FINAL.pdf https://www.gw.govt.nz/assets/Documents/2021/11/GWRC-NIWA-climate-extremes-FINAL3.pdf https://www.gw.govt.nz/assets/Documents/2021/10/WairarapaCCFinalReport.pdf https://www.gw.govt.nz/environment/environmental-data-hub/climate-monitoring/ https://www.gw.govt.nz/assets/Documents/2021/11/WhaituaClimateChangeprojectionsMarch2020.pdf Climate Resilience Programme: Erosion and flood protection works
WRGF	https://wrgf.co.nz/
HDC	• Horowhenua District Council have recently completed a Climate Change Risk Assessment with Horizons Regional Council
Iwi	Te Rūnanga o Toa Rangatira: • Te Rūnanga o Toa Rangatira (Te Rūnanga) is preparing a climate change strategy that will cover the whole rohe, especially our core territories of Porirua, Kapiti, Te Whanganui a Tara and Te Tau Ihu. The strategy will form part of our Iwi Environmental Management Plan (IEMP) and Poutiaki Plan. This links climate change into the wider context of iwi environmental planning and Treaty Settlement implementation and fisheries management. A fundamental issue for Ngāti Toa Rangatira is that our vulnerable marae and coastal lands returned under the Settlement are at risk from climate change. • Te Rūnanga has submitted a funding application to Proposal for Kāhui Māori Deep South Challenge. This funding application will build our knowledge about the impact of climate change in Raukawa Moana (both Te Upoko o te Ika and Te Tau Ihu). A good portion of this research will involve the coastal lands and seas within Greater Wellington region.

B

Appendix B – Assessment of Climate Hazard Information

	Hazard (arising from climate change)	Primary climate-related variables	Secondary climate-related variables	Relevant existing GIS layers *Italics = NIWA layer in GWRC viewer*
1	**Higher mean temperatures: air and water**	• Higher day and night temperatures • Higher mean water (freshwater and marine) temperatures	• More heatwaves and warm spells • Fewer frosts or cold days	1. *Hot days > 25 degrees* 2. *Cold nights* 3. *Mean temperature* 4. *Mean min temp* 5. *Mean max temp* 6. *Diurnal temp range* 7. *Snow days* 8. *Frost days* 9. *Warm nights* 10. *Cold days* 11. *Extreme hot days* 12. *Heatwave days* 13. *Extreme heatwave days* 14. *GDD 10 (and 5)* Gap: Water/Ocean temperature projections – literature?
2	**Heatwaves**: increasing persistence, frequency and magnitude	• Higher day and night temperatures • Increase in persistence of maximum daily temperatures above 25°C	• Changes in seasonal winds • Humidity changes from changes in cloudiness	• *Heatwave days* • *Extreme heatwave days* • *Hot days* • *Extreme hot days* • *Mean min temp* • *Mean max temp* • *Windy days* • *Relative humidity*
3	More and longer dry spells and drought	• Low seasonal rainfall • Change in seasonal wind patterns • Interannual variability (eg, ENSO)	• Higher day and night temperatures	• *PED* • *PED >300mm* • *Soil moisture deficit days* • *Dry days* • *3, 5, 10 day dry spells* • *Mean rainfall* • *Windy days* • *Mean min temp* • *Mean max temp*
4	**Changes in climate seasonality** with longer summers and shorter winters	• Fewer frosts or cold days • Higher day and night temperatures • Changes in seasonal rainfall	• Changes in seasonal wind	• *Mean temperature* • *Mean min temp* • *Mean max temp* • *Mean rainfall* • *Windy days* • *Solar radiation* • *Relative humidity* • *Frost days* • *Cold days*

				• *Cold nights*
5	Increasing **fire–weather** conditions: harsher, prolonged season	• Low seasonal rainfall • Change in seasonal wind patterns • Increase in persistence of maximum daily temperatures above 25°C • Humidity changes from changes in cloudiness	• Higher day and night temperatures • Interannual variability (eg, ENSO)	• *Mean rainfall* • *Mean temperature* • *Relative humidity* • *PED* • *PED>300mm* • *Dry days* • *3, 5, 10 day dry spells* • *Hot days* • *Extreme hot days* • *Heatwave days* • *Extreme heatwave days* • *Mean max temp* • *Mean min temp*
6	Increased **storminess and extreme winds**	• Increase in storminess (frequency, intensity) including tropical cyclones • Changes in extreme wind speed	• Changes in wind seasonality • Interannual variability (eg, ENSO) • Increase in convective weather events (tornadoes, lightning)	• *99th percentile rain days* • *Heavy rain days >25mm* • *Rain days >10mm* • *Rain days >20mm* • *Rain days >30mm* • *3, 5, 10 day wet spells* • *Windy days* • *99th percentile wind speed* • HIRDS datasets
7	Change in **mean annual rainfall**	• Higher or lower mean annual rainfall in sub-national climate zones • Changes in seasonal winds	• Humidity changes from changes in cloudiness	• *Mean rainfall* • *Wet days* • *Dry days* • *Windy days* • *Relative humidity*
8	Reducing **snow and ice cover**	• Higher day and night temperatures • Changes in rainfall seasonality • Change in seasonal wind patterns • Receding snowline • Reduced snow and glacier cover • Earlier snow melt	• Increase in avalanches • Interannual variability (eg, ENSO)	• *Snow days* • *Mean rainfall* • *Mean temperature* • *Mean max temp* • *Mean min temp*
9	Increasing **hail** severity or frequency	• Increase in hail severity or frequency • Increase in convective weather events (tornadoes, lightning)	• Humidity changes from changes in cloudiness	• *Relative humidity* • *Extreme hot days* • HIRDS datasets (rain not hail) • Mullan 2010 paper

