Earth Sciences New Zealand

National Climate Hazard Exposure Census

Prepared for He Pou a Rangi Climate Change Commission

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Purpose and Approach

The National Climate Hazard Exposure Census establishes a robust baseline of climate hazard exposure for Aotearoa-New Zealand (A-NZ), quantifying the population, buildings, infrastructure, and land exposed to a range of climate hazards. These hazards include inland flooding, coastal flooding, shallow groundwater (coastal), coastal erosion, rainfall-induced landslides, and climate extremes (winds, temperatures, evapotranspiration deficit). Exposure is evaluated under scenarios of temperature increase (+0°C, +1°C, +2°C, +3°C) and mean sea level rise (+0 m, +0.5 m, +1 m, +1.5 m, +2 m), and across four emissions pathways (SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5). The baseline period used for temperature increase affecting rainfall, inland flooding and landslides was 1986–2005. The baseline period for mean sea level change affecting coastal flooding and coastal groundwater rise was 1995–2014.

The census utilises the RiskScape multi-hazard risk modelling framework, integrating national geospatial hazard layers with datasets for population, buildings, infrastructure, and land.

National Insights

- Inland Flooding: This is the most widespread hazard for future climates, exposing 753,656 people at +0°C and up to 902,395 at +3°C. Building exposure rises from 555,942 to 674,433; replacement value increases from NZD 235B to NZD 287B at +3°C.
- Rainfall-induced landslides: Show strong sensitivity to warming; population exposure rises from 77,794 (+0°C) to 224,099 (+3°C). Building exposure increases from 89,238 to 206,296; replacement value from NZD 33B to NZD 83B.
- Coastal Hazards: Exposure escalates with sea-level rise. Extreme sea-level flooding could affect 32,108 people at +0 m and up to 282,988 at +2 m relative sea-level rise, with 228,895 buildings (NZD 111B) exposed at +2 m. Shallow groundwater in coastal areas exposes 302,514 people at +0 m and 441,146 at +2 m, with 296,977 buildings (NZD 140B). Coastal erosion exposes 3,484 buildings (NZD 1.2B) by 2100; while numerically small, the economic impact is significant for affected properties.
- Temperature Extremes: Under SSP5–8.5, up to 484,247 people could experience 30–40 very hot days (≥30°C) annually by 2090.
- Infrastructure Networks: Roads exposed to extreme sea-level flooding increase from 1,286 km (+0 m) to 5,605 km (+2 m sea-level rise), and rail exposure from 39 km to 419 km. Electricity transmission lines exposed to inland flooding reach 1,362 km at +3°C warming. Potable water nodes exposed to inland flooding increase from 638,912 (+0°C) to 727,080 (+3°C).
- Land Cover: Built land exposed to inland flooding grows from 326 km^2 to 394 km^2 at +3°C. Production land exposed to rainfall-induced landslides rises from ~13,179 km^2 to 23,605 km^2 at +3°C. Extreme sea-level flooding exposes up to 57 km^2 of built land and 1,811 km^2 of production land under +2 m sea-level rise.

Regional Insights

- Inland Flooding: Auckland and Canterbury have highest exposure. Auckland: 83,139 people (+0°C) to 205,275 (+3°C); Canterbury: 139,956 to 165,105. Building exposure: Auckland 75,960 to ~82,575; Canterbury 126,309 to 140,999.
- Rainfall-Induced Landslides: The highest population exposure occurs in northern regions. Auckland: 20,297 (+0°C) to 96,826 (+3°C) and Northland: 18,000 to 39,000 people. Gisborne has the greatest production land cover exposed to rainfall-triggered landslides, rising from 3,206 km^2 (+0°C) to 3,855 km^2 (+3°C). Hawkes Bay ranks next, with exposure growing from 2,167 km^2 to 3,425 km^2, while Northland's affected area expands from 1,593 km^2 to 2,532 km^2.
- Coastal Flooding: Hotspots include Hawke's Bay and Canterbury. Under +2 m sea-level rise: Hawke's Bay has 47,276 people and Canterbury 77,637 exposed. Canterbury has up to 414,980 people exposed go shallow groundwater at +1 m rise.
- Coastal erosion impacts are highly localised. By 2100: Waikato (687 buildings, NZD 278M), West Coast (507 buildings, NZD 125M), Northland and Tasman (400+ buildings each).
- Temperature Extremes: In the Waikato 303,000 people and in Hawke's Bay 150,000+ people could face 20–30 very hot days by 2090 under scenario SSP5–8.5.
- Infrastructure Networks: Canterbury road exposure to inland flooding increases from 7,421 km (+0°C) to 8,313 km (+3°C); Waikato from 3,255 km to 3,737 km. Electricity transmission line exposure in Waikato increases from 230 km to 258 km (+3°C).
- Land Cover: Canterbury has the largest increase in production land exposed to inland flooding, from about 3028 km^2 at +0 °C to 3473 km^2 at +3 °C, followed by Southland (1482 km^2 to 1655 km^2) and Waikato (1059 km^2 to 1202 km^2). Gisborne has highest production land exposure to rainfall-induced landslides (3,206 km^2 to 3,855 km^2).

Methodological Notes

The census applies a systematic, spatially referenced approach, analogous to a population census, to enumerate all elements-at-risk across A-NZ. This enables consistent identification, quantification, and mapping of exposure by geography and element type.

This framework supports regular, scalable, and repeatable reporting for policy, planning, and monitoring adaptation progress. It also provides the basis for identifying risk hotspots, comparative regional analysis, and tracking temporal changes in exposure.

The census does not quantify risk or loss, but establishes the foundation for more detailed risk analysis. Limitations and recommendations for enhancing input data and modelling functionality are identified for future iterations.

1 Introduction

1.1 Climate hazard-exposure analysis: What is a hazard-exposure analysis and what is their purpose?

Exposure analysis is the process of identifying and quantifying tangible (e.g., buildings, infrastructure) and intangible elements (e.g., people, taonga) that could be directly impacted by a natural hazard. The exposure analysis purpose is to determine what elements are at risk, how frequently the elements are at risk, the quantities of elements at risk and where the elements are located. Element exposure to a natural hazard (herein referred to as 'hazard-exposure') are often reported as:

- counts (e.g., number of buildings) of elements exposed to a climate hazard, and/or
- geometric quantities (e.g., land area (km^2), road length (km)) of elements exposed to a climate hazard.

Element hazard-exposure counts or geometric quantities can be reported for elements based on geospatial features (e.g., building polygons, road polylines) only or features with characteristics that may influence an elements vulnerability to impact (e.g., building use, road class) from a natural hazard.

Hazard-exposure counts or geometric quantities can be mapped and enumerated using geoprocessing functions in a geospatial software. A simple geospatial representation of hazard-exposure is schematically presented in Figure 1. Here, a blue polygon representing pluvial flooding is overlaid on building outlines polygons, with hazard-exposure indicated by red buildings. This process now enables hazard-exposure counts (i.e., number of red buildings (6)) and geometric quantities (i.e., area (m^2) of red buildings) to be enumerated. The same process can be applied to road and land parcel features depicted in the schematic example, to enumerate and report hazard-exposure for multiple elements at risk.

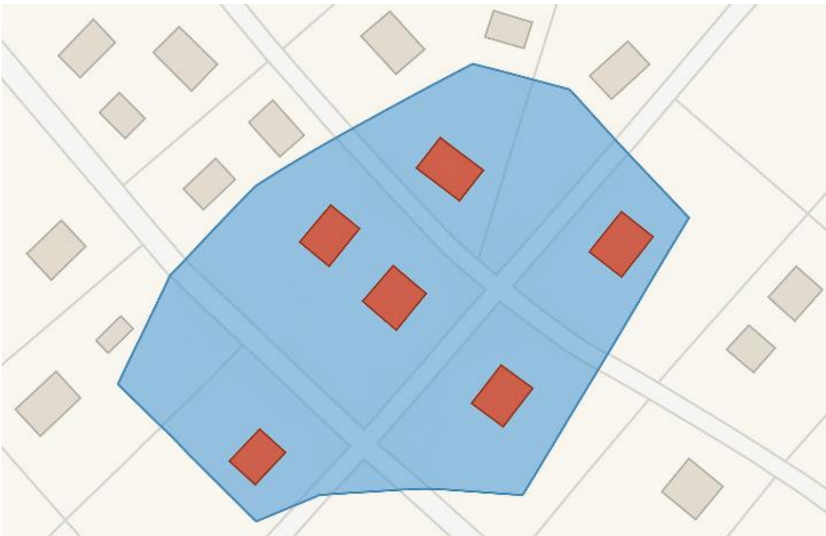

Figure 1: Simple schematic representation of building hazard-exposure to inland flooding. Buildings (red) located within the modelled inland flood extent (blue) indicate hazard-exposure.

Exposure analyses have several practical applications in disaster risk management and climate adaptation planning. It is widely used for risk 'profiling' or 'hot spot' mapping, where areas with high concentrations of hazard-exposed people, buildings, infrastructure are spatially and temporally identified. This mapping then allows for prioritisation of detailed risk analysis and assessments of optimal mitigation interventions to manage risk. This process also supports risk monitoring, whereby an exposure analysis generates a temporal information baseline for tracking how hazard exposure changes over time in an area. For instance, hazard-exposure may change in response to single or a combination of factors including (but not limited to) climate-driven shifts in hazard regimes, hazard mitigation interventions, urban growth or land-use change, all of which may be represented in new geospatial data developed within a given time-period. In addition, exposure analysis further supports monitoring the effectiveness of adaptation interventions for managing natural hazard risk. Changes in hazard-exposure can indicate whether or not structural (e.g., seawalls, stopbanks) or non-structural (e.g., land use regulations, education) are contributing effectively toward risk management outcomes. The multiple purposes for exposure analysis in natural hazard risk management, means these analyses provide important foundational information to inform more detailed location-based quantitative risk analysis

It is important to note that an exposure analysis does not quantify the risk of tangible or intangible impact or loss from natural hazards, but can inform these investigations. Quantitative risk analysis for natural hazards is centred on a well-established conceptual framework for risk quantification:

$$R = f(H, E, V) \quad (1)$$

Where risk (*R*) is a function (f) of the consequences (negative or positive) from a hazard event (*H*) acting upon an exposed element (*E*). Tangible and intangible impact or loss are determined from the exposed elements vulnerability (*V*) to an impact or loss in response to a hazard event. If *V* is not known or cannot be reliably defined, *R* can be abridged as a function of hazard event *H* acting upon an exposed element *E*:

$$R = f(H, E) \quad (2)$$

1.2 Purpose of this study

The purpose of this study is to support He Pou a Rangi Climate Change Commission with developing a quantitative evidence base for the second National Climate Change Risk Assessment (NCCRA) and the second National Adaptation Plan Progress Assessment (NAPPA), to be completed in August 2026. The study provides a current understanding of Aotearoa-New Zealand's (A-NZ) economy, society, environment, and ecology elements at risk of exposure to climate hazards under present-day and future climate conditions. Evaluating a broad range of climate hazard exposure metrics aims to improve the current baseline understanding of risks in A-NZ and to provide metrics for assessing A-NZ's progress towards the Government's 20 key objectives in the National Adaptation Plan (NAP). In addition, the exposure analysis methodology supports iterative refinement and extension in future NCCRA and NAPPA cycles.

A climate-hazard exposure census forms the analytical framework of this study. Similar to a national population census, this approach systematically identifies and enumerates elements in A-NZ that may be at-risk to climate hazards. This first climate-hazard census has included multiple climate-driven hazards such as coastal erosion, flooding (extreme sea levels, inland), landslides (rainfall-induced) and extreme temperatures, and elements-at-risk including usually-resident population, land cover, land use, buildings, and infrastructure network components to provide a comprehensive national inventory of climate hazard-exposure. By adopting a census approach, the study ensures that all relevant elements-at-risk are consistently identified, spatially referenced, and quantified across the country. This creates a robust evidence base that can be disaggregated by geographic area (e.g., regional council, territorial authority) or element type and attributes, thereby enabling risk hotspot identification, comparative analysis, and the monitoring of changes in exposure over time. Ultimately, the census approach supports a scalable and repeatable methodology that can underpin both current and future assessments of climate hazard risk and adaptation progress in A-NZ.

1.3 Climate hazards and elements-at-risk in this study

Climate hazards and elements-at-risk considered in this study are defined in Table 1 and Table 2, respectively. Further information on the corresponding spatial datasets used in this study are available in Section 3.2.

Table 1: Climate hazards considered in this study.

Climate Hazard	Climate Hazard Definition in this Study	Hazard Metric Used in This Study
Coastal flooding (extreme sea levels)	Flood inundation of land above mean high water springs caused by extreme sea levels (i.e., the combination of mean sea level, storm-tide and wave set-up).	Water depth (m)
Coastal flooding (mean high water springs)	Flood inundation of land above mean high water springs caused by tidal sources.	Water depth (m)
Inland Flooding	Flood inundation of land occurring away from the coastal which is caused by combinations of fluvial, pluvial and/or tidal sources.	Water depth (m)
Shallow groundwater (coastal)	Shallow groundwater presence refers to the condition where the water table is located relatively close to the ground surface (e.g., <1 m).	1= Present; 0= Not present
Rainfall-induced landslides	A rainfall-induced landslide is a type of slope failure where heavy or prolonged rain saturates soil and rock, increasing pore water pressure and reducing the slope's stability until gravity causes a sudden movement of earth, debris, or mud down a slope.	Rating (1 to 5)
Coastal Erosion	Coastal erosion is when the shoreline retreats, either temporarily or permanently.	1= Present; 0= Not present
Potential evapotranspiration deficit (PED)	Potential evapotranspiration deficit accumulation is a key drought indicator, measuring the growing gap between water plants could lose to the atmosphere (Potential Evapotranspiration - PET) and what's actually available, reflecting soil moisture stress.	PED (mm)
Extreme Winds	The 99th percentile wind change is used to identify and measure the frequency of rare, very strong wind events for a location.	Percentage change (%)
Extreme Temperatures	A very hot day is a day with a maximum air temperature reaches or exceeds 30°C.	Number of days
	A frost day is a day where the daily minimum air temperature is below 0°C.	Number of days

Table 2: Elements-at-risk considered in this study.

Element-at-Risk		Element-at-Risk Definition in this Study	Exposure Metric Used in This Study
Population		Census usually resident population i.e., the location and count of all people who usually live in and were present in New Zealand on census night 2023.	Number of people
Buildings		A temporary or permanent movable or immovable structure (including a structure intended for occupation by people, animals, machinery, or chattels).	Number of buildings; Replacement value (NZD)
Infrastructure	Transport (Roads)	An area principally used for vehicle or pedestrian traffic.	Length (km)
	Transport (Railways)	A structure acting a permanent way with rails for trains.	Length (km)
	Transport (Airports and aerodromes)	An aerodrome is a land area of land for the landing, departure, and surface movement of aircraft. Airport is often used interchangeably with aerodrome and typically refers to a more developed aerodrome with facilities for domestic or international aircraft.	Number of airports and aerodromes
	Electricity (Transmission Lines)	National electricity grid high-voltage power lines that transport electricity from generation stations to substations.	Length (km)
	Electricity (Structures)	National electricity grid pylons that carry high-voltage power lines.	Number of structures
	Electricity (Substations)	National electricity grid facility with equipment that controls the flow of electricity to change its voltage level for transmission and distribution.	Number of sites
	Water (nodes)	Non-linear structures forming components of potable water, wastewater and stormwater networks including (but not limited to): manholes, valves, gully traps, junctions, pump stations, treatment plants, and storage facilities.	Number of nodes
	Water (pipelines)	Linear structures (under or above ground pipes) forming components of potable water, wastewater and stormwater networks.	Length (km)
Land	Land Cover	The physical and biological features on the land surface, such as (but not limited to) vegetation, built environments, water bodies, and bare natural surfaces.	Area (km^2)
	Land Use	The purpose for which land use, encompassing human activities such as (but not limited to), primary production, or provide services such as recreation. Land use is determined by socio-economic functions like commercial, industrial, or residential purposes.	Area (km^2)

1.4 Climate change scenarios considered in this study

Climate change scenarios considered in this study are defined in Table 3. These scenarios represent climate processes that alter hazard states, and represented either independent of time (e.g., temperature change, mean sea-level rise) or as time-based projections based on the IPCC's Sixth Assessment Report (2021–22) Shared Socio-economic Pathways (SSPs)[1]. SSPs incorporate different socio-economic assumptions that drive future greenhouse gas emissions. Together, these scenarios span a wide range of plausible societal and climatic futures, resulting in global warming stabilisation at approximately 1.5 °C to more than 4 °C by 2100. This study uses the following medium confidence (moderate polar ice sheet melt):

- SSP1-2.6: A world with low emissions (2°C warmer world). This is the 'Paris Pathway', which is only possible if COP26 pledges are delivered on.
- SSP2-4.5: This is a world with moderate emissions (+2.7°C warmer world). This is the path we are on, if we follow current policy settings.
- SSP3-7.0: A world with high emissions (3°C warmer world).
- SSP5-8.5: This is a worst-case scenario world with very high emissions (>4°C warmer world). It is unlikely.

Table 3: Climate change scenarios considered in this study.

Climate Process	Scenario Type	Scenarios	Years	Climate Hazards Applied
Temperature Change (°C)	Incremental temperature warming	+0°C, +1°C, +2°C, +3°C	-	Inland flooding, Rainfall-induced landslides
	Shared Socioeconomic Pathways	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	2020 to 2090	Inland flooding, Rainfall-induced landslides, Very hot days (≥30°C), Frost days (<0°C), PED, Extreme winds
Mean Sea Level Rise (m)	Incremental rise scenarios	+0 m, +0.5 m, +1.0 m, +1.5 m, +2.0 m	-	Coastal flooding (Extreme Sea Levels), Coastal flooding (MHWS), Shallow groundwater (coastal)
	Shared Socioeconomic Pathways	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	2020 to 2090	Coastal flooding (Extreme Sea Levels), Coastal flooding (MHWS), Shallow groundwater (coastal)
Historic Trend Projection	Single projection at 2100	-	2100	Coastal erosion
Climate Processes	Shared Socioeconomic Pathways	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	2020 to 2090	Very hot days (≥30°C), Frost days (<0°C), PED, Extreme winds

[1] https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change/

2 Results

This section presents climate hazard-exposure at national (Section 2.1) and regional levels (Section 2.2). Our reporting summarises spatial and temporal exposure trends with accompanying graphical representation. Results are structured to demonstrate element hazard-exposure change by the forcing climate process (e.g., temperature or sea level rise) alone, and projected under four Shared Socioeconomic Pathways (SSPs) SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5, representing medium confidence GHC emissions scenarios. Haza-exposure projections based on either SSP temperature or sea level change scenarios represents an uncertainty distribution associated with the climate process. For simplicity, the 50th percentile hazard-exposure is the reporting focus in Section 2 for each SSP scenario, with 17th, 50th and 83rd percentiles reported in supplementary data with this report.

Reporting is further focussed on the hazard-exposure likely to have socioeconomic impacts. For instance, inland flooding is likely to have a greater socioeconomic impact on buildings than frost days, whereas frost days are likely to have greater impacts for land cover (i.e., production land). Hazard-exposure combinations reported at national and regional levels are summarised in Table 4.

Table 4: Climate hazard-exposure reporting combinations for this report. Note: complete results are provided as supplementary data files (see Appendix A).

Climate Hazard or Process	Elements-at-Risk Reported
Inland Flooding	All elements-at-risk
Coastal flooding (extreme sea levels)	All elements-at-risk
Coastal flooding (mean high water springs)	All elements-at-risk
Shallow groundwater (coastal)	All elements-at-risk
Coastal Erosion	All elements-at-risk
Rainfall-induced landslides	All elements-at-risk
Potential Evapotranspiration Deficit (PED)	Land Cover, Land Use
Frost Days (< 0°C)	Land Cover, Land Use
Very Hot Days (≥30°C)	Population, Buildings, Transport (Roads), Transport (Railways), Land Cover, Land Use
Extreme Winds	Buildings, Transport (Roads), Transport (Railways), Electricity (Transmission Lines), Electricity (Structures), Land Cover, Land Use

Hazard-exposure results presented in this report may use rounded values in summary statements, figures and tables to support clear communication of national and regional-scale trends. This rounding does not affect the underlying analysis. Rounded or unrounded values should not be interpreted as implying a level of precision beyond what is appropriate for national- and regional-scale modelling. For example, population and building hazard-exposure counts can be rounded to the nearest thousand, and economic values expressed in billions are rounded to whole billions. These conventions ensure that results reflect their intended order-of-magnitude accuracy rather than spurious precision.

Complete results with full unrounded values, including detailed hazard-exposure metrics and scenario comparisons, are provided in the supplementary data files (see Appendix A). This data is to support ongoing detailed assessment and further analytical use. These files contain full tabular outputs for all hazards and elements, by climate-driving process and SSPs (SSP1-2.6, SSP2-4.5, SSP3-7.0, SSP5-8.5), enabling further analysis and regional breakdowns beyond the summary presented in Sections 2.1 and 2.2.

2.1 National climate hazard-exposure: summary

2.1.1 Population

Inland flooding

Temperature Change(+0°C to +3°C)
Population exposure to inland flooding increases steadily with warming, rising from 753,656 people at +0°C to 902,395 people at +3°C warming, indicating a significant escalation in exposure under more extreme temperature scenarios (Figure 2).

SSP1-2.6 Scenario (2020–2090)
Exposure increases from 793,441 people in 2020 to 815,301 by 2050, but then declines to 806,174 by 2090, reflecting minimal overall change under a low emissions scenario.

SSP2-4.5 Scenario (2020–2090)
Projected exposure reaches 827,131 people by 2050, and rising further to 858,683 by 2090, indicating gradual exposure escalation under a mid-range emissions future.

SSP3-7.0 Scenario (2020–2090)
Exposure shows a stronger upward trend than SSP2-4.5, reaching 839,330 people by 2050, and reaching 899,920 by 2090, highlighting greater exposure growth under a high-emission, fragmented development pathway.

SSP5-8.5 Scenario (2020–2090)
Exposure shows the largest from 2020, reaching 842,446 people by 2050, and reaching about 902,389 by 2090, demonstrating high-emission scenarios could considerably increase population exposure to inland flooding.

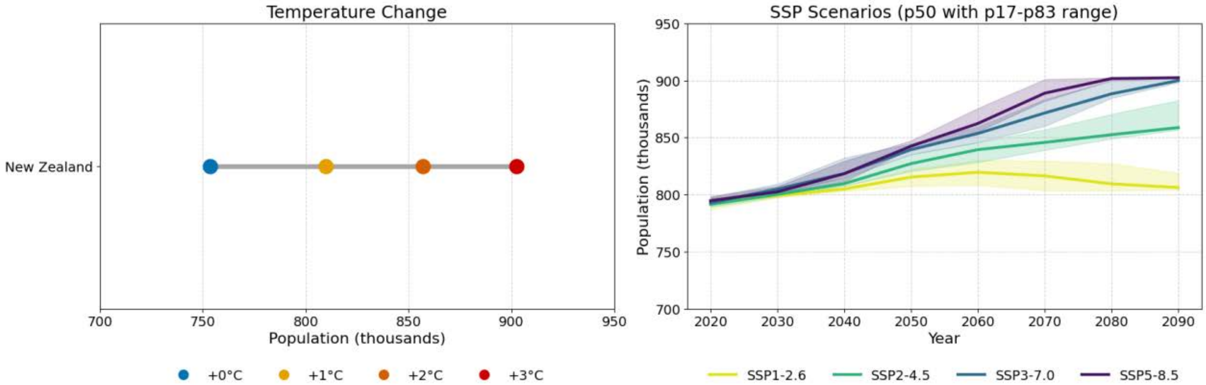

Figure 2: Projected A-NZ population exposure to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Population values are rounded for presentation clarity.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Population exposure to rainfall-induced landslides increases with warming, from 77,794 people at +0°C and rising to approximately 224,099 people at +3°C, indicating a strong sensitivity of landslide hazard to temperature-driven changes in rainfall intensity (Figure 3).

SSP1-2.6 Scenario (2020–2090)

Exposure remains stable with lower emission scenarios beginning near 95,297 people in 2020, increasing slightly to around 110,574 by 2050, and then declining to 104,703 by 2090, reflecting limited growth under low-emission scenarios.

SSP2-4.5 Scenario (2020–2090)

Projected exposure rises steadily, reaches118,251 people by 2050, increasing to 146,846 by 2090, indicating moderate growth under a mid-range emissions scenario.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend, reaching 127,499 people by 2050, and reaching 209,990 by 2090, highlighting greater exposure under a higher-emission scenarios.

SSP5-8.5 Scenario (2020–2090)

Exposure increases to 130,671 people by 2050, and reaching 224,027 by 2090, demonstrating that high-emission futures may considerably exacerbate landslide exposure.

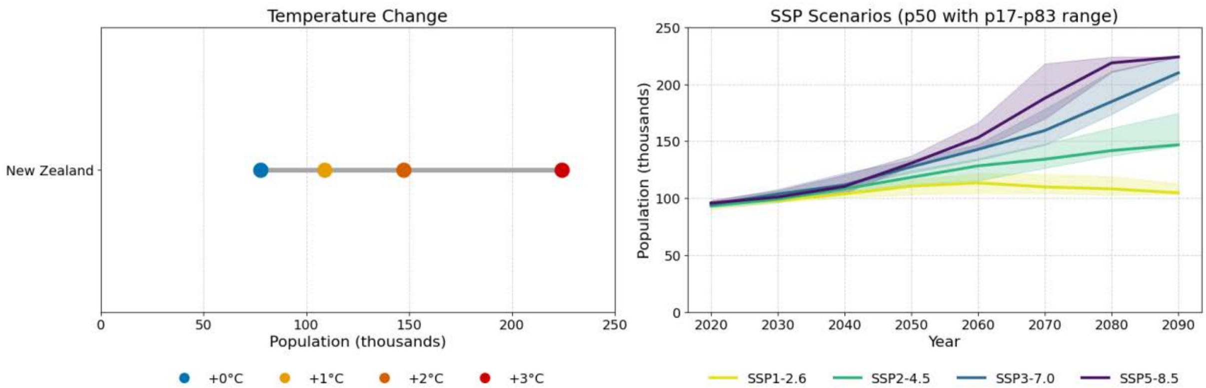

Figure 3: Projected A-NZ population exposure to rainfall-induce landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Population values are rounded for presentation clarity.

Coastal flooding (extreme sea levels)

Sea-Level Change (+0 m to +2 m)
Population exposure to coastal flooding increases sharply with rising sea levels, starting at about 32,108 people at +0 m and reaching 282,988 people at +2 m, indicating a substantial escalation in exposure under higher sea-level rise conditions (Figure 4).

SSP1-2.6 Scenario (2020–2090)
Exposure is projected to reach 47,650 people by 2050, and 68,102 by 2090.

SSP2-4.5 Scenario (2020–2090)
Projected exposure increases to 50,148 people in 2050, reaching 80,092 by 2090.

SSP3-7.0 Scenario (2020–2090)
Exposure reaches 51,712 people in 2050, then nearly doubles to 94,336 by 2090, highlighting escalating exposure under a high-emission scenario.

SSP5-8.5 Scenario (2020–2090)
Exposure similarly increases to 53,731people by 2050, then doubles to 106,820 by 2090, demonstrating that high-emission futures could considerably increase population exposure to coastal flooding.

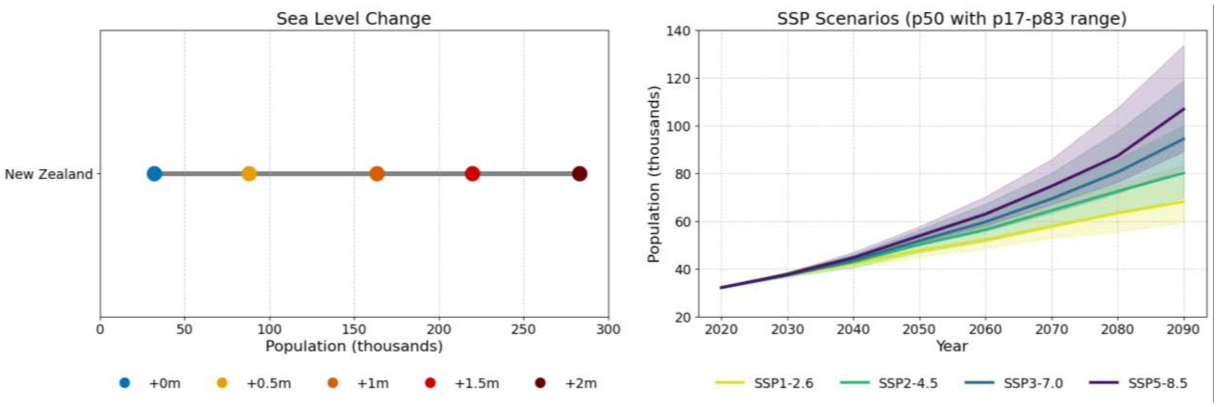

Figure 4: Projected A-NZ population exposure to extreme sea level driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Population values are rounded for presentation clarity.

Coastal flooding (mean high water springs)

Sea-Level Change(+0 m to +2 m)

Population exposure to coastal flooding under mean high water springs increases markedly with rising sea levels, starting at 599 people at +0 m and reaching 140,078 people at +2 m, indicating significant exposure growth as sea-level rise intensifies (Figure 5).

SSP1-2.6 Scenario (2020–2090)

Exposure is relatively low but nearly doubles until late century with rising sea levels, starting at 598 in 2020 and reaching 1184 people by 2090.

SSP2-4.5 Scenario (2020–2090)

Exposure increases to 892 people by 2050, and reaches 1388 by 2090.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a sharper increase later in the century. Exposure reaches 916 people by 2050, and 3522 by 2090.

SSP5-8.5 Scenario (2020–2090)

Exposure accelerates more rapidly toward the end of the century, increasing from 949 people in 2050 to 7509 by 2090.

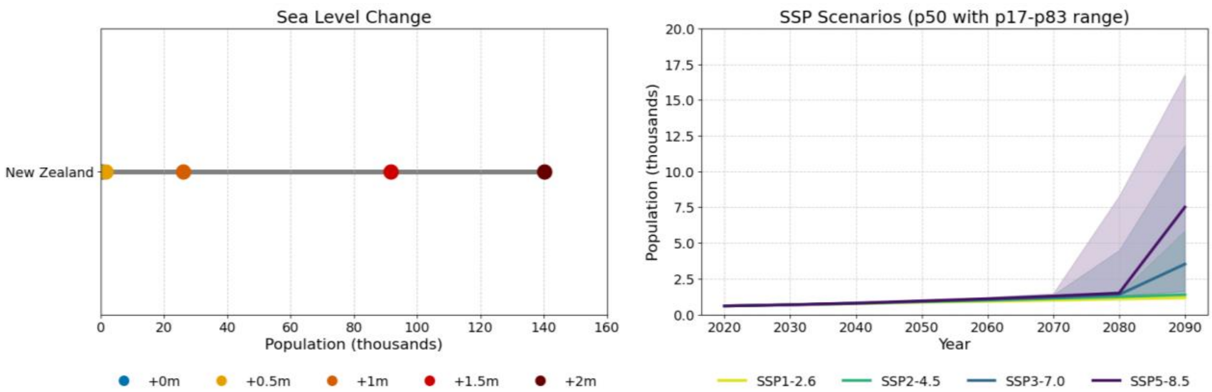

Figure 5: Projected A-NZ population exposure to mean high water springs driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Population values are rounded for presentation clarity.

Shallow groundwater (coastal)

Sea-Level Change(+0 m to +2 m)

Population exposure to shallow groundwater increases steadily with rising sea levels, starting at about 302,514 people at +0 m and reaching approximately 441,146 people at +2 m, indicating a substantial increase in exposure as groundwater levels respond to sea-level rise (Figure 6).

SSP1-2.6 Scenario (2020–2090)

Exposure grows relatively slowly, beginning at just over 302,495 people in 2020, increasing to around 322,649 by 2050, and reaching approximately 349,021 by 2090.

SSP2-4.5 Scenario (2020–2090)

Projected exposure rises more quickly to 326,070 people in 2050, and reaches 364,790 by 2090.

SSP3-7.0 Scenario (2020–2090)

Exposure shows an accelerating trend later this century, where 328,102 people exposed in 2020, increases to 378,420 by 2090.

SSP5-8.5 Scenario (2020–2090)

Exposure mid-century relative to SSP3-7.0 is slightly higher at 330,809 people in 2050, then rises to about 385,022 by 2090.

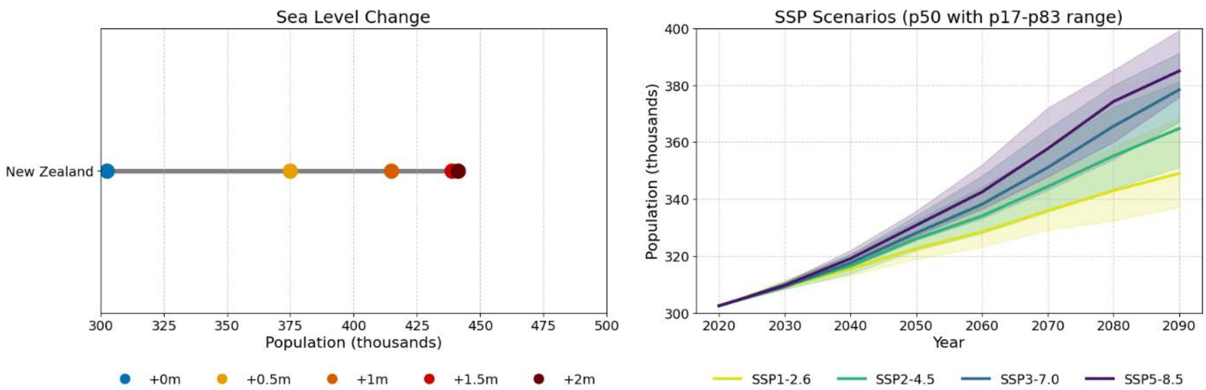

Figure 6: Projected A-NZ population exposure on coastal land with shallow groundwater presence under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Population values are rounded for presentation clarity.

Coastal erosion

Projected population exposure to coastal erosion at 2100:based on historic erosion trends

Population exposure to coastal erosion is low at the national scale based on available historic coastal erosion hazard trends. An estimated 1768 people reside on land that could be susceptible to erosion (Figure 7).

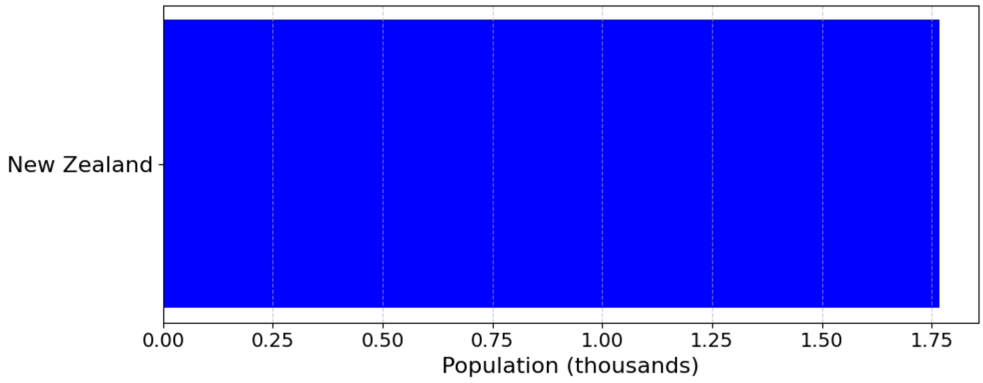

Figure 7: Projected exposure of A-NZ population to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Very Hot Days (≥30°C)

National exposure of population to very hot days remains dominated by the 0–10 day range across all SSP scenarios in 2020 and 2050, with totals consistently near 4.7–5.0 m people (Table 5). Under SSP1-2.6 and SSP2-4.5, this pattern persists through 2090, with negligible exposure beyond 10 days, indicating minimal change under low-emission pathways. In contrast, SSP3-7.0 and SSP5-8.5 show significant shifts by 2090, with SSP3-7.0 recording over 1.4M people in the 10–20 day range and 326,000 in the 20–30 day range, while SSP5-8.5 exhibits the most pronounced increase. Under SSP5-8.5 in 2090, exposure expands dramatically: 1.19M people remain in the 0–10 day range, but 2.58M shift to 10–20 days, 730,251 to 20–30 days, and 484,247 to 30–40 days, with smaller but notable counts beyond 40 days.

Table 5: National Summary of Population Exposure to Very Hot Days (≥30°C) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -10 days	-10 to 0 days	0 to 10 days	10 to 20 days	20 to 30 days	30 to 40 days	40 to 50 days	> 50 days
SSP1-2.6	2020	0	283,524	4,707,930	0	0	0	0	0
SSP1-2.6	2050	0	18,040	4,973,414	0	0	0	0	0
SSP1-2.6	2090	0	5906	4,985,548	0	0	0	0	0
SSP2-4.5	2020	0	132,652	4,858,802	0	0	0	0	0
SSP2-4.5	2050	0	4691	4,986,763	0	0	0	0	0
SSP2-4.5	2090	0	0	4,752,984	238,470	0	0	0	0
SSP3-7.0	2020	0	46,540	4,944,914	0	0	0	0	0
SSP3-7.0	2050	0	412	4,986,738	4304	0	0	0	0
SSP3-7.0	2090	0	0	3,219,258	1,446,204	325,992	0	0	0
SSP5-8.5	2020	0	108,773	4,882,681	0	0	0	0	0
SSP5-8.5	2050	0	2004	4,987,163	2287	0	0	0	0
SSP5-8.5	2090	0	0	1,190,739	2,581,929	730,251	484,247	4291	0

2.1.2 Buildings

Inland flooding

Temperature Change (+0°C to +3°C)

The number of buildings exposed to inland flooding increases steadily with warming, rising from just over 555,942 at +0°C to around 674,433 at +3°C, indicating higher exposure under more extreme temperature scenarios (Figure 8). Total inland flooding replacement value increases from about NZD 235B at +0°C to NZD 287B at +3°C, showing a clear upward trend with temperature warming.

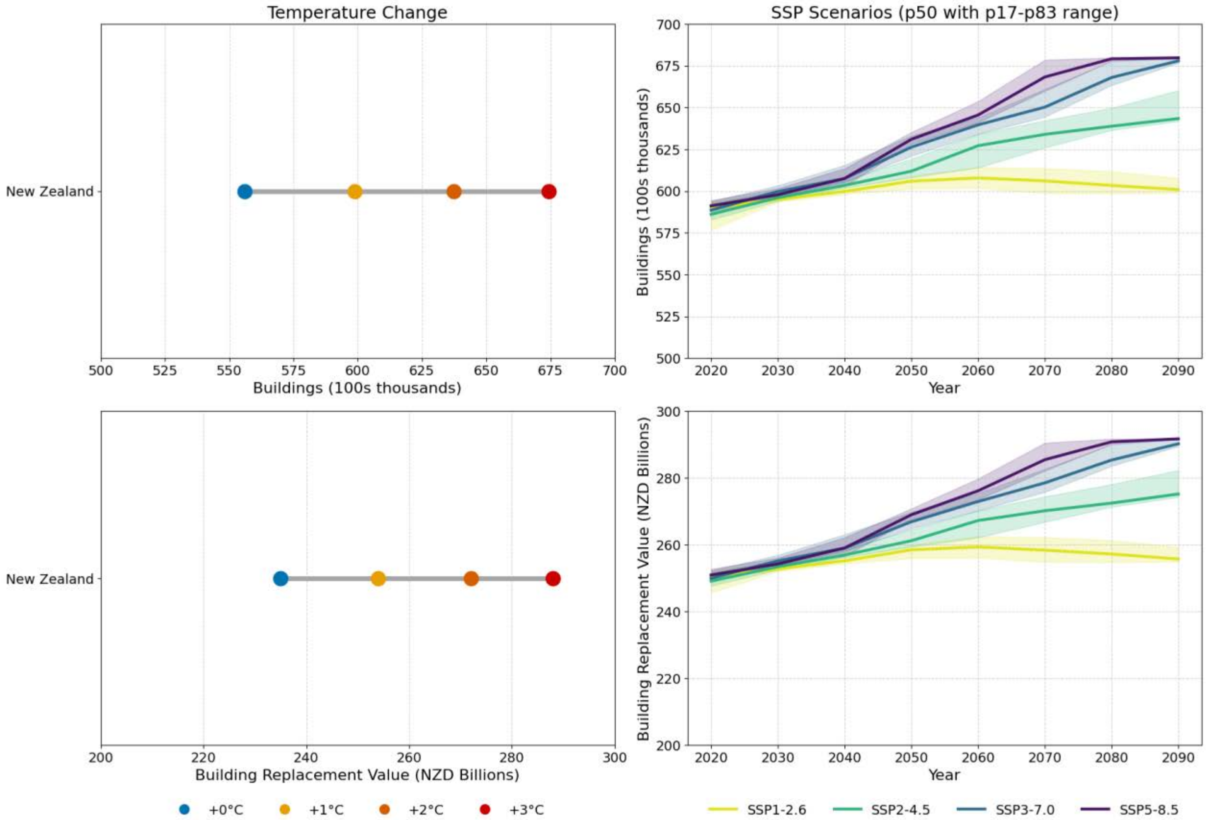

Figure 8; Projected exposure of A-NZ building and building replacement value (NZD) exposure to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure remains relatively stable under strong mitigation, starting at 589,825 buildings in 2020, increasing slightly to 605,945 by 2050, and then declining marginally to 600,913 by 2090, reflecting minimal change under low-emission futures. Replacement values remain relatively stable, starting near NZD 250B in 2020, increasing slightly to NZD 258B by 2050, and then declining slightly to NZD 255B by 2090.

SSP2-4.5 Scenario (2020–2090)

Projected building exposure grows moderately over time, reaching approximately 643,422 by 2090, reflecting gradual exposure escalation under a mid-range emissions future. Projected replacement values rise to NZD 275B by 2090, indicating moderate growth in value exposure under this emissions pathway.

SSP3-7.0 Scenario (2020–2090)
Exposure shows a stronger upward trend than SSP2-4.5, climbing to about 626,270 buildings by 2050, and reaching 677,947 by 2090, highlighting greater exposure of buildings under a high-emission development pathway. Replacement values show a stronger increase, starting near NZD 249B in 2020, climbing to NZD 266B by 2050 and NZD 290B by 2090.

SSP5-8.5 Scenario (2020–2090)
Similar trend to SSP3-7.0, with exposure increasing to 679,737 buildings by 2090, showing that even under high emissions, aggregate exposure remains comparable but slightly higher than SSP3-7.0. Similar trend to SSP3-7.0, starting at NZD 250B in 2020 but reaching NZD 291B by 2090, demonstrating that high-emission futures significantly amplify economic exposure.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Building exposure increases from 89,238 at +0°C warming to 206,296 at +3°C warming, while replacement value rises from around NZD 33B to NZD 83B, indicating strong sensitivity to warming and associated rainfall extremes (Figure 9).