10	**River and pluvial flooding**: changes in frequency and magnitude in rural and urban areas	• Changes in extremes: high intensity and persistence of rainfall • Increase in hail severity or frequency • Interannual variability (eg, ENSO) • Increased storminess and wind • Relative sea-level rise (including land movement) • Rising groundwater from sea-level rise	• Humidity changes from changes in cloudiness • Changes in rainfall seasonality • Change in seasonal wind patterns • More and longer dry spells and droughts (antecedent conditions)	• Wellington Water – Rain on Grid flood model • All flood layers all councils at whatever Resolution that it is available. Not downscaling until Riskscape step. • *Total Rainfall* • *Wet days over 1 mm per day* • *Wet days over 25 mm per day* • *99th percentile of daily rainfall* • *Rain days >10mm* • *Rain days >20mm* • *Rain days >30mm* • *3, 5, 10 day wet spells* • *HIRDS datasets* • *Windy days* • *99th percentile wind speed* • *PED* • *PED>300mm* • *3, 5, 10 day dry spells* • *Dry days*
11	**Coastal and estuarine flooding**: increasing persistence, frequency and magnitude	• Relative sea-level rise (including land movement) • Change in tidal range or increased water depth • Permanent increase in spring high-tide inundation • Rising groundwater from sea-level rise • Changes in extremes: high intensity and persistence of rainfall • Increase in storminess (frequency, intensity) including tropical cyclones	• Changes in waves and swell • Changes in extreme wind speed • Changes in sedimentation (estuaries and harbours)	• GWRC layers or updated NIWA layers • NZ sea rise data aggregated up to district scale (with narrative with GNS). Then use GWRC viewer with adjusted SLR increment to be RSLR proxy for inundation. • *99th percentile of daily rainfall* • *Rain days >10mm* • *Rain days >20mm* • *Rain days >30mm* • *3, 5, 10 day wet spells* • *Windy days* • *99th percentile wind speed* • Extreme sea-level flooding for ARI 2, 5, 10, 20, 50, 100, 200, 500, 1000-year scenarios + sea-level rise increments • MHWS-10 flooding scenarios + sea-level rise increments

12	**Sea-level rise and salinity stresses on brackish and aquifer systems** and coastal lowland rivers	• Relative sea-level rise (including land movement) • Permanent and episodic (low river flow) saline intrusion • Low seasonal rainfall • Rising groundwater from sea-level rise • Permanent increase in spring high-tide inundation	• Changes in sedimentation (estuaries and harbours) • Interannual variability (eg, ENSO)	• GWRC layers or updated NIWA layers? • NZ sea rise data aggregated up to district scale (with narrative with GNS). Then use GWRC viewer with adjusted SLR increment to be RSLR proxy for inundation. • *Mean rainfall*
13	Increasing **coastal erosion:** cliffs and beaches	• Relative sea-level rise (including land movement) • Changes in waves and swell • Changes in extreme rainfall: high intensity and persistence • Changes in sedimentation from catchment run-off • Increased storminess and extreme winds • Interannual variability (eg, ENSO)	• Rising groundwater from sea-level rise • Changes in rainfall seasonality • Change in seasonal wind patterns	• GWRC layers or updated NIWA layers for coastal storms. • *Mean rainfall* • *99th percentile of daily rainfall* • *Rain days >10mm* • *Rain days >20mm* • *Rain days >30mm* • *3, 5, 10 day wet spells* • *Windy days* • *99th percentile wind speed*
14	Increasing **landslides and soil erosion**	• Changes in extreme rainfall: high intensity and persistence • Changes in rainfall seasonality • More and longer dry spells and droughts (antecedent conditions)	• Interannual variability (eg, ENSO)	• Mean rainfall • *99th percentile of daily rainfall* • *Rain days >10mm* • *Rain days >20mm* • *Rain days >30mm* • *3, 5, 10 day wet spells* • PED • PED>300mm • 3, 5, 10 day dry spells • Dry days • *Windy days* • *99th percentile wind speed* • GWRC/WCC landslides potential layers
15	**Marine heatwaves:** more persistent high summer sea temperatures	• Higher mean ocean temperatures • Increase in persistence of maximum daily temperatures eg, above 25°C • Change in seasonal wind patterns	• Interannual variability (eg, ENSO) • Changes in waves and swell	• SST projections • Marine heatwave projections • Heatwave days • Extreme heatwave days • Hot days • Extreme hot days •

		• Ocean circulation changes		
16	**Ocean chemistry changes:** nutrient cycling and pH changes	• Changes in ocean nutrient cycling – upwelling and carbon • Ocean acidification (pH decreasing) • Higher mean surface-water temperatures • Change in seasonal wind patterns	• Ocean circulation changes • Interannual variability (eg, ENSO)	• Munida (Otago) ocean acidification transect: https://www.stats.govt.nz/indicators/ocean-acidification • SST projections