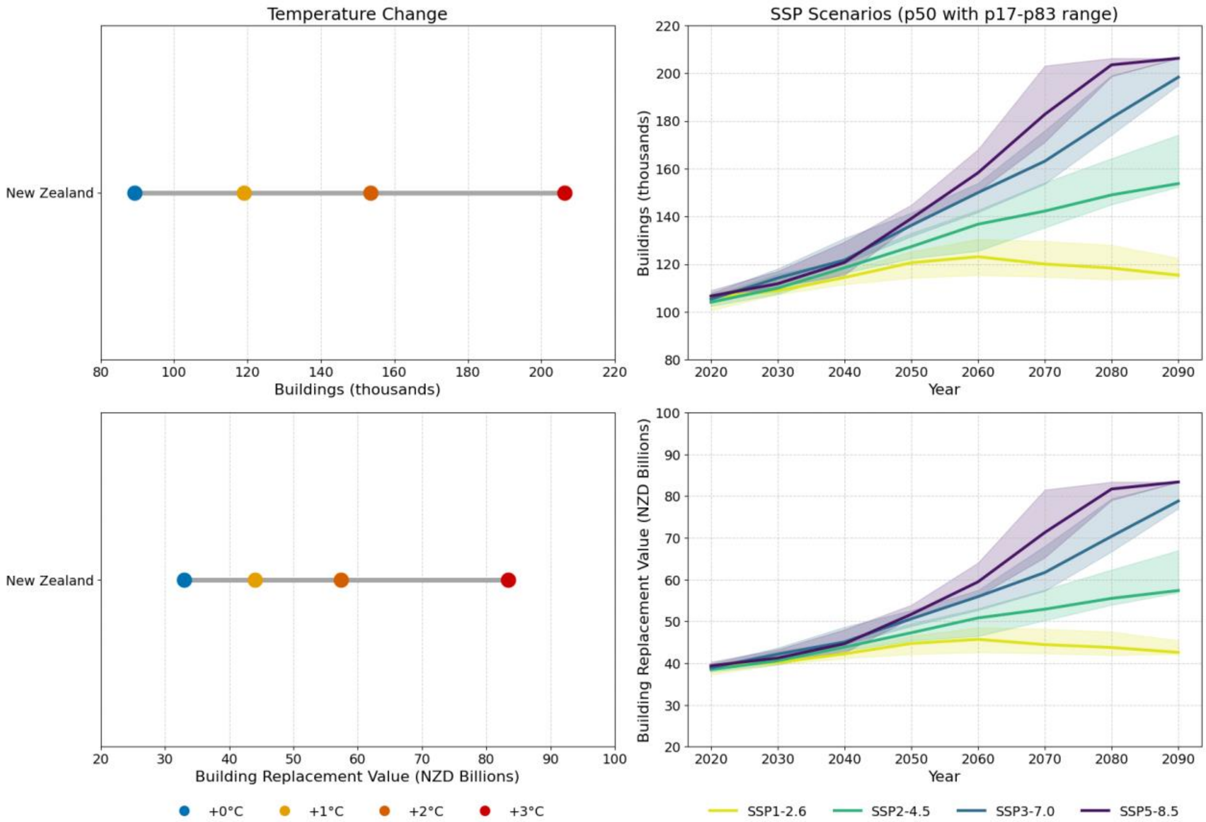

Figure 9: Projected exposure of A-NZ building and building replacement value (NZD) exposure to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Building exposure starts at 106,124 in 2020, peaking at 120,624 in 2050 and reduces slightly to around 115,395 at 2090.

SSP2-4.5 Scenario (2020–2090)

Exposure grows to 127,353 buildings in 2050 and 153,762 buildings in 2090, with replacement values of NZD 47B and NZD 57B, showing steady escalation under mid-range emissions.

SSP3-7.0 Scenario (2020–2090)

Exposure increases to 198,357 buildings by 2090, with replacement value reaching NZD 78B by 2090, highlighting greater exposure under high-emission conditions.

SSP5-8.5 Scenario (2020–2090)

Exposure reaches 206,268 buildings, and replacement value grows to NZD 83B by 2090, demonstrating the highest exposure and economic risk under extreme emissions.

Coastal flooding (extreme sea levels)

Sea-Level Change (+0 m to +2 m)

Building exposure to coastal flooding increases substantially with rising sea levels, starting at just over 32,698 buildings at +0 m and reaching 228,895 buildings at +2 m (Figure 10). Correspondingly, replacement value rises from around NZD 11B to nearly NZD 111B, indicating significant economic risk under higher sea-level rise conditions.

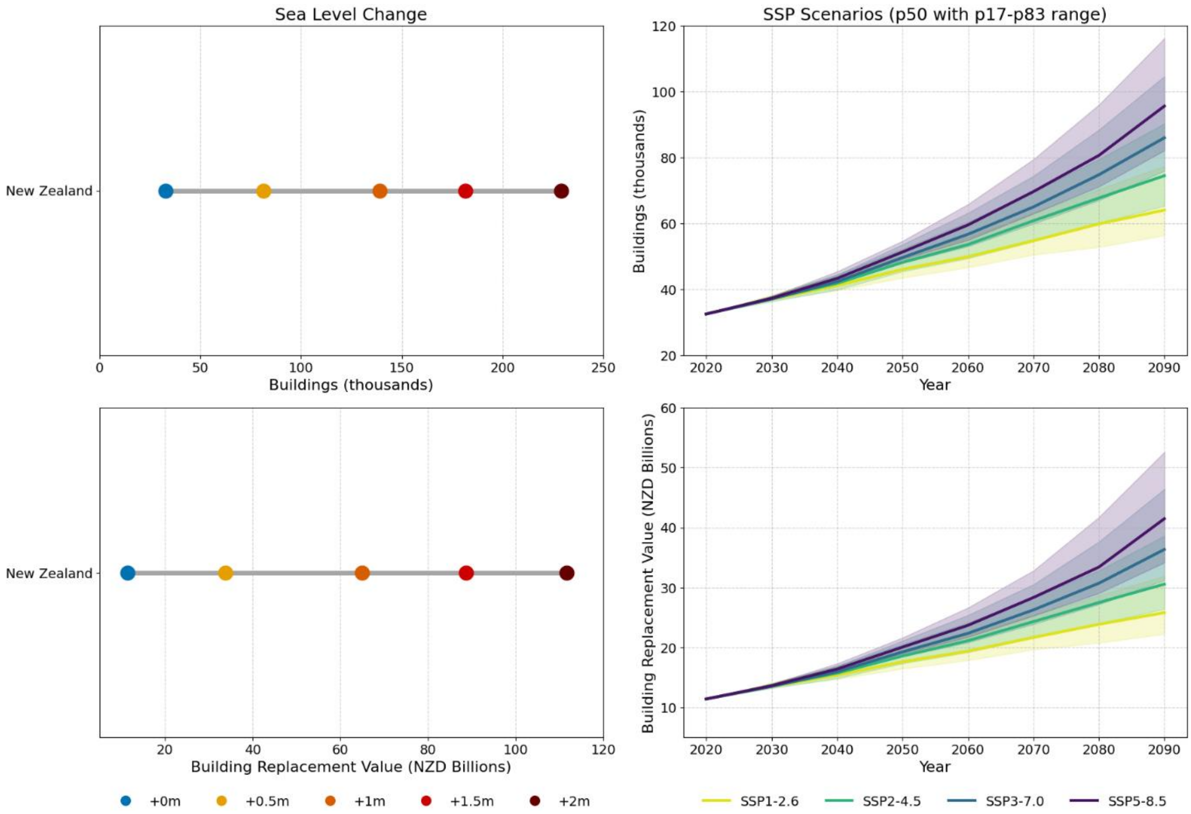

Figure 10: Projected exposure of A-NZ building and building replacement value (NZD) exposure to extreme sea level driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure grows slowly under strong mitigation, beginning at 32,577 buildings in 2020, increasing to 46,109 by 2050, and reaching 64,079 by 2090. Replacement value follows a similar trend, rising from NZD 17B in 2050 to NZD 25B by 2090, reflecting limited growth under low-emission futures.

SSP2-4.5 Scenario (2020–2090)

Exposure reaches 48,254 buildings in 2050, the rises to 74,507 by 2090. Replacement value also grows from NZD 18B to NZD 30B, indicating moderate escalation under mid-range emissions.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a similar trend to SSP2-4.5, reaching 49,696 buildings in 2050, climbing to about 86,010 by 2090, with replacement value reaching around NZD 36B in 2090.

SSP5-8.5 Scenario (2020–2090)

Exposure exhibits the largest increase, reaching approximately 95,618 buildings by 2090, and replacement value grows to nearly NZD 41B, demonstrating the highest exposure and economic risk under extreme emissions.

Coastal flooding (mean high water springs)

Sea-Level Change (+0 m to +2 m)

Building exposure to coastal flooding under mean high water springs increases significantly with rising sea levels. An estimated 1620 buildings could be exposed at +0 m, increasing to 27,750 buildings at +1 m and the increasing to 128,096 buildings at +2 m (Figure 11). Correspondingly, replacement value increases from NZD 1B +0 m to about NZD 73B +2 m, indicating substantial economic risk as sea-level rise intensifies.

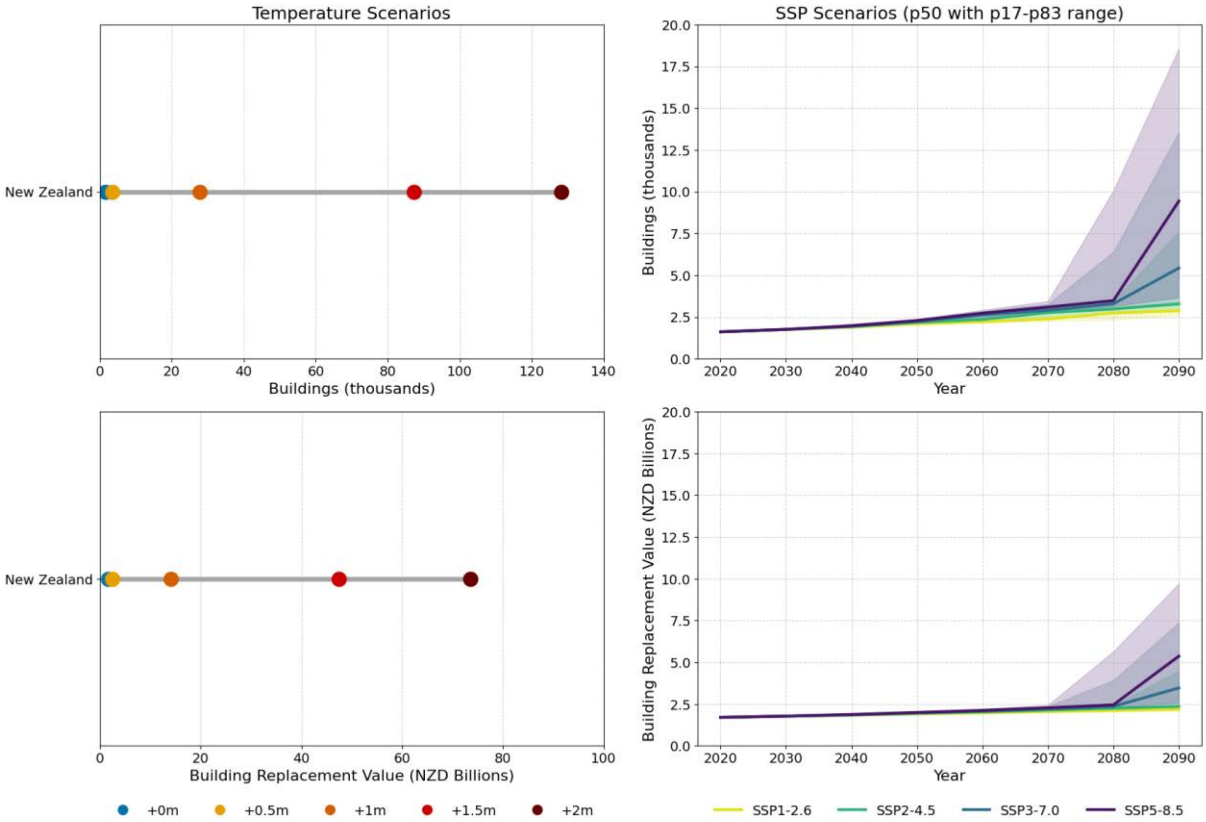

Figure 11: Projected exposure of A-NZ building and building replacement value (NZD) exposure to mean high water springs driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure remains negligible until late century, starting at 1615 buildings in 2020, and increasing to 2882 by 2090. Replacement value exposure over this period increases to 2B at 2090.

SSP2-4.5 Scenario (2020–2090)

Exposure grows gradually to 2181 in 2050 to 3284 buildings by 2090, while replacement value rises to just over NZD 2B at 2090.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend, reaching about 5431 buildings by 2090, with replacement value climbing to over NZD 3B, highlighting greater exposure under high-emission conditions.

SSP5-8.5 Scenario (2020–2090)

Exposure exhibits the largest increase, reaching 9440 buildings by 2090, and replacement value grows to over NZD 5B, demonstrating the highest exposure and economic risk under extreme emissions.

Shallow groundwater (coastal)

Sea-Level Change (+0 m to +2 m)

Building exposure on land with shallow groundwater presence increases steadily with rising sea levels, starting at about 204,385 buildings at +0 m and reaching approximately 296,977 buildings at +2 m (Figure 12). Correspondingly, replacement value rises from NZD 98B to NZD 140B.

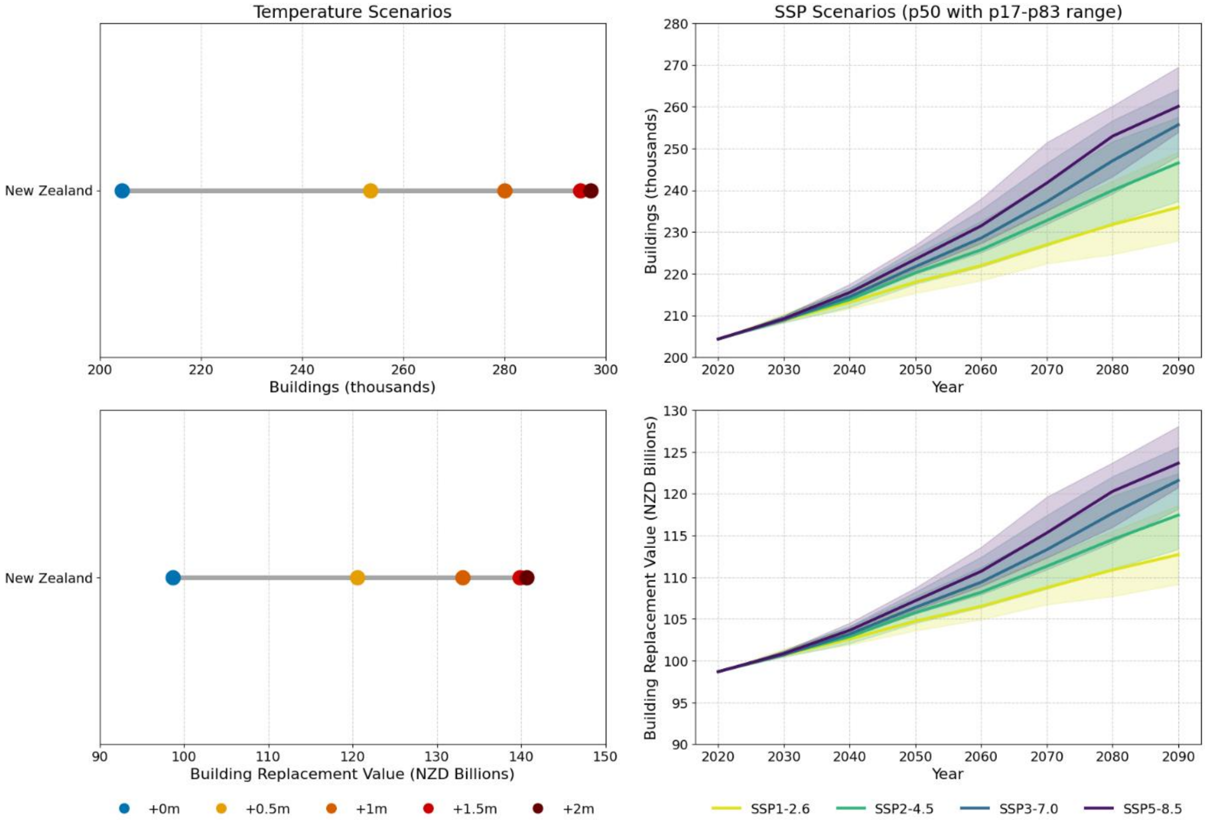

Figure 12: Projected exposure of A-NZ building and building replacement value (NZD) exposure on coastal land with shallow groundwater presence under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure grows slowly under strong mitigation, beginning near 204,000 buildings in 2020, increasing to 218,000 by 2050, and reaching approximately 235,000 by 2090. Replacement value follows a similar trend, rising from NZD 98B to around NZD 112B, reflecting limited growth under low-emission futures.

SSP2-4.5 Scenario (2020–2090)

Exposure rises steadily from 220,000 buildings in 2050 to 246,000 by 2090, while replacement value grows from NZD 105B to approximately NZD 117B, indicating moderate escalation under mid-range emissions.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend, starting near 210,000 buildings in 2020, climbing to about 270,000 by 2090, with replacement value reaching around NZD 130B, highlighting greater exposure under high-emission conditions.

SSP5-8.5 Scenario (2020–2090)
Exposure exhibits the largest increase, reaching approximately 280,000 buildings by 2090, and replacement value grows to nearly NZD 140B, demonstrating the highest exposure and economic risk under extreme emissions.

Coastal erosion

Projected building exposure to coastal erosion at 2100 based on historic erosion trends

Based on historic coastal erosion trends, projected building exposure to 2100 remains relatively low compared to other coastal hazards. An estimated 3484 buildings are identified as being at risk from erosion-prone areas by 2100 (Figure 13). The corresponding building replacement value is around NZD 1.2B, indicating that while the number of exposed buildings is small at the national scale, the economic implications for affected properties are significant. This projection assumes continuation of historic erosion rates and does not incorporate potential acceleration due to future climate change or sea-level rise, meaning actual exposure could be higher under more dynamic coastal processes.

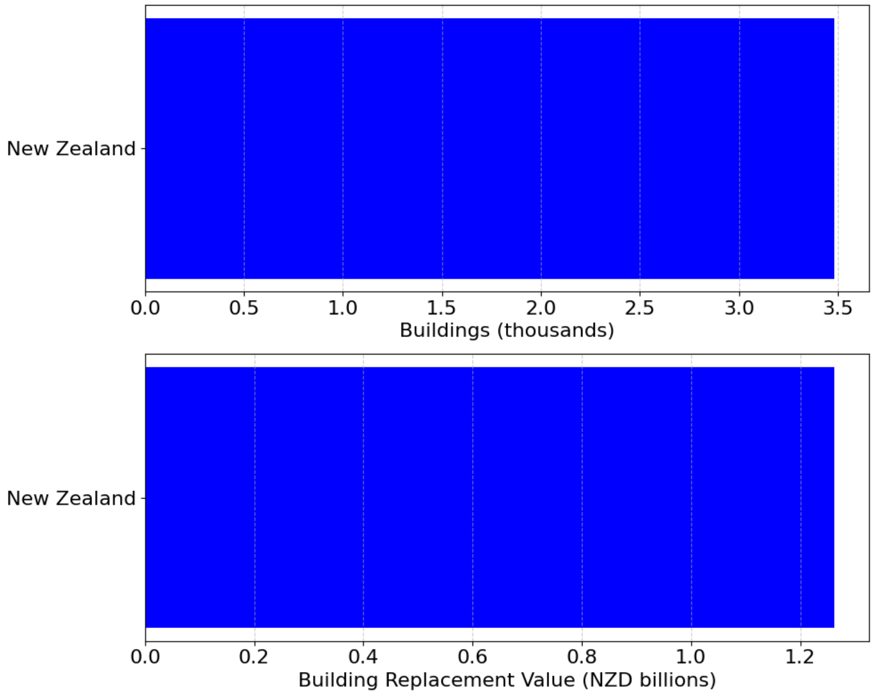

Figure 13: Projected exposure of A-NZ buildings and building replacement value (NZD) to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Extreme Winds

Exposure of buildings to extreme wind shows relatively stable patterns across SSP scenarios in 2020 and 2050, with most exposure concentrated in the -5 to 0 and 0 to 5 change ranges, indicating minimal shifts in wind hazard intensity for the majority of buildings (Table 6) . By 2090, however, high-emission pathways such as SSP5-8.5 exhibit notable increases in exposure to higher wind change ranges. While the majority of buildings remain in the baseline ranges, although 165,466 buildings appearing in the 5 to 10 and >10 change ranges, signalling localised intensification of wind hazards under severe climate scenarios. Low-emission pathways (SSP1-2.6 and SSP2-4.5) maintain near-baseline exposure throughout the century.

Table 6: National Summary of Building Exposure to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5% to 0%	0% to 5%	5% to 10%	>10%
SSP1-2.6	2020	0	0	0	0	666,425	2,764,618	0	0
SSP1-2.6	2050	0	0	0	13	831,950	2,599,080	0	0
SSP1-2.6	2090	0	0	0	7	891,909	2,539,127	0	0
SSP2-4.5	2020	0	0	0	0	799,225	2,631,818	0	0
SSP2-4.5	2050	0	0	0	51	1,802,226	1,628,766	0	0
SSP2-4.5	2090	0	0	3	306	2,231,226	1,199,508	0	0
SSP3-7.0	2020	0	0	0	0	2,282,201	1,148,842	0	0
SSP3-7.0	2050	0	0	0	79	996,104	2,434,860	0	0
SSP3-7.0	2090	0	0	152	211	2,200,551	1,230,129	0	0
SSP5-8.5	2020	0	0	0	13	913,812	2,517,218	0	0
SSP5-8.5	2050	0	0	0	250	1,938,762	1,492,031	0	0
SSP5-8.5	2090	0	14	146	198	2,026,217	1,239,002	165,466	0

Very Hot Days (≥30°C)

Building exposure to changes in very hot days remains concentrated in the 0–10 day range for 2020 and 2050, with totals exceeding several hundred thousand buildings nationally and minimal exposure in higher ranges. By 2090, however, the distribution shifts markedly under higher-emission pathways. For SSP5-8.5, exposure expands dramatically, with 612,535 buildings in the 20–30 day range, and 342,088 buildings in the 30–40 day range (Table 7). SSP3-7.0 shows a similar but less pronounced trend, with exposure reaching 247,315 buildings in the 10–20 day range by 2090. In contrast, SSP1-2.6 and SSP2-4.5 remain relatively stable, with exposure largely confined to the 0–10 day range throughout the century.

Table 7: National Summary of Building Exposure to Very Hot Days (≥30°C) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	<-10 days	-10 to 0 days	0 to 10 days	10 to 20 days	20 to 30 days	30 to 40 days	40 to 50 days	>50 days
SSP1-2.6	2020	0	208,242	3,222,801	0	0	0	0	0
SSP1-2.6	2050	0	12,766	3,418,277	0	0	0	0	0
SSP1-2.6	2090	0	8381	3,422,662	0	0	0	0	0
SSP2-4.5	2020	0	115,734	3,315,309	0	0	0	0	0
SSP2-4.5	2050	0	9545	3,421,498	0	0	0	0	0
SSP2-4.5	2090	0	30	3,245,682	185,331	0	0	0	0
SSP3-7.0	2020	0	55,030	3,376,013	0	0	0	0	0
SSP3-7.0	2050	0	1090	3,425,178	4775	0	0	0	0
SSP3-7.0	2090	0	26	2,083,445	1,100,257	247,315	0	0	0
SSP5-8.5	2020	0	101,151	3,329,892	0	0	0	0	0
SSP5-8.5	2050	0	5193	3,420,202	5,648	0	0	0	0
SSP5-8.5	2090	0	0	910,815	1,561,988	612,535	342,088	3617	0

2.1.3 Transport (roads, railways airports (incl. aerodromes))

Inland flooding

Temperature Change (+0°C to +3°C)

Road exposure increases from 26,831 km at +0°C warming to 30,775 km at +3°C warming, indicating a steady rise with increasing temperature (Figure 14). Railway exposure grows from 688 km to 837 km across this temperature range. Airport exposure remains relatively constant with 76 airports and aerodromes, showing minimal sensitivity to temperature change due to pluvial flooding exposure.

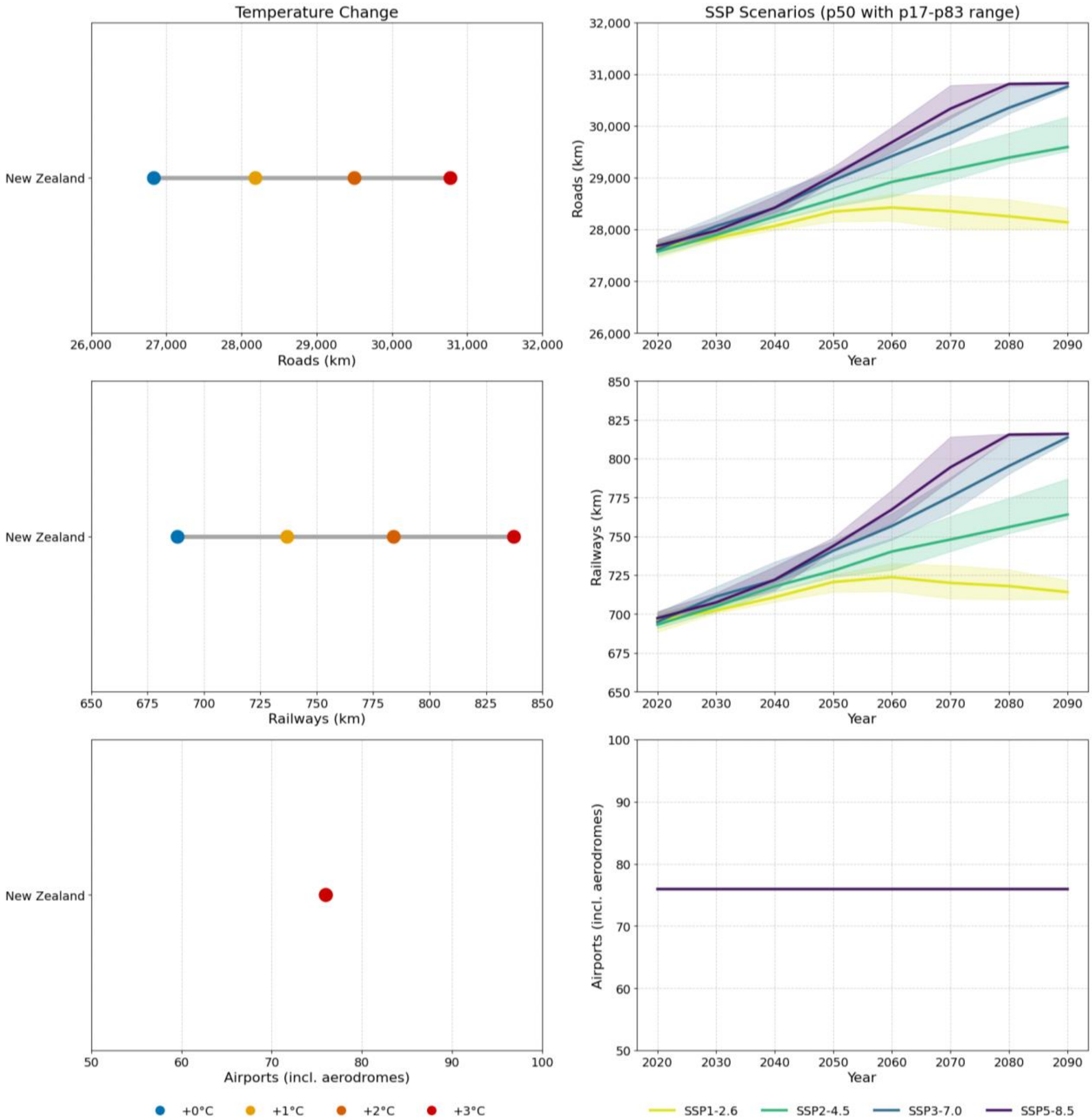

Figure 14: Projected exposure of A-NZ transport infrastructure to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Road exposure is just over 27,640 km in 2020, increasing slightly to 28,347 km by 2050, and reduces slightly to 28,139 km by 2090. Railway exposure follows a similar pattern, rising slightly from 696 km to 714km by 2090, while airports and aerodromes exposure remains at 76 under all SSP scenarios due to pluvial flooding exposure.

SSP2-4.5 Scenario (2020–2090)
Road exposure increases to 29,593 km by 2090, and railway exposure rises to 764 km, indicating gradual escalation under mid-range emissions.

SSP3-7.0 Scenario (2020–2090)
Road exposure reaches 30,760 km by 2090, while railway exposure climbs to 814 km, highlighting greater vulnerability under high-emission conditions.

SSP5-8.5 Scenario (2020–2090)
Road exposure increases slightly higher to 30,825 km by 2090, and railway exposure grows to about 816 km, demonstrating the highest exposure under extreme emissions.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Road exposure increases with increasing temperature from 10,174 km at +0°C to 18,083 km at +3°C, indicating a strong sensitivity to warming and associated rainfall extremes (Figure 15). Railway exposure rises from around 173 km to 341 km, while airport and aerodrome exposure remains very low, increasing slightly from 3 to 4 sites across the temperature range.

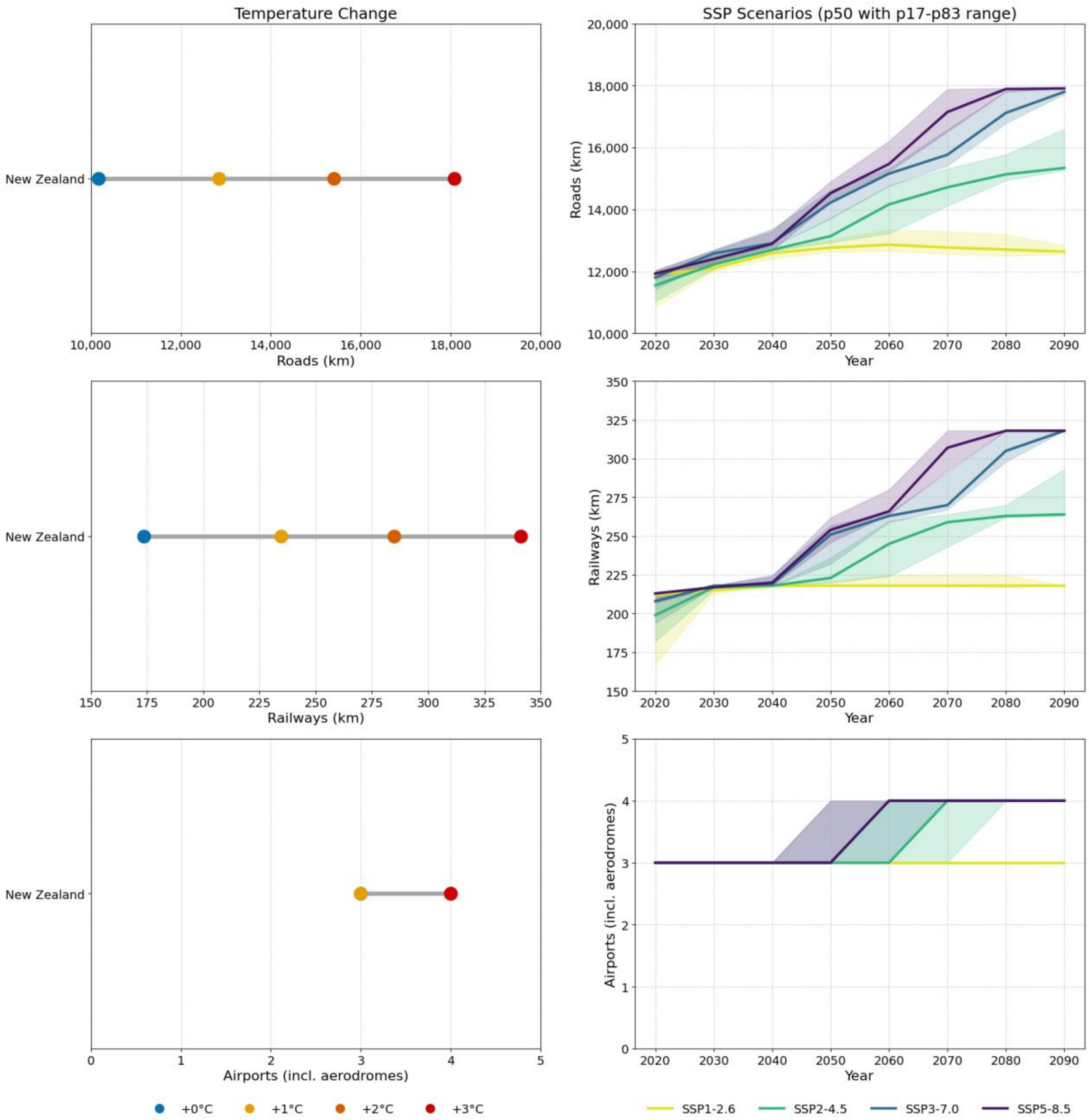

Figure 15: Projected exposure of A-NZ transport infrastructure to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Exposure remains relatively stable under strong mitigation, with roads increasing modestly from 11,893 km in 2020 to 12,639 km by 2090, and railways rising from 212 km to 218 km. Airports and aerodrome exposure reaches 4 sites by 2090.

SSP2-4.5 Scenario (2020–2090)
Road exposure grows steadily to 15,341 km by 2090, and railway exposure to 264 km. Airport and aerodrome site exposure by 2090 remains unchanged relative to lower SSP scenarios.

SSP3-7.0 Scenario (2020–2090)
Road exposure shows a stronger upward trend, reaching 17,796 km by 2090, while railway exposure increases to 318 km. Airport and aerodrome site exposure by 2090 remains unchanged relative to lower SSP scenarios.

SSP5-8.5 Scenario (2020–2090)
Road exposure reaches 17,909 km by 2090, and railway exposure reaches 318 km. Airport and aerodrome site exposure by 2090 remains unchanged relative to lower SSP scenarios.

Coastal flooding (extreme sea levels)

Sea level Change (+0 m to +2 m)

Road exposure to coastal flooding increases sharply with rising sea levels, starting at about 1286 km at +0 m and reaching 5605 km at +2 m, indicating significant exposure of road networks to extreme sea-level rise (Figure 16). Railway exposure grows from around 10 km at +0 m to 419 km at +2 m, while airport and aerodrome exposure rises from 12 to 18, showing these sites are increasingly at risk under higher sea-level conditions.

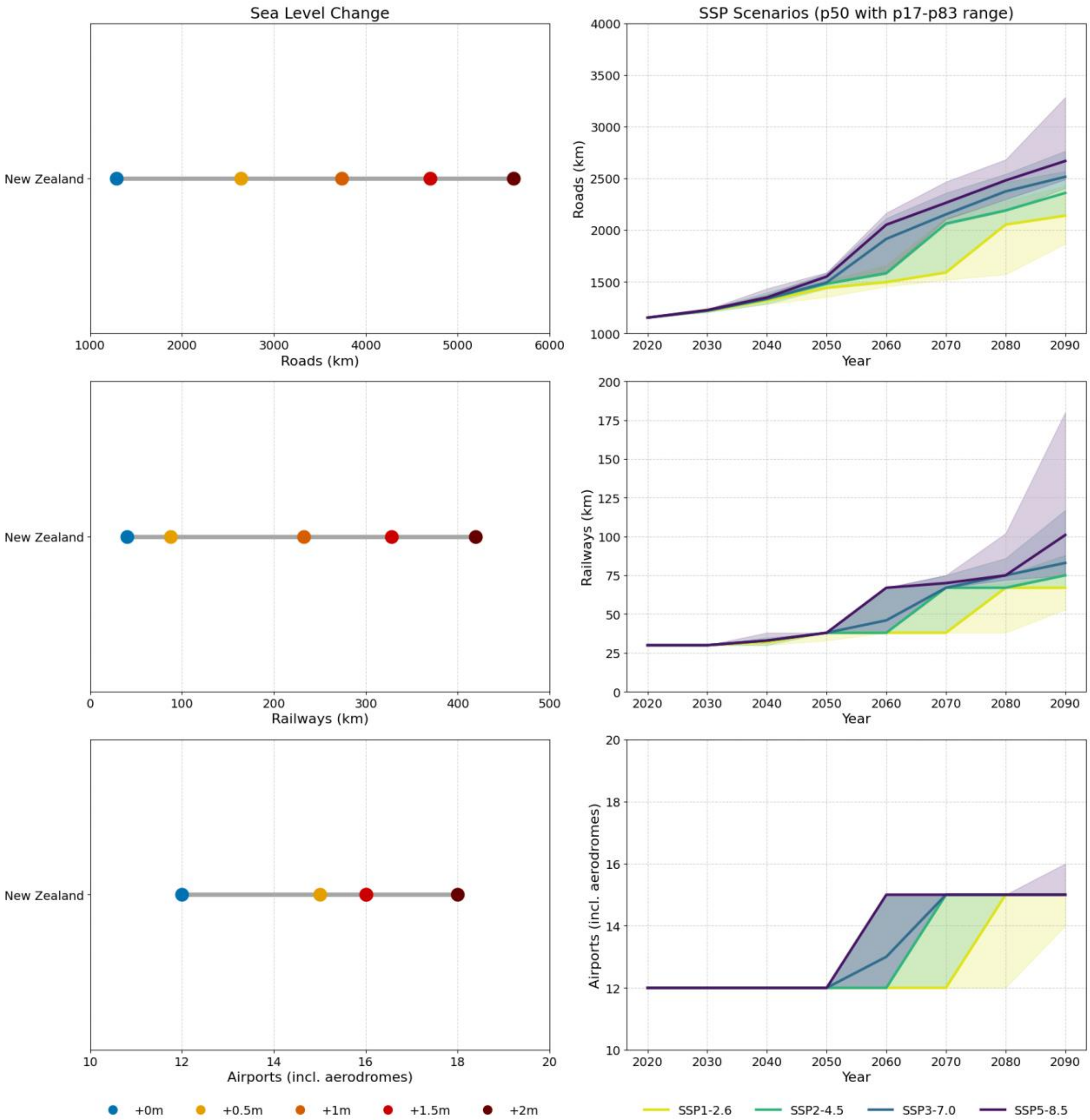

Figure 16: Projected exposure of A-NZ transport infrastructure to extreme sea level driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Exposure remains relatively low under strong mitigation, with roads increasing just over 1150 km in 2020 to 2130 km by 2090, while railways rising from 30 km to 67 km over this period, and airport and aerodrome exposure increase from 12 to 15.

SSP2-4.5 Scenario (2020–2090)
Road exposure grows steadily from 1200 km to about 2,500 km by 2090, and railway exposure rises to 100 km. Airport and aerodrome exposure increases from 12 to 15 by 2070.

SSP3-7.0 Scenario (2020–2090)
Road exposure shows an upward trend, reaching approximately 3,000 km by 2090, while railway exposure climbs to 150 km. Airport and aerodrome exposure increases from 12 to 15 by 2070.

SSP5-8.5 Scenario (2020–2090)
Road exposure exhibits the largest increase, reaching nearly 3,500 km by 2090, railway exposure grows to about 175 km. Airport and aerodrome exposure increases from 12 to 15 by 2060.

Coastal flooding (mean high water springs)

Sea level Change (+0 m to +2 m)

Road exposure to coastal flooding under mean high water springs increases significantly with rising sea levels, starting near 77 km at +0 m and reaching just over 3096 km at +2 m (Figure 17). Railway exposure grows from 5 km at +0 m to about 252 km at +2 m , while airport and aerodrome exposure reaches 14 at +2 m.

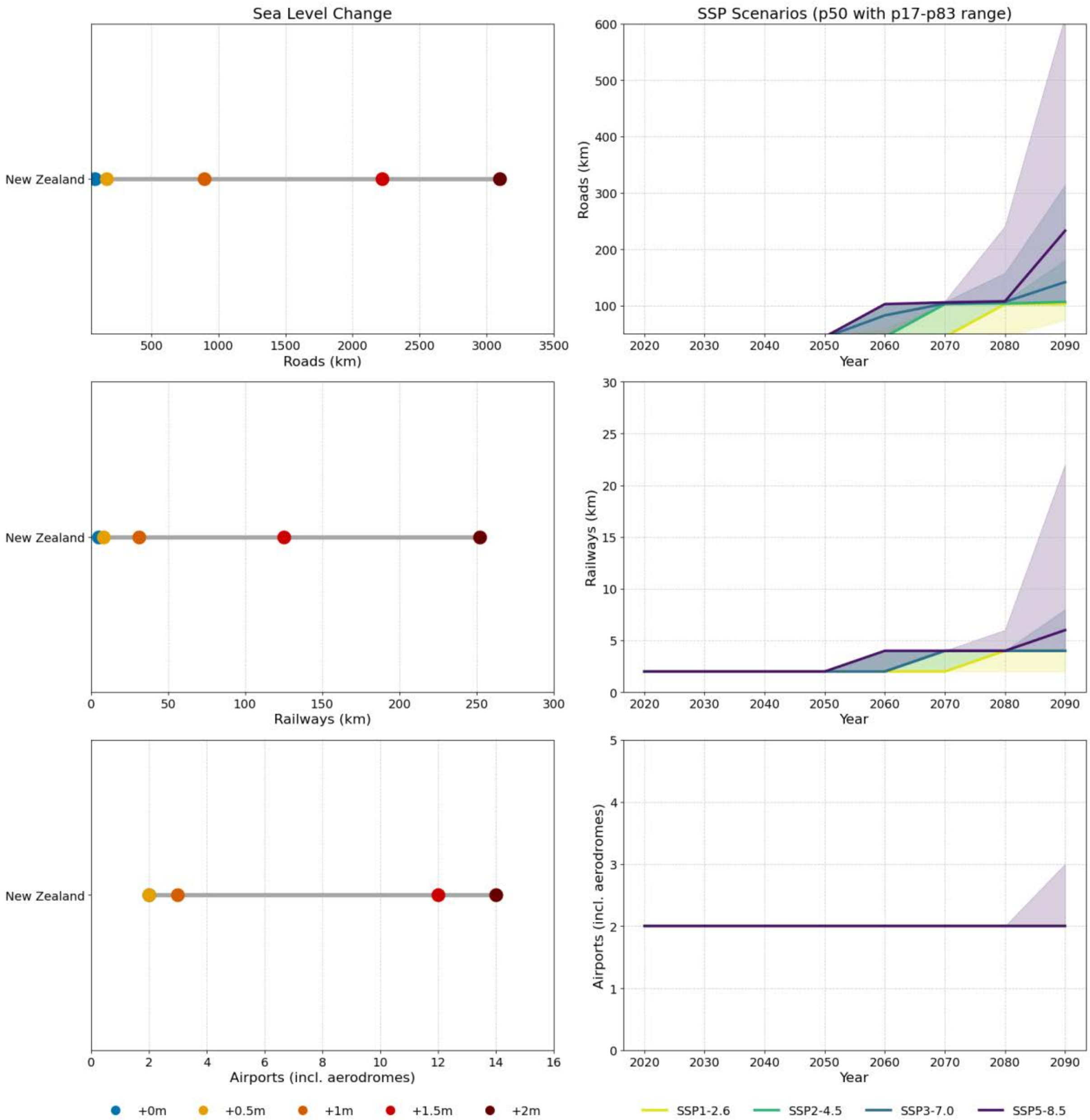

Figure 17: Projected exposure of A-NZ transport infrastructure to mean high water springs driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Exposure accelerates later this century, increasing from 44 km in 2050 to 103 km by 2090. Railway exposure reaches 4 km by 2090, and airport and aerodrome exposure reaches 2 by 2090.

SSP2-4.5 Scenario (2020–2090)
Road exposure grows gradually 107 km by 2090, and railway exposure reaches 4 km, while airport and aerodrome exposure remains at 2 by 2090.

SSP3-7.0 Scenario (2020–2090)
Road exposure shows a stronger upward trend, reaching approximately 142 km by 2090, while railway exposure reaches 4 km, and airport and aerodrome exposure remains at 2 by 2090.

SSP5-8.5 Scenario (2020–2090)
Road exposure exhibits the largest increase, reaching 233 km by 2090, railway exposure reaches 6 km, and airport and aerodrome exposure remains at 2 by 2090.

Shallow groundwater (coastal)

Sea level Change (+0 m to +2 m)

Road exposure to shallow groundwater in coastal areas increases steadily with rising sea levels, starting at about 3485 km at +0 m and reaching 5284 km at +2 m (Figure 18). Railway exposure grows from 161 km at +0 m to 268 km +2 m, and airport and aerodrome exposure increases slightly from 16 at +0 m to 19 at +2 m.

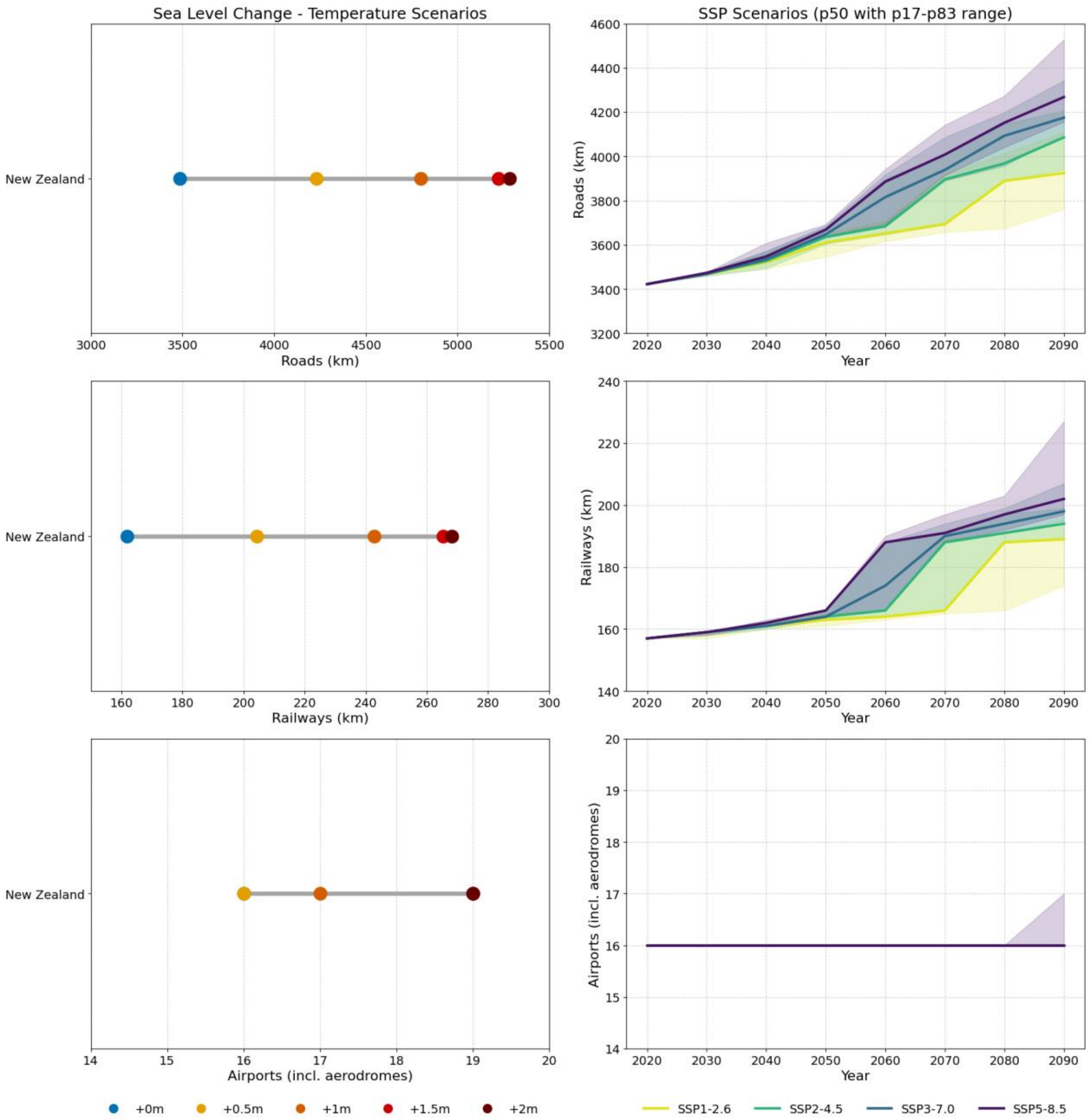

Figure 18: Projected exposure of A-NZ transport infrastructure on coastal land with shallow groundwater presence under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Exposure grows slowly under strong mitigation, with roads increasing from 3423km in 2020 to about 3925 km by 2090, railways rising from 157 km in 2020 to 189 km by 2090, and airport and aerodrome exposure remains at from 16 over the century.

SSP2-4.5 Scenario (2020–2090)
Road exposure rises steadily from 3636 km at 2050 to just 4086 km by 2090, and railway exposure increases to 194 km, while airport and aerodrome exposure remains at from 16 over the century.

SSP3-7.0 Scenario (2020–2090)
Road exposure shows a stronger upward trend, reaching 4175 km by 2090, while railway exposure reaches 198 km, and airport and aerodrome exposure remains at from 16 over the century.

SSP5-8.5 Scenario (2020–2090)
Road exposure exhibits the largest increase, reaching nearly 4268 km by 2090, railway exposure increases 202 km, and airport and aerodrome exposure remains at 16 over the century.

Coastal erosion

Projected transport exposure to coastal erosion at 2100 based on historic erosion trends

Projected exposure of transport infrastructure to coastal erosion by 2100 is relatively low compared to flooding hazards but still significant for localized impacts (Figure 19). Approximately 126 km of roads are identified as being located on erosion exposed land, along with 3.6 km of railway and 4 airports or aerodromes.

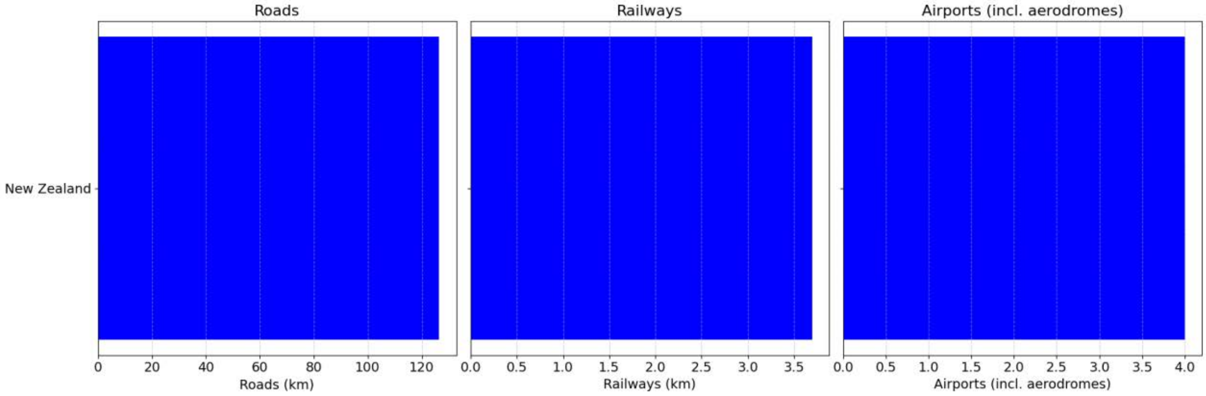

Figure 19: Projected exposure of A-NZ transport infrastructure to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Extreme Winds

Exposure of roads to extreme wind remains concentrated in the -5% to 0% and 0% to 5% change ranges across all SSP scenarios in 2020 and 2050, indicating minimal shifts in wind hazard intensity for most transport infrastructure (Table 8). By 2090, high-emission pathways such as SSP5-8.5 show modest increases in exposure to higher ranges, with 14,767 km of roads appearing in the 5% to 10% change ranges. Low-emission scenarios (SSP1-2.6 and SSP2-4.5) maintain near-baseline exposure throughout the century

Table 8: National Summary of Road Exposure (km) to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0% to 5%	5% to 10%	>10%
SSP1-2.6	2020	0	0	0	0	35,452	107,149	0	0
SSP1-2.6	2050	0	0	0	0	34,924	107,677	0	0
SSP1-2.6	2090	0	0	0	6	40,090	102,505	0	0
SSP2-4.5	2020	0	0	0	0	38,230	104,371	0	0
SSP2-4.5	2050	0	0	0	2	68,484	74,114	0	0
SSP2-4.5	2090	0	0	0	85	79,992	62,524	0	0
SSP3-7.0	2020	0	0	0	0	82,893	59,708	0	0
SSP3-7.0	2050	0	0	0	15	50,835	91,751	0	0
SSP3-7.0	2090	0	0	25	94	77,898	64,583	0	0
SSP5-8.5	2020	0	0	0	6	46,980	95,614	0	0
SSP5-8.5	2050	0	0	0	56	65,370	77,175	0	0
SSP5-8.5	2090	0	0	25	86	69,433	58,289	14,767	0

Railway exposure to wind changes remains relatively stable across scenarios, with only minor shifts over time. Under SSP1-2.6, exposure in the 0–5% range grows slightly from 3707 km in 2020 to 4090 km in 2050, then declines to 3934 km by 2090, with no exposure in the 5–10% range (Table 9). SSP2-4.5 shows a sharper decline, dropping from 3915 km in 2020 to 2419 km in 2050 and 1995 km in 2090. SSP3-7.0 peaks mid-century at 3278 km before falling to 2092 km by 2090. Under SSP5-8.5, exposure decreases from 3364 km in 2020 to 2668 km in 2050, then 2195 km in 2090, with 310 km exposed in the 5–10% range by 2090.

Table 9: National Summary of Railway Exposure (km) to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0%to 5%	5%to 10%	>10%
SSP1-2.6	2020	0	0	0	0	1255	3707	0	0
SSP1-2.6	2050	0	0	0	0	872	4090	0	0
SSP1-2.6	2090	0	0	0	0	1028	3934	0	0
SSP2-4.5	2020	0	0	0	0	1047	3915	0	0
SSP2-4.5	2050	0	0	0	0	2543	2419	0	0
SSP2-4.5	2090	0	0	0	0	2967	1995	0	0
SSP3-7.0	2020	0	0	0	0	3235	1727	0	0
SSP3-7.0	2050	0	0	0	0	1684	3278	0	0
SSP3-7.0	2090	0	0	0	0	2870	2092	0	0
SSP5-8.5	2020	0	0	0	0	1598	3364	0	0
SSP5-8.5	2050	0	0	0	0	2294	2668	0	0
SSP5-8.5	2090	0	0	0	0	2457	2195	310	0

Very Hot Days (≥30°C)

Exposure of roads to very hot days remains almost entirely within the 0–10 day range for all SSP scenarios in 2020 and 2050 (Table 10). By 2090, however, high-emission pathways show notable shifts. Under SSP5-8.5, exposure expands beyond the baseline, with 53,776 km in the 10–20 day range, 27,105 km in the 20–30 day range, and 8904 km beyond 30 days, indicating significant vulnerability of transport networks under extreme warming. SSP3-7.0 shows similar but less pronounced changes, with exposure reaching 7049 km in the 20–30 day range. In contrast, SSP1-2.6 and SSP2-4.5 remain stable, with exposure confined to the 0–10 day range throughout the century.

Table 10: National Summary of Road Exposure (km) to Very Hot Days (≥30°C) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -10 days	-10 to 0 days	0 to 10 days	10 to 20 days	20 to 30 days	30 to 40 days	40 to 50 days	>50 days
SSP1-2.6	2020	0	7084	135,521	0	0	0	0	0
SSP1-2.6	2050	0	499	142,102	0	0	0	0	0
SSP1-2.6	2090	0	618	141,980	0	0	0	0	0
SSP2-4.5	2020	0	6243	136,359	0	0	0	0	0
SSP2-4.5	2050	0	828	141,774	0	0	0	0	0
SSP2-4.5	2090	0	6	135,768	6828	0	0	0	0
SSP3-7.0	2020	0	2708	139,894	0	0	0	0	0
SSP3-7.0	2050	0	90	142,201	309	0	0	0	0
SSP3-7.0	2090	0	6	93,094	42,452	7049	0	0	0
SSP5-8.5	2020	0	4575	138,025	0	0	0	0	0
SSP5-8.5	2050	0	318	141,807	477	0	0	0	0
SSP5-8.5	2090	0	0	52,736	53,776	27,105	8904	81	0

Railway exposure follows a similar pattern to roads, remaining concentrated in the 0–10 day range for 2020 and 2050 across all SSPs (Table 11). By 2090, high-emission scenarios drive substantial increases in exposure to longer durations of extreme heat. Under SSP5-8.5, exposure reaches 1576 km in the 10–20 day range, 1009 km in the 20–30 day range, and 490 km in the 30–40 day range. SSP3-7.0 also shows significant change, with 1428 km in the 10–20 day range and 361 km in the 20–30 day range by 2090. Low-emission pathways (SSP1-2.6 and SSP2-4.5) remain largely unchanged over the century.

Table 11: National Summary of Railway Exposure (km) to Very Hot Days (≥30°C) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	<-10 days	-10 to 0 days	0 to 10 days	10 to 20 days	20 to 30 days	30 to 40 days	40 to 50 days	>50 days
SSP1-2.6	2020	0	355	4606	0	0	0	0	0
SSP1-2.6	2050	0	18	4943	0	0	0	0	0
SSP1-2.6	2090	0	36	4926	0	0	0	0	0
SSP2-4.5	2020	0	277	4685	0	0	0	0	0
SSP2-4.5	2050	0	12	4950	0	0	0	0	0
SSP2-4.5	2090	0	0	4643	320	0	0	0	0
SSP3-7.0	2020	0	117	4844	0	0	0	0	0
SSP3-7.0	2050	0	0	4962	0	0	0	0	0
SSP3-7.0	2090	0	0	3176	1428	361	0	0	0
SSP5-8.5	2020	0	164	4797	0	0	0	0	0
SSP5-8.5	2050	0	19	4927	15	0	0	0	0
SSP5-8.5	2090	0	0	1873	1576	1009	490	15	0

2.1.4 Electricity (transmission lines, structures and sites)

Inland flooding

Temperature Change (+0°C to +3°C)

Exposure of electricity transmission infrastructure to inland flooding increases steadily with warming. Transmission lines increase from 1225 km at +0°C to approximately 1362 km at +3°C, while structures increase from around 3820 to 4473 (Figure 20). Sites show a notable rise from 46 at +0°C to 62 at +3°C.

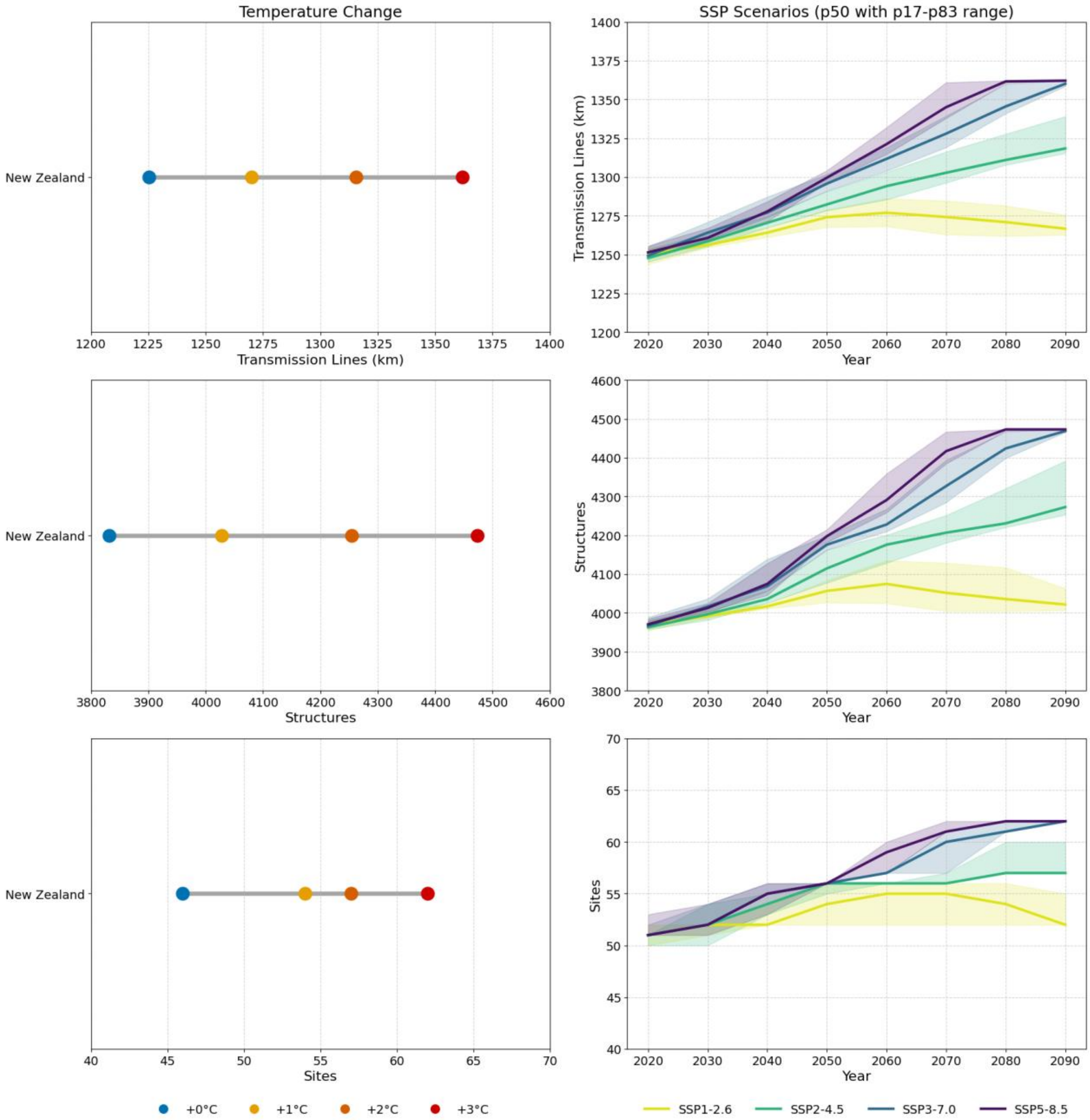

Figure 20: Projected exposure of A-NZ national grid electricity infrastructure components to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Exposure remains relatively stable under strong mitigation, with transmission lines increasing modestly from 1250 km in 2020 to 1266 km by 2090, structures rising from 3970 in 2020 to 4022 by 2090, and sites remaining at just over 50 exposed during this period.

SSP2-4.5 Scenario (2020–2090)
Exposure grows moderately, with transmission lines reaching about 1318 km by 2090, structures increasing to 4273, and sites rising to 57.

SSP3-7.0 Scenario (2020–2090)
Exposure shows a stronger upward trend, with transmission lines climbing to 1360 km by 2090, structures reaching 4469, and sites increasing to 62.

SSP5-8.5 Scenario (2020–2090)
Exposure exhibits the largest increase, with transmission lines increasingly slightly 1362 km, structures reaching 4473, and sites remaining unchanged at 62.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Exposure of electricity transmission infrastructure to rainfall-induced landslides increases significantly with warming. Transmission line exposures grow from 576 km at +0°C to 1262 km at +3°C warming, while exposure of structures increase from around 1298 to 2957 (Figure 21). Sites show a smaller but notable rise in exposure, from 3 at +0°C to 10 at +3°C .

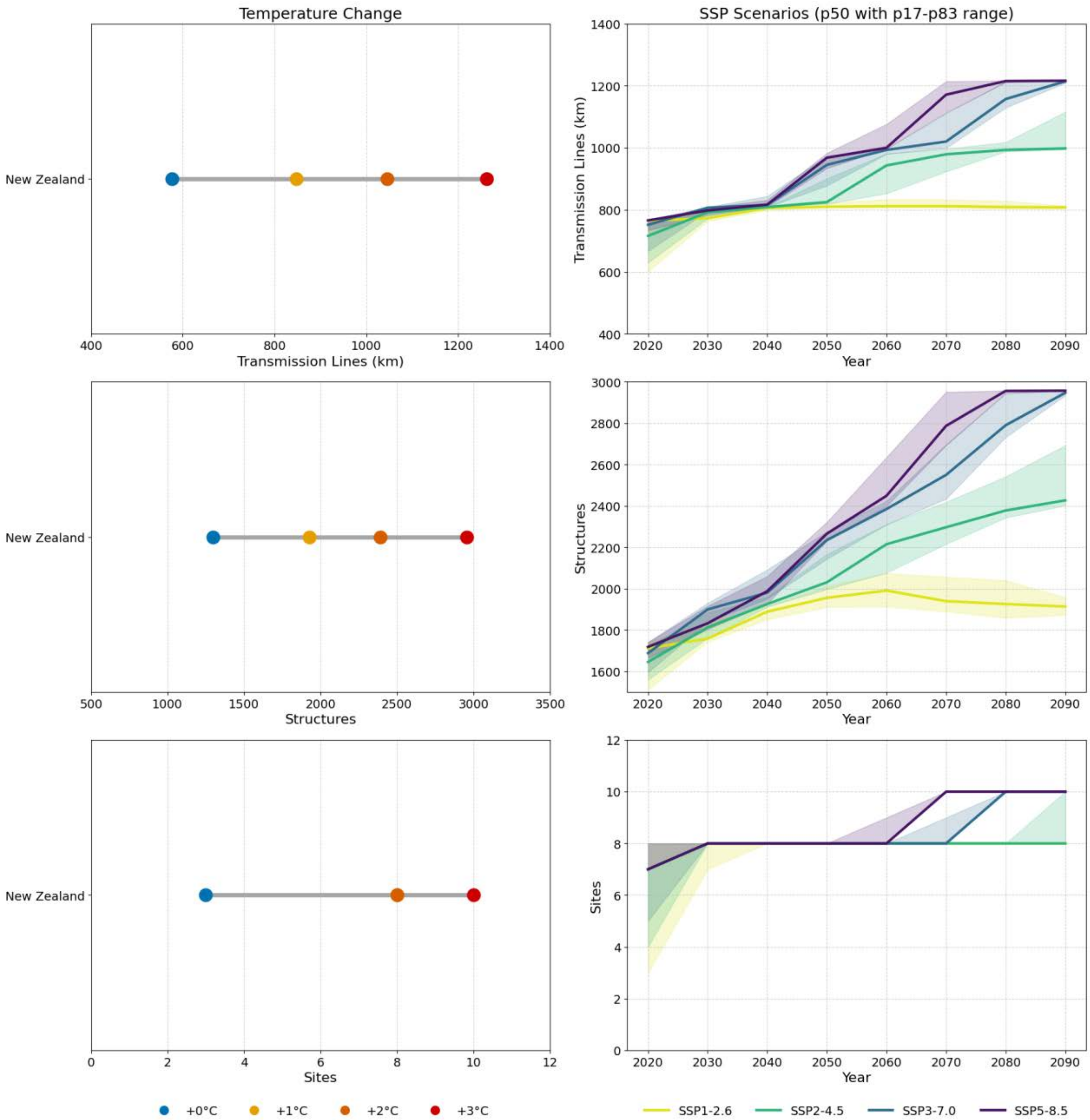

Figure 21: Projected exposure of A-NZ national grid electricity infrastructure components to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)

Transmission line exposure increases modestly from 765 km in 2020 to 808 km by 2090, while structures increase from 1712 to 1914, and sites reach 8 at this time.

SSP2-4.5 Scenario (2020–2090)

Transmission line exposure reaches 998 km by 2090, while structures increase from 1646 to 2427, and 8 sites are exposed.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend, with transmission lines climbing to 1214 km by 2090, while structures reach 2947, and sites increase to 10.

SSP5-8.5 Scenario (2020–2090)

Exposure exhibits a minor increase on SSP3-7.0, with transmission lines reaching 1216 km, structures remain unchanged at 2957, and sites also remain at 10.

Coastal flooding (extreme sea levels)

Sea level Change (+0 m to +2 m)

Transmission line exposure nearly doubles from 46 km at +0 m to 90 km at +1 m, the reaches 133 km at +2 m, while structures increase from 68 to 397 (Figure 22). Sites exposure increases from 0 at +0 m to 7 at +2 m.

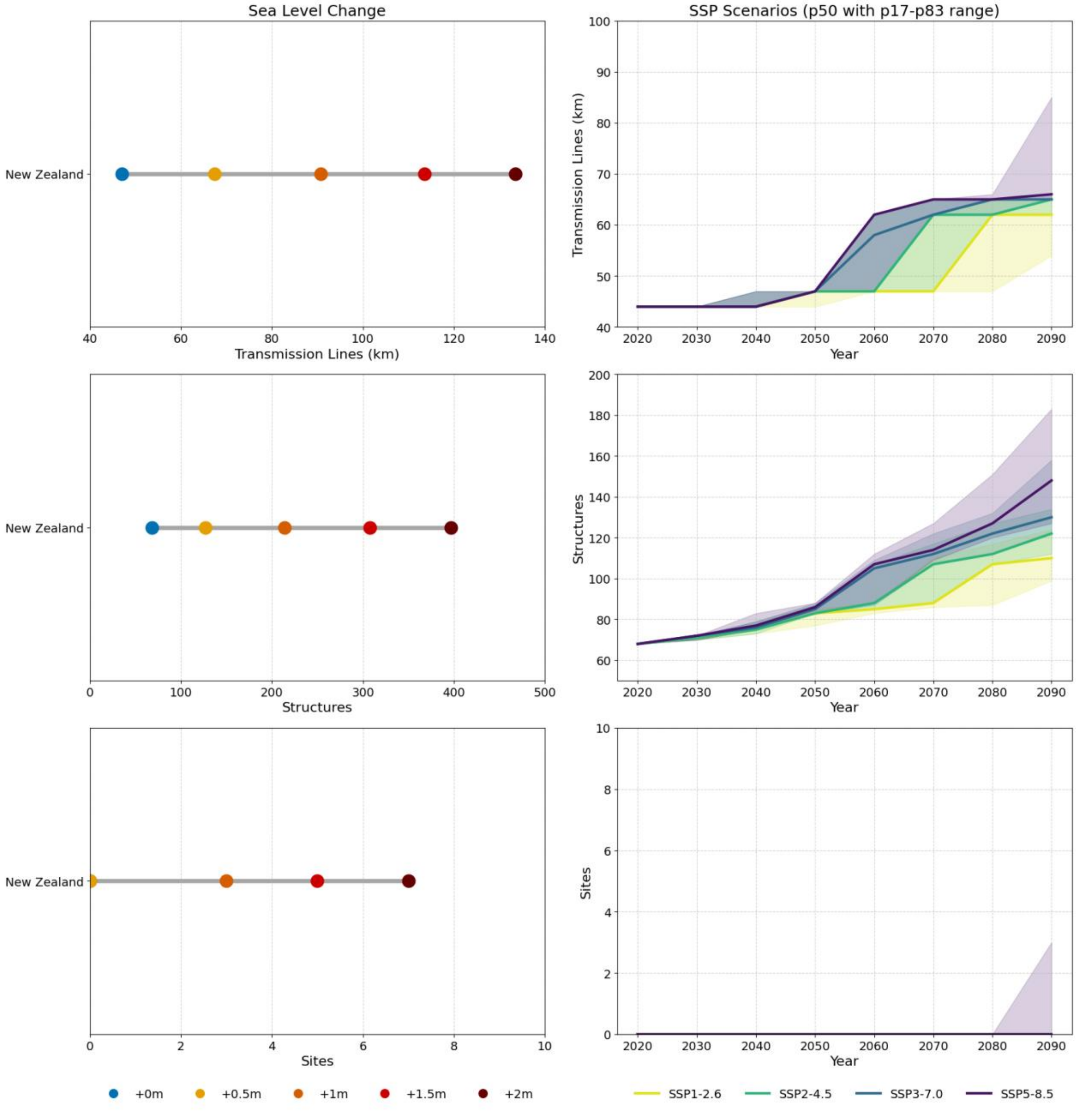

Figure 22: Projected exposure of A-NZ national grid electricity infrastructure components to extreme sea level driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Transmission line exposure increasing modestly from 44 km in 2020 to 62 km by 2090, structures rising from 68 to 110, while no sites are identified as exposed by 2090.

SSP2-4.5 Scenario (2020–2090)
Exposure increases slightly, with transmission lines reaching 65 km by 2090, while structures increases to 122. No sites are identified as exposed.

SSP3-7.0 Scenario (2020–2090)
Transmission line exposure remains at 65 km at 2090, while structures reach 130, while no sites are identified as exposed.

SSP5-8.5 Scenario (2020–2090)
Transmission line exposure increase is minor, reaching 66 km at 2090, structures reaching 148, while up to 3 sites could be exposed by 2090 under 83rd percentile projections.

Coastal flooding (mean high water springs)

Sea level Change (+0 m to +2 m)

Exposure of electricity transmission infrastructure to coastal flooding from Mean High Water Springs (MHWS) increases with rising sea levels, though overall exposure remains relatively modest compared to more extreme coastal flooding scenarios. Transmission line exposure increases from 21 km at +0 m to 74 km at +2 m, while structures increase from 10 at +0 m to 174 at +2 m (Figure 23). Site exposure reaches 4 at +2 m.

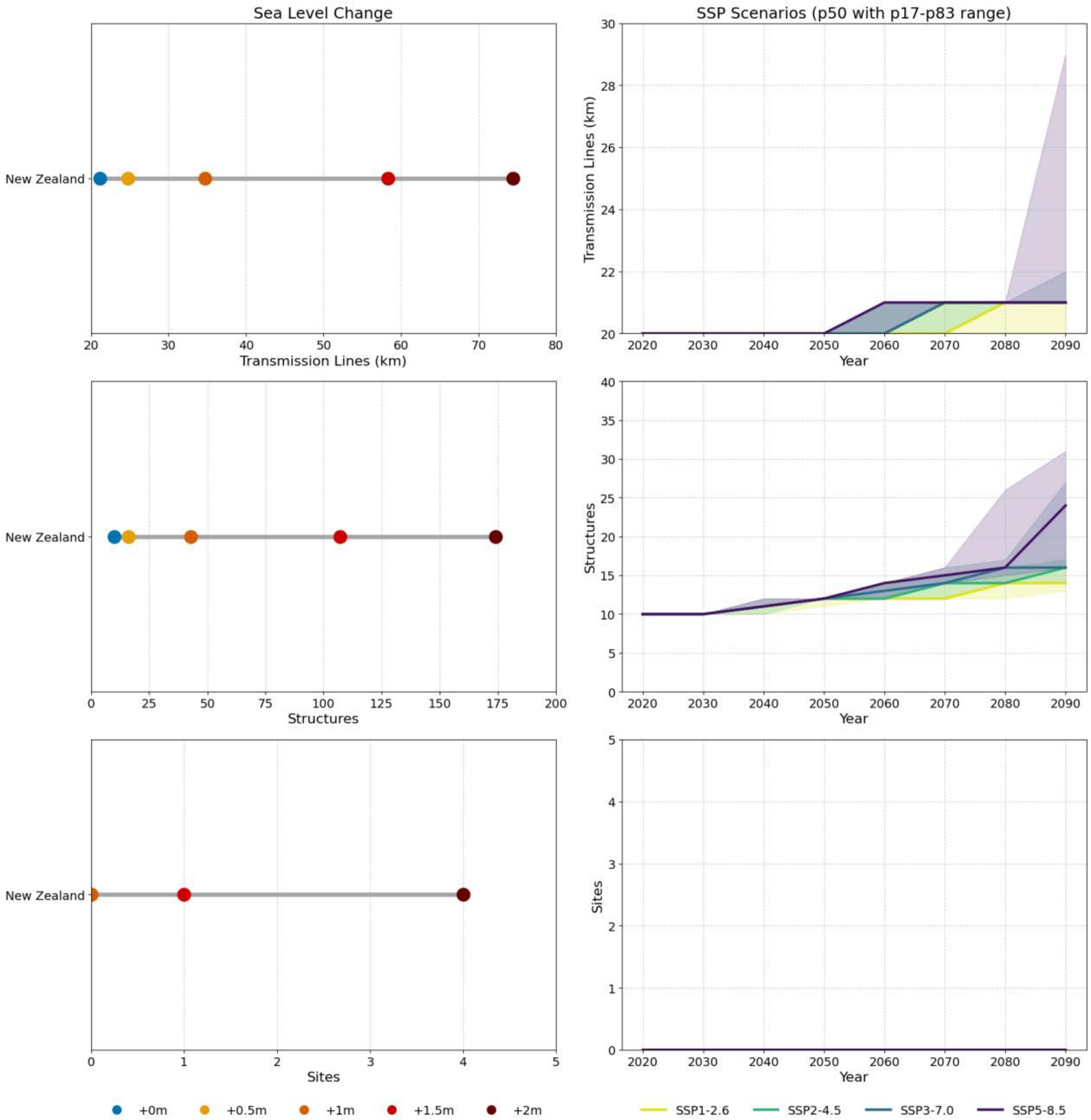

Figure 23: Projected exposure of A-NZ national grid electricity infrastructure components to mean high water springs driven coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Transmission lines increase slightly from 20 km in 2020 to 21 km by 2090, while structures reach 14 by 2090. No sites are identified as exposed by 2090.

SSP2-4.5 Scenario (2020–2090)
Transmission lines relative to SSP1-2.6 remain unchanged at 21 km by 2090, while structures increase slightly to 16, and no sites are identified as exposed by 2090.

SSP3-7.0 Scenario (2020–2090)
Transmission lines and structures exposure remains unchanged at 21 km and 16 by 2090, while no sites are identified as exposed.

SSP5-8.5 Scenario (2020–2090)
Transmission lines exposure remains unchanged at 21 km by 2090, while structures increase slightly to 24, with no sites are identified as exposed.

Shallow groundwater (coastal)

Sea level Change (+0 m to +2 m)

Exposure of electricity transmission infrastructure on land with shallow groundwater presence is already substantial and increases slightly with sea-level rise. Transmission line exposure increases from about 97 km at +0 m to 157 km at +2 m, while structures increase from 438 to 703 (Figure 24). Sites increase from 7 at +0 m to 9 at + 2m.

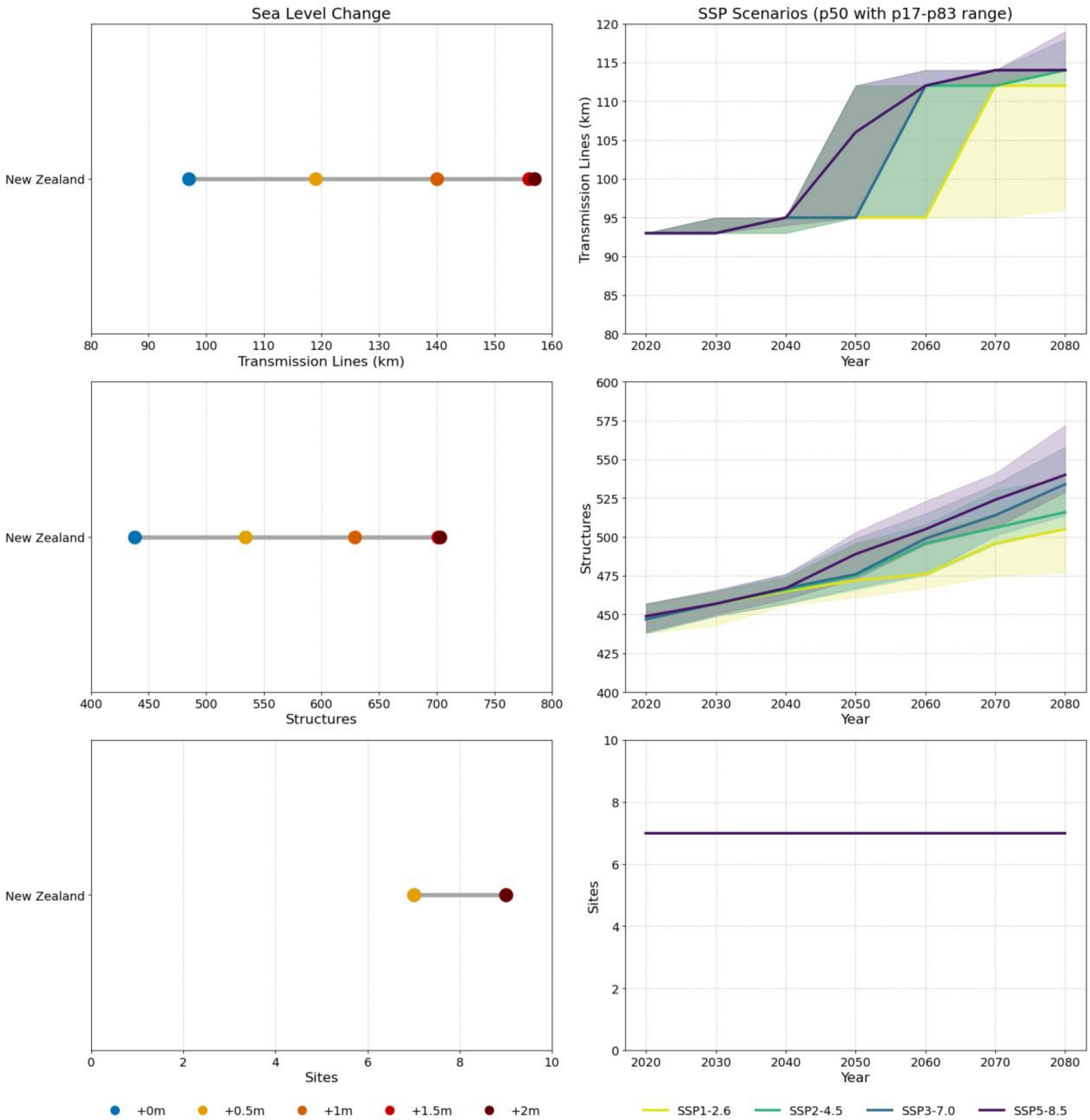

Figure 24: Projected exposure of A-NZ national grid electricity infrastructure components on coastal land with shallow groundwater presence under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Transmission line exposure increases modestly from 93 km in 2020 to 112 km by 2090, structures rising from 438 to 502, and sites remain at 7 from 2020 to 2090.

SSP2-4.5 Scenario (2020–2090)
Transmission line exposure increases slightly to 114 km by 2090, structures increasing to 522, and sites remain at 7 from 2020 to 2090.

SSP3-7.0 Scenario (2020–2090)
Transmission line exposure remains at 114 km by 2090, structures increasing to 539, and sites remain at 7 from 2020 to 2090.

SSP5-8.5 Scenario (2020–2090)
Transmission line exposure increases slightly to 117 km by 2090, structures reach 556, and sites remain at 7 from 2020 to 2090.

Coastal erosion

No hazard-exposed transmission lines, structures or sites were identified in the coastal erosion areas used in this study.

Climate processes

Extreme Winds
Exposure of transmission lines to wind changes shows mixed trends across SSP scenarios. Under SSP1-2.6, exposure in the 0–5% range rises from 8406 km in 2020 to 9256 km in 2050, then declines to 8633 km by 2090, with no exposure in the 5–10% range (Table 12). SSP2-4.5 drops sharply from 8786 km in 2020 to 5965 km in 2050 and 4855 km in 2090. SSP3-7.0 peaks mid-century at 7211 km before falling to 5131 km by 2090. Under SSP5-8.5, exposure decreases from 7771 km in 2020 to 6436 km in 2050, then 4610 km in 2090, with 1655 km entering the 5–10% range by 2090.

Table 12: National Summary of National Grid Electricity Transmission Line Exposure (km) to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0%to 5%	5%to 10%	>10%
SSP1-2.6	2020	0	0	0	0	2701	8406	0	0
SSP1-2.6	2050	0	0	0	0	1851	9256	0	0
SSP1-2.6	2090	0	0	0	0	2474	8632	0	0
SSP2-4.5	2020	0	0	0	0	2321	8786	0	0
SSP2-4.5	2050	0	0	0	0	5141	5965	0	0
SSP2-4.5	2090	0	0	0	6	6245	4855	0	0
SSP3-7.0	2020	0	0	0	0	6558	4549	0	0
SSP3-7.0	2050	0	0	0	0	3895	7211	0	0
SSP3-7.0	2090	0	0	0	6	5970	5131	0	0
SSP5-8.5	2020	0	0	0	0	3336	7771	0	0
SSP5-8.5	2050	0	0	0	6	4665	6436	0	0
SSP5-8.5	2090	0	0	0	6	4835	4610	1655	0

Wind exposure for structures shows similar patterns but with larger absolute numbers. Under SSP1-2.6, exposure in the 0–5% range grows from 28,544 structures in 2020 to 31,746 in 2050, then declines to 29,298 by 2090, with no exposure in the 5–10% range (Table 13). SSP2-4.5 falls from 29,177 structures in 2020 to 21,052 in 2050 and 17,388 in 2090. SSP3-7.0 peaks at 24,683 structures in 2050 before dropping to 18,480 by 2090. Under SSP5-8.5, exposure decreases from 27,058 structures in 2020 to 22,565 in 2050, then 16,679 in 2090, with 5233 structures entering the 5–10% range by late century.

Table 13: National Summary of National Grid Electricity Structures to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0%to 5%	5%to 10%	>10%
SSP1-2.6	2020	0	0	0	0	9432	28,544	0	0
SSP1-2.6	2050	0	0	0	0	6230	31,746	0	0
SSP1-2.6	2090	0	0	0	0	8678	29,298	0	0
SSP2-4.5	2020	0	0	0	0	8799	29,177	0	0
SSP2-4.5	2050	0	0	0	0	16,924	21,052	0	0
SSP2-4.5	2090	0	0	0	35	20,553	17,388	0	0
SSP3-7.0	2020	0	0	0	0	21,814	16,162	0	0
SSP3-7.0	2050	0	0	0	0	13,293	24,683	0	0
SSP3-7.0	2090	0	0	0	35	19,461	18,480	0	0
SSP5-8.5	2020	0	0	0	0	10,918	27,058	0	0
SSP5-8.5	2050	0	0	0	21	15,390	22,565	0	0
SSP5-8.5	2090	0	0	0	35	16,029	16,679	5233	0

2.1.5 Water (potable water, stormwater, wastewater)

Inland flooding

Temperature Change (+0°C to +3°C)

Exposure of water infrastructure nodes and pipelines to inland flooding increases steadily with warming. Potable water nodes grow from 638,912 at +0°C to approximately 727,080 at +3°C warming, wastewater nodes rise from around 215,000 to 247,000, and stormwater nodes increase from 410,819 to just over 450,618 (Figure 25). Pipeline exposure also expands, with potable water pipelines increasing from nearly 17,959 km to 20,198 km, wastewater pipelines from 633 km to 1800 km, and stormwater pipelines from 545 km to 1548 km (Figure 26).