C

Appendix C – Natural, Built and Human Domain Data Analysis

			Key	Recommended Dataset for Use
				Dataset does not cover entire region
				Recommended Additional Datasets
Layer	**Description**	**Type**	**Coverage**	**Comments**
Indigenous and Taonga Species				
VME_inverts	South Pacific Regional Fisheries Management Organisation Vulnerable Marine Ecosystem dataset. Vulnerable marine ecosystems (VMEs) are any ecosystem that are highly vulnerable to one or more kinds of fishing activity or other disturbance, and are identified by the vulnerability of their components. Here ten benthic invertebrate taxa that are regarded as indicators of VMEs.	Point	National	This layer would be better suited to Coastal Ecosystems
Schedule F2 - Indigenous Bird Habitat	Habitats for indigenous birds in rivers, lakes and the coastal marine area. GWRC - Sites were identified and assessed using a review of existing information and expert opinion, using the criteria in Policy 23 of the Regional Policy Statementfor the Wellington Region and contained in more detail in McArthuret al (2015). McArthur N, Robertson H, Adams L, Small D. (2015), A review of coastal and freshwater habitats of significance for indigenous birds in the Wellington region. Greater Wellington Regional Council, Publication No. GW/ESCI-T-14/68, Wellington.	Polygon	Regional	Specific values will need to be looked up on a case by case basis in in McArthur et al (2015) as there is little attribute data attached.
High Macroinvertebrate community health	Waterbodies (rivers, streams and their tributaries and Lake Wairarapa) predicted to have high macroinvertebrate community index (MCI) health scores based on the extent of indigenous vegetation cover in the catchment for indigenous freshwater ecosystems within the Greater Wellington Region.	Line	Regional	This might be better suited to 'Freshwater Ecosystems'
Schedule F1c - Lakes with Significant Aquatic Plants	Lakes with significant aquatic plant communities. GWRC - These lakes were identified using LakeSPI (an index of ecological condition), based on scuba surveys and desktop assessment, using the criteria in Policy 23 of the Regional Policy Statement for the Wellington Region and contained in more detail in Perrie et al (2014). Perrie A, Greenfield S, Beaglehole J. (2014). Rivers and lakes with significant indigenous ecosystems. Greater Wellington Regional Council, Publication No. GW/EP-G-14/93, Wellington.	Polygon	Regional	This might be better suited to 'Freshwater Ecosystems'
Schedule F1b - Inanga Spawning Habitat	Known rivers and parts of the coastal marine area with inanga spawning habitat	Polygon	Regional	To assess impacts we would need to understand how far upstream the upper limit of the saltwater wedge would be moving
New Zealand Freshwater Fish Database	Survey data showing freshwater fish records across new zealand.	Point	National	Administered by NIWA. Data will need to be exported
eBird	Citizen science data on bird species distribution.	Point	Other	Administered by Cornell Lab of Ornithology. Data will need to be exporte
Department of Conservation Bat Database	Bat presence/absence records for NZ. Would need to be requested from DOC as data is not publically available.	Point	National	Administered by DoC. Data will need to be requested
Department of Conservation Herpetofauna Database	Lizard presence/absence records for NZ. Would need to be requested from DOC as data is not publically available.	Point	National	Administered by DoC. Data will need to be requested
National Level Monitoring - Birds (acoustic recorders)	DOC acoustic recorder bird monitoring data	Point	National	Administered by DoC. Data will need to be requested
National Level Monitoring - Birds (observer counts)	DOC observer count bird monitoring data	Point	National	Administered by DoC. Data will need to be requested
Non-migratory Freshwater Fish Distribution	Known habitat fragments of non-migratory freshwater fish species	Polygon	Regional	Administered by DoC https://www.arcgis.com/home/item.html?id=0a8fe178906944a08a9d3ef3e0d133d5
Migratory Fish Habitat	Waterbodies (rivers, streams and their tributaries and Lake Wairarapa) with habitat for six or more indigenous migratory fish species within the Greater Wellington Region	Line	Regional	GWRC - these species are named in Schedule F1.Schedule F1 replicates Table 16 of the Regional Policy Statement for the Wellington Region, based on Warr et al (2009), and updated with recommendations in Perrie et al (2014). Perrie A, Greenfield S, Beaglehole J. (2014). Rivers and lakes with significant indigenous ecosystems. Greater Wellington Regional Council, Publication No. GW/EP-G-14/93, Wellington.Warr S, Perrie A and McLea M. (2009). Selection of rivers and lakes with significant indigenous ecosystems. Greater Wellington Regional Council, Publication No. GW/EP-G-09/29, Wellington.
Predicted fish distributions	Predictions of fish species occurrence	Line	National	Source: Freshwater Ecosytems of New Zealand FENZ_Rivers_2010.gdb - P:\421\4210000\0-Technical Reference\Ecology\GIS layers\NZ\Freshwater\FENZ (Freshwater Ecosystem of NZ)
Department of Conservation - Marine mammal records			National	Administered by DoC. Data will need to be requested
Biosecurity				
Intervention Level Monitoring - Small mammals	Small mammal monitoring data	Point?	National	Administered by DoC. Data will need to be requested
National Level Monitoring - Mammals	Mammal monitoring data	Point?	National	Administered by DoC. Data will need to be requested
SanctuaryPointLocations	Pest free sanctuaries	Point	National	Administered by Predator Free NZ https://www.arcgis.com/home/item.html?id=349c86185f504583bbd9a3c99fef9ec5
Pest Free Islands	Predator free islands	Polygon	National	Administered by Predator Free NZ https://www.arcgis.com/home/item.html?id=349c86185f504583bbd9a3c99fef9ec5
Pest species distribution			Regional/Local	Data potentially available through Predator Free Wellington, Predator Free NZ or GWRC? Would need to be specifically requested from the Predator Free groups
Freshwater Ecosystems				
Wairarapa Moana Wetlands	Wairarapa Moana Wetlands Boundaries	Polygon	Local	Provides little valuable information other than extent GWRC/Boffa Miskell
Natural Resources Plan - Schedule F3 - Significant Natural Wetlands	Wetlands featuring in the natural resources plan of significance.Wetlands in footprint of Pekapeka expressway removed 25/02/2015	Polygon	Regional	Specific values will need to be looked up on a case by case basis as there is little attribute data attached apart from significance criteria GWRC - Schedule F3
Natural Resources Plan 2019 - Schedule A - Outstanding Waterbodies	Outstanding waterbodies in the Wellington region including lakes, rivers and wetlands with biodiversity values for indigenous species	Polygon	Regional	Specific values will need to be looked up on a case by case basis as there is little attribute data attached apart from significance criteria
REC2 - Rivers	REC2 (River Environment Classification, v2.5) The River Environment Classification (REC) is a database of catchment spatial attributes, summarised for every segment in New Zealand's network of rivers.	Line	National	Version number to be checked. Description says this is v2.5. v5 is the latest version NIWA

Current wetlands typology	FENZ - current extent of wetlands and human pressures (2010).	Polygon	National	Source: Freshwater Ecosytems of New Zealand FENZ_Wetlands_2010.gdb - P:\421\4210000\0-Technical Reference\Ecology\GIS layers\NZ\Freshwater\FENZ (Freshwater Ecosystem of NZ)
Current wetlands sites	FENZ - current extent and distribution of wetland types (2010)	Polygon	National	Source: Freshwater Ecosytems of New Zealand FENZ_Wetlands_2010.gdb - P:\421\4210000\0-Technical Reference\Ecology\GIS layers\NZ\Freshwater\FENZ (Freshwater Ecosystem of NZ)
Predicted invertebrate distributions	Predictions of macroinvertebrate species occurrence	Line	National	Source: Freshwater Ecosytems of New Zealand FENZ_Rivers_2010.gdb - P:\421\4210000\0-Technical Reference\Ecology\GIS layers\NZ\Freshwater\FENZ (Freshwater Ecosystem of NZ)
River predictors	Contains an extended set of environmental attribute data that describes environmental conditions across all New Zealand's rivers and streams	Line	National	Source: Freshwater Ecosytems of New Zealand FENZ_Rivers_2010.gdb - P:\421\4210000\0-Technical Reference\Ecology\GIS layers\NZ\Freshwater\FENZ (Freshwater Ecosystem of NZ)
River pressures	Describes spatial variation in human pressures on riverine biodiversity, estimated using the best nationally available datasets (2010)	Line	National	Source: Freshwater Ecosytems of New Zealand FENZ_Rivers_2010.gdb - P:\421\4210000\0-Technical Reference\Ecology\GIS layers\NZ\Freshwater\FENZ (Freshwater Ecosystem of NZ)
River flow data				NEW???
Lake extent	LINZ lake polygons	Polygon	National	https://data.linz.govt.nz/layer/50293-nz-lake-polygons-topo-150k/
Lakes in Schedule F1	Lake with threatened/ at risk fish habitat	Polygon	Regional	NEW. Could also go in 'Endangered Species'
Groundwater level/water table data				NEW???
Substrate/Soil type		Polygon		NEW. Relevant to wetland type and their response to climate change. May also be useful for Terrestrial ecosystems S-map maybe?
Water quality monitoring data		Point		NEW.
Underlying geology		Polygon		NEW. May also be useful for Terrestrial ecosystems
Coastal Ecosystems				
Natural Resources Plan 2019 - Schedule F4 - Indigenous Biodiversity Coastal	Sites with significant indigenous biodiversity values in the CMA	Polygon	Regional	GWRC - Sites were identified with existing information and expert opinionandusing the criteria in Policy 23 of the Regional Policy Statementfor the Wellington Region and contained in more detail in:MacDiarmidet al (2012); Oliver & Beaglehole (2014); Todd et al (2014). MacDiarmid A, Nelson W, Gordon D, Bowden D, Mountjoy J and Lamarche G. (2012),Sites of significance for indigenous marine biodiversity in the Wellington region. Report prepared for Greater Wellington Regional Council by NIWA.Oliver M, Beaglehole J. (2014),Coastal sites and habitats with significant indigenous biodiversity values in the Wellington region: Technical memo to support Schedules F4 and F5 of the draft Natural Resources Plan.Todd M, Kettles H, Graeme C, Sawyer J, McEwan A, Adams L. (2014),Estuarine systems in the lower North Island: ranking of significance, current status and future management options. Department of Conservation, Wellington (in prep).
Natural Resources Plan 2019 - Coastal Marine Area and Rivermouth Boundaries	Coastal Marine Area and River Mouth boundaries	Line	Regional	GWRC - These boundaries were agreed to for the Regional Coastal Plan for the Wellington Region 2000 and the delineations that appear in this map conform to those agreements. All other rivers and streams not identified are defined using the RMA 1991 definition, as measured from the line of the Mean High Water Springs either side of where the waterbody enters the sea.
MPA Policy habitats of the Territorial Sea	Coastal Marine Habitat types	Polygon	National	NEW. Coarse scale, more detailed regional info may be available through GWRC or NIWA Administered by DoC https://www.arcgis.com/home/item.html?id=ab9d7519a4c94f57afc89ede9e72103e
Beach exposure	Exposure – the degree to which the shoreline is exposed to wave and swell energy	Line	National	NIWA - https://www.arcgis.com/home/item.html?id=2e2f8ea5ea31453e808b36b2a1ca43a0 - The geomorphic variables were sourced from the New Zealand coastal type classification scheme and GIS mapping procedures that were previously created for Coastal Explorer using advice from expert panels including regional council staff, knowledgeable locals, university staff and consultants from throughout New Zealand. The coast was mapped and referenced against panel knowledge using information from a wide variety of sources including: 1:50,000 topographic maps, aerial photographs, Google Maps and Google Earth, RNZN hydrographic charts, various publications and reports, New Zealand Land Resources Inventory (NZLRI), the National Land Cover Data Base (LCDB), and the Estuarine Environment Classification database. In assembling the coastal and beach type information, site visits were made to many beaches to obtain information that could not be collected from existing sources, and parts of the coast were flown by light aircraft to obtain oblique aerial photographs
Terrestrial Ecosystems				
Akatarawa Forest	Akatatawara Forest Boundary	Polygon	Local	Provides little valuable information other than extent
Pakuratahi Forest	Pakuratahi Forest Boundary	Polygon	Local	Provides little valuable information other than extent
Regional Parks	Regional Parks Boundaries	Polygon	Regional	Provides little valuable information other than extent
Plantation Forests - Western Area	Western Area Managed Plantation Forests	Polygon	Local	Uncertain about relevance. Fire hazard risk likely to increase? Wilding pine spread potentially exacerbated by changes in climate?
Plantation Forests - Eastern Area	Eastern Area Managed Plantation Forests	Polygon	Local	Uncertain about relevance. Fire hazard risk likely to increase? Wilding pine spread potentially exacerbated by changes in climate?
Ecological Sites (WCC)	Ecological sites for Wellington City	Polygon	Local	No attributes attached. Need better understanding of what the polygons represent
Backyard Taonga - Draft Significant Natural Areas (WCC)	Draft Significant Natural Area - descriptions and values	Polygon	Local	Includes information relevant to a number of elements (indigenous and Taonga spp., freshwater ecolosystems, terrestrial ecosystems, endangered species)
Landcare Research NZ Land Cover Database	Thematic classification of New Zealand's land cover.	Polygon	National	Need to ensure this is most up to date version (v5.0)
Singers Forest Classification - Current Forest Extent	This layer delineates the existing forest ecosystems for the Wellington region as mapped by Nick Singers using the national ecosystem classification system. A process to determine which forests were regionally threatened was then completed using IUCN criteria	Polygon	Regional	https://www.arcgis.com/home/item.html?id=adc731cf488a4ed09b875c0ee5ed2b84. Data is based on work done by Nick Singers with Geoff Rogers for the Department of Conservation in 2014.
DoC Public Conservation Land?				NEW but might be outside of scope?
Key Native Ecosystems	Key Native Ecosystems as defined using GWRC Biodiversity Management Areas database	Polygon	Regional	GWRC - https://mapping.gw.govt.nz/arcgis/rest/services/GW/Our_Environment_P/MapServer/11
Soil moisture/water availability				NEW???
LENZ level 4 polygons	Land Environments of New Zealand (LENZ) is a classification of fifteen climate, landform, and soil variables chosen for their relevance to biological distributions.	Polygon	National	MfE - https://data.mfe.govt.nz/layer/52358-land-environments-new-zealand-lenz-level-4-polygons-2009/
Council green asset network	Locations and extent of parks and green space	Polygon	Regional/Local	Various councils