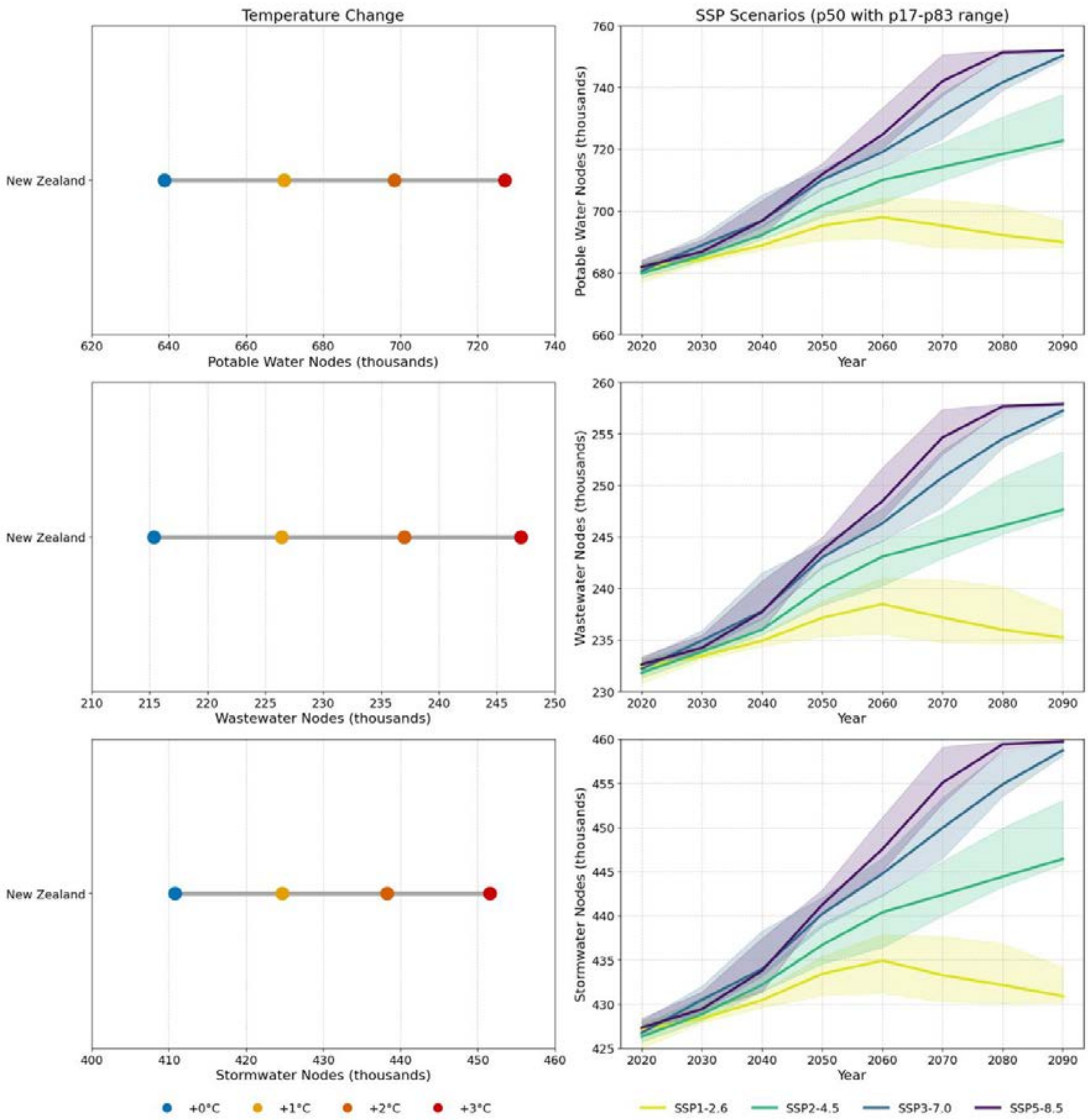

Figure 25: Projected exposure of A-NZ water infrastructure nodes to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Water node values are rounded for presentation clarity.

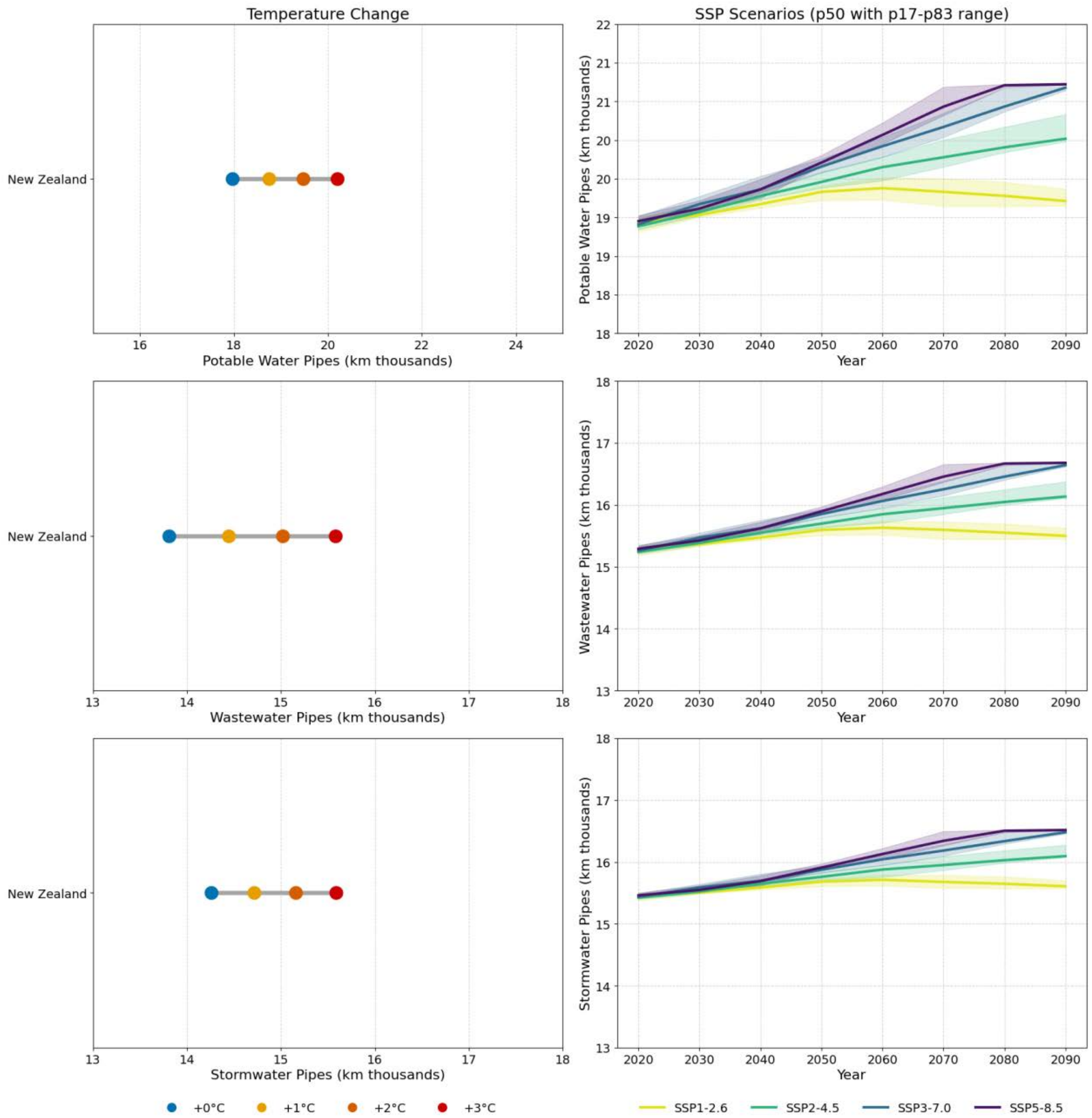

Figure 26: Projected exposure of A-NZ's water infrastructure pipelines to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Water pipe values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)
Exposure remains relatively low under strong mitigation, with potable water nodes increasing modestly from 680,355 in 2020 to 689,927 by 2090, wastewater nodes rising from 232,387 to 235,230, and stormwater nodes from 427,122 to 430,894. Pipeline exposure also shows minimal change, with potable water pipelines reaching 19,712 km, wastewater pipelines 15,269 km, and stormwater pipelines 15,607 km by 2090.

SSP2-4.5 Scenario (2020–2090)
Exposure grows steadily, with potable water nodes reaching about 722,766, wastewater nodes increasing to 247,635, and stormwater nodes rising to 446,414 by 2090. Pipeline exposure shows moderate increases by 2090, where potable water pipelines exceed 20,517 km, wastewater pipelines at 16,135 km, and stormwater pipelines at 16,095 km.

SSP3-7.0 Scenario (2020–2090)
Potable water node exposure by 2090 reaches 750,231, while wastewater nodes reach 257,232, and stormwater nodes increase to 458,732. Pipeline exposure at 2090 shows potable water pipelines exceeding 21,176 km, wastewater pipelines 16,643 km, and stormwater pipelines 16,480 km.

SSP5-8.5 Scenario (2020–2090)
Water node exposure is comparable to SSP3-7.0 at 2090. Similarly, pipelines show a minor increase in exposure at 2090, with potable water pipelines exceeding 21,221 km, wastewater pipelines at 16,679 km, and stormwater pipelines at 16,516 km.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Exposure of water infrastructure to rainfall-induced landslides increases significantly with warming. Potable water nodes grow from 26,929 at +0°C to 90,357 at +3°C warming, wastewater nodes rise from 14,374 to 42,792, and stormwater nodes increase from 21,230 to 59,396 (Figure 27). Pipeline exposure shows potable water pipelines increasing from 806 km at +0°C to 2258 km at +3°C warming, while wastewater pipelines increase from 633 km to 1800 km, and stormwater pipelines increase from 545 km to 1548 km (Figure 28).

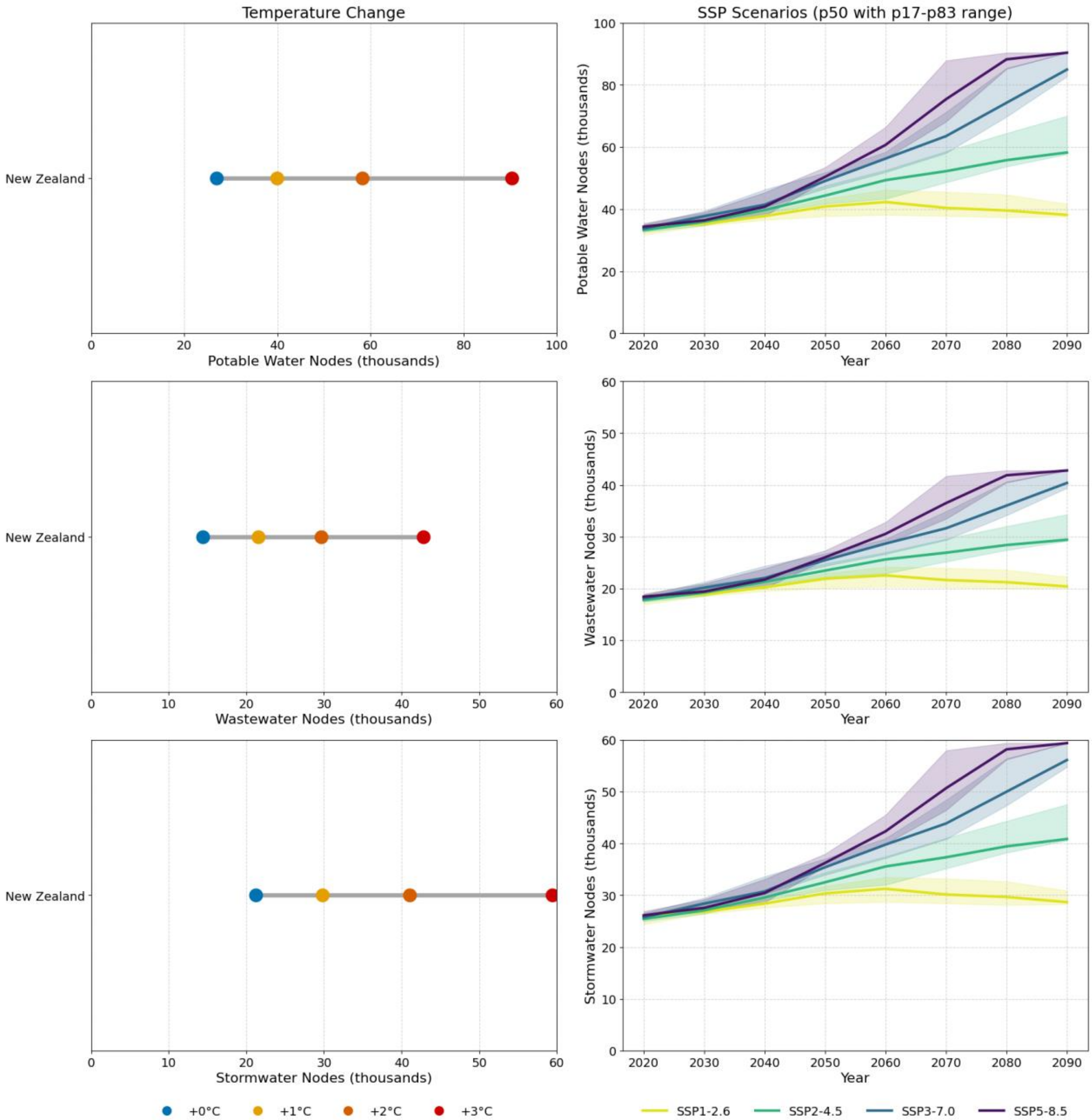

Figure 27: Projected exposure of A-NZ water infrastructure nodes to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Water node values are rounded for presentation clarity.

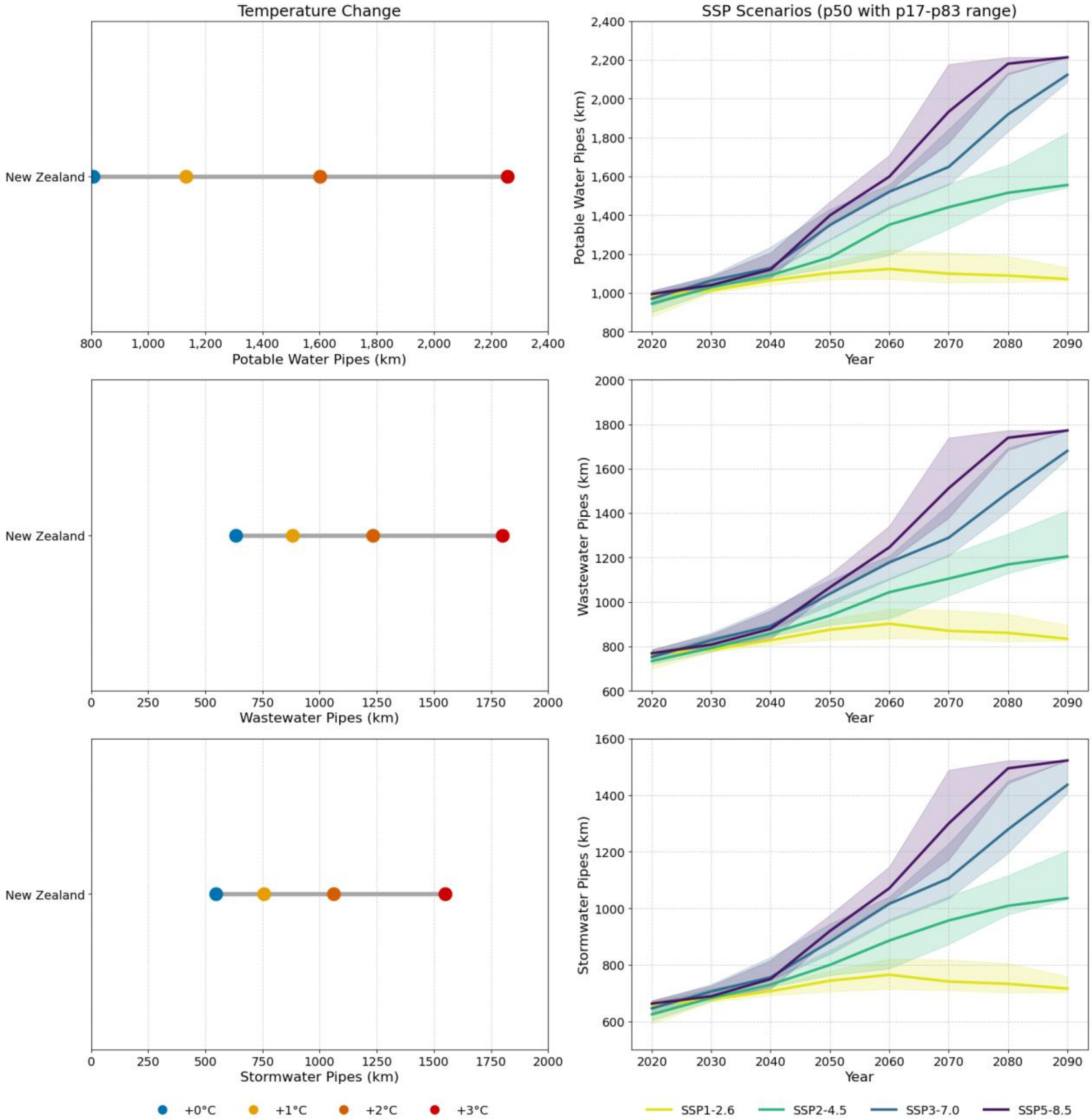

Figure 28: Projected exposure of A-NZ's water infrastructure pipelines to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Water node exposure shows a modest increase over the century, with potable water nodes rising from 34,335 in 2020 to 38,174 by 2090, wastewater nodes increasing from 18,383 to 20,410, and stormwater nodes from 26,040 to 28,692. Pipelines also show minor change over the century, with potable water pipelines reaching 1072 km, wastewater pipelines 834 km, and stormwater pipelines 716 km by 2090.

SSP2-4.5 Scenario (2020–2090)
Exposure grows steadily, with potable water nodes reaching about 58,251 by 2090, wastewater nodes increasing to 29,425, and stormwater nodes rising to 40,877. By 2090, exposure of potable water pipelines reaches 1556 km, while wastewater pipelines reach 1205 km, and stormwater pipelines 1036 km.

SSP3-7.0 Scenario (2020–2090)
Water network exposure shows a stronger upward trend, with potable water nodes climbing to 84,941, wastewater nodes reaching 40,387, and stormwater nodes increasing to 56,131. Pipeline exposure roughly doubles over the century for each water network, with potable water pipelines increasing to 2123 km by 2090, wastewater pipelines to 1680 km, and stormwater pipelines to 1437 km.

SSP5-8.5 Scenario (2020–2090)
Water network exposure is slightly higher than SSP3-7.0 with potable water nodes reaching 90,357, wastewater nodes reach 42,792, and stormwater nodes rise to 59,396 by 2090. Potable water pipeline increases to 2213 km at 2090, while wastewater pipelines reach 1772 km, and stormwater pipelines 1523 km.

Coastal flooding (extreme sea levels)

Sea level Change (+0 m to +2 m)

Potable water node exposure increases from 25,751 at +0°C to 216,687 at +3°C, wastewater nodes rise from around 11,618 to 83,356, and stormwater nodes increase from 20,340 to 114,614 (Figure 29). Pipeline exposure also expands, with potable water pipelines increasing from 795 km to 5022 km, wastewater pipelines from 792 km to 4706 km, and stormwater pipelines from 766 km to 3686 km (Figure 30).

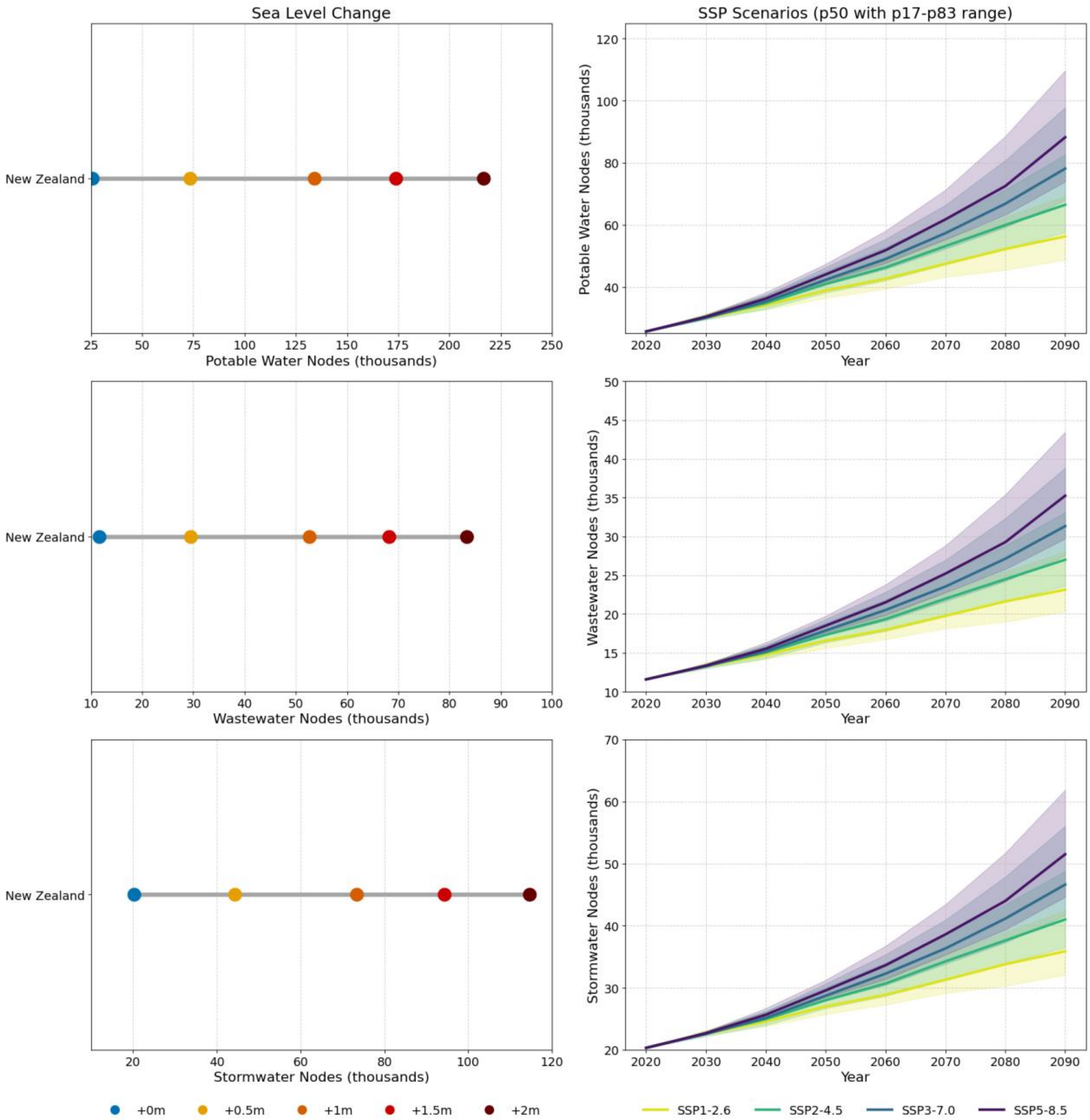

Figure 29: Projected exposure of A-NZ water infrastructure nodes to extreme sea level driven coastal flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Water node values are rounded for presentation clarity.

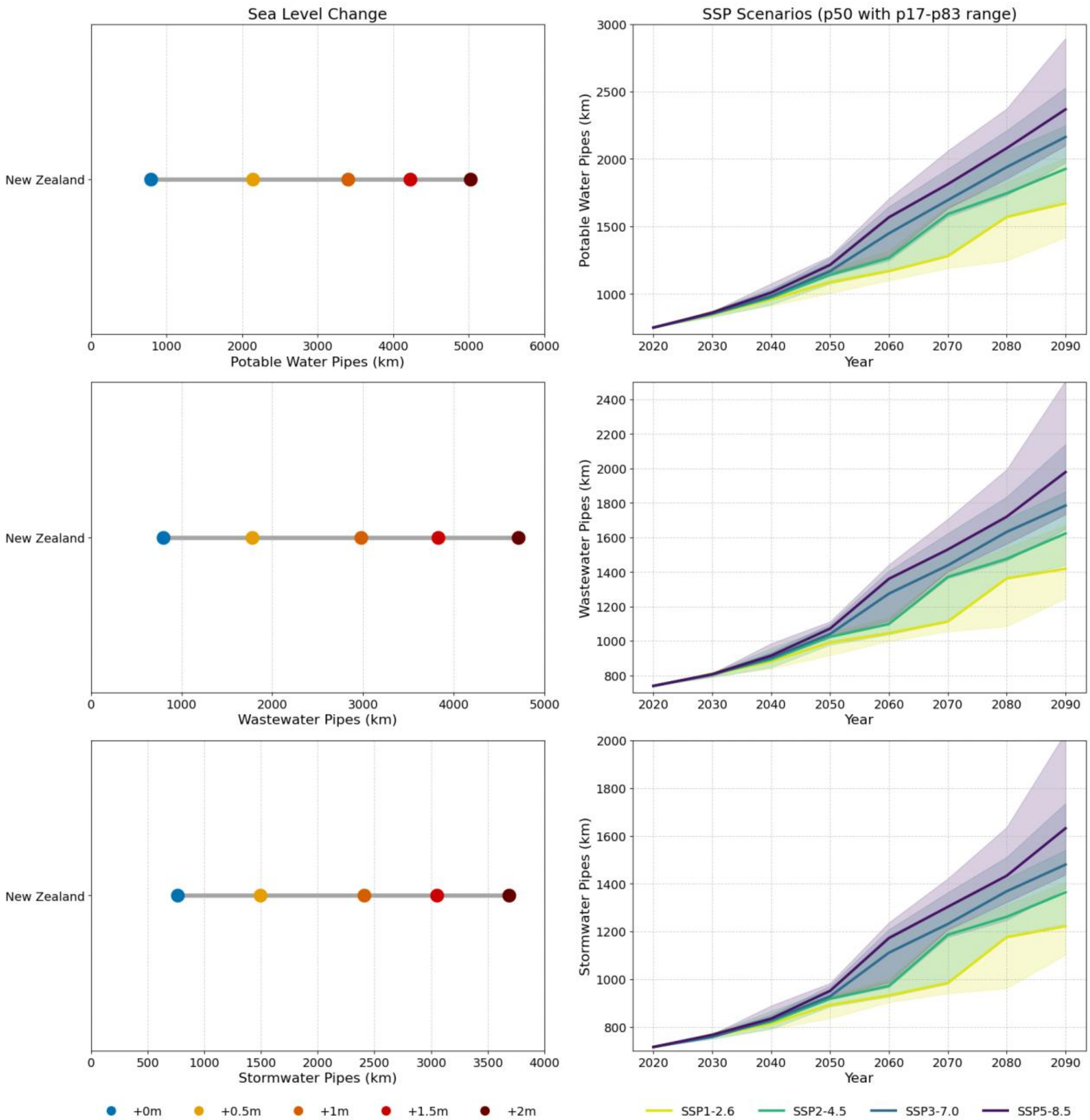

Figure 30: Projected exposure of A-NZ's water infrastructure pipelines to extreme sea level driven coastal flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
In 2020, exposed potable water nodes total 25,681, wastewater nodes 11,590, and stormwater nodes 20,329. By 2090, these exposures increase considerably to 56,312 potable nodes, 23,151 wastewater nodes, and 35,885 stormwater nodes. Exposed potable water pipelines also double from 751 km in 2020 to 1672 km in 2090, wastewater pipelines from 736 km to 1416 km, and stormwater pipelines from 716 km to 1222 km.

SSP2-4.5 Scenario (2020–2090)
Exposure grows steadily. Potable water nodes increase in exposure to 66,497 by 2090, wastewater nodes to 27,013, and stormwater nodes to 41,022. Exposed potable water pipelines rise to 1927 km, wastewater pipelines to 1620 km, and stormwater pipelines to 1364 km.

SSP3-7.0 Scenario (2020–2090)
Exposure of potable water nodes increase to 78,141 by 2090, wastewater nodes to 31,339, and stormwater nodes to 46,636. Pipeline exposures also grow significantly: potable water pipelines increase to 2163 km, wastewater pipelines to 1782 km, and stormwater pipelines to 1480 km.

SSP5-8.5 Scenario (2020–2090)
Potable water nodes exposed surge from 25,681 in 2020 to 88,231 by 2090, wastewater nodes from 11,590 to 35,2598, and stormwater nodes from 20,329 to 51,517. Exposure of potable water pipelines more than triple from 751 km to 2368 km, wastewater pipelines increase from 736km to 1976 km, and stormwater pipelines from 716 km to 1632 km.

Coastal flooding (mean high water springs)

Sea level Change (+0 m to +2 m)

Exposure of potable water nodes grow from 427 at +0 m to 120,980 at +2 m, wastewater nodes rise from 2187 to 48,741, and stormwater nodes increase from 18,100 to 64,540 (Figure 31). Potable water pipeline exposures increase from 71 km at +0 m to 3058 km at +2 m, wastewater pipelines from 92 km to 2569 km, and stormwater pipelines from 92 km to 2150 km (Figure 32).

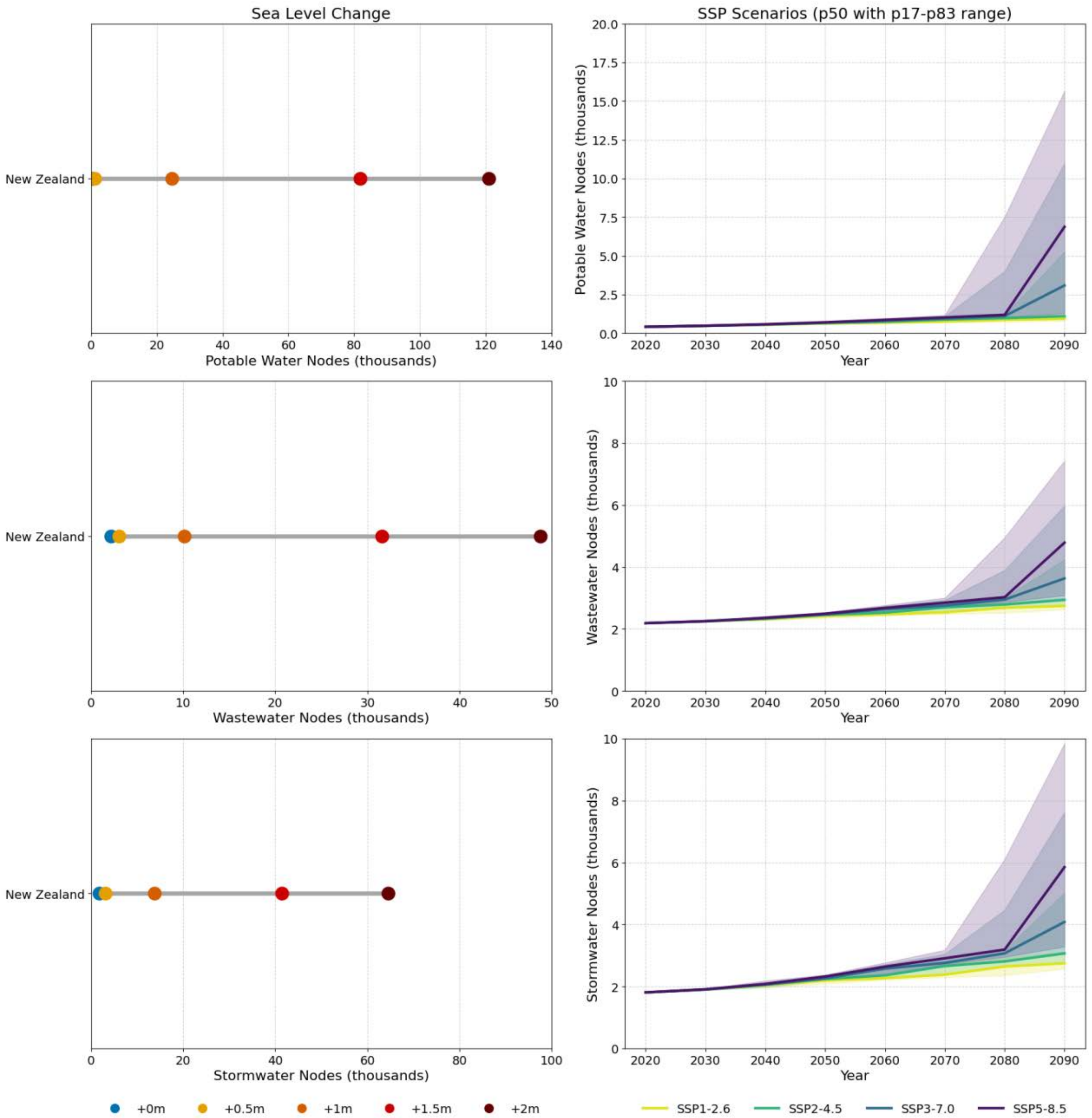

Figure 31: Projected exposure of A-NZ water infrastructure nodes to mean high water springs driven coastal flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Water node values are rounded for presentation clarity.

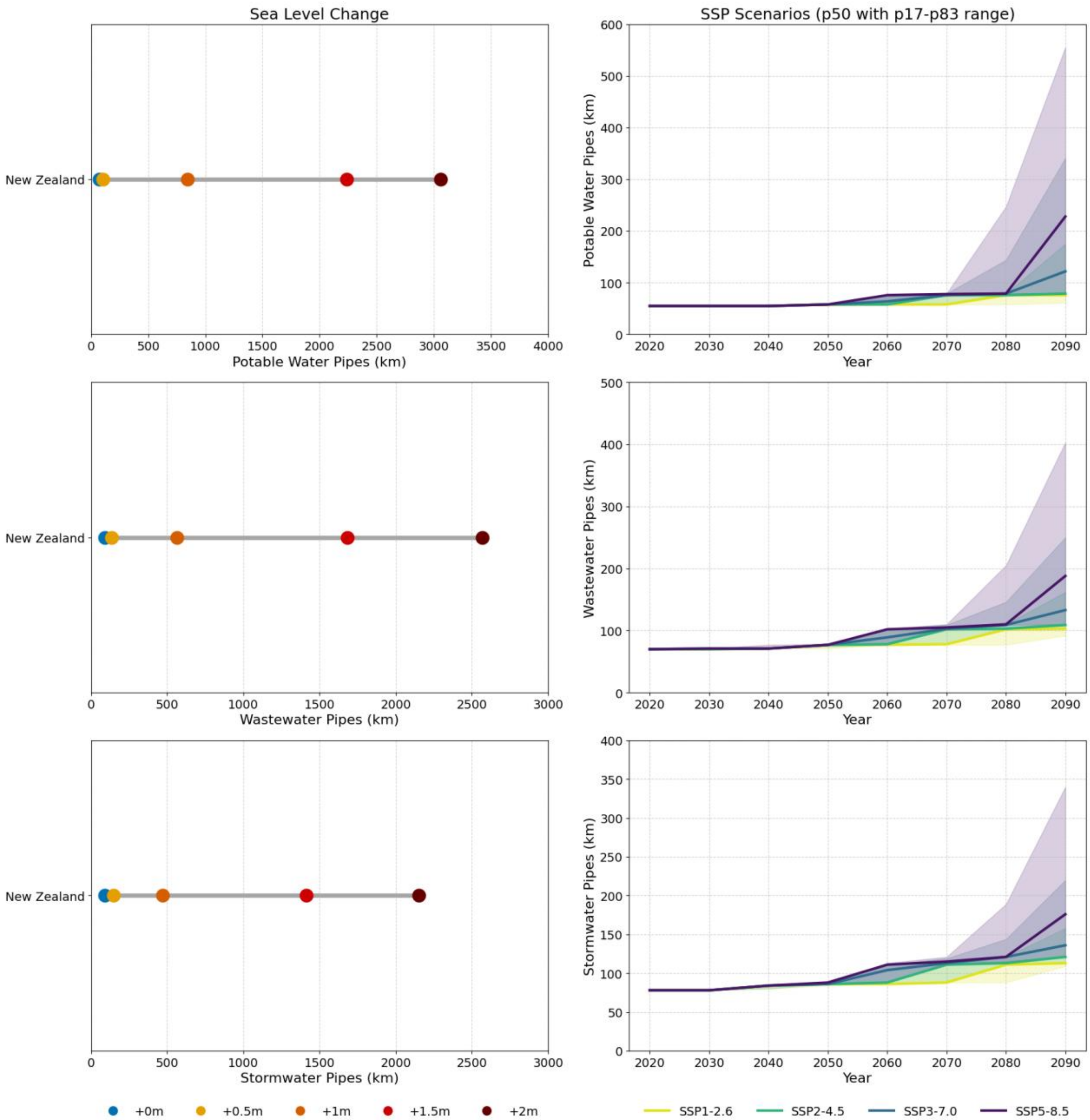

Figure 32: Projected exposure of A-NZ's water infrastructure pipelines to mean high water springs driven coastal flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
In 2020, exposed potable water nodes total 427, wastewater nodes 2187, and stormwater nodes 1810. By 2090, these exposure values increase modestly to 945 potable nodes, 2745 wastewater nodes, and 2750 stormwater nodes. Pipeline exposures also grow slightly: potable water pipelines rise from 55 km in 2020 to 76 km in 2090, wastewater pipelines from 70 km to 103 km, and stormwater pipelines from 78 km to 113 km.

SSP2-4.5 Scenario (2020–2090)
Exposure of potable water nodes increase from 427 in 2020 to 1112 by 2090, wastewater nodes from 2187 to 2940, and stormwater nodes from 1810 to 3067. Pipeline exposures expand moderately: potable water pipelines rise from 55 km to 79 km, wastewater pipelines from 70 km to 109 km, and stormwater pipelines from 78 km to 121 km.

SSP3-7.0 Scenario (2020–2090)
Potable water node exposures climb from 427 in 2020 to 3095 by 2090, wastewater nodes from 2187 to 3,632, and stormwater nodes from 1810 to 4083. Pipelines increase considerably in exposure; potable water pipelines increase from 55 km to 122 km, wastewater pipelines from 70 km to 133 km, and stormwater pipelines from 78 km to 136 km.

SSP5-8.5 Scenario (2020–2090)
Exposure of potable water nodes surge from 427 in 2020 to 6,880 by 2090, wastewater nodes from 2187 to 4785, and stormwater nodes from 1810 to 5853. Potable water pipeline exposures increase from 55 km to 228 km, wastewater pipelines from 70 km to 188 km, and stormwater pipelines from 78 km to 176 km.

Shallow groundwater (coastal)

Sea-Level Change (+0 m to +2 m)

Potable water node exposure increases from 160,098 at +0 m to 240,009 at +2 m, wastewater nodes rise from around 45,860 to 66,748, and stormwater nodes increase from 71,395 to 101,149 (Figure 33). Potable water pipeline exposure increasing from 3464 km to 5136 km, wastewater pipelines from 3446 km to 4946 km, and stormwater pipelines from 2466 km to 3413 km (Figure 34).

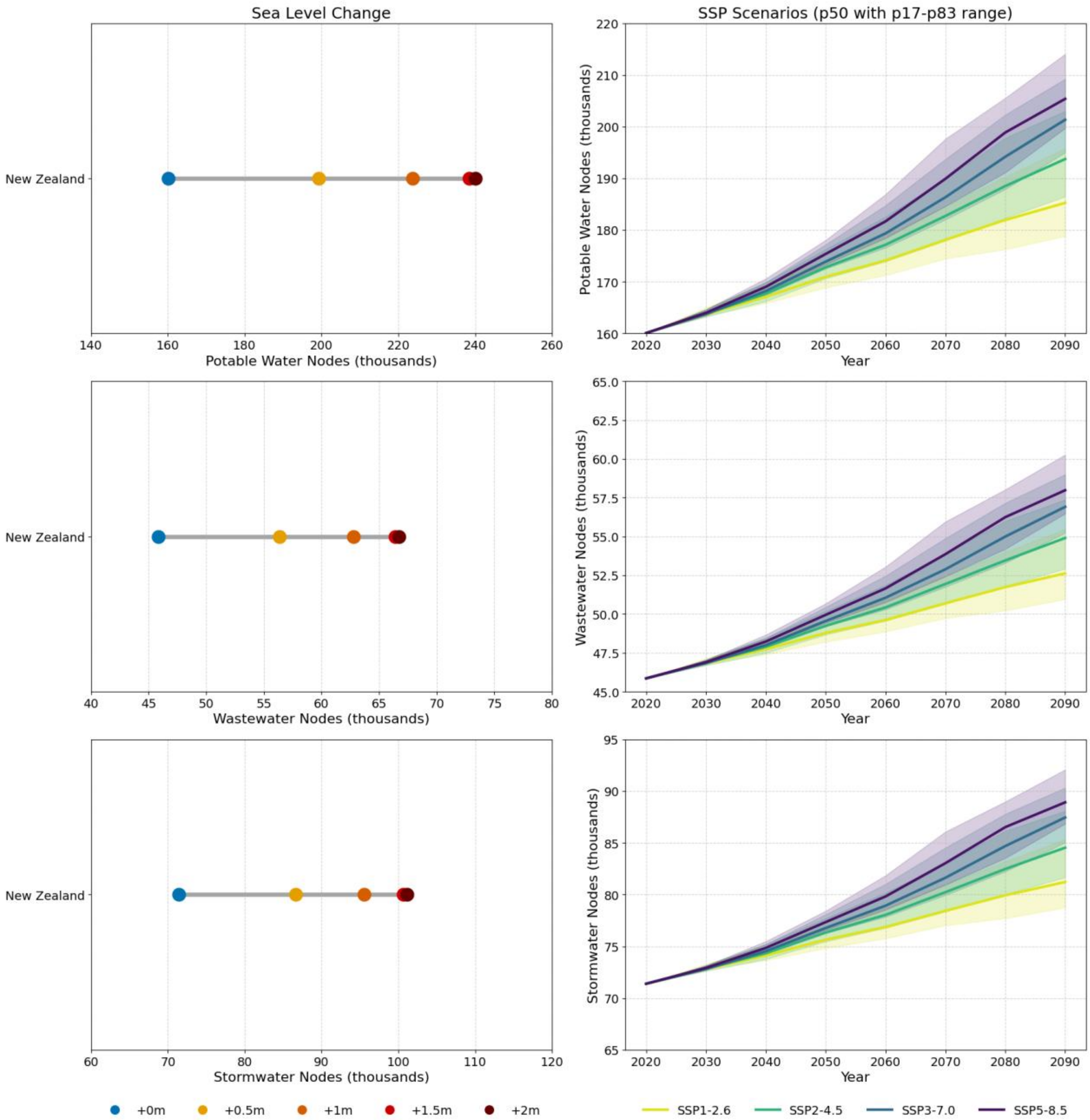

Figure 33: Projected exposure of A-NZ water infrastructure nodes on coastal land with shallow groundwater presence under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right). Water node values are rounded for presentation clarity.

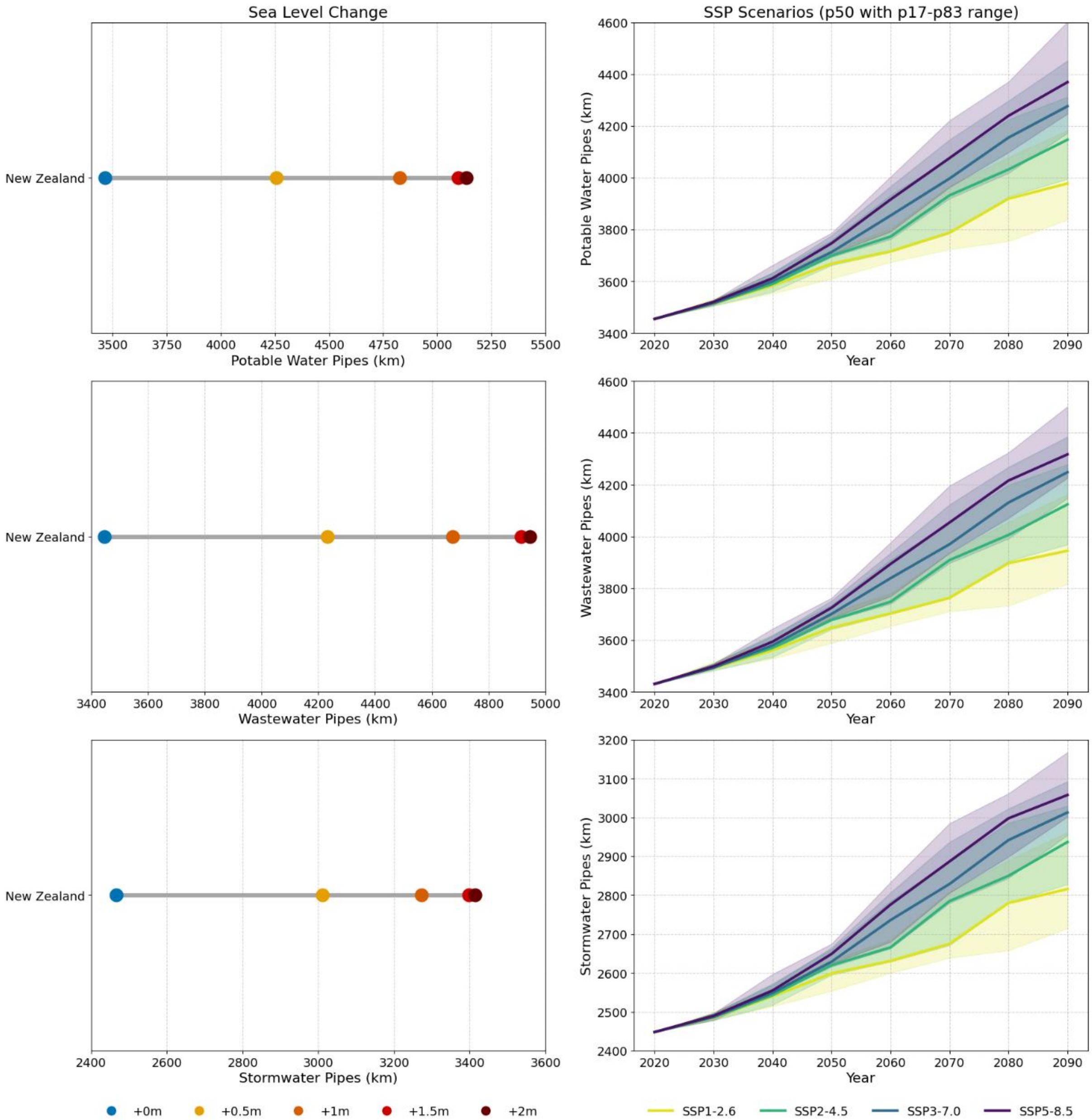

Figure 34: Projected exposure of A-NZ's water infrastructure pipelines on coastal land with shallow groundwater presence under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP2-4.5 Scenario (2020–2090)
Exposure grows gradually under the low-emission pathway, with potable water nodes reaching 185,260, wastewater nodes increasing to 52,626, and stormwater nodes rising to 81,232 by 2090. Pipeline exposures expand slightly, with potable water pipelines at 3978 km, wastewater pipelines at 3945 km, and stormwater pipelines at 2816 km.