Threatened Environment Classification	Shows how much native (indigenous) vegetation remains within land environments, and how past vegetation loss and legal protection are distributed across New Zealand's landscape.	Polygon	National	Landcare Research New Zealand Ltd - https://lris.scinfo.org.nz/layer/48288-threatened-environments-classification-2012/
Endangered Species				
Threatened or At Risk Fish Habitat	Waterbodies (rivers, streams and their tributaries and Lake Wairarapa) with habitat for threatened and at risk indigenous fish species within the Greater Wellington Region	Line	Regional	GWRC - These species are named in Schedule F1.Schedule F1 replicates Table 16 of the Regional Policy Statement for the Wellington Region, based on Warr et al (2009), and updated with recommendations in Perrie et al (2014). Perrie A, Greenfield S, Beaglehole J. (2014). Rivers and lakes with significant indigenous ecosystems. Greater Wellington Regional Council, Publication No. GW/EP-G-14/93, Wellington.Warr S, Perrie A and McLea M. (2009). Selection of rivers and lakes with significant indigenous ecosystems. Greater Wellington Regional Council, Publication No. GW/EP-G-09/29, Wellington.
Threatened and At Risk Plant Data	Threatened plant distribution	Point	National	This is likely available through NVS (https://nvs.landcareresearch.co.nz/Data/Search), although i'm uncertain if we're able to source data only for threatened/at risk plants. DoC and NZPCN may also hold data on threatened plant distribution.
SanctuaryPointLocations	Pest free sanctuaries	Point	National	Administered by Predator Free NZ https://www.arcgis.com/home/item.html?id=349c86185f504583bbd9a3c99fef9ec5
Pest Free Islands	Predator free islands	Polygon	National	Administered by Predator Free NZ https://www.arcgis.com/home/item.html?id=349c86185f504583bbd9a3c99fef9ec5