SSP2-4.5 Scenario (2020–2090)
Exposure grows steadily, with potable water nodes reaching about 193,737, wastewater nodes increasing to 54,907, and stormwater nodes rising to 84,546 by 2090. Pipeline exposures expand moderately, with potable water pipelines at 4147 km, wastewater pipelines at 4124 km, and stormwater pipelines at 2937 km.

SSP3-7.0 Scenario (2020–2090)
Exposure shows a stronger upward trend, with potable water nodes increasing to 201,329 by 2090, wastewater nodes reaching 56,915, and stormwater nodes increasing to 87,465. Pipeline exposures also grow, with potable water pipelines at 4276 km, wastewater pipelines at 4248 km, and stormwater pipelines at 3013 km.

SSP5-8.5 Scenario (2020–2090)
Potable water node exposures reach 205,371, while wastewater nodes increase to 57,984, and stormwater nodes to 88,928 by 2090. Pipelines show the highest exposure, with potable water pipelines at 4369 km, wastewater pipelines at 4317 km, and stormwater pipelines at 3058 km.

Coastal erosion

Projected transport exposure to coastal erosion at 2100 based on historic erosion trends

Exposure of water infrastructure to coastal erosion is relatively modest compared to flooding hazards but still significant for assets located near eroding shorelines. Nationally, 892 potable water nodes, 601 wastewater nodes, and 952 stormwater nodes are exposed to erosion (Figure 35). Pipeline exposure is smaller in scale but critical for service continuity, with 30 km of potable water pipelines, 33 km of wastewater pipelines, and 23 km of stormwater pipelines affected.

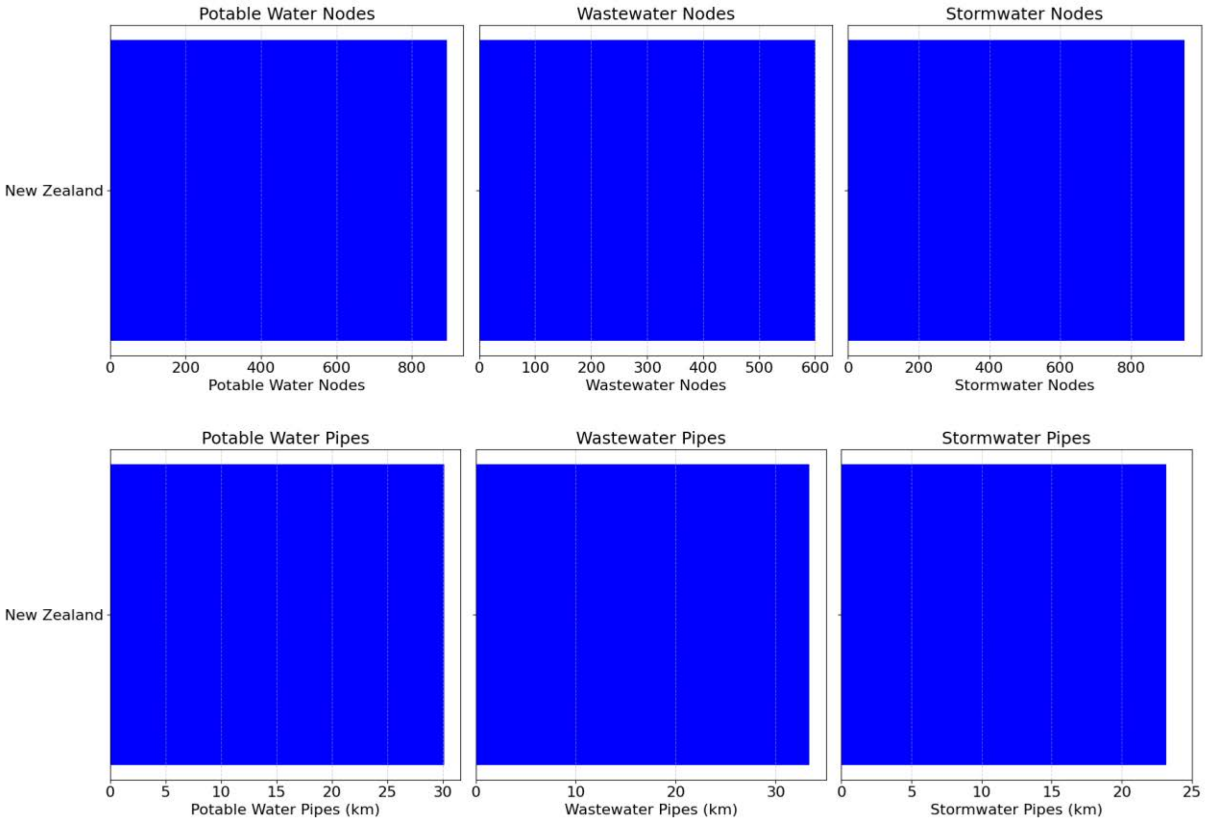

Figure 35: Projected exposure of A-NZ water infrastructure to coastal erosion at 2100, based on historic erosion rates.

2.1.6 Land (cover and use)

Inland flooding

Temperature Change (+0°C to +3°C)

Exposure of land cover and land use to inland flooding increases steadily with temperature warming. Built land cover exposure grows from about 326 km^2 at +0°C to approximately 394 km^2 at +3°C, while production land cover exposure rises from around 10,427 km^2 to 11,904 km^2, and undeveloped (or natural) land cover increases from 1541 km^2 to 1705 km^2 (Figure 36). Over this same range in warming, exposure of residential land areas expand from 287 km^2 to 343 km^2, commercial and industrial land from 111 km^2 to 130 km^2, and rural land from 11,080 km^2 to 12,563 km^2 (Figure 37).

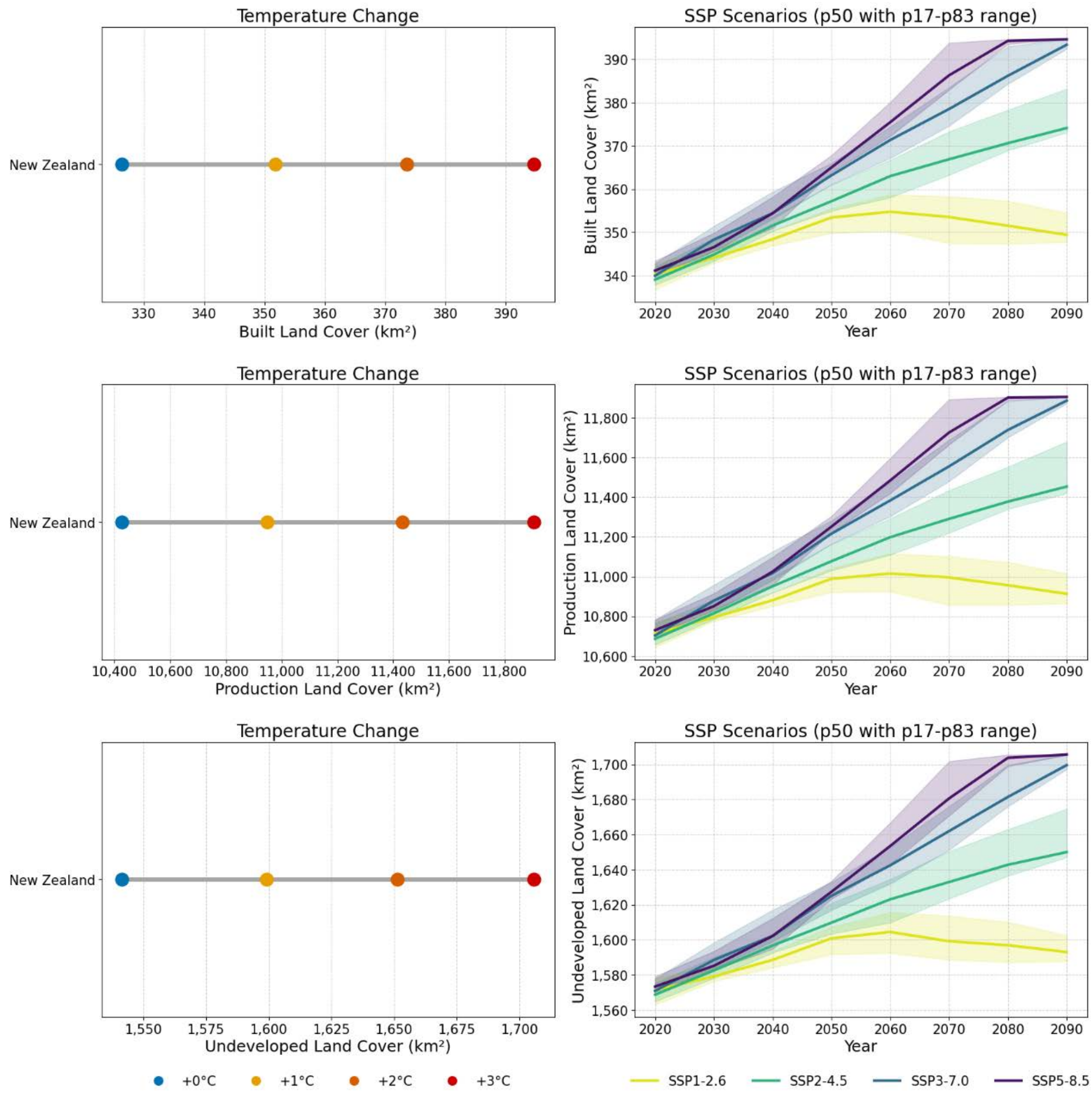

Figure 36: Projected exposure of A-NZ land cover classes to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

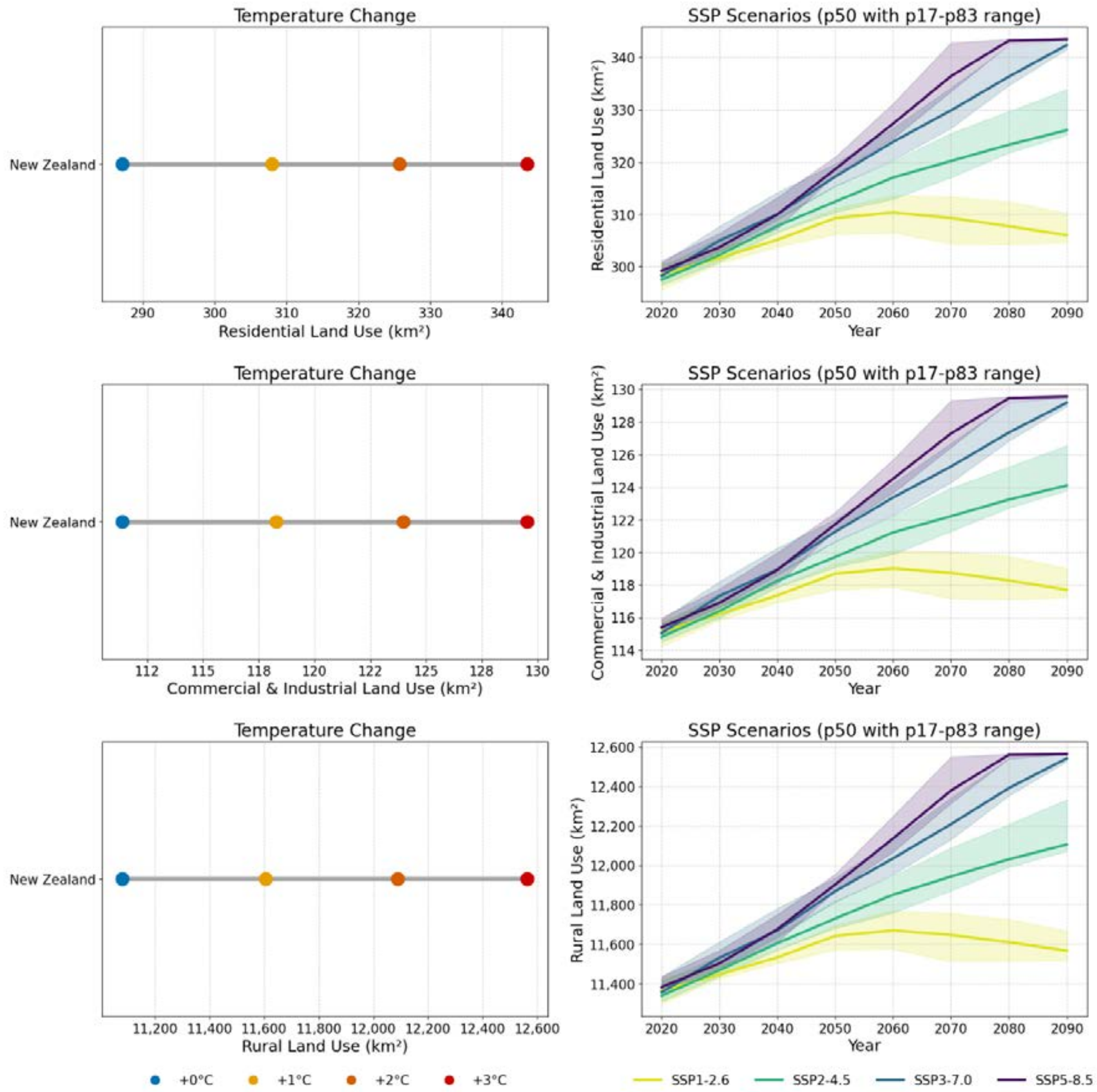

Figure 37: Projected exposure of A-NZ land use classes to inland flooding under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Exposure of built land cover increases modestly from 340 km^2 in 2020 to 349 km^2 by 2090, production land from 10,712 km^2 to 10,912 km^2, and undeveloped land from 1571 km^2 to 1593 km^2. Residential land use exposure rises slightly to 306 km^2, commercial and industrial land to 117 km^2, and rural land to 11,567 km^2.

SSP2-4.5 Scenario (2020–2090)
Exposure grows steadily, with built land cover reaching 374 km^2, production land increasing to 11,453 km^2, and undeveloped land increasing to 1650 km^2 by 2090. Residential land use exposure expands to 326 km^2, commercial and industrial land to 124 km^2, and rural land to 12,105 km^2.

SSP3-7.0 Scenario (2020–2090)
Built land cover exposure climbs to 393 km^2 by 2090, while production land reaches 11,886 km^2, and undeveloped land increase to 1700 km^2. Residential land use exposure increases to 342 km^2, commercial and industrial land to 129 km^2, and rural land to 12,542 km^2.

SSP5-8.5 Scenario (2020–2090)
Land exposure increase over the century is similar to SSP3-7.0 with built land cover reaching 395 km^2 by 2090, production land increasing to 11,904 km^2, and undeveloped land 1705 km^2. Residential land use increases to 343 km^2, commercial and industrial land 129 km^2, and rural land 12,563 km^2.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Built land cover exposure to rainfall-induced landslides grows from about 45 km^2 at +0°C warming to approximately 97 km^2 at +3°C warming, while production land cover exposure rises from around 13,179 km^2 to 23,605 km^2, and undeveloped (natural) land cover exposure increases from 38,225 km^2 to 48,328 km^2 (Figure 38). For land use, residential area exposures expand from 171 km^2 to 263 km^2, commercial and industrial land exposures from 8 km^2 to 31 km^2, and rural land exposures from 35,070 km^2 to 51,411 km^2 (Figure 39).

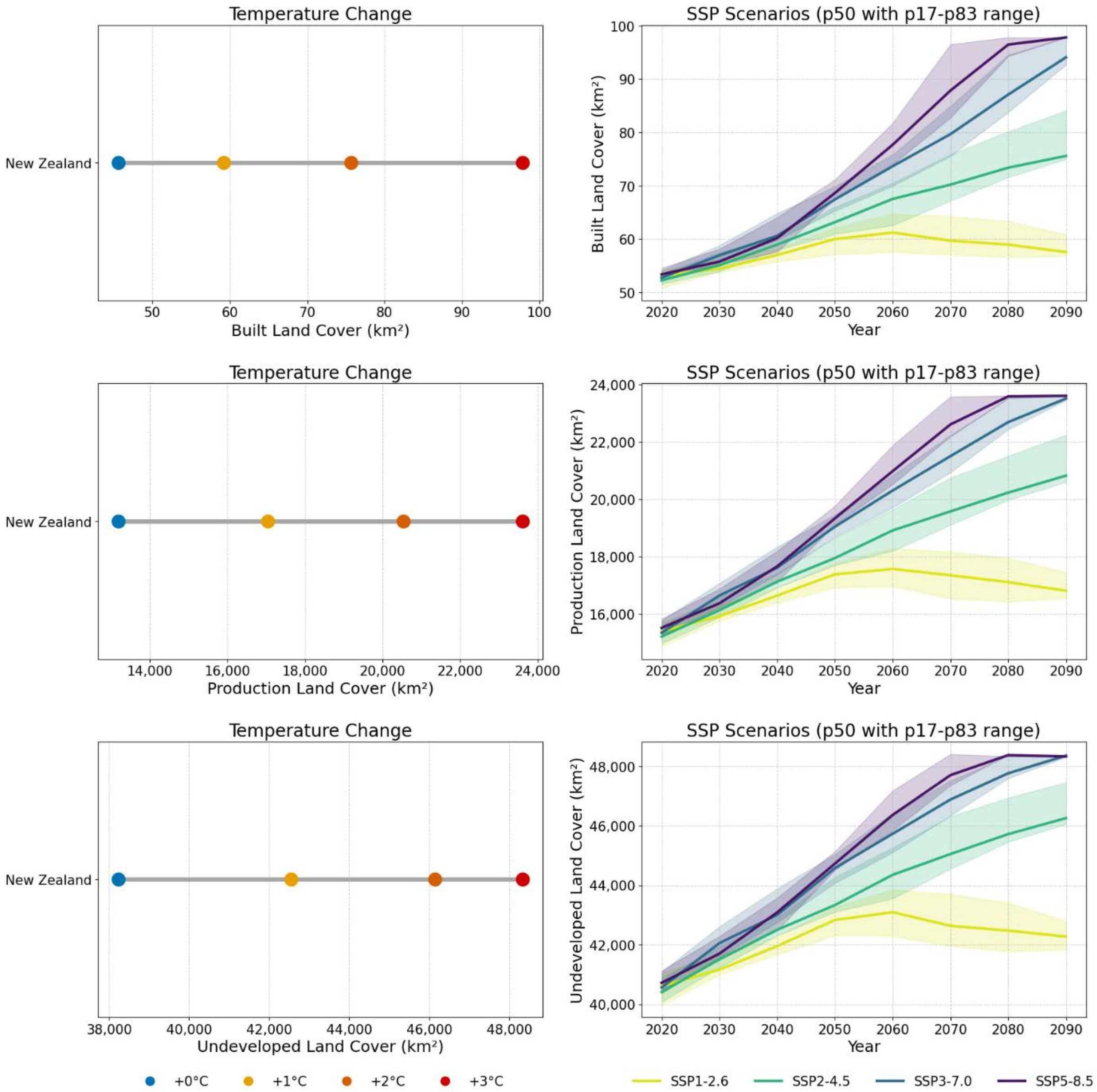

Figure 38: Projected exposure of A-NZ land cover classes to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

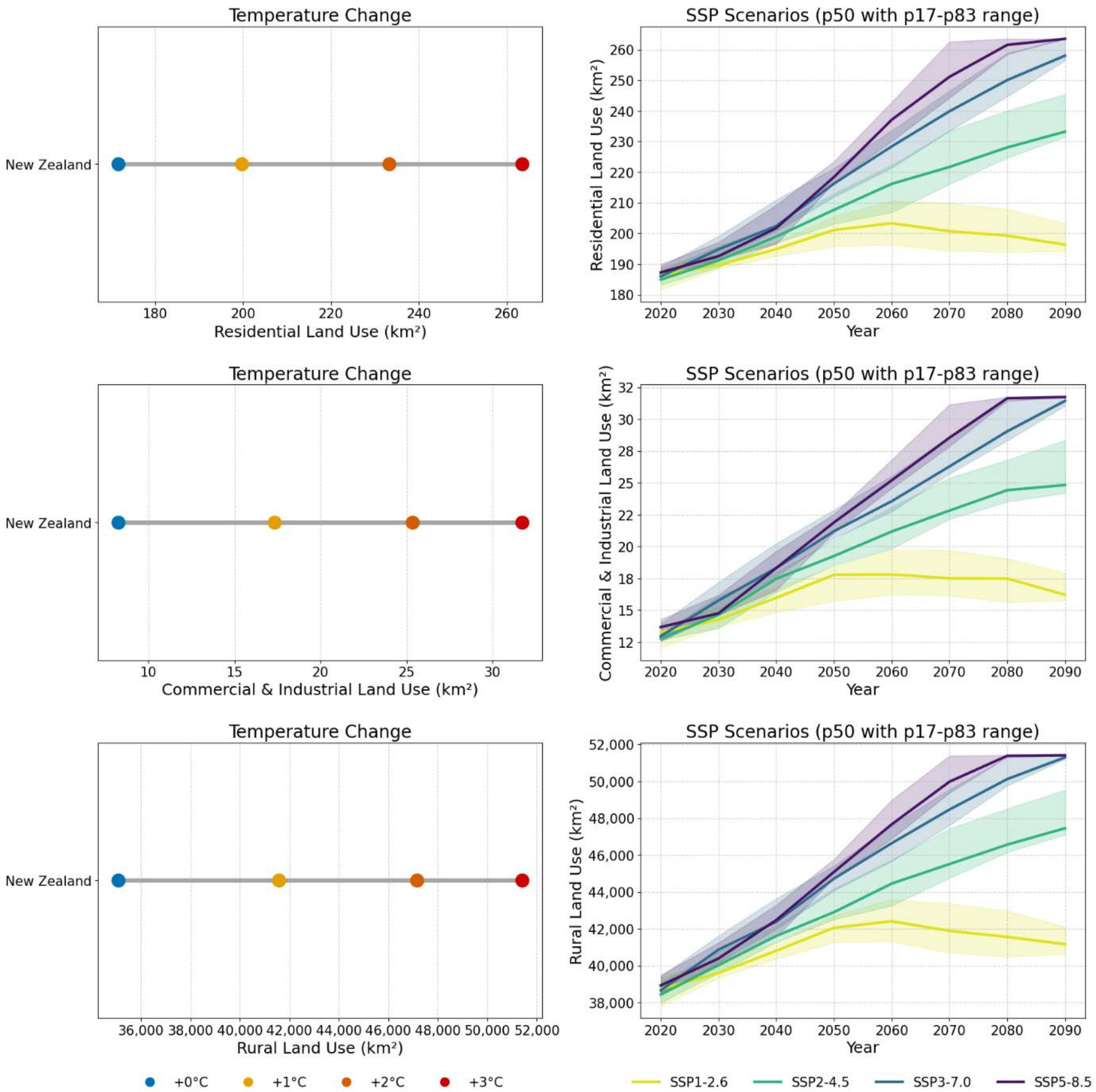

Figure 39: Projected exposure of A-NZ land use classes to rainfall-induced landslides under temperature change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)

Exposure of built land cover increases modestly from 53 km^2 in 2020 to 57 km^2 by 2090, production land rises from 15,385 km^2 to 16,800 km^2, and undeveloped (natural) land exposure grows slightly from 40,612 km^2 to 42,276 km^2. Residential land use exposure reaches 196 km^2, commercial and industrial land 16 km^2, and rural land 41,163 km^2.

SSP2-4.5 Scenario (2020–2090)

Exposure grows steadily, with built land cover reaching 75 km^2, production land increasing to 20,819 km^2, and undeveloped land rising to 46,257 km^2 by 2090. Residential land use exposure expands to 233 km^2, commercial and industrial land to 24 km^2, and rural land to 47,451 km^2.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend, with built land cover reaching 94 km^2 at 2090, production land 23,510 km^2, and undeveloped land increasing to 48,357 km^2. Residential land use exposure increases to 258 km^2, commercial and industrial land to 31 km^2, and rural land to 51,296 km^2.

SSP5-8.5 Scenario (2020–2090)

Exposure of built land cover reaches 97.8 km^2 at 2090, production land to 23,605 km^2, and undeveloped land rises to 48,328 km^2. Residential land use exposure increases to 263 km^2, commercial and industrial land to 31.7 km^2, and rural land to 51,411 km^2.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Flooding of built land cover grows from 11 km^2 at +0 m to 57 km^2 at +2 m, while production land cover rises from around 684 km^2 to 1811 km^2, and natural (undeveloped) land cover increases from 156 km^2 to 318 km^2 (Figure 40). For land use, residential areas exposed to coastal flooding expand from 8 km^2 at +0 m to 43 km^2 at +2 m, commercial and industrial land combined grows from 3 km^2 to 21 km^2, and rural land increases from 734 km^2 to 1829 km^2 (Figure 41).

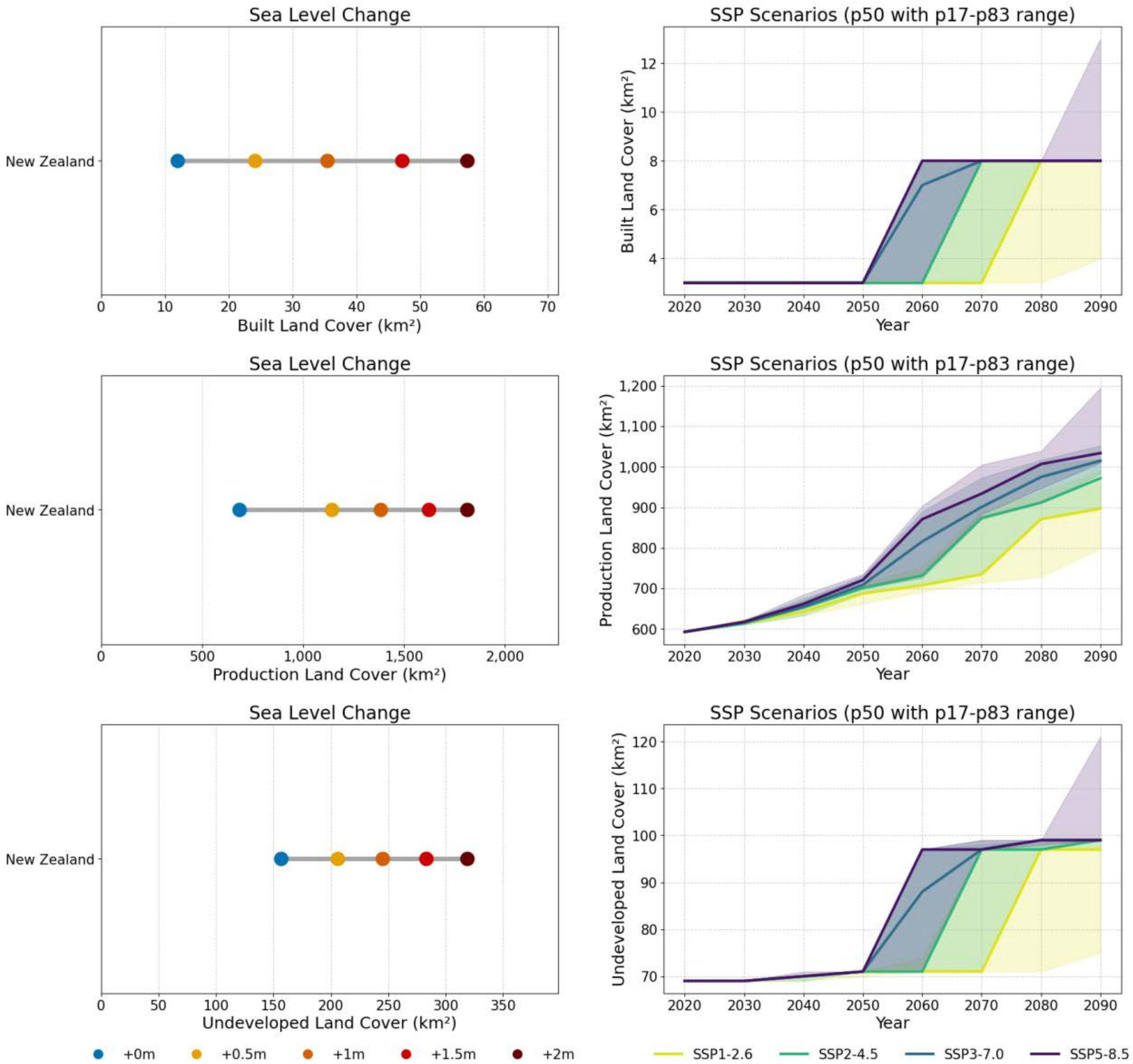

Figure 40: Projected exposure of A-NZ land cover classes to extreme sea level coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

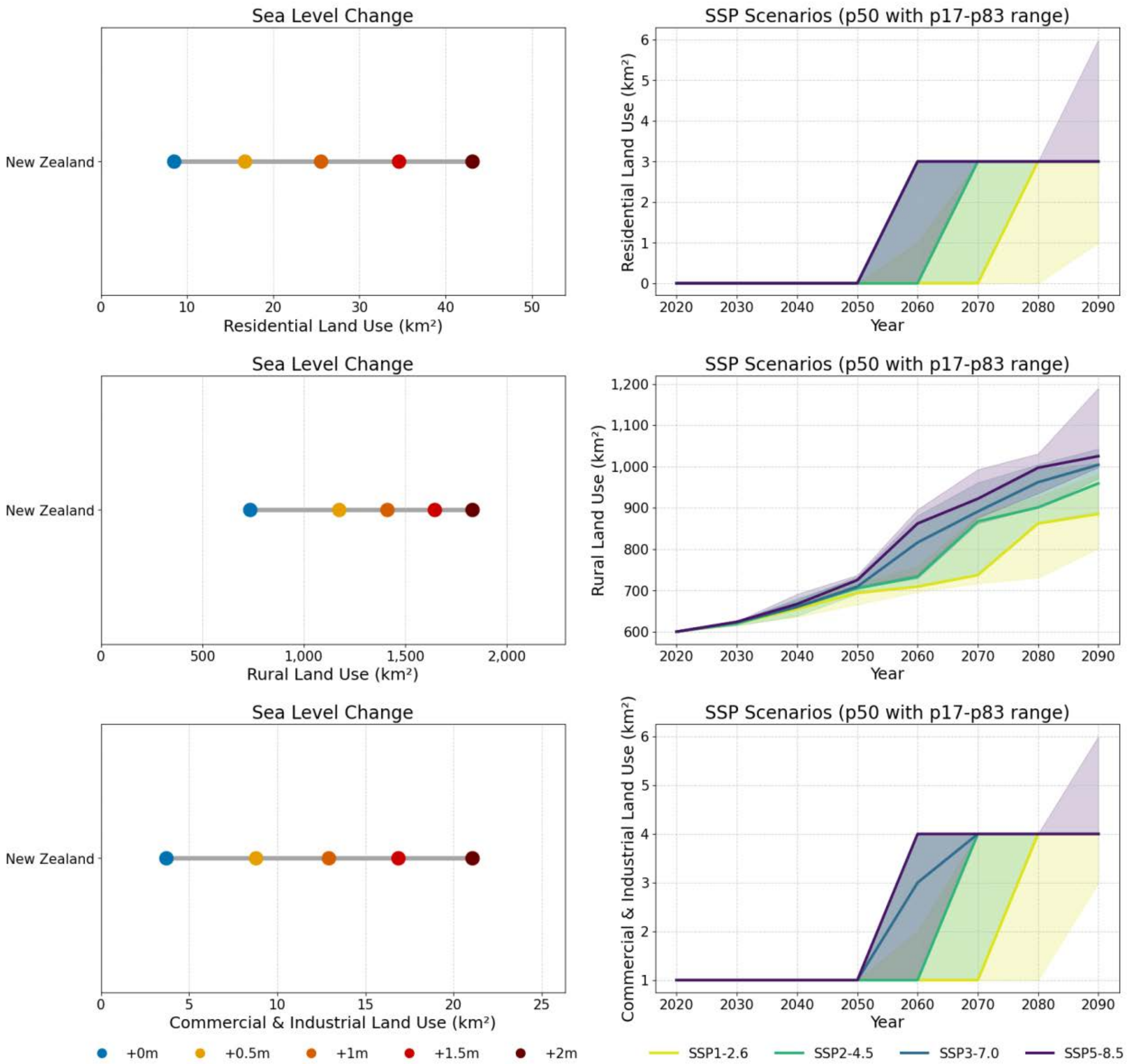

Figure 41: Projected exposure of A-NZ land use classes to extreme sea level coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Built land cover exposure to coastal flooding in this scenario increases modestly from about 3 km^2 in 2020 to 8 km^2 by 2090, production land cover rises from 593 km^2 to 897 km^2, and undeveloped land cover expands from 69 km^2 to 97 km^2. Residential land use exposure to flooding increases slightly from 0 km^2 to 3 km^2, commercial and industrial land from 1 km^2 to 4 km^2, and rural land from 600 km^2 to 885 km^2.

SSP2-4.5 Scenario (2020–2090)
In this scenario built land cover exposure increases to 8 km^2 by 2090, while production land cover reaches 972 km^2, and undeveloped land cover 99 km^2. Residential land use expands to 3 km^2, commercial and industrial land to 4 km^2, and rural land to 959 km^2.

SSP3-7.0 Scenario (2020–2090)
Built land cover exposure remains at 8 km^2 in 2090 in this scenrio, while production land cover reaches 1015 km^2, and undeveloped land cover remains at 99 km^2. Residential land use exposure remains at 3 km^2, commercial and industrial land use at 4 km^2, and rural land use increases to 1004 km^2.

SSP5-8.5 Scenario (2020–2090)
Built land cover exposure in this scenario remains unchanged at 8 km^2 in 2090, while production land cover increases to 1064 km^2, and natural land cover rises to 111 km^2. Residential land use exposure remains at 3 km^2, and commercial and industrial land use at 4 km^2, while rural land increases to 1064 km^2.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Built land cover exposure to coastal flooding grows from 1.1 km^2 at +0 m to 84 km^2 at +2 m, while production land cover rises from 33 km^2 to 1102 km^2, and natural land cover increases from 29 km^2 to 215 km^2 (Figure 42). For land use, exposure of residential areas expand from 0.7 km^2 at +0 m to 46 km^2 at +2 m, commercial and industrial land from 0.5 km^2 to 30 km^2, and rural land from 64 km^2 to 1112 km^2 (Figure 43).

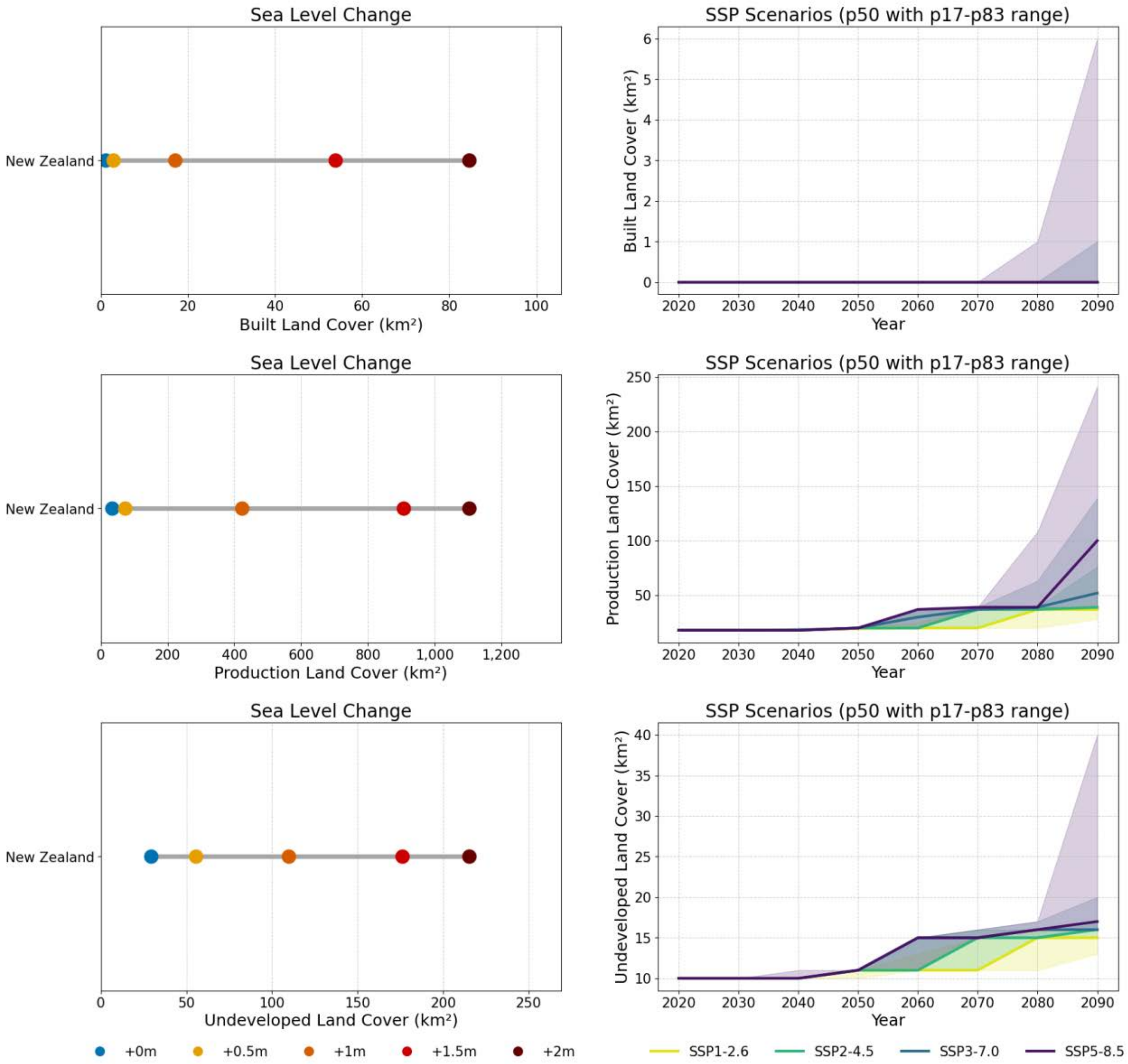

Figure 42: Projected exposure of A-NZ land cover classes to mean high water springs coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

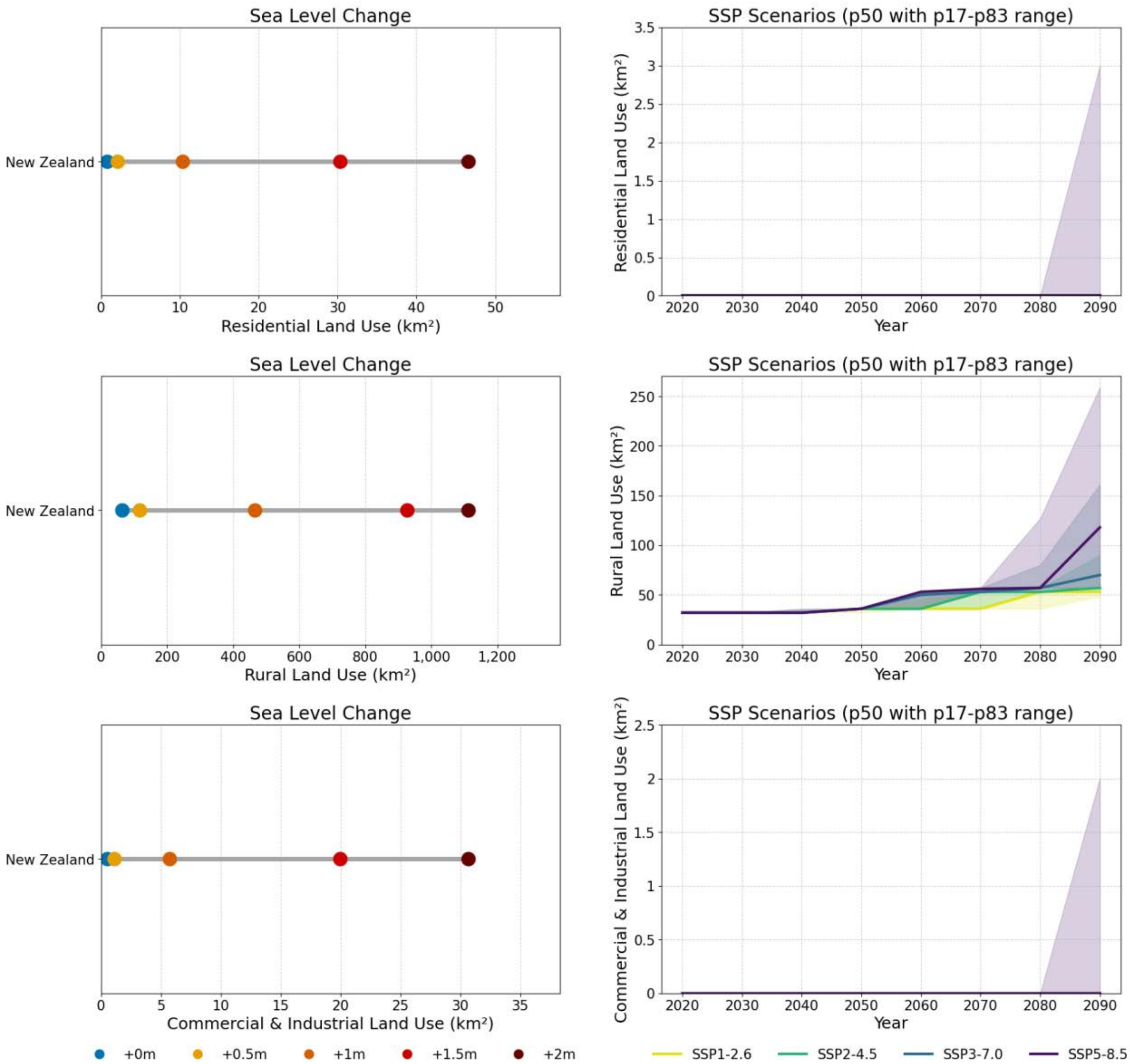

Figure 43: Projected exposure of A-NZ land use classes to mean high water springs coastal flooding under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)

Built land cover exposure remains at 0 km^2 over the century. Production land cover exposure rises modestly from 18 km^2 in 2020 to 37 km^2 by 2090, while undeveloped land cover exposure increases slightly from 10 km^2 to 15 km^2. Residential and commercial and industrial land use exposures remain at 0 km^2, while rural land use exposure increases from 32 km^2 to 53 km^2.

SSP2-4.5 Scenario (2020–2090)

Built land cover exposure remains at 0 km^2. Production land cover exposure reaches 39 km^2, rural land expands to 57 km^2, and undeveloped land cover rises to 16 km^2 by 2090. Residential and commercial/industrial land use exposure remains negligible.

SSP3-7.0 Scenario (2020–2090)

Built land cover exposure remains at 0 km^2. Production land cover exposure reaches 52 km^2, rural land expands to 70 km^2, and undeveloped land cover remains at 16 km^2 by 2090. Residential and commercial and industrial land use exposures remain negligible.

SSP5-8.5 Scenario (2020–2090)

Built land cover exposure remains at 0 km^2 under 50th percentile projected sea level change but reaches 6 km^2 under 83rd percentile projections by 2090. Similarly, Residential and commercial/industrial land use exposures reach 3 km^2 and 2 km^2 respectively under 83rd percentile projections. Production land cover exposure increases to 100 km^2, natural land cover to 17 km^2, and rural land to 118 km^2 by 2090 under 50th percentile projected sea level change.

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Exposure of land cover and land use to shallow groundwater presence in coastal areas is already substantial and increases further with rising sea levels. Built land cover exposure grows from about 116 km^2 at +0 m to approximately 177 km^2 at +2 m, while production land cover rises from around 1227 km^2 to 1925 km^2, and undeveloped (natural) land cover increases from 66 km^2 to 182 km^2 (Figure 44). For land use, residential area exposures expand from 83 km^2 to 122 km^2, commercial and industrial land from 25 km^2 to 48 km^2, and rural land from 1132 km^2 to 1838 km^2 (Figure 45).

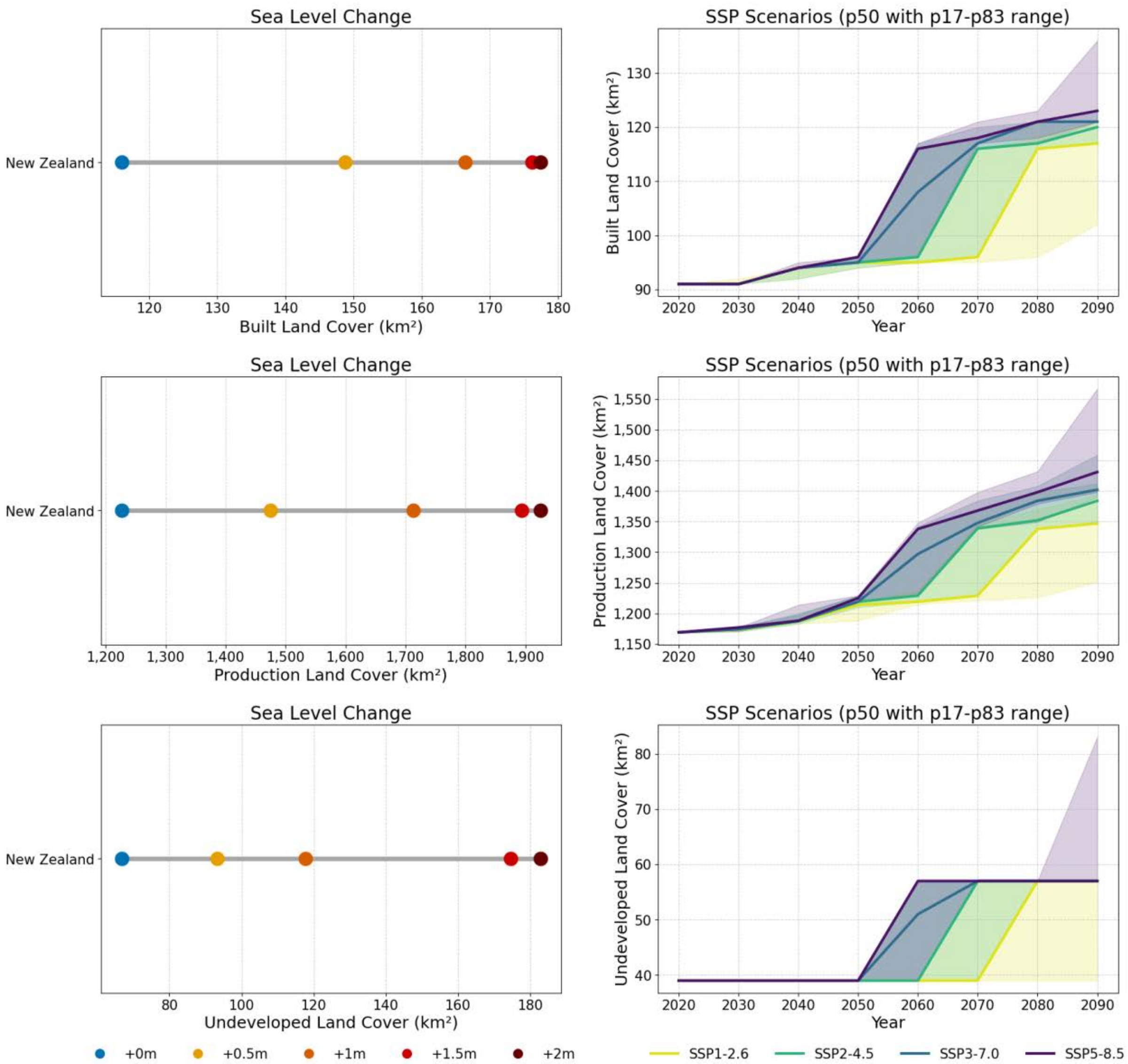

Figure 44: Projected exposure of A-NZ land cover classes on land with shallow groundwater presence under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

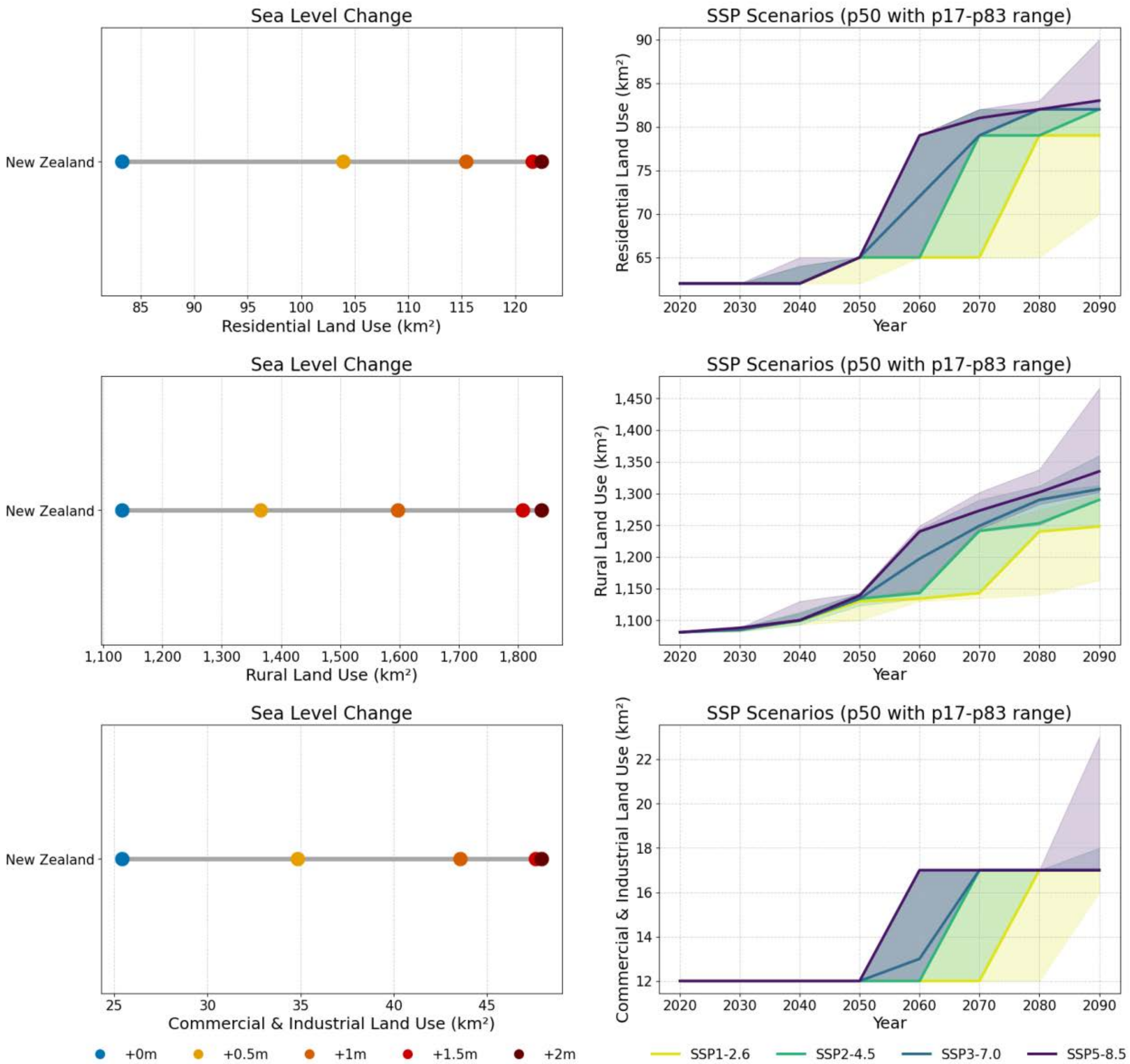

Figure 45: Projected exposure of A-NZ land use classes on land with shallow groundwater presence under sea level change (left) and medium confidence shared socio-economic pathway (SSP) scenarios (right).

SSP1-2.6 Scenario (2020–2090)
Built land cover exposure increases in this scenario from 91 km^2 in 2020 to 117 km^2 in 2090, production land from 1169 km^2 to 1347 km^2, and undeveloped land from 39 km^2 to 57 km^2. Residential land use exposure rises from 62 km^2 to 79 km^2, commercial and industrial land from 12 km^2 to 17 km^2, and rural land from 1081 km^2 to 1248 km^2.

SSP2-4.5 Scenario (2020–2090)
In this scenario built land cover exposure increases from 91 km^2 in 2020 to 120 km^2 in 2090, production land from 1169 km^2 to 1384 km^2, and undeveloped land from 39 km^2 to 57 km^2. Residential land use exposure rises from 62 km^2 to 82 km^2, commercial and industrial land from 12 km^2 to 17 km^2, and rural land from 1081 km^2 to 1290 km^2.

SSP3-7.0 Scenario (2020–2090)
Built land cover exposure increases in this scenario from 91 km^2 in 2020 to 121 km^2 in 2090, production land from 1169 km^2 to 1402 km^2, and undeveloped land from 39 km^2 to 57 km^2. Residential land use exposure rises from 62 km^2 to 82 km^2, commercial and industrial land from 12 km^2 to 17 km^2, and rural land from 1081 km^2 to 1307 km^2.

SSP5-8.5 Scenario (2020–2090)
Built land cover exposure in this scenario increases from 91 km^2 in 2020 to 123 km^2 in 2090, production land from 1169 km^2 to 1431 km^2, and undeveloped land from 39 km^2 to 57 km^2. Residential land use exposure rises from 62 km^2 to 83 km^2, commercial and industrial land from 12 km^2 to 17 km^2, and rural land from 1081 km^2 to 1335 km^2.

Coastal erosion

Projected transport exposure to coastal erosion at 2100 based on historic erosion trends

Exposure of land cover and land use to coastal erosion is relatively limited compared to flooding hazards but still notable for assets located near eroding shorelines. Built land cover accounts for 2 km^2, while production land cover shows the largest exposure at 20 km^2, and undeveloped land cover reaches 18 km^2 (Figure 46). For land use categories, residential areas contribute around 1.6 km^2, rural land use is the most exposed at 28 km^2, and commercial and industrial land use reaches 0.3 km^2.

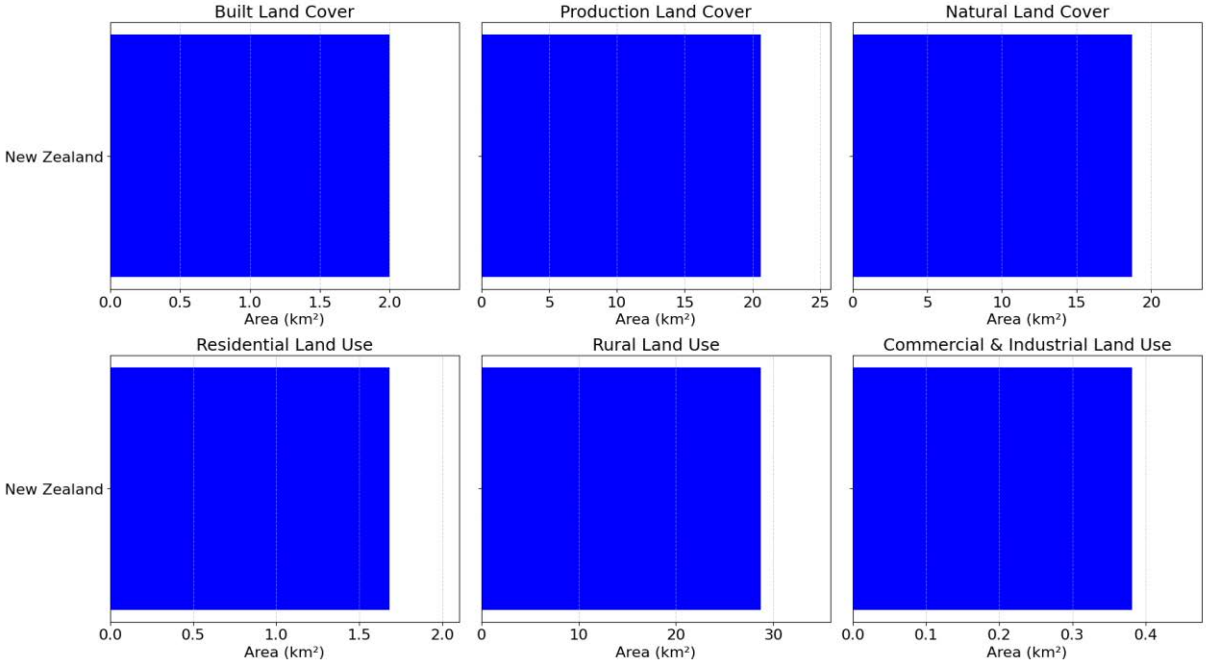

Figure 46: Projected exposure of A-NZ land cover and land use classes to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Potential Evapotranspiration Deficit (PED)

In 2020, most production land sits below 50 mm PED, but early signs of intensification appear: SSP2-4.5 already has 8,810 km^2 in the 50–75 mm band and 75 km^2 in 75–100 mm, while SSP3-7.0 and SSP5-8.5 reach 19,646 km^2 and 18,660 km^2 respectively in 50–75 mm, with SSP5-8.5 adding 1,383 km^2 in 75–100 mm (Table 14). Negative PED (–25 to 0 mm) remains modest across scenarios, ranging from 1,695 km^2 under SSP3-7.0 to 7,557 km^2 under SSP2-4.5. By 2050, high-deficit exposure accelerates. SSP2-4.5 records 16,344 km^2 in 50–75 mm and 2214 km^2 in 75–100 mm, while SSP3-7.0 jumps to 38,352 km^2 and 13,980 km^2 in these bands, plus 2642 km^2 above 100 mm. SSP5-8.5 surges further, with 35,679 km^2 in 50–75 mm, 23,908 km^2 in 75–100 mm, and 12,964 km^2 exceeding 100 mm. Negative PED nearly disappears, dropping to 423 km^2 under SSP2-4.5 and just 5 km^2 under SSP3-7.0. By 2090, under SSP3-7.0 PED reaches 22,298 km^2 in 50–75 mm, 30,397 km^2 in 75–100 mm, and a staggering 42,136 km^2 above 100 mm. SSP5-8.5 increases exposure to these higher PED ranges: 17,347 km^2, 22,594 km^2, and 54,105 km^2 respectively. Negative PED becomes negligible, falling to 16 km^2 under SSP5-8.5 and 347 km^2 under SSP3-7.0.

Table 14: National Summary of Production Land Cover Exposure (km²) to potential evapotranspiration deficit (mm) change by SSP scenario for 2020, 2050, and 2090.

SSP	Year	<-25	-25 to 0	0 to 25	25 to 50	50 to 75	75 to 100	>100
SSP1-2.6	2020	0	4991	68,418	29,769	5825	0	0
SSP1-2.6	2050	0	909	30,068	39,919	30,776	7163	168
SSP1-2.6	2090	0	601	31,306	45,824	29,221	2035	16
SSP2-4.5	2020	0	7557	43,585	48,977	8,810	75	0
SSP2-4.5	2050	0	423	27,566	62,436	16,344	2214	20
SSP2-4.5	2090	0	273	14,786	18,600	35,391	29,302	10,651
SSP3-7.0	2020	0	1695	34,715	52,921	19,646	26	0
SSP3-7.0	2050	0	5	11,525	42,500	38,352	13,980	2642
SSP3-7.0	2090	0	347	4,055	9,771	22,298	30,397	42,136
SSP5-8.5	2020	0	1988	40,896	46,076	18,660	1383	0
SSP5-8.5	2050	0	221	11,358	24,873	35,679	23,908	12,964
SSP5-8.5	2090	0	16	4566	10,375	17,347	22,594	54,105

Frost Days (< 0 ℃)

Exposure of production land cover to frost day changes remains concentrated in the lower change ranges (−25 to 0 and 0 to 25) across all SSP scenarios in 2020 and 2050, indicating minimal shifts in frost-related risk during mid-century (Table 15). By 2090, high-emission scenarios such as SSP5-8.5 show slight increases in exposure to more extreme reductions in frost days (e.g., −50 to −25 and beyond), though the overall distribution remains dominated by moderate change ranges.

Table 15: National Summary of Production Land Cover Exposure (km²) to Frost Days (<0°C) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	<-100 days	-100 days to -75 days	-75 days to -50 days	-50 days to -25 days	-25 days to 0 days	0 days to 25 days	> 25 days
SSP1-2.6	2020	0	0	0	0	108,122	881	0
SSP1-2.6	2050	0	0	0	205	108,239	559	0
SSP1-2.6	2090	0	0	0	479	108,088	436	0
SSP2-4.5	2020	0	0	0	0	108,478	525	0
SSP2-4.5	2050	0	0	0	2051	106,516	436	0
SSP2-4.5	2090	0	5	204	31,892	76,502	401	0
SSP3-7.0	2020	0	0	0	0	108,360	643	0
SSP3-7.0	2050	0	0	1	8001	100,601	401	0
SSP3-7.0	2090	5	46	4676	43,579	60,297	401	0
SSP5-8.5	2020	0	0	0	1	108,324	679	0
SSP5-8.5	2050	0	0	9	12,593	96,001	401	0
SSP5-8.5	2090	16	436	15,757	36,939	55,455	401	0

Very Hot Days (≥30°C)

In 2020, almost all production land lies within the 0–10 day change range, with national exposure totals exceeding 104,000 km^2 across all SSPs, indicating minimal deviation from historical conditions (Table 16). By 2050, exposure remains largely unchanged under SSP1-2.6 and SSP2-4.5, while SSP3-7.0 and SSP5-8.5 begin to show early redistribution, with small areas entering the 10–20 day range by 2050. The most significant changes occur by 2090 under SSP3-7.0 and SSP5-8.5. Under SSP3-7.0, 29,034 km^2 shifts into 10–20 days and 4222 km^2 into 20–30 days. SSP5-8.5 exhibits an even stronger pattern, with large-scale movement into 10–20 and 20–30 day ranges and 4726 km^2 in the 30–40 day range.

Table 16: National Summary of Production Land Cover Exposure (km^2) to Very Hot Days (≥30°C) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -10 days	-10 to 0 days	0 to 10 days	10 to 20 days	20 to 30 days	30 to 40 days	40 to 50 days	>50 days
SSP1-2.6	2020	0	5018	103,986	0	0	0	0	0
SSP1-2.6	2050	0	402	108,602	0	0	0	0	0
SSP1-2.6	2090	0	558	108,445	0	0	0	0	0
SSP2-4.5	2020	0	4991	104,012	0	0	0	0	0
SSP2-4.5	2050	0	784	108,220	0	0	0	0	0
SSP2-4.5	2090	0	16	104,541	4447	0	0	0	0
SSP3-7.0	2020	0	1963	107,041	0	0	0	0	0
SSP3-7.0	2050	0	108	108,640	255	0	0	0	0
SSP3-7.0	2090	0	21	75,726	29,034	4222	0	0	0
SSP5-8.5	2020	0	3472	105,532	0	0	0	0	0
SSP5-8.5	2050	0	278	108,195	530	0	0	0	0
SSP5-8.5	2090	0	0	48,124	37,377	18,734	4726	42	0

Extreme Winds

Built-up areas between 2020 and 2090 show relatively minor proportional increases in exposure to extreme winds in the 0% to 5% for all SSP scenarios (Table 17). Under SSP5-8.5, 71 km^2 of built-up areas are exposed in the 5% to 10% range by 2090. Production land also reaches 12,626 km^2 by 2090 (Table 18), and undeveloped land 3683 km^2 (Table 19).

Table 17: National Summary of Built Land Cover Exposure (km^2) to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0%to 5%	5%to 10%	>10%
SSP1-2.6	2020	0	0	0	0	349	1558	0	0
SSP1-2.6	2050	0	0	0	0	456	1450	0	0
SSP1-2.6	2090	0	0	0	0	475	1431	0	0
SSP2-4.5	2020	0	0	0	0	443	1463	0	0
SSP2-4.5	2050	0	0	0	0	987	919	0	0
SSP2-4.5	2090	0	0	0	1	1243	663	0	0
SSP3-7.0	2020	0	0	0	0	1232	674	0	0
SSP3-7.0	2050	0	0	0	0	532	1375	0	0
SSP3-7.0	2090	0	0	0	0	1216	690	0	0
SSP5-8.5	2020	0	0	0	0	471	1436	0	0
SSP5-8.5	2050	0	0	0	0	1096	810	0	0
SSP5-8.5	2090	0	0	0	0	1134	700	71	0

Table 18: National Summary of Production Land Cover Exposure (km^2) to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0%to 5%	5%to 10%	>10%
SSP1-2.6	2020	0	0	0	0	25,598	83,406	0	0
SSP1-2.6	2050	0	0	0	3	20,002	88,998	0	0
SSP1-2.6	2090	0	0	0	5	25,184	83,815	0	0
SSP2-4.5	2020	0	0	0	0	23,817	85,186	0	0
SSP2-4.5	2050	0	0	0	25	45,959	63,019	0	0
SSP2-4.5	2090	0	0	0	135	52,326	56,542	0	0
SSP3-7.0	2020	0	0	0	0	55,183	53,820	0	0
SSP3-7.0	2050	0	0	0	51	37,004	71,949	0	0
SSP3-7.0	2090	0	0	35	145	50,972	57,851	0	0
SSP5-8.5	2020	0	0	0	6	34,162	74,835	0	0
SSP5-8.5	2050	0	0	0	82	37,598	71,324	0	0
SSP5-8.5	2090	0	7	32	135	43,877	52,328	12,626	0

Table 19: National Summary of Undeveloped Land Cover Exposure (km²) to Extreme Winds (99% Percentile) by SSP scenario for 2020, 2050, and 2090.

SSP	Year	< -20%	-20% to -15%	-15% to -10%	-10% to -5%	-5%to 0%	0%to 5%	5%to 10%	>10%
SSP1-2.6	2020	0	0	0	0	25,169	52,153	0	0
SSP1-2.6	2050	0	0	0	204	27,777	49,341	0	0
SSP1-2.6	2090	0	0	0	61	28,371	48,889	0	0
SSP2-4.5	2020	0	0	0	0	32,168	45,154	0	0
SSP2-4.5	2050	0	0	0	1260	40,999	35,063	0	0
SSP2-4.5	2090	0	0	35	3914	39,467	33,906	0	0
SSP3-7.0	2020	0	0	0	0	45,612	31,710	0	0
SSP3-7.0	2050	0	0	0	1499	37,404	38,419	0	0
SSP3-7.0	2090	0	65	1408	3307	34,009	38,532	0	0
SSP5-8.5	2020	0	0	0	147	34,719	42,456	0	0
SSP5-8.5	2050	0	0	13	2644	33,000	41,665	0	0
SSP5-8.5	2090	0	339	1373	2884	28,305	40,738	3683	0

2.2 Regional exposure to climate hazards: summary

2.2.1 Population

Inland flooding

Temperature Change (+0°C to +3°C)

Exposure of regional populations to inland flooding increases steadily with warming. Auckland shows the highest exposure, growing from about 183,139 people at +0°C to 205,275 at +3°C, followed by Canterbury (139,956 to 165,105) and Wellington (from 90,403 to 102,636) (Figure 47). Waikato and Bay of Plenty also experience notable increases, reaching 75,506 and 72,516 respectively at +3°C. Hawkes Bay shows a considerable population exposure increase over 15,000 between +0°C and +1°C while exposure in Manawatū–Whanganui increases from 31,441 to 49,187 between +0°C and +3°C.

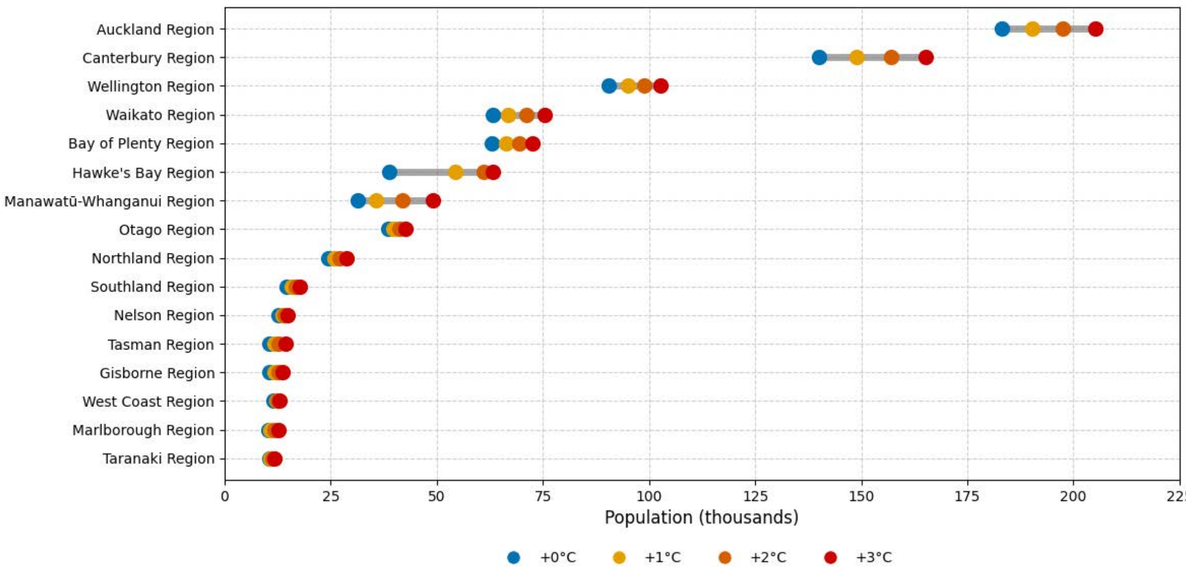

Figure 47: Projected exposure of A-NZ region populations to inland flooding under temperature change. Population values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Projected population exposure is modest under low emissions scenarios. Auckland's exposure increases slight from 187,327 in 2020 to 189,291by 2090, Canterbury from 145,104 to 148,418, and Wellington from 93,243 to 94,270 (Figure 48). Other regions also show minimal change.

SSP2-4.5 Scenario (2020–2090)

Exposure grows steadily, with Auckland reaching 196,950 by 2090. Canterbury and Wellington show modest exposure increases by 2090, while Tasman increases from 11,204 in 2020 to 12,989 (16%) by 2090, Gisborne from 11,305 to 12,785 (13%), and Southland from 15,126 to 16,617 (9%).

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend under high-emission conditions, with Auckland increasing to 203,667 by 2090. Canterbury rises also rises to 165,090, while Wellington grows to 102,000 by 2090. Waikato expands from 65,674 in 2020 to 75,399 by 2090, and Bay of Plenty from 65,107 to 72,497, indicating moderate growth.

SSP5-8.5 Scenario (2020–2090)

Population exposure under SSP5-8.5 shows a clear upward trend, with Auckland increasing to 205,275 by 2090. Canterbury rises to 165,105, and Wellington reaches 102,636. Several other regions also surpass 50,000 by 2090, including Waikato (75,506), Bay of Plenty (72,516), and Hawke's Bay (63,223).

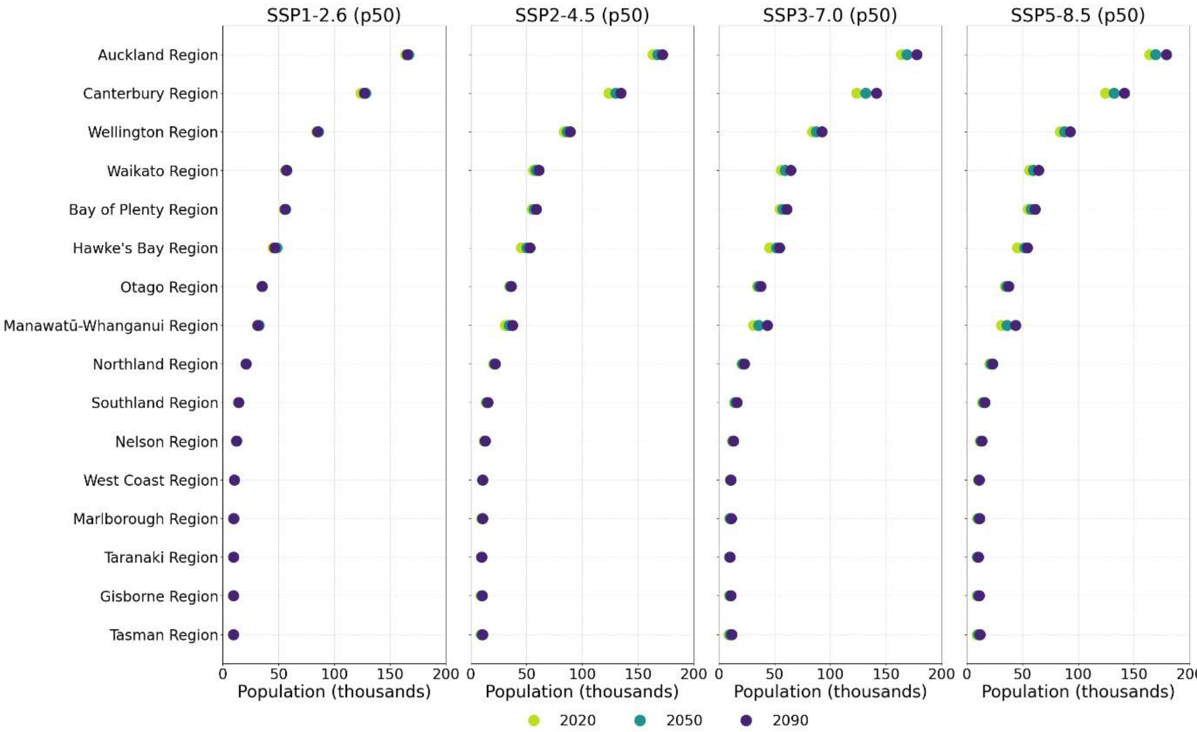

Figure 48: Projected 50th percentile (p50) exposure of A-NZ region populations to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Population values are rounded for presentation clarity.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Auckland shows the highest exposure, increasing from 20,297 people at +0°C warming to 96,826 at +3°C (Figure 49). Northland follows, increasing from 18,000 to 39,000, while Bay of Plenty rises from 18,078 to 32,564. Waikato and Wellington also show notable growth, reaching 12,842 and 8859 at +3°C warming. Population exposure in Nelson, Tasman and Taranaki more than triples between +0°C and +3°C warming.

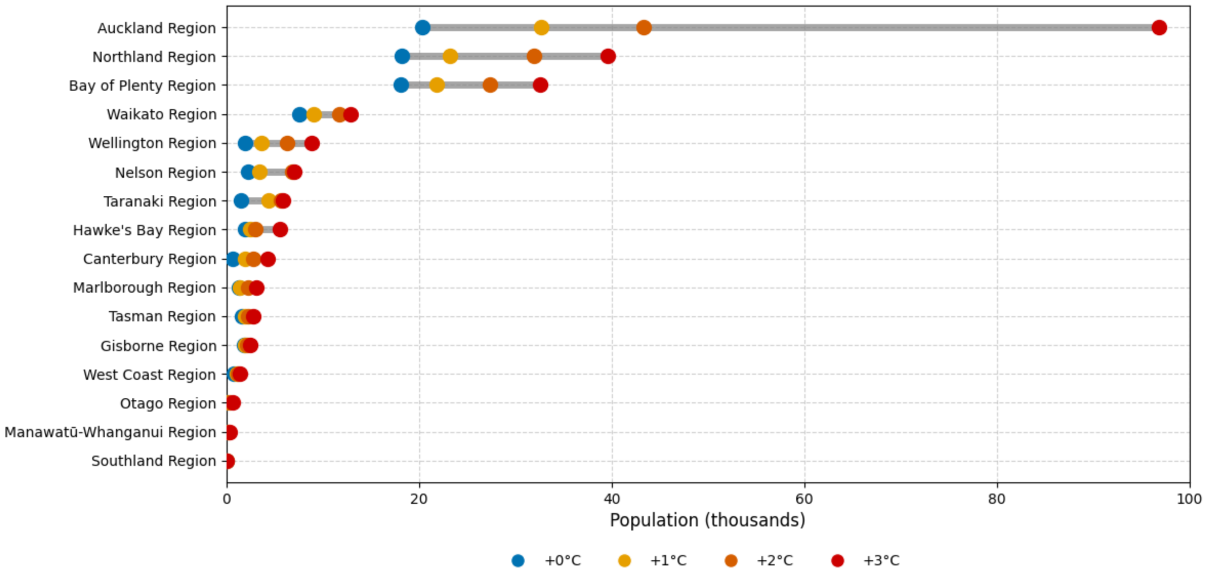

Figure 49: Projected exposure of A-NZ region populations to rainfall-induced landslides under temperature change. Population values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure remains relatively low under strong mitigation, with Auckland increasing modestly from 27,021 in 2020 to 30,458 by 2090, Northland from 21,130 to 22,790, and Bay of Plenty from 20,457 to 21,646 (Figure 50). Other regions show minimal change, reflecting limited escalation under low-emission scenarios.

SSP2-4.5 Scenario (2020–2090)

Exposure grows steadily, with Auckland reaching 42,558, Northland 31,587, and Bay of Plenty 27,822 by 2090. Projected exposure also exceeds 6000 in several regions including Waikato, Wellington and Nelson.

SSP3-7.0 Scenario (2020–2090)

Exposure shows a stronger upward trend under higher emission scenarios, with Auckland 84,421, Northland to 38,542, and Bay of Plenty to 32,452 by 2090. Waikato's exposure also exceeds 10,000.

SSP5-8.5 Scenario (2020–2090)

Auckland's projected exposure reaches 38,339 in 2050, then doubles to 96,826 by 2090. Northland (39,611), and Bay of Plenty (32,560) also show high population exposure by 2090.

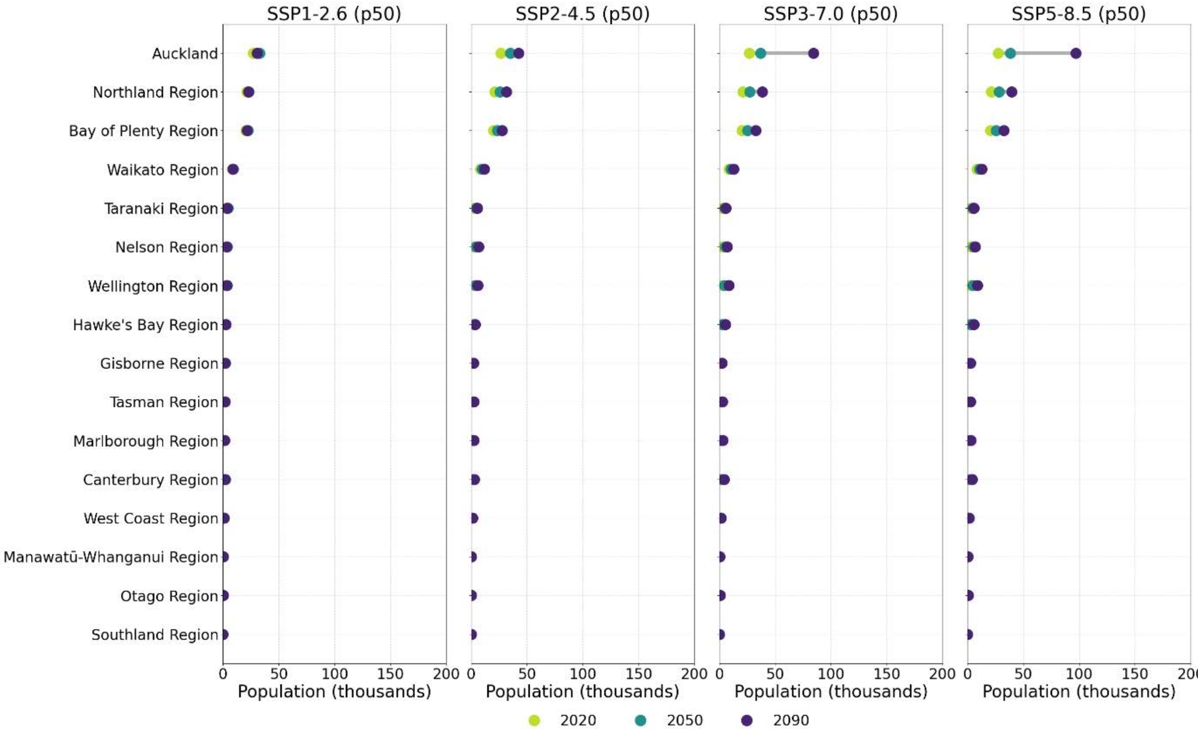

Figure 50: Projected 50th percentile (p50) exposure of A-NZ region populations to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios. Population values are rounded for presentation clarity.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Population exposure increases sharply with rising sea levels. At +0 m, Canterbury (9261), Hawke's Bay (7455), and Auckland (3418) show the highest building exposure (Figure 51). By +1 m, population exposure escalates significantly: Canterbury reaches 41,693, Hawke's Bay 33,364, and Wellington 12,540, while Otago jumps to 13,329. At +2 m, Canterbury exceeds 77,637, Hawke's Bay climbs to 47,276, and Wellington rises to 27,042, indicating severe vulnerability in eastern and southern regions. Auckland and Bay of Plenty also show substantial increases in population exposure, reaching 26,869 and 24,279 respectively.

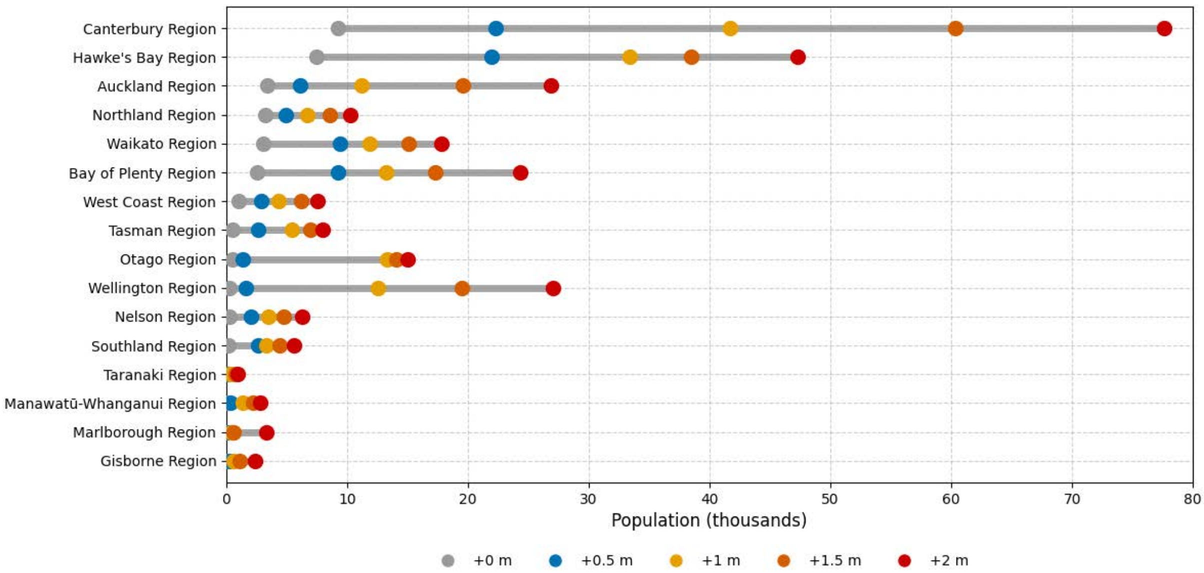

Figure 51: Projected exposure of A-NZ region populations to extreme sea level driven coastal flooding under sea level change. Population values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Population exposure to extreme sea level driven coastal flooding in Waikato rises from 3040 in 2020 to 7222 people by 2090, Auckland from 3408 to 5154, and Bay of Plenty from 2581 to 6967 (Figure 52). Canterbury and Hawke's Bay show more substantial growth, with the number of people exposed in Canterbury increasing from about 9262 to over 17,621 and Hawke's Bay from 7455 to 16,707. Regions such as Gisborne, Marlborough, and Taranaki remain almost unchanged.

SSP2-4.5 Scenario (2020–2090)

Population exposure grows steadily in this scenario, with Waikato increasing to 8489 people by 2090, Auckland reaches 5738, and Bay of Plenty 8297. Canterbury exposure increases to 20,492 people by 2090, and Hawke's Bay to 19,890.

SSP3-7.0 Scenario (2020–2090)

In this scenario population exposure in Waikato rises to 9560 people by 2090, Auckland to 6546, and Bay of Plenty to 9544. Canterbury and Hawke's Bay show more substantial growth by 2090, with Canterbury increasing to 24,249 and Hawke's Bay to 22,826. Other regions such as Gisborne, Marlborough, and Taranaki show relatively small increases in exposure.

SSP5-8.5 Scenario (2020–2090)

While growth in population exposure is modest in some regions, others show marked increases over time. Waikato climbs from 3040 people in 2020 to 10,016 by 2090, and Auckland moves from 3408 to 7353. Bay of Plenty sees a sharper rise, starting at 2581 and reaching 10,197 people exposed by 2090. The largest shifts occur in Canterbury and Hawke's Bay, where exposure more than doubles by 2090, with Canterbury increasing from 9262 to 27,355 and Hawke's Bay from 7455 to 24,665. Exposure increases remain relatively smaller in regions such as Gisborne, Marlborough, and Taranaki.