			Key	Recommended Dataset for Use
				Dataset does not cover entire region
				Recommended Additional Datasets
Layer	**Description**	**Type**	**Coverage**	**Comments**
Community Wellbeing				
Facilities	Community centres, recreation centres, swimming pools, community gardens	Point	Local	Only have data for WCC
Fire Stations	Also picked up through building footprint layer	Point	Regional	Data across the region
Police Stations	Also picked up through building footprint layer	Point	Regional	Data across the region
NZ Places of Worship	Also picked up through building footprint layer	Point	Regional	Data across the region
Community halls and community centers	Also picked up through building footprint layer	Point	Other	No data for Kapiti
Cemetery Outlines	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon	Local	Only have data for WCC
Cafes Bars and Restaurants - Cafes, Bars & Restaurants	TLA level dataset. Likely picked through building footprint layer to a degree	Point	Local	Only have data for UH
Play Areas in Upper Hutt - Major and Neighbourhood Parks	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon	Local	Only have data for UH
Libraries	TLA level dataset. Likely picked through building footprint layer to a degree	Point	Local	Only have data for Hutt City
Preparing Coastal Communities for Climate	Assessing coastal vulnerability to climate change, sea level rise and natural hazard	non	Greater	Councils
Social Cohesion and Welfare				
Kāinga Ora Land		Polygon	Other	Data for Wairarapa? - Queried, no Kainga Ora land in Wairarapa.
Projected Housing Deficit		Polygon	Local	WCC
New Zealand Census 2018 and deprivation index Statistical Area 1		Polygon	Regional	
Population SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
Children SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
OlderAdults SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
HealthStatus SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
EnoughMoney SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
SocialConnectedness SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	Interested to interrogate this one further - what does 'immigrant' mean? Is that a recent arrival to the suburb/ city/ country?
Knowledge SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
Housing SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
FoodWater SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	Interested to interrogate this one further - how many people without power/ running water have voluntarily chosen that way of living (eg remote hut/ bach)?
Social vulnerability indicators for flooding in Aotearoa New Zealand		non-spatia	National	Councils 2019 - presentation of methodology
Occupational SVI2018	Social vulnerability indicators for natural hazardsGroup Layer	Polygon	National	
Coastal Communities				
Regional Planning P - Coastal Unit Assessment	Regional Planning Coastal Unit Assessment - Wairarapa Coastal Strategy Boffa 2004	Polygon	Local	Only for Wairarapa - places of value in Wairarapa Strategy Doc
Regional Planning P - Coastal Character Areas	Regional Planning Coastal Character Areas - Wairarapa Coastal Strategy Boffa 2004	Polygon	Local	Only for Wairarapa - places of value in Wairarapa Strategy Doc
Education				
Schools		Point	Regional	Missing data from Wairarapa, can be captured below by LINZ data.
Early Childhood Education Centres		Point	National	
LINZ NZ Facilities (School) - Polygon		Polygon	National	From LINZ
Cultural Heritage and Taonga				
Maori sites of significance [NaturalResourcesPlan2019]	Point, line and polygon			Comprehensive Dataset, use with Maori sites of significance [DraftDistrictPlan] below
Maori sites of significance [DraftDistrictPlan]				Wellington City Only
Scheduled Archaeological Sites		Polygon		Wellington City Only
Sports and Recreation				
Sports Fields Picnic Areas (Upper/Lower Hutt)				Only data for Upper Hutt Valley
Stage (Harcourt Park)	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for Upper Hutt Valley
Tables	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for Upper Hutt Valley
Picnic Areas	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for Upper Hutt Valley
BBQ	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for Upper Hutt Valley
Changing Rooms	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for Upper Hutt Valley
Toilets	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for Upper Hutt Valley
Tracks	TLA level dataset. Likely picked through building footprint layer to a degree	Line		Only data for Upper Hutt Valley
Winter Sportsfields	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon		Only data for Upper Hutt Valley
Summer Sportsfields	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon		Only data for Upper Hutt Valley
All-year Sportsfields	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon		Only data for Upper Hutt Valley
Park	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon		Only data for Upper Hutt Valley
Recreation facilities (sports fields, etc)	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon		Wellington City Council
Wellington Sporting and Boat Clubs - Wellington Hall and Club Facilities-Copy	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Wellington City Council
Recreation facilities (sports fields, etc)	TLA level dataset. Likely picked through building footprint layer to a degree	Polygon		Only data for WCC

Wellington Sporting and Boat Clubs - Wellington	TLA level dataset. Likely picked through building footprint layer to a degree	Point		
Hall and Club Facilities-Copy				Only data for WCC
Wellington boat clubs and surf lifesaving	TLA level dataset. Likely picked through building footprint layer to a degree	Point		Only data for WCC
Health				
Aged Care Facility		Point		Data across region
LINZ NZ Facilities (Hospital) Polygon		Polygon		Is there data for hospices? Only one is shown (in the Hutt)
Building Outlines	National building footprints layer. High resolution. Unknown if building floor levels are included.	Polygon	National	Use this as preference for the assessment - this is sufficient for the qualitative region/district scale assessment. Are we able to find building type (residential, commercial etc) Or specific uses (e.g. like the supermarkets) to inform a sub-district assessment if Councils want to take that next step?
Supermarkets	Buildings - supermarket foot prints. Relevant to community as much as buildings	Polygon	National	Useful for quantitative stage if selected
Population Metrics				
Population Density	Polygons by suburb	Polygon	National	All useful information for exposure and vulnerability of certain population groups
Urban Rural	Polygons by suburb	Polygon	National	All useful information for exposure and vulnerability of certain population groups
Usually Resident Population	Polygons by suburb	Polygon	National	All useful information for exposure and vulnerability of certain population groups
Number of Households	Polygons by suburb	Polygon	National	All useful information for exposure and vulnerability of certain population groups
Ethnic group, European, Maori, Pacific Peoples, Asian, MELAA	Polygons by suburb	Polygon	National	All useful information for exposure and vulnerability of certain population groups
end				