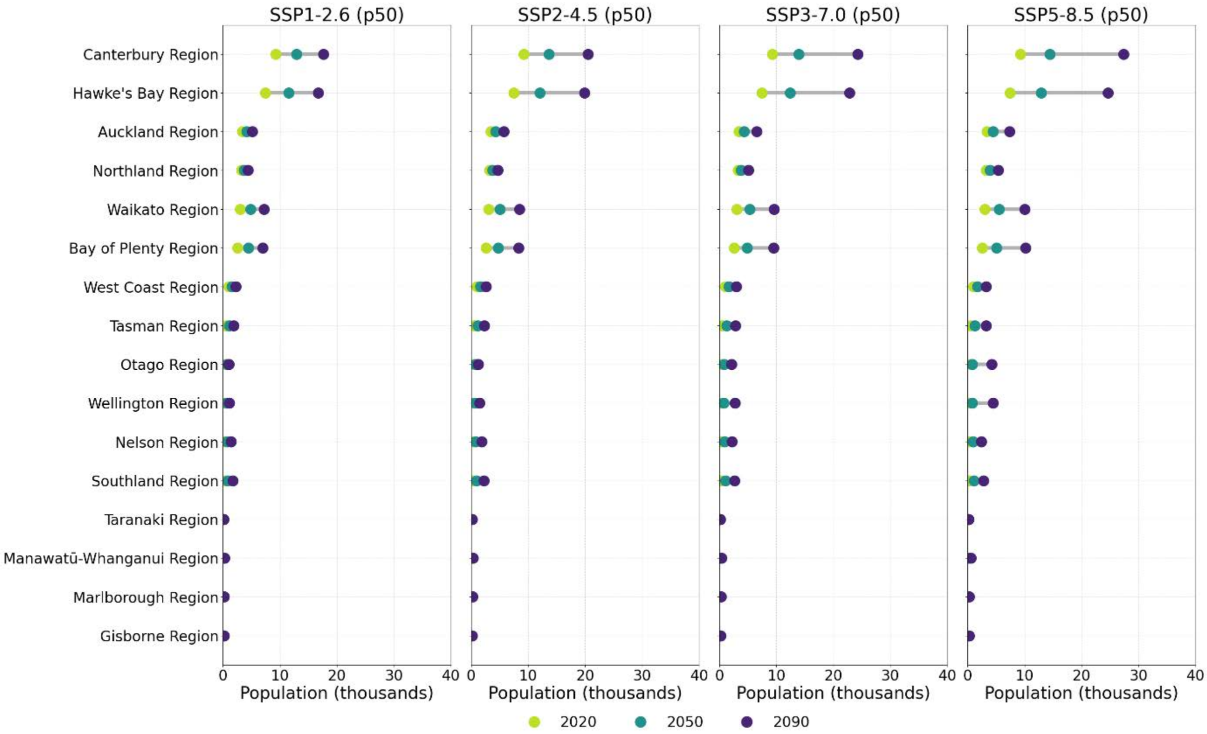

Figure 52: Projected 50th percentile (p50) exposure of A-NZ region populations to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Population values are rounded for presentation clarity.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Population exposure to coastal flooding from mean high water springs (MHWS) increases substantially with rising sea levels, though overall exposure is lower than for extreme sea levels. Hawke's Bay shows the highest exposure, increasing from no people at +0 m to 36,051 at +2 m. Population exposure also exceeds 10,000 people in Wellington (17,176), Canterbury (14,412), Otago (13,709) and Bay of Plenty (13,236) at +2 m (Figure 53). West Coast population also rises considerably, from 54 people at +0 m to 5023 at +2 m.

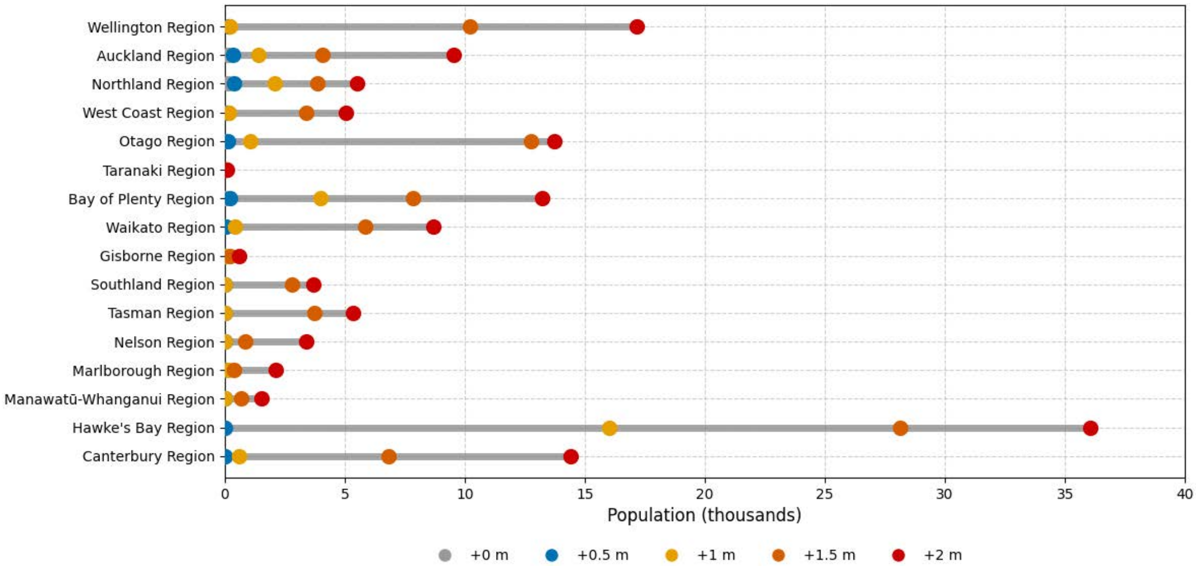

Figure 53: Projected exposure of A-NZ region populations to mean high water springs driven coastal flooding under sea level change. Population values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Auckland sees the largest increase in exposure, rising from 148 people in 2020 to more than 263 by 2090, while Northland grows steadily from 110 to 298 (Figure 54). Bay of Plenty also trends upward, moving from 21 to 148 people exposed by the end of the century. Otago and West Coast show moderate growth, reaching around 102 people each by 2090. In contrast, Wellington holds constant at 170 people exposed throughout the period, and regions such as Hawke's Bay, Manawatū-Whanganui, Marlborough, Nelson, and Tasman show no population exposure.

SSP2-4.5 Scenario (2020–2090)

Auckland population exposure rises to 305 people by 2090, Northland reaches 362 and Bay of Plenty increases to nearly 186. Otago and West Coast show moderate growth, reaching around 129 and 120 people exposed respectively by 2090.

SSP3-7.0 Scenario (2020–2090)

Auckland again shows a steady exposure increase in exposure to over 426 people by 2090, while Northland rises to 573. Bay of Plenty reaches 510 people by 2090. Otago and West Coast also trend upward toward 2090, reaching 204 and 133 people exposed respectively. Wellington remains almost unchanged at 175 people exposed, and regions such as Gisborne, Taranaki, and Tasman show minimal increases. Hawke's Bay, shows no exposure at 2050 but exceeds 1281 by 2090.

SSP5-8.5 Scenario (2020–2090)

Hawke's Bay shows no exposure for most of the century before an acceleration to 3847 people by 2090. Bay of Plenty follows a similar pattern, starting at just 21 in 2020 and accelerating sharply after mid-century to 1111 by 2090. Auckland's exposure steadily throughout the century, rising to 603, while Northland increase to 862.

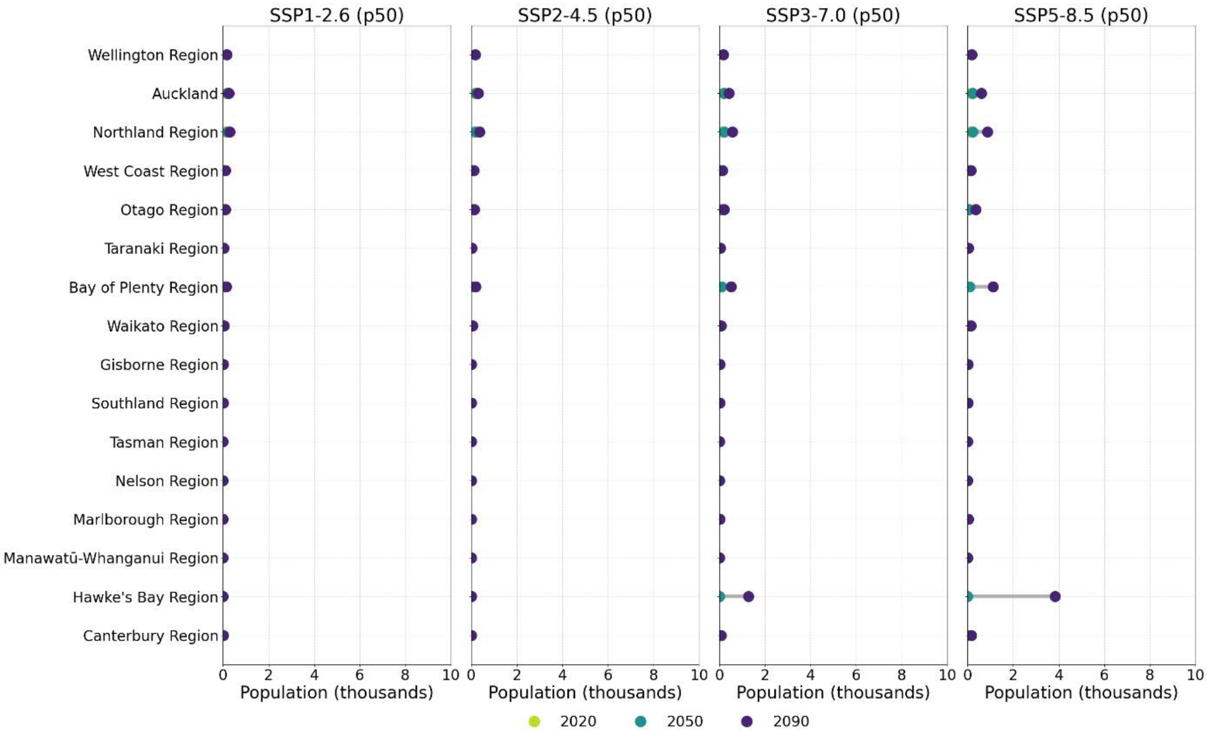

Figure 54: Projected 50th percentile (p50) exposure of A-NZ region populations to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Population values are rounded for presentation clarity.

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Population exposure on coastal land with shallow groundwater presence is already significant and increases further with sea-level rise. Canterbury shows the highest exposure, growing from 156,465 people at +0 m to 217,515 at +2 m (Figure 55). Auckland follows, increasing from 47,050 to 54,224, while Bay of Plenty increases from 20,783 to 36,060. Hawke's Bay also shows a notable exposure increase, from 19,821 to 31,792, Southland from 2086 to 13,249 and Gisborne from 625 to 13,114.

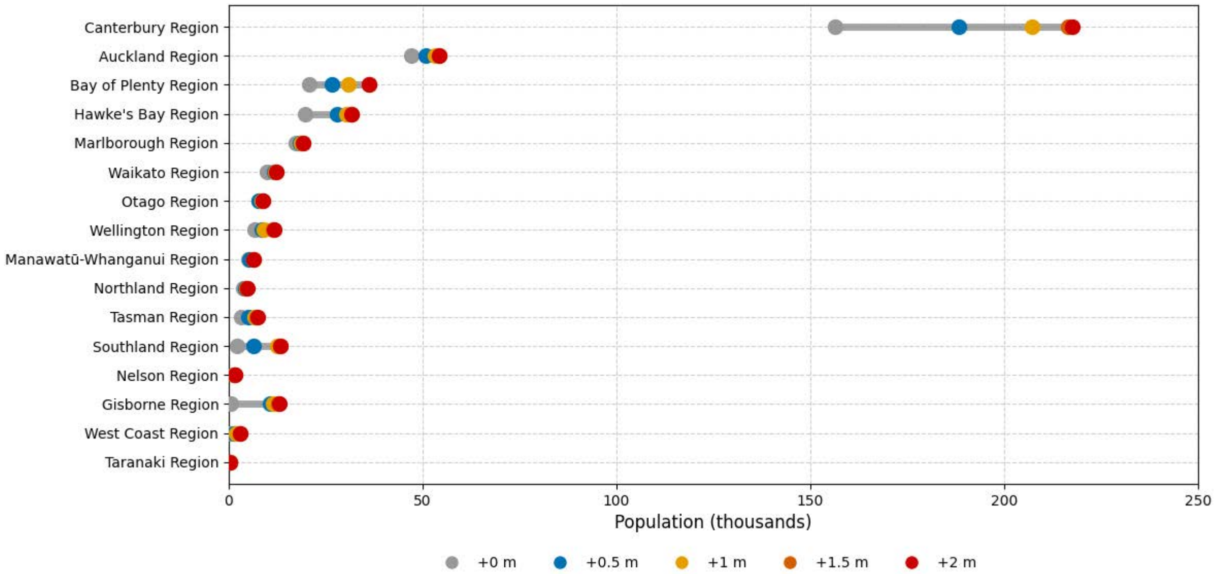

Figure 55: Projected exposure of A-NZ region populations on coastal land with shallow groundwater presence under sea level change. Population values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Canterbury's population exposure increases from 156,466 in 2020 to 176,883 by 2090 (Figure 56). Auckland exposure grows modestly from 47,048 to 49,590, while Bay of Plenty and Hawke's Bay increase from around 20,780 and 19,821 to about 24,586 and 24,984 people respectively. Smaller regions show relatively rapid exposure over the century with Gisborne increasing from 625 to 7039, and Southland from 2086 to nearly 4799 people.

SSP2-4.5 Scenario (2020–2090)

Canterbury continues to dominate exposure, increasing to 184,910 people by 2090. Over this same period Auckland grows modestly in exposure to just over 50,429 people, while Bay of Plenty rises to 25,738 and Hawke's Bay to 26,757. Gisborne and Southland continue to accelerate reaching 9239 and 5757 people respectively by 2090.

SSP3-7.0 Scenario (2020–2090)

Canterbury again has the highest population exposure, exceeding 167,955 people by 2050, and reaching 190,247 by 2090. Auckland exposure grows modestly from 48,435 in 2050 to 51,120 by 2090, while Bay of Plenty rises from 22,738 to 26,893. Hawke's Bay similarly increases from 22,582 in 2050 to 28,093people exposed in 2090. Smaller regions by population show proportionately rapid exposure with Gisborne increasing from 4030 to over 10,694 people, and Southland from 3658 to 6817.

SSP5-8.5 Scenario (2020–2090)

Canterbury continues to dominate exposure, increasing to 193,269 people by 2090. Auckland exposure grows modestly from 47,048 to 48,588 by 2050 and 51,479 by 2090. Bay of Plenty rises from 20,780 to 22,970 in 2050 and almost 27,594 by century's end, while Hawke's Bay moves from 19,821 to 22,889 and then 28,511. Gisborne exceeds 10,801, and Southland 7917 by 2090.

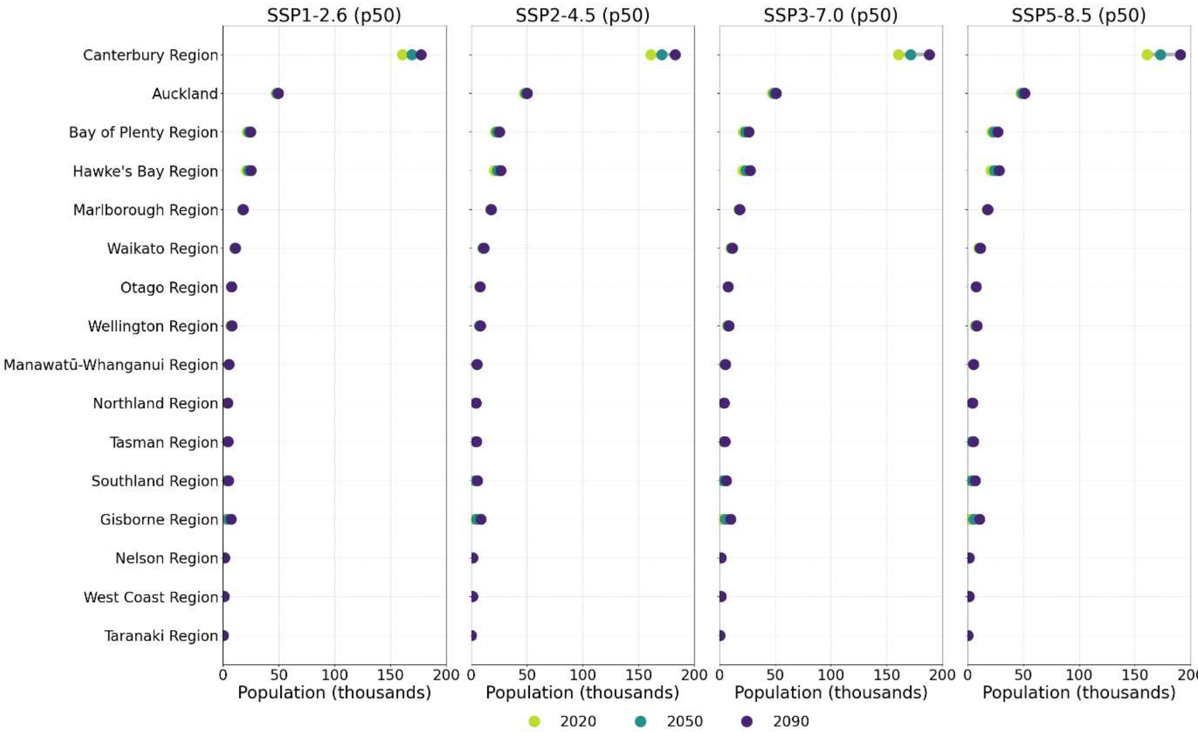

Figure 56: Projected 50th percentile (p50) exposure of A-NZ region populations on coastal land with shallow groundwater presence under medium confidence shared socio-economic pathway (SSP) scenarios. Population values are rounded for presentation clarity.

Coastal erosion

Projected population exposure to coastal erosion at 2100 based on historic erosion trends

Projected population exposure to coastal erosion is relatively low compared to coastal flooding hazards but is notable for certain regions. Hawke's Bay Region has the highest exposure, with 297 people exposed, followed by the Waikato Region at around 255 people and West Coast Region at 213 people (Figure 57). Other regions such as Tasman, Nelson, Auckland and Northland range between 150–210 people, while smaller regions like Gisborne, Southland, Otago, and Taranaki have exposures below 50 people.

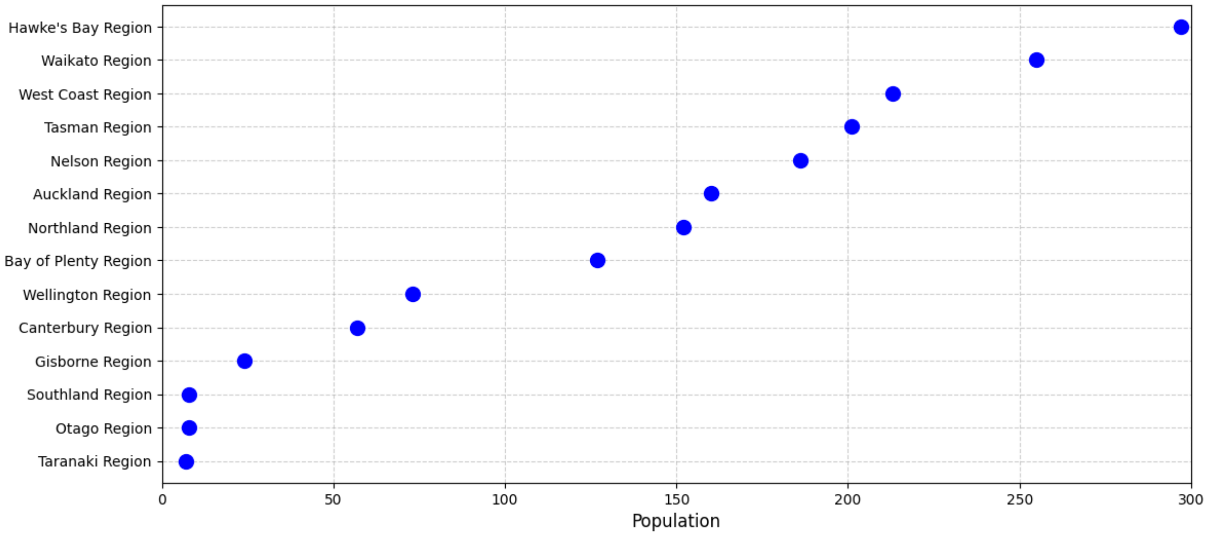

Figure 57: Projected exposure of A-NZ region populations to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Very Hot Days (≥30°C)

In the Waikato region, 303,000 people could be exposed to 20–30 very hot days annually by 2090 under SSP5-8.5. Hawke's Bay could see over 150,000 people exposed to 20–30 very hot days by 2080. Auckland and Bay of Plenty also show substantial exposure, each with over 90,000 people exposed to 20–30 very hot days under this scenario. Canterbury emerges as a major hotspot in the South Island, with more than 125,000 people projected to face 20–30 very hot days by 2090 annually under SSP5-8.5.

2.2.2 Buildings

Inland flooding

Temperature Change (+0°C to +3°C)

Building exposure to inland flooding increases steadily across all regions with warming, indicating higher risk under more extreme temperature scenarios. Canterbury shows the highest exposure, rising from 126,309 buildings at +0°C to 140,999 at +3°C warming, with replacement value increasing from NZD 50B to NZD 59B (Figure 58). Auckland follows, growing from 75,960 buildings to around 82,575, and replacement value from NZD 42B to NZD 50B. Waikato and Wellington exhibit similar trends, respectively increasing from 58,564and 54,161 buildings at +0°C warming to 67,072and 60,093 at +3°C warming, with replacement values rising from NZD 20B and NZD 27B to NZD 24B to NZD 31B. Smaller regions such as Nelson, Taranaki, Gisborne, and Marlborough remain below 20,000 buildings even at +3°C warming, with replacement values under NZD 10B.

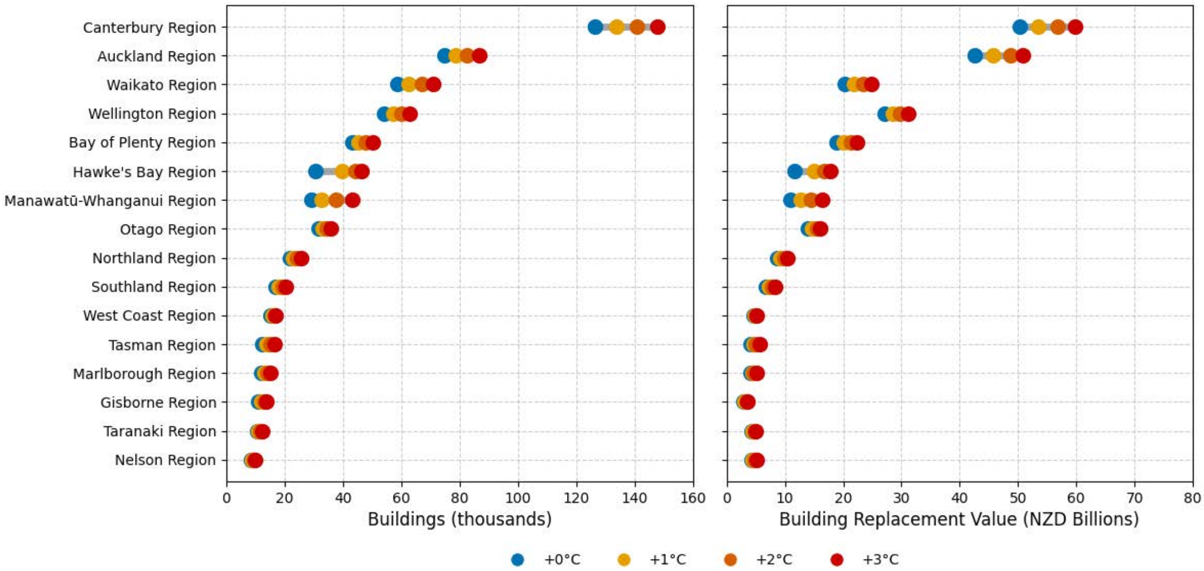

Figure 58: Projected exposure of A-NZ region buildings and building replacement value (NZD) to inland flooding under temperature change. Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure in Canterbury starts at 131,633 buildings in 2020, increases slightly to 135,351 by 2050, and declines marginally to 134,070 by 2090, with replacement values varying between NZD 52–54B over this period (Figure 59). Auckland shows similar stability, moving from 78,384 buildings exposed in 2020 to 80,215 by 2050, and reducing slightly to 79,469 by 2090, with replacement value at NZD 45B in 2020, NZD 46B by 2050, and remaining at NZD 46B by 2090. Other regions exhibit minimal change, reflecting limited escalation under low-emission futures.

SSP2-4.5 Scenario (2020–2090)

Exposure in Canterbury rises to 137,029 buildings by 2050, and reaches 141,959 by 2090, with replacement value increasing from NZD 52B to NZD 57B by 2090. Auckland climbs to 81,019 by 2050 and 83,652 by 2090, with replacement value moving from NZD 45B in 2020 to NZD 49B by 2090. Waikato and Wellington region exposure increases to 63,911 and 58,123 buildings by 2050, and to 67,703 and 60,527 by 2090, indicating gradual exposure escalation under mid-range emissions.

SSP3-7.0 Scenario (2020–2090)
Exposure shows a stronger upward trend than SSP2-4.5. Canterbury reaches 139,340 buildings exposed by 2050 and 148,836 by 2090, with replacement value rising to NZD 55B and then NZD 60B. Auckland reaches 81,714 buildings by 2050 and 87,232 by 2090, with replacement values of NZD 47B mid-century and NZD 51B by late century. Other regions follow similar patterns, highlighting greater exposure under high-emission conditions.

SSP5-8.5 Scenario (2020–2090)
The trend is similar to SSP3-7.0 but slightly higher end projections. Canterbury reaches139,666 buildings exposed by 2050 and 148,853 by 2090, with replacement value rising to NZD 56B by 2050 and NZD 60B by 2090. Auckland reaches 82,231 buildings by 2050 and 88,101 by 2090, with replacement value near NZD 48B and NZD 51B respectively. This scenario demonstrates that high-emission futures significantly amplify economic exposure, particularly in Canterbury and Auckland.

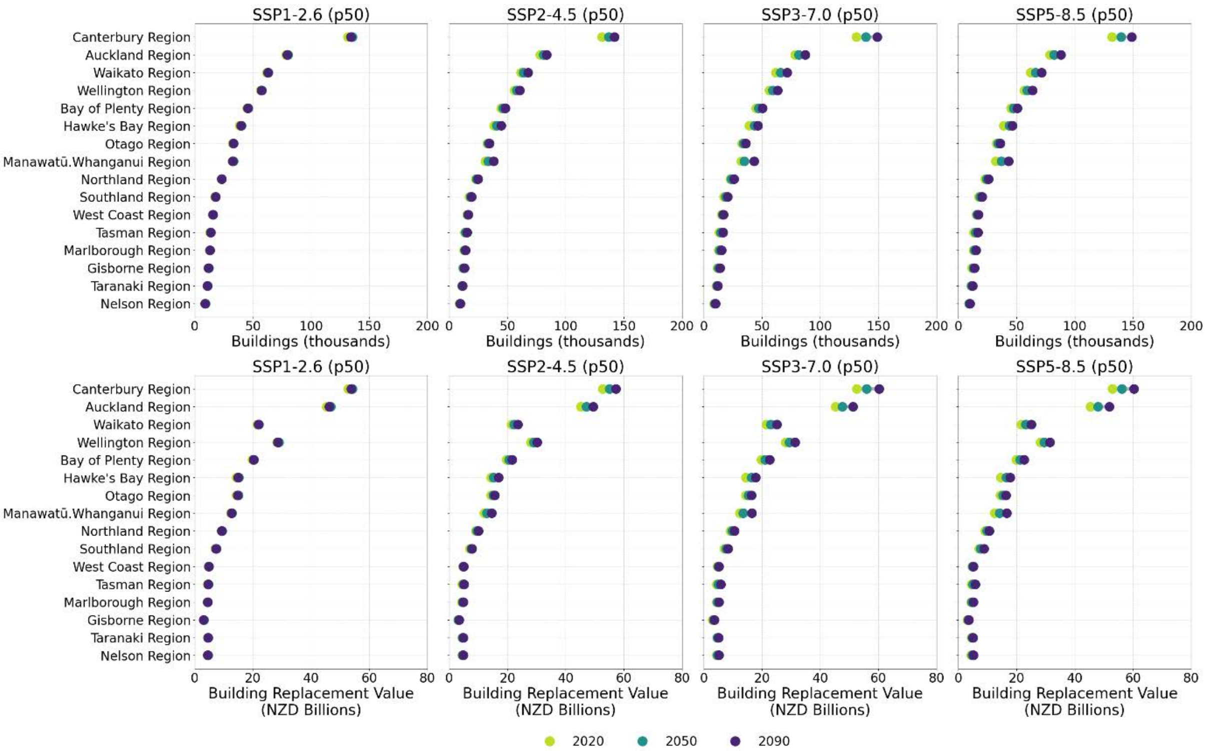

Figure 59: Projected 50th percentile (p50) exposure of A-NZ region building and building replacement value (NZD) to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Building values are rounded for presentation clarity.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Auckland shows the highest exposure to rainfall-induced landslides, increasing from 14,628 buildings at +0°C warming to 59,530 at +3°C warming, with replacement value rising from NZD 7B to NZD 32B (Figure 60). Northland follows over this temperature warming, with exposure growing from 19,695 buildings to 39,320, and replacement value from NZD 7B to NZD 13B. Bay of Plenty and Waikato also experience significant increases, reaching 28,221and 21,344 buildings at +3°C warming , with replacement values of NZD 14B and NZD 6B. South Island regions such as Otago, Southland, and West Coast remain below 5000 buildings even under the highest warming scenario, though they still exhibit proportional increases. Overall, northern and eastern regions dominate exposure growth, reflecting their vulnerability to rainfall-driven landslide hazards.

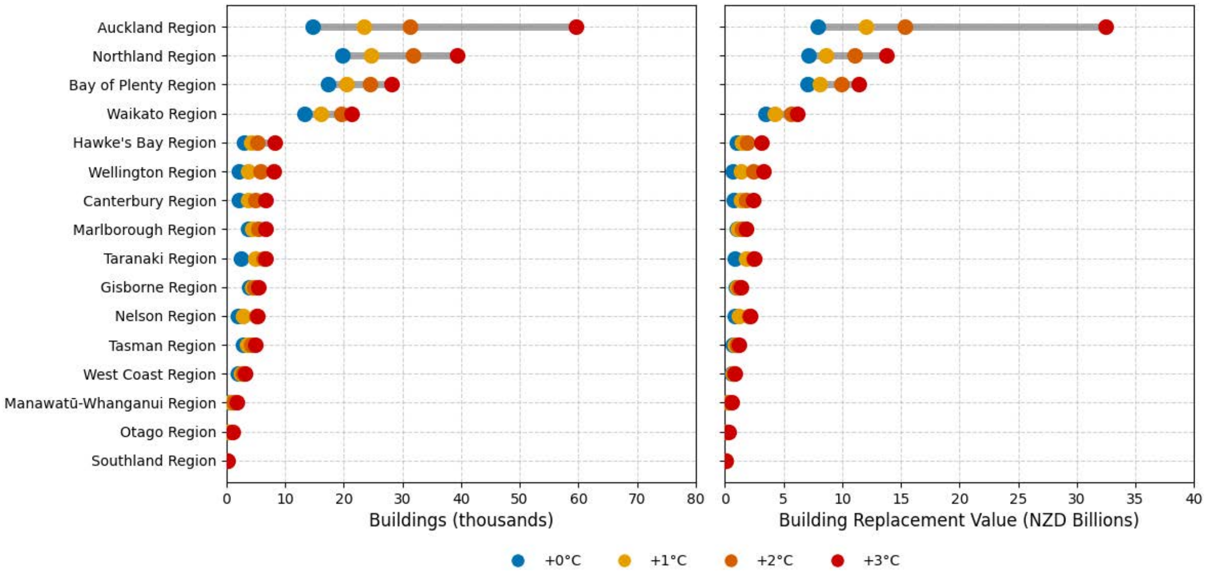

Figure 60: Projected exposure of A-NZ region buildings and building replacement value (NZD) to rainfall-induced landslides under temperature change. Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Auckland exposure to rain-induced landslides starts at 19,374 buildings in 2020, increases slightly to 23,535 by 2050, and reduces to 21,868 by 2090, with replacement value varying from NZD 10B to NZD 12B over this period (Figure 61). Northland grows modestly from 22,525 in 2020 to 24,130 buildings by 2090, and Bay of Plenty rises from 19,320 to 20,298. Other regions show minimal change, indicating limited escalation under low-emission futures.

SSP2-4.5 Scenario (2020–2090)

Auckland exposure rises from 18,912 buildings in 2020 to 25,258 by 2050 and 30,756 by 2090, with replacement value increasing from NZD 9B to NZD 12B at 2050 and NZD 15B at 2090. Northland reaches 26,554 buildings by 2050 and 31,517 by 2090, while at this time Bay of Plenty and Waikato grow to 24,875 and 19,600 buildings. Hawke's Bay and Wellington also increase moderately, reaching 5,884 and 5,762 buildings by 2090.

SSP3-7.0 Scenario (2020–2090)

Exposure in Auckland climbs to 26,701 buildings by 2050 and 53,245 by 2090, with replacement values of NZD 13B and NZD 28B. Northland grows to 38,233 buildings and NZD 13B by 2090, while Bay of Plenty and Waikato rise to 28,132 and 21,256 buildings. Hawke's Bay and Wellington reach 8,187 and 7,853 buildings.

SSP5-8.5 Scenario (2020–2090)

The largest increases in exposure to rain-induced landslides occur under extreme emissions. Exposure in Auckland approaches 27,620 buildings by 2050 and 59,530 by 2090, with replacement values of NZD 13B and NZD 32B. Northland exposure climbs to 39,320 buildings and NZD 13B by 2090, while Bay of Plenty and Waikato respectively reach 28,221 and 21,344 buildings exposed. Hawke's Bay and Wellington exposures both exceed 8000 buildings.

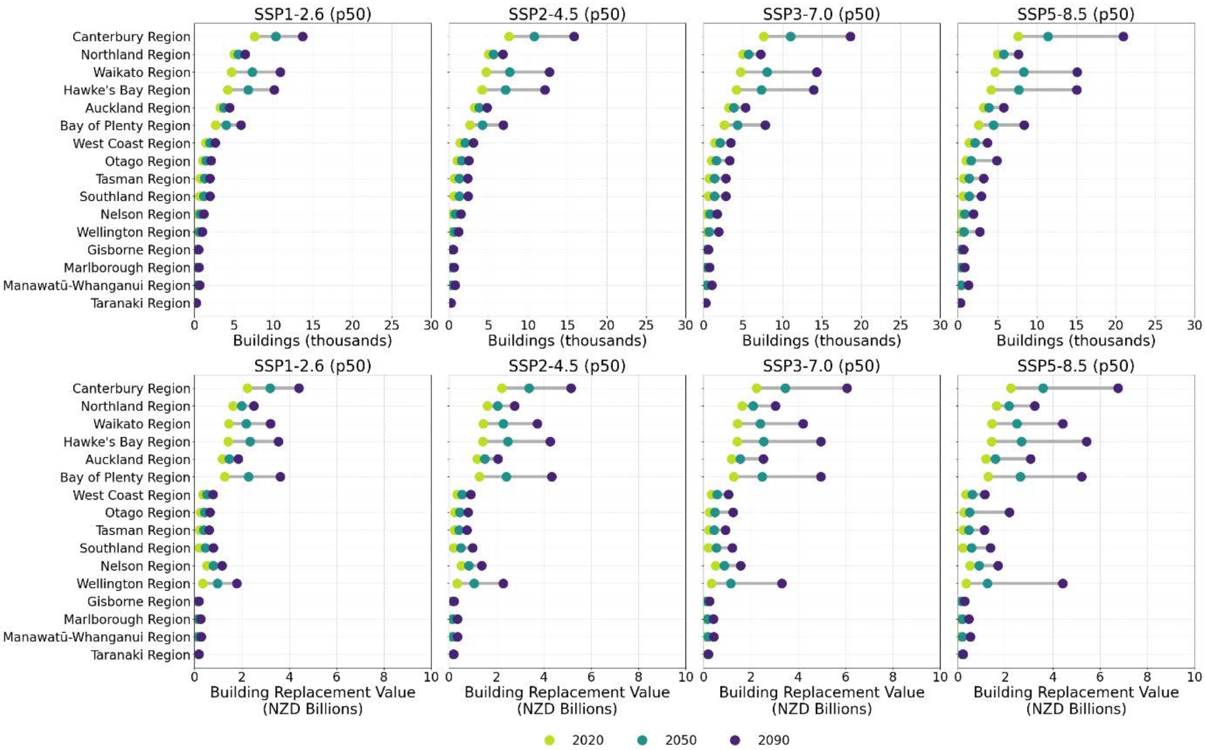

Figure 61; Projected 50th percentile (p50) exposure of A-NZ region building and building replacement value (NZD) to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios. Building values are rounded for presentation clarity.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Building exposure to coastal flooding from extreme sea levels increases sharply with rising sea levels across most regions. Canterbury shows the highest exposure, rising from 7603 buildings at +0 m to 55,256 at +2 m, with replacement value increasing from NZD 2B to NZD 18B (Figure 62). Hawke's Bay follows, growing from 4184 buildings exposed to 29,549, and replacement value from NZD 1B to NZD 11B. Waikato and Bay of Plenty also experience significant increases in exposure, reaching 26,702 and 29,549 buildings at +2 m, with replacement values of NZD 7B and NZD 11B. Auckland rises from 3277 buildings exposed at +0 m to 12,068 at +2 m, with replacement value climbing from NZD 1B to NZD 13B. Otago building exposure increases considerably from 1000 buildings at +0 m to 11,914 at +1 m. Smaller regions such as Gisborne, Taranaki, and Marlborough remain below 5000 buildings exposed even under the highest sea-level scenario.

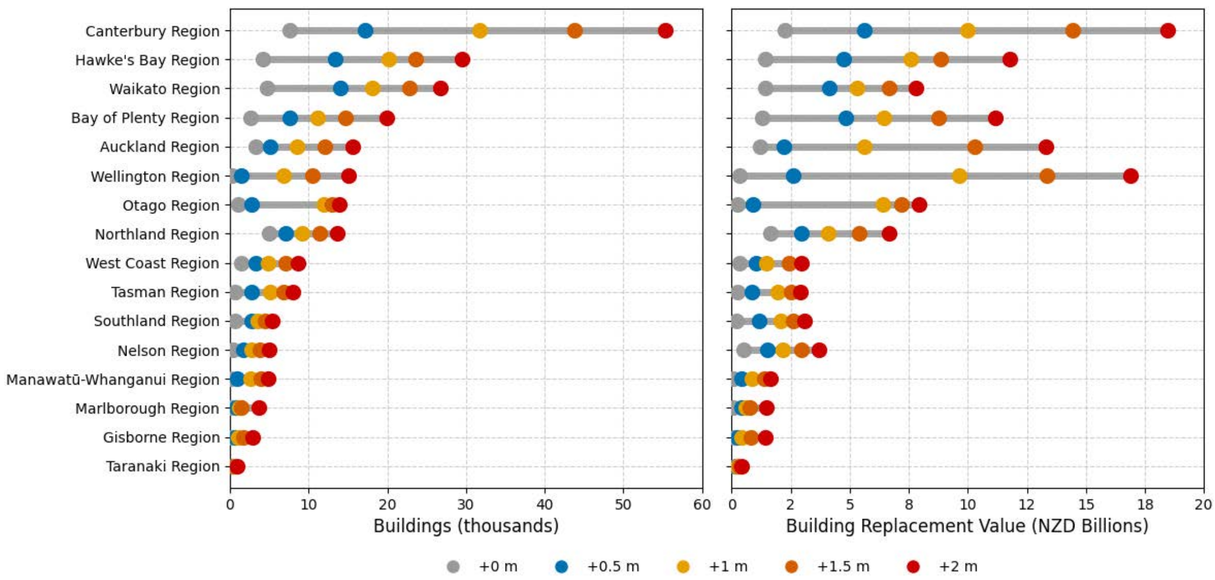

Figure 62: Projected exposure of A-NZ region buildings and building replacement value (NZD) to extreme sea level driven coastal flooding under sea level change. Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Canterbury has 7603 buildings exposed in 2020, increasing to 10,283 by 2050, and reaches 13,718 by 2090, with replacement value moving from NZD 2B to NZD 4B over the century (Figure 63). Hawke's Bay and Waikato region building exposure increases to 10,094 and 10,860 by 2090.

SSP2-4.5 Scenario (2020–2090)

Canterbury rises 15,828buildings exposed by 2090, with replacement value of NZD 5B. Hawke's Bay reaches 7138 buildings exposed by 2050 and 12,124 by 2090. Waikato and Bay of Plenty reach 12,728 and 6868 buildings exposed respectively by 2090. Auckland climbs to 4817 buildings by 2090.

SSP3-7.0 Scenario (2020–2090)
Canterbury increases to 11,045 buildings exposed by 2050, with replacement value of NZD 3B. Hawke's Bay exposure grows to 7323 buildings by 2050, with a replacement value of NZD 2B. Waikato expands to 8037 buildings exposed with NZD 2B replacement value by 2050, while Bay of Plenty rises to 4305 buildings and NZD 2B replacement value. Auckland increases to 3853 buildings exposed by 2050, with a NZD 1B replacement value.

SSP5-8.5 Scenario (2020–2090)
Canterbury exposure increases to 11,414 buildings by 2050, and 20,942 by 2090, with replacement values rising 3B and NZD 6.8B. Hawke's Bay grows to 7691 buildings exposed by 2050 and 15,035 by 2090, with replacement value reaching NZD 5B at 2090. Waikato reaches 15,077 by 2090, with NZD 4B replacement value, while Bay of Plenty reaches 8,391 buildings and NZD 5B replacement value. Auckland reaches 5811 buildings by 2090, and NZD 3B replacement value.

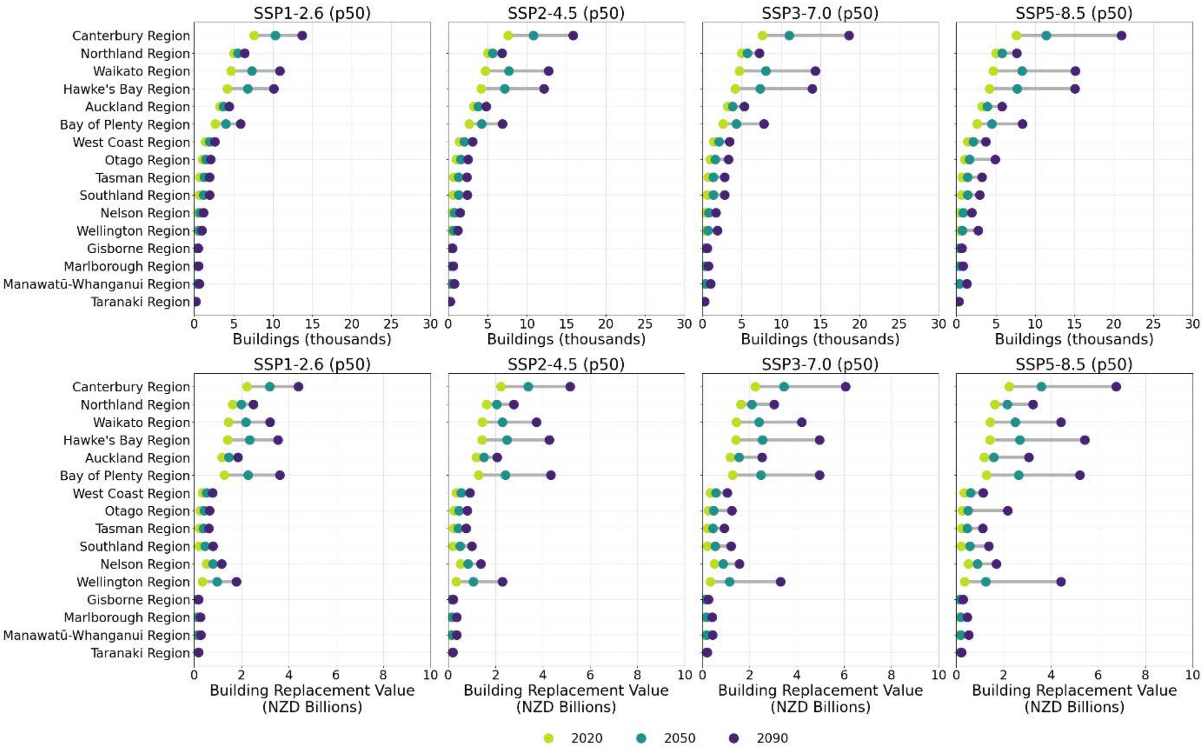

Figure 63: Projected 50th percentile (p50) exposure of A-NZ region building and building replacement value (NZD) to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Building values are rounded for presentation clarity.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Building exposure to coastal flooding under mean high water springs increases markedly with rising sea levels, though overall exposure is lower than for extreme sea levels. Hawke's Bay shows the highest exposure, rising from about no building exposure at +0 m to 22,570 at +2 m, with replacement value of NZD 8B (Figure 64). Waikato follows, growing from 94 buildings at +0 m to 15,709 buildings with NZD 4B replacement value at +2 m. Otago and Bay of Plenty also experience significant increases, reaching 12,956 and 12,501 buildings exposed respectively at +2 m, each with replacement values exceeding NZD 7B. Canterbury increases from 120 buildings at +0 m to 12,250 at +2 m, with replacement value climbing from NZD 42M to NZD 4B. Wellington and Northland show substantial growth, moving from 205 and 301 buildings exposed at +0 m to 9999 and 8179 buildings exposed respectively at +2 m, with replacement values of NZD 15B and NZD 4B. Smaller regions such as Gisborne, Taranaki, and Marlborough remain below 3000 buildings exposed even under the highest sea-level scenario, though they still exhibit proportional increases.