Key	Recommended Dataset for Use
	Dataset does not cover entire region
	Recommended Additional Datasets

Layer	Description	Type	Coverage	Comments
Airports and Seaports				
Wellington Airport	Airport Zone from WCC district plan.	Polygon	Local	Extents goes beyond current airport boundary and includes parts of Mirimar Golf Club and Lyall bay industrial areas. Needs updating to include actual WIAL boundary (suggest: https://data.linz.govt.nz/search/?q=airport) . Could also find information on runway extents and buildings.
Kapiti Coast Airport	Airport zone from KCDC district plan	Polygon	Local	Extents goes beyond current airport boundary and includes parts of nearby commercial areas. Needs updating to include actual land boundary (https://data.linz.govt.nz/search/?q=airport). Could also find information on runway extents and buildings.
Hood Aerodrome	Airfield near Masterton	Polygon	Local	Add from linz polygons: https://data.linz.govt.nz/search/?q=airport. See other details at https://mstn.govt.nz/community-4/hood-aerodrome-2/
Centreport	Centreport assets within Wellington Harbour needs to include Pipitea, Mirimar and Seaview parts of the Port	Polygon	Local	Essential to find or create. See Water designation of port zones: https://data-gwrc.opendata.arcgis.com/datasets/749f7cc694394b58a84eea28034f77fd_2/explore. And the draft strategic plan includes: https://gis.wcc.govt.nz/arcgis/rest/services/CDPP/Draft_Spatial_Plan/MapServer/8 or LINZ Wharf edges https://data.linz.govt.nz/layer/50377-nz-wharf-edges-topo-150k/
Marinas	polygon of marina extents in the region	Polygon	Local	Nice to have but not essential. Could come from Linz Wharf edges:https://data.linz.govt.nz/layer/50377-nz-wharf-edges-topo-150k/
Buildings and Facilities				
WRFG Constraints	Constraints Mapping Report	non spatial	National	GWRC (2020) report for spatial planning purposes of areas where new developments should not occur
Building Outlines	National building footprints layer. High resolution. Unknown if building floor levels are included.	Polygon	National	Use this as preference for the assessment - this is sufficient for the qualitative region/district scale assessment. Are we able to find building type (residential, commercial etc) Or specific uses (e.g. like the supermarkets) to inform a sub-district assessment if Councils want to take that next step?
Supermarkets	Buildings - supermarket foot prints. Relevant to community as much as buildings	Polygon	National	Useful for quantitative stage if selected
Aged Care Facilities	Agred care facility poin layer. Unsure of completeness.	Point	National	Useful for quantitative stage. May be useful for social impacts.
District Plan Zones (KCDC)	Multiple layers from District plan. More relevant to other domains.	Polygon	Local	Useful throughout other domains for qualitative assessment. Lots of information specific to this district.
Special Housing Areas (WCC)	Special housing areas within WCC	Polygon	Local	Relevant to housing
District Plan Zones (WCC)	Multiple layers from District plan. More relevant to other domains.	Polygon	Local	Useful throughout other domains for qualitative assessment. Lots of information specific to this district.
District Plan (HCC)	Multiple layers from District plan. More relevant to other domains.	Polygon	Local	Useful throughout other domains for qualitative assessment. Lots of information specific to this district.
Map Image Layer		Polygon	Local	
District Plan (UHCC)	Multiple layers from District plan. More relevant to other domains.	Polygon	Local	Useful throughout other domains for qualitative assessment. Lots of information specific to this district.
District Plan Zones (Wairarapa)	Multiple layers from District plan. More relevant to other domains.	Polygon	Local	Useful throughout other domains for qualitative assessment. Lots of information specific to this district.
Proposed District Plan Zones (PCC)	Multiple layers from District plan. More relevant to other domains.	Polygon	Local	Useful throughout other domains for qualitative assessment. Lots of information specific to this district.
Energy				
Transpower Structures	Transpower towers	Point	National	Includes type of tower (e.g. steel) and number of lines
Transpower Sites	Substations, key buildings (e.g. Cook Strait HVDC)	Point	National	Useful for drill in to details
Transmission Lines	Transpower lines between towers and substations	Line	National	Includes overhead lines and buried cables
Wellington Electricty	Wellington, Porirua, Lower and Upper Hutt provider			Traditionally difficult to obtain from providers due to commercial sensitivity. Can we get this?
PowerCo	Wairarapa provider			Traditionally difficult to obtain from providers due to commercial sensitivity. Can we get this?
Electra	Kapiti Coast provider			Traditionally difficult to obtain from providers due to commercial sensitivity. Can we get this?
Wind turbines	Windmill points from LINZ 1:50	Point	National	Could be opportunity - more with CC wind = more power. Get layer from: https://data.linz.govt.nz/layer/50378-nz-windmill-points-topo-150k/
Electricity generation	Location of generation in Wellington region	Polygon	Local	"The majority of electricity used in Wellington is taken from the national grid at Transpower substations located at Upper Hutt (Birchville), Haywards, Melling, Gracefield, Pauatahanui, Takapu Road (to the east of Linden), Kaiwharawhara, Wilton and Central Park (Mount Cook). The network also receives up to 12 MW of electricity from power generating facilities connected to the distribution network, including two landfill gas stations at Silverstream and Happy Valley, a gas fired cogeneration facility at Wellington Hospital, and a single wind turbine in Brooklyn." https://en.wikipedia.org/wiki/Wellington_Electricity
Vector Gas pipeline	Location of main vector pipes	Line	Regional	Find layer within https://gwrc.maps.arcgis.com/apps/webappviewer/index.html?id=06c8d6c3b3be49d4a4d55a8d4f973ea3
Flood and Coastal Defences				
GWRC pump stations	Wairarapa pump stations only	Point	Regional	https://data-gwrc.opendata.arcgis.com/datasets/GWRC::flood-protection-drainage-scheme-pump-stations/explore
GWRC flood protection information	Need it all - may not use it all. Note also it includes QE2 open space covenant areas - could be useful for other natural environment domains	Multiple	Regional	https://gwrc.maps.arcgis.com/apps/webappviewer/index.html?id=06c8d6c3b3be49d4a4d55a8d4f973ea3
https://gis.mstn.govt.nz/arcgis/rest/services/Services/WaterRaces/MapServer	Overlaps with 3 waters stormwater information. Water races Wairapa	Line	Local	Useful and part of flood defences
Transport (Road and Rail)				
KiwiRail Track Centreline	Kiwirail track centrelines	Line	National	All we need for Kiwirail transport networks. Their Public GIS includes all their other assets (land, stations, bridges, tunnels etc): https://gis.kiwirail.co.nz/maps/?viewer=kiwirailpropertyview
One Network Road Classification	Road networks everywhere	Line	National	Comprehensive. Aligns with basemaps. Doesn't name each road.
Map Image Layer	Layer not loaded in viewer but appears to be duplicate of ONRC			
Public Transport (GWRC)	All GWRC public transport information - down to bus stops. Lines, polygons and points	Polygon	Regional	All GWRC public transport information - down to bus stops.
Map Image Layer	Layer not loaded in viewer but appears to be duplicate of GWRC public transport			

Photo wcc kerbs	WCC kerb assets - plots as polygon but should be line	Polygon	Local	
Ttr contract areas	Unknown. Do not use	Line	Local	
Ttr footpaths	WCC footpats	Line	Local	Could probably find other council kerb and transport asset for completeness, but anything sub-road scale seems secondary (kerbs)
Ttr heavy vehicle route	WCC HV route	Line	Local	
Ttr onstreet parking	WCC parking areas	Line	Local	
Ttr parking spaces	WCC parking areas	Line	Local	
Ttr road carriageway	WCC roads - duplicates ONRC	Line	Local	
Ttr road categories	WCC road categories - superseeded by ONRC	Line	Local	
Ttr street events and road closures	no application	Line	Local	
Solid Waste Management				
Landfill Polygons (LINZ Topo 1:50k)	NZ landfills. Unsure if includes closed or historic landfills.	Polygon	National	National scale. Unsure if includes closed or historic landfills.
Selected Land Use Register (GWRC)	Regional SLUR. Comprehensive for designated land uses. Sub categories show why the site is on the register. May miss distributed contamination (e.g. from historic rail track contamination)	Polygon	National	Regional scale useful
Communications				
Fibre networks (Chorus?)				Traditionally difficult to obtain due to commercial sensitivity.
Underground comms services				Traditionally difficult to obtain from providers due to commercial sensitivity. Likely to be many different providers across the region. All underground data missing, copper, fibre, exchange buildings, roadside cabinets. Need to understand
https://wcc.maps.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=22e8367f456b4642b6708e030e54c1ff	NZ Cell towers	Points	National	already in WCC arcgis?
https://koordinates.com/layer/1502-vodafone-cell-sites/	Vodaphone cell towers	Points	National	Koordinates. Unsure of currency
https://koordinates.com/layer/1503-spark-formerly-telecom-cell-sites/	Spark towers	Points	National	Koordinates. Unsure of currency
https://koordinates.com/layer/1504-2degrees-cell-sites/	2Degrees cell sites	Points	National	Koordinates. Unsure of currency
Three Waters				
KCDC Stormwater	Review of Development Impacts on Stormwater Management	non spatial	KCDC	2006 councils report
3 Waters asset data (and children)	Water, Wastewater and Stormwater from Wellington Water	Line	Local	Wellington Water bounds only. Missing Carterton, Masterton, KCDC
https://maps.kapiticoast.govt.nz/LocalMaps/Viewer/?map=627d29f22676457ca22bc92c19a095cc	Water, waste water and SW for KCDC	Line	Local	KCDC
https://gis.mstn.govt.nz/WairarapaViewer/?map=d6f5378092314eb4ac10c276906e554d	Water, waste water and SW for other Wairarapa Councils	Line	Local	Wairarapa - but seems to overlap Wellington Water at featherson and greytown
https://gis.mstn.govt.nz/arcgis/rest/services/Services/PrivateUtilitySchemes/MapServer	Water services	Line	Local	A private scheme in Wairarapa - still serves the community
Major Infrastructure				
Hospital Facilities	NZ hospitals	Point	National	National hospitals data. Seems to be better looking at the Building outlines with 'use' being Hospital
3 Waters Asset Data				Better information in 3 waters tab
Prisons				Accessible?
Stadiums				Accessible?
Dams	Could we get this?	Polygon	National	https://geospatial.ac.nz/?portfolio_page=nzid
Schools/ministry of ed				Seems to be better looking at the NZ Building outlines with 'use' being School. Has been autoprocessed: https://nz-facilities.readthedocs.io/en/latest/introduction.html