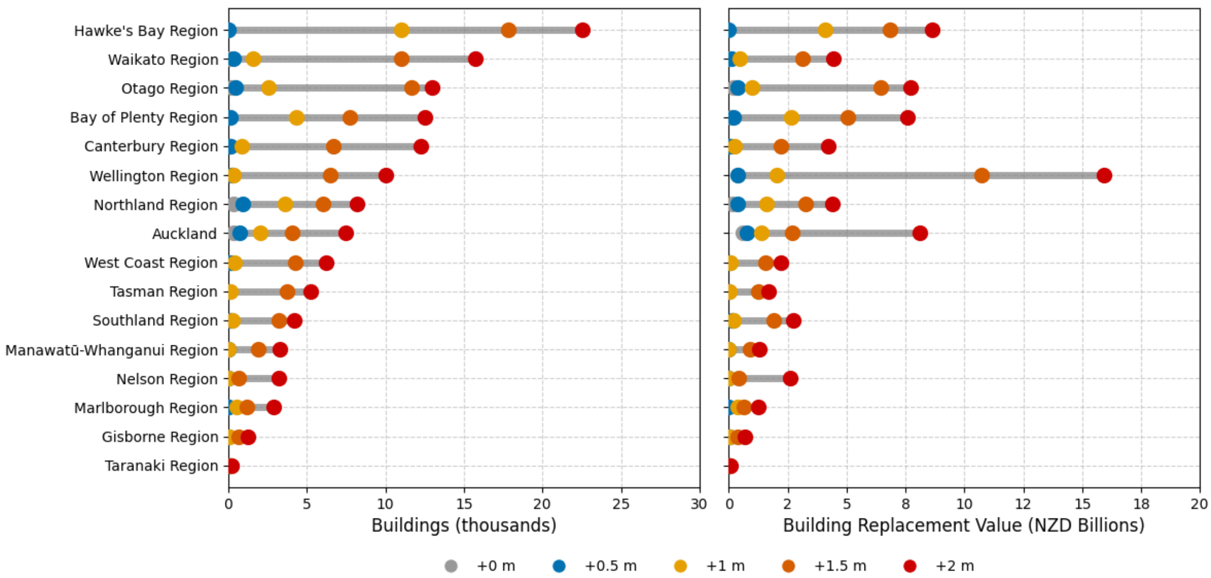

Figure 64: Projected exposure of A-NZ region buildings and building replacement value (NZD) to mean high water springs driven coastal flooding under sea level change. Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Auckland and Northland show 593 and 705 buildings exposed by 2090, with replacement values reaching NZD 0.7B to NZD 0.3B respectively (Figure 65). Waikato and Otago building exposure grows modestly to 266 and 391 buildings respectively by 2090. Other regions show minimal change, indicating limited escalation under low-emission futures.

SSP2-4.5 Scenario (2020–2090)

Waikato exposure grows modestly from about 91 buildings in 2020 to 168 by 2050, with replacement value increasing from NZD 0.04B to NZD 0.06B. Otago rises to 291 by 2050, reaching NZD 0.25B replacement value. Canterbury shows 130 buildings exposed by 2050, with a replacement value of NZD 0.05B.

SSP3-7.0 Scenario (2020–2090)

Hawke's Bay has no building exposure until late century, reaching 877 buildings by 2090 with a replacement value of NZD 0.3B. Otago reaches 305 by 2050 and 620 by 2090, with a replacement value NZD 0.4B. Auckland exposure increases to 444 by 2050 and 838 by 2090, with replacement value reaching NZD 0.8B.

SSP5-8.5 Scenario (2020–2090)

Hawke's Bay grows from zero exposure in early decades to 2640 buildings by 2090, with replacement value reaching NZD 0.9B. Waikato increases to 188 by 2050 and 664 by 2090, with replacement value increasing from NZD 0.04B to NZD 0.1B. Otago expands from 213 buildings exposed to 312 by 2050 and 960 by 2090, with replacement value climbing from NZD 0.2B to NZD 0.5B. Bay of Plenty reaches 1104 buildings exposed by 2090, with a replacement value of NZD 0.8B. Auckland remains the largest contributor, moving from 307 buildings to 455 by 2050 and 1068 by 2090, with replacement value growing from NZD 0.6B to NZD 0.9B.

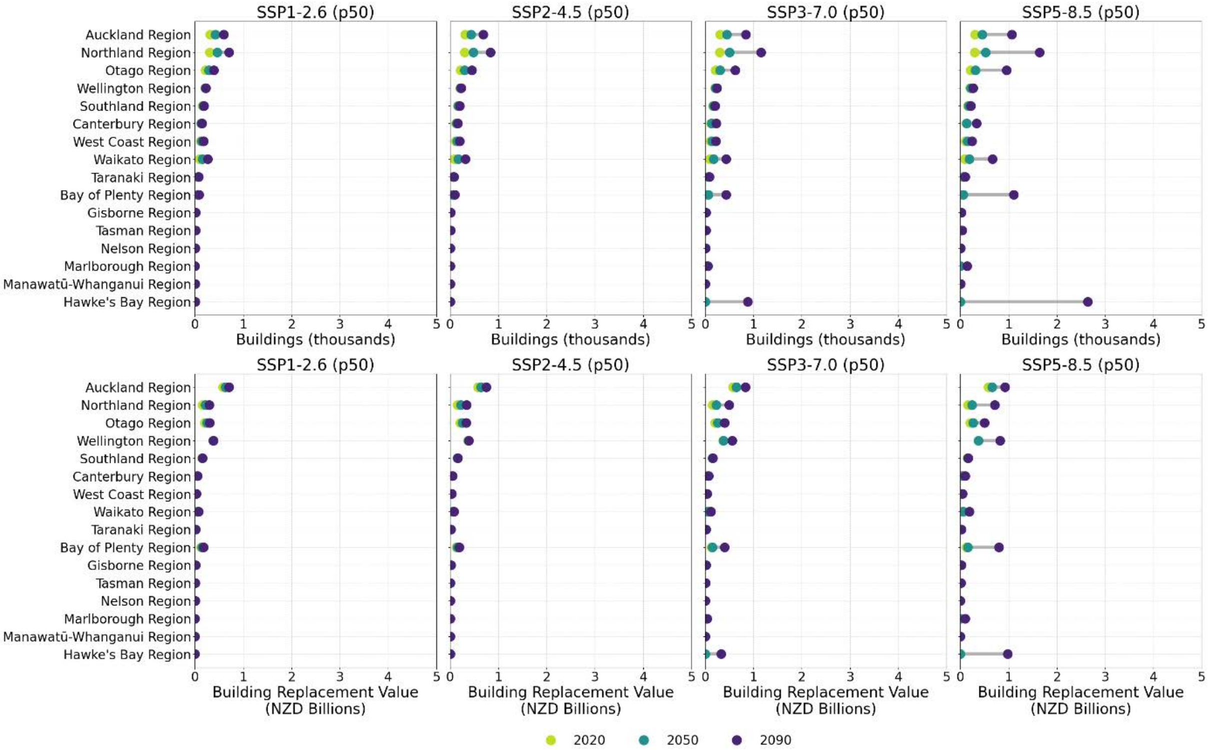

Figure 65: Projected 50th percentile (p50) exposure of A-NZ region building and building replacement value (NZD) to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Building values are rounded for presentation clarity.

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Building exposure on coastal land with shallow groundwater presence is already substantial and increases further with rising sea levels. Canterbury shows the highest exposure, rising from about 96,876 buildings at +0 m to 131,196 at +2 m, with replacement value increasing from NZD 47B to NZD 62B (Figure 66). Auckland shows a slight increase in exposure from 23,371 to 26,815 buildings, and replacement value of NZD 1.4B and NZD 1.6B. Bay of Plenty and Hawke's Bay also show considerable increases in exposure, reaching 23,206 and 21,687 buildings at +2 m, each with over NZD 11B replacement value. Waikato rises from 14,429 buildings exposed at +0 m to 18,276 at +2 m, with a replacement value reaching NZD 2.8B. Smaller regions such as Gisborne, Otago, and Tasman remain below 10,000 buildings exposed even under the highest sea-level scenario, though they still exhibit proportional increases.

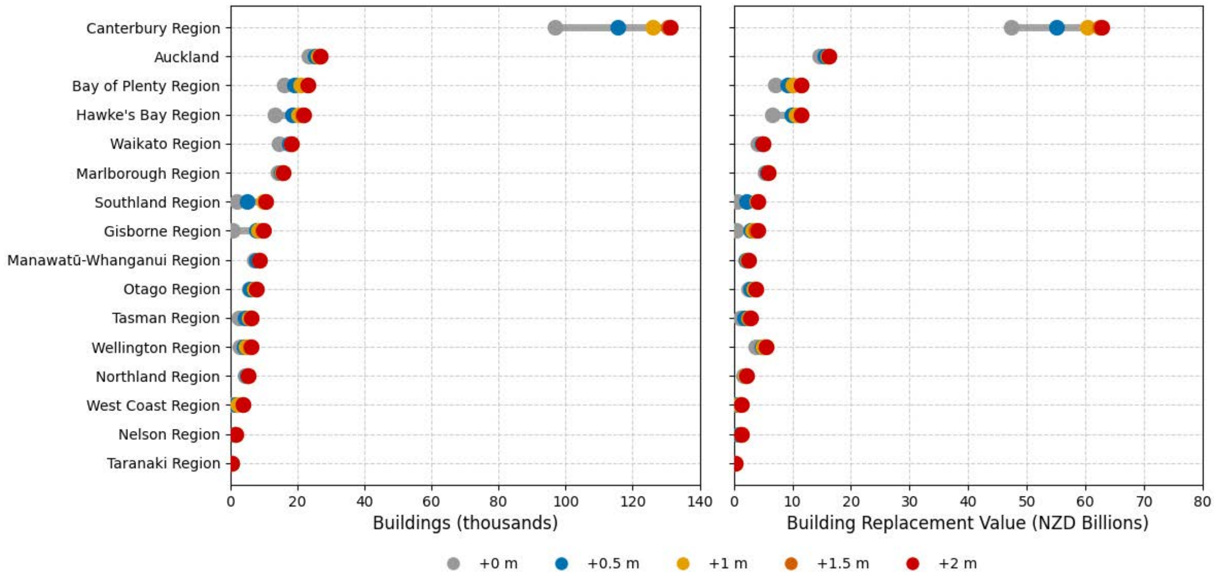

Figure 66: Projected exposure of A-NZ region buildings and building replacement value (NZD) on coastal land with shallow groundwater presence under sea level change. Building values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposure remains relatively stable under strong mitigation. Canterbury has 96,876 buildings exposed in 2020, increasing to108,859 by 2090, with replacement value moving from NZD 47B to NZD 52B (Figure 67). Auckland's exposure grows modestly from 23,371 to 24,533 buildings by 2090, and Bay of Plenty rises from 15,901 to 18,000. Other regions show minimal change, indicating limited escalation under low-emission futures.

SSP2-4.5 Scenario (2020–2090)

Exposure grows steadily over time. Canterbury rises from 103,191 in 2050 to112,982 by 2090, with replacement value increasing from NZD 49B to NZD 54B over this period. Hawke's Bay and Bay of Plenty show 17,820 and 18,634 buildings exposed by 2090.

SSP3-7.0 Scenario (2020–2090)

Canterbury shows to 103,619 buildings exposed by 2050 and 116,640 by 2090, with replacement values of NZD 50B at 2050 and NZD 55B at 2090. Auckland, Bay of Plenty and Hawke's Bay show between NZD 9B to NZD 15B replacement value exposure by 2090.

SSP5-8.5 Scenario (2020–2090)

Canterbury building exposure increases slightly to 118,312 by 2090, with a replacement value of NZD 56B. Replacement value exposure for Auckland, Bay of Plenty and Hawke's Bay remains between NZD 9B to NZD 15B at 2090.

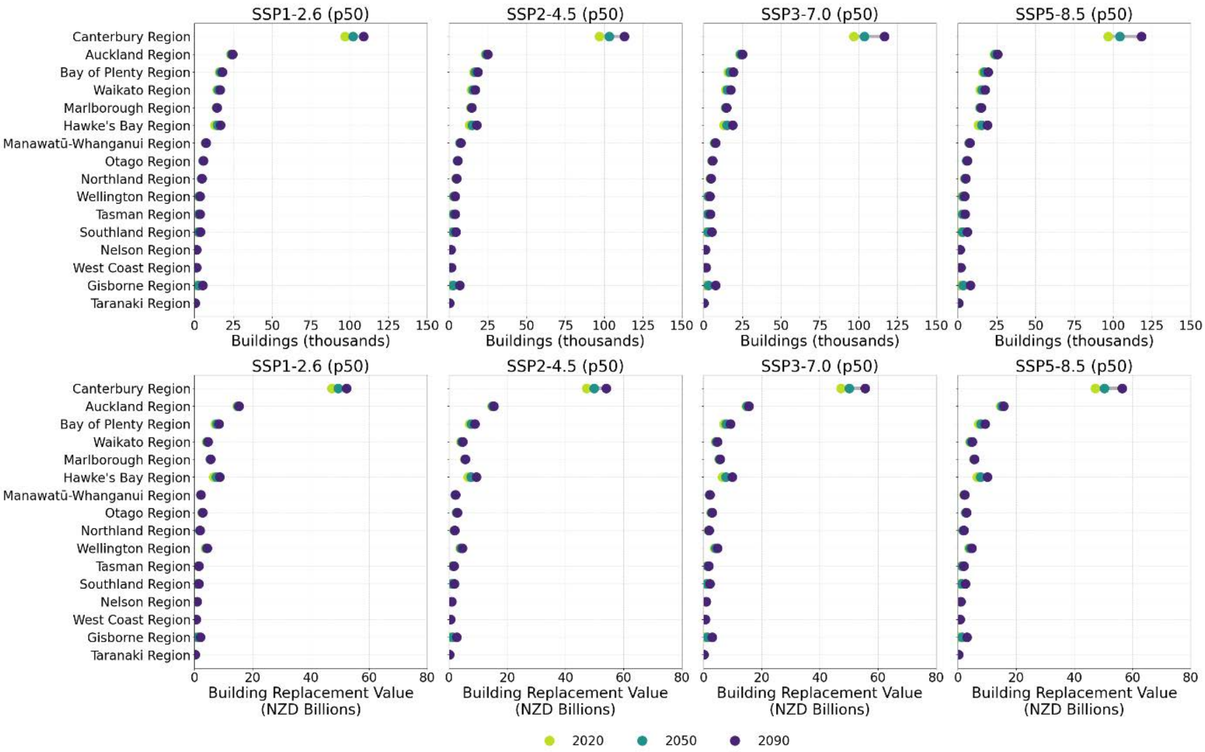

Figure 67: Projected 50th percentile (p50) exposure of A-NZ region building and building replacement value (NZD) on coastal land with shallow groundwater presence under medium confidence shared socio-economic pathway (SSP) scenarios. Building values are rounded for presentation clarity.

Coastal erosion

Projected building exposure to coastal erosion at 2100 based on historic erosion trends

Projected building exposure to coastal erosion at 2100 remains relatively low compared to flooding hazards but is still significant for certain regions. Waikato shows the highest exposure, with 687 buildings located in erosion-prone areas, representing a replacement value of around NZD 278 M (Figure 68). West Coast follows with 507 buildings exposed and a replacement value near NZD 125 M. Northland and Tasman also show notable exposure, each with over 400 buildings, and replacement values exceeding NZD 110M. Auckland, Hawke's Bay and Bay of Plenty each have over 200 buildings exposed, and replacement values exceeding NZD 100M. Nelson, Gisborne, and Taranaki show less than 150 buildings exposed, with replacement values not exceeding NZD 80M. Otago, Southland, and Manawatū-Whanganui have the lowest exposure, with fewer than 100 buildings and replacement values below NZD 40M.

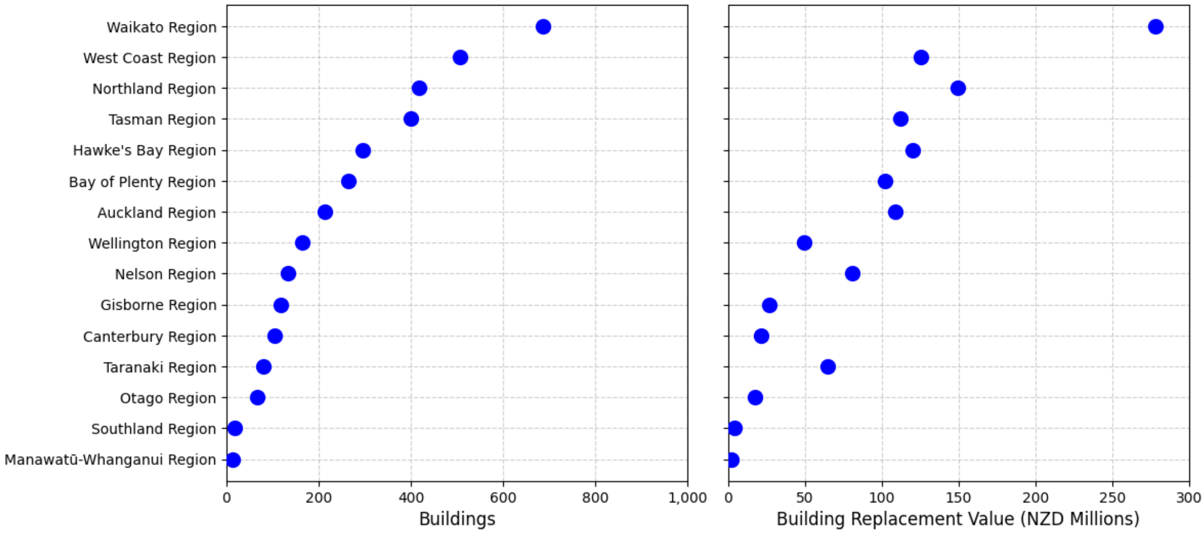

Figure 68: Projected exposure of A-NZ regions building and building replacement value (NZD) to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Extreme Winds

By 2090 under SSP5-8.5, several regions show measurable increases in wind exposure within the 0–5% change range, signalling areas likely to experience slightly stronger winds in the future. Canterbury leads with approximately NZD 161B and 361,640 buildings affected, followed by Wellington at NZD145B and 275,924 buildings. Otago ranks third with NZD 88B and 187,116 buildings, while Southland and Manawatū-Whanganui contribute NZD 50B (118,380 buildings) and NZD 43B (108,762 buildings) respectively. Other regions such as Marlborough, Taranaki, Tasman, and West Coast show smaller but notable exposures, indicating that even modest wind intensification could have widespread implications for infrastructure resilience. No regions fall into the >10% change category.

Very Hot Days (≥30°C)

Auckland again dominates with NZD 396.7B and 725,047 buildings exposed. Canterbury ranks second at NZD 211B and 505,545 buildings, followed by Waikato with NZD 165B and 444,638 buildings. Wellington and Otago remain significant, with exposures of NZD 148B (287,236 buildings) and NZD 96B (210,549 buildings) respectively. .

2.2.3 Transport (roads, railways airports (incl. aerodromes))

Inland flooding

Temperature Change (+0°C to +3°C)

Exposure of transport infrastructure to inland flooding increases steadily with warming across all regions. Roads show the largest exposure growth, with Canterbury increasing from 7421 km at +0°C warming to 8313 km at +3°C warming, Waikato increasing from 3255 km to 3737 km, and Auckland from 2257 km to 2553 km (Figure 69). Bay of Plenty and Northland also show notable growth, reaching 1992 and 2066 km at +3°C warming. Railway exposure follows a similar pattern, with Canterbury leading at 120 km at +0°C warming and 138 km at +3°C warming, followed by Auckland (113 km) and Waikato (68 km), and most other regions below 60 km. Airport exposure remains constant across temperature scenarios, with Canterbury having 11airports and aerodromes exposed, Waikato 9, Auckland 6, and other regions ranging from 1 to 5 sites exposed.

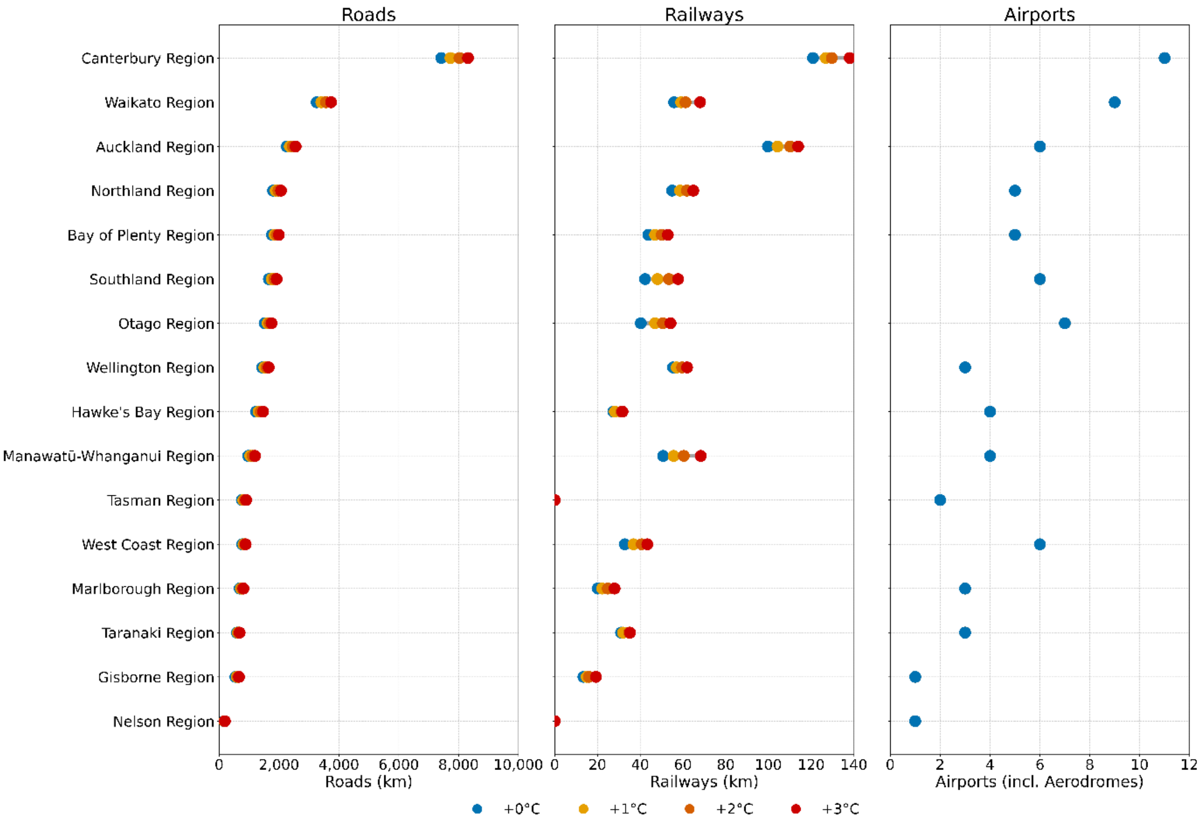

Figure 69: Projected exposure of A-NZ region transport infrastructure to inland flooding under temperature change.

SSP1-2.6 Scenario (2020–2090)

Canterbury road exposure increases slightly from 7602 km in 2020 to 7724 km by 2090, Waikato from 3354 to 3402 km, and Auckland from 2335 km to 2364 km. (Figure 70). Railways show minor increases in exposure, with Canterbury moving from 124 km to 127 km and Auckland from 102 km to 104 km. Airports and aerodromes reaches 11 sites exposed in Canterbury in 2020, 9 in Waikato, and 6 in Auckland, and remain unchanged over the century.

SSP2-4.5 Scenario (2020–2090)

Canterbury road exposure reaches just over 8050 km by 2090, Waikato 3584 km, and Auckland 472 km. Railways increase slightly, with Canterbury reaching 131 km and Waikato at 61 km by 2090 (Figure 71). Airports and aerodromes remain unchanged.

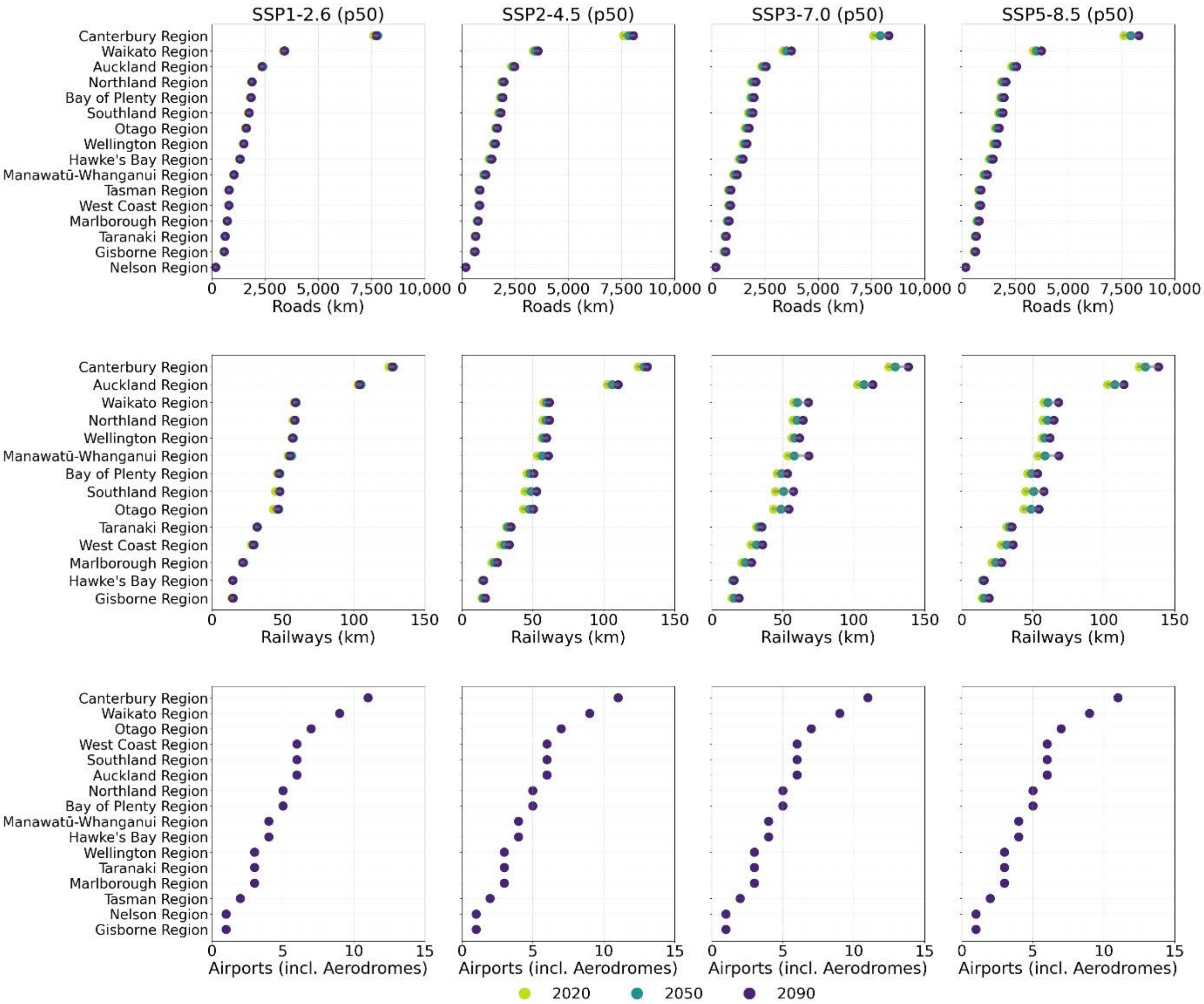

Figure 70: Projected 50th percentile (p50) exposure of A-NZ region transport infrastructure to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Road exposure in Canterbury increases to 8320 km by 2090, Waikato 3734 km, and Auckland 2555 km. Railways follow similar patterns over the century, with Canterbury reaching 138 km and Auckland 113 km exposed by 2090. Airports and aerodromes remain unchanged.

SSP5-8.5 Scenario (2020–2090)

Road exposure in Canterbury reaches just over 8321 km by 2090, Waikato 3741 km, and Auckland 2574 km. At 2090, railways remain relative unchanged at 138 km in Canterbury and 114 km in Auckland. Airports and aerodromes remain unchanged.

Rainfall-induced landslides

Exposure of transport infrastructure to rainfall-induced landslides increases sharply with warming, particularly for roads in northern and hilly regions. Northland shows the highest road exposure, rising from 1488 km at +0°C to nearly 2667 km at +3°C (Figure 71). Waikato and Hawke's Bay exceed 2000 km at +3°C. Auckland, Bay of Plenty, Gisborne and Tasman also exceed 1000 km. Railway exposure also increases with temperate warming, with Canterbury increasing from 32 km at +0°C to 58 km at +3°C, while Bay of Plenty and Hawke's Bay exceed 40 km +3°C. Airport and aerodrome exposure is limited to few regions, with Northland, West Coast, and Taranaki each show sites exposed from +0°C to +3°C.

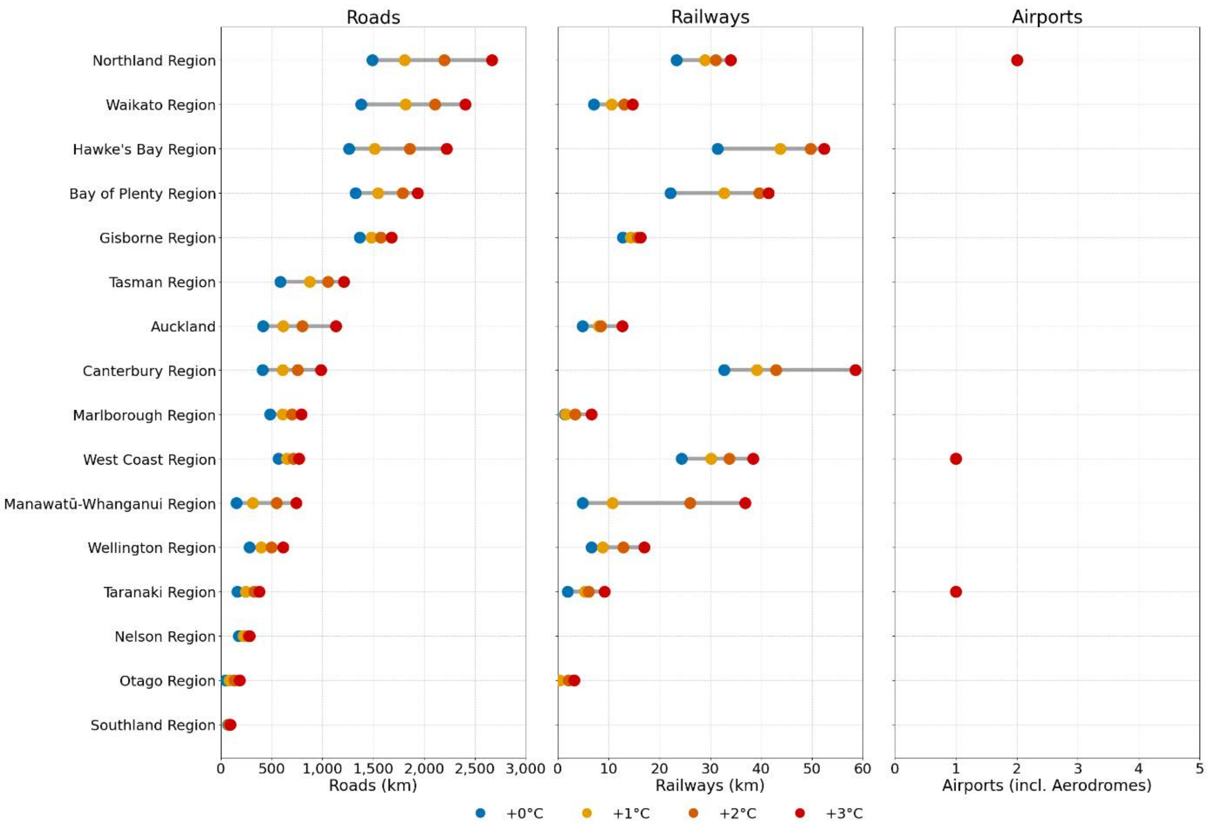

Figure 71: Projected exposure of A-NZ region transport infrastructure to rainfall-induced landslides under temperature change.

SSP1-2.6 Scenario (2020–2090)

Road exposure in Northland increases from 1703 km in 2020 to 1791 km by 2090, while Waikato also increases to over 1767 km, and Hawke's Bay and Gisborne both exceed to 1400 km (Figure 72). Railway exposures show minimal change, with Hawke's Bay moving from 40 km to 42 km and Canterbury from 37 km to 38 km. Airport and aerodrome site exposure occurs from +0°C to +3°C in Northland, West Coast, and Taranaki.

SSP2-4.5 Scenario (2020–2090)

Northland road exposure increases to 2187 km by 2090, Waikato rises to 2069 km, and Hawke's Bay to 1891 km. Railway exposures increase slightly, with Hawke's Bay at 52 km and Canterbury at 43 km by 2090. Airport and aerodrome site exposure by 2090 remains unchanged relative to lower SSP scenarios.

SSP3-7.0 Scenario (2020–2090)

Northland road exposure increases to 2619 km by 2090, Waikato reaches 2369 km, and Hawke's Bay 2196 km. Railway exposures follow similar patterns, with Hawke's Bay reaching 53 km and Canterbury 57 km. Airport and aerodrome site exposure by 2090 remains unchanged relative to lower SSP scenarios.

SSP5-8.5 Scenario (2020–2090)

Northland reaches 2668 km of road exposure by 2090, Waikato reaches 2370 km, and Hawke's Bay 2196 km. Railway exposure rises to 53 km in Hawke's Bay and 57 km in Canterbury. Airport and aerodrome site exposure by 2090 remains unchanged relative to lower SSP scenarios.

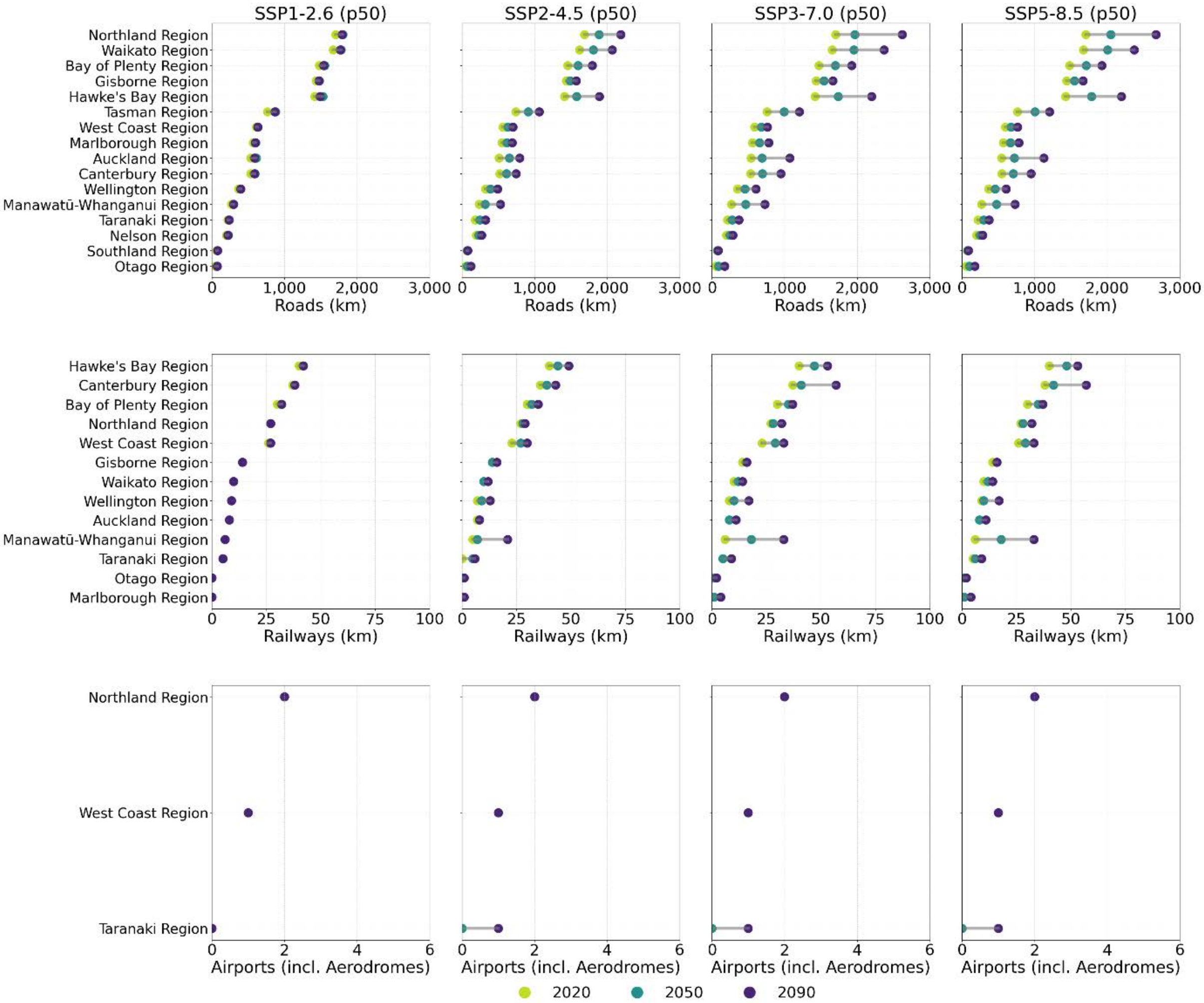

Figure 72: Projected 50th percentile (p50) exposure of A-NZ region transport infrastructure to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Exposure of transport infrastructure to coastal flooding from extreme sea levels increases sharply with rising sea levels, particularly for roads in low-lying regions. Waikato shows the highest road exposure, rising from 182 km at +0 m to 834 km at +2 m (Figure 73). Canterbury follows, increasing from 154 km to 825 km, while Northland reaches 751 km at +2 m. Railway exposure in Wellington, Auckland and Otago exceeds 50 km at +2 m. Airport and aerodrome exposure shows West Coast has 4 sites exposed at +2 m, Waikato has 2 at +2 m, while several other regions have 1 exposed +2 m.

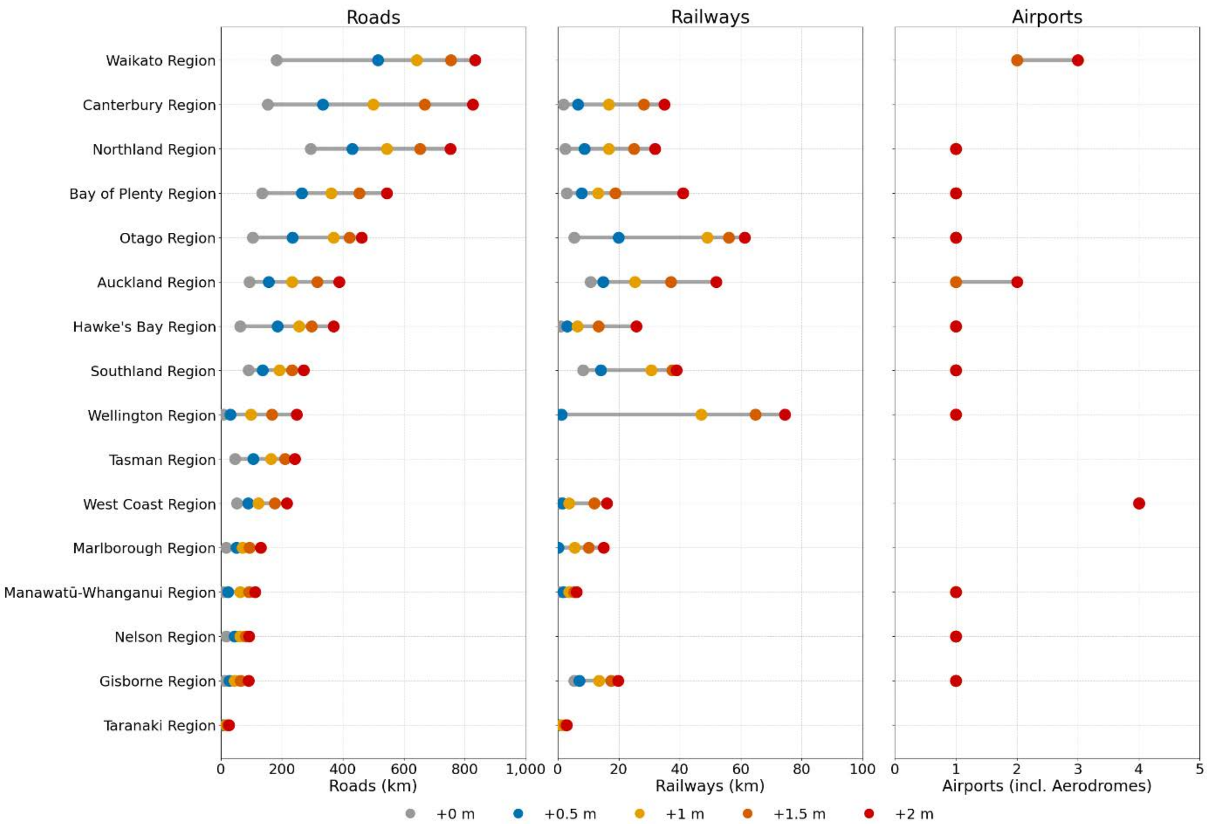

Figure 73: Projected transport infrastructure exposure in A-NZ regions to extreme sea level driven coastal flooding under sea level change.

SSP1-2.6 Scenario (2020–2090)

Waikato road exposure increase from 165 km in 2020 to 405 km by 2090, while Northland, Bay of Plenty and Canterbury also exceed 200 km by 2090 (Figure 74). Railway exposure in Otago increases from 3 km in 2020 to 15 km by 2090, while Auckland is most highly exposed at 2020 with 10 km. Airport and aerodrome exposure shows West Coast has 4 aerodromes exposed under all sea level scenarios, Waikato has 2, while several other regions have 1 exposed.

SSP2-4.5 Scenario (2020–2090)

Exposure of Waikato roads reaches 460 km by 2090, while Northland and Canterbury exceed 300 km at this time. Railway exposure in Otago reaches 18 km by late 2090. Airport and aerodrome exposure remains similar to lower emissions scenarios.

SSP3-7.0 Scenario (2020–2090)

Waikato road exposure exceeds 500 km and Northland 400 km by 2090. Notably, road exposure exceeds 100 km in eight regions. Railway exposure in Otago reaches 19 km by late 2090, while Southland (14) exceeds Auckland (13) at this time. Airport and aerodrome exposure remains similar to lower emissions scenarios.

SSP5-8.5 Scenario (2020–2090)

Waikato road exposure exceeds 520 km by 2090, and also exceeds 250 km in Bay of Plenty and Otago region at this time. Railway exposure reaches 22 km in Otago by 2090 and exceeds 15 km in Auckland and Southland. Airport and aerodrome exposure remains similar to lower emissions scenarios.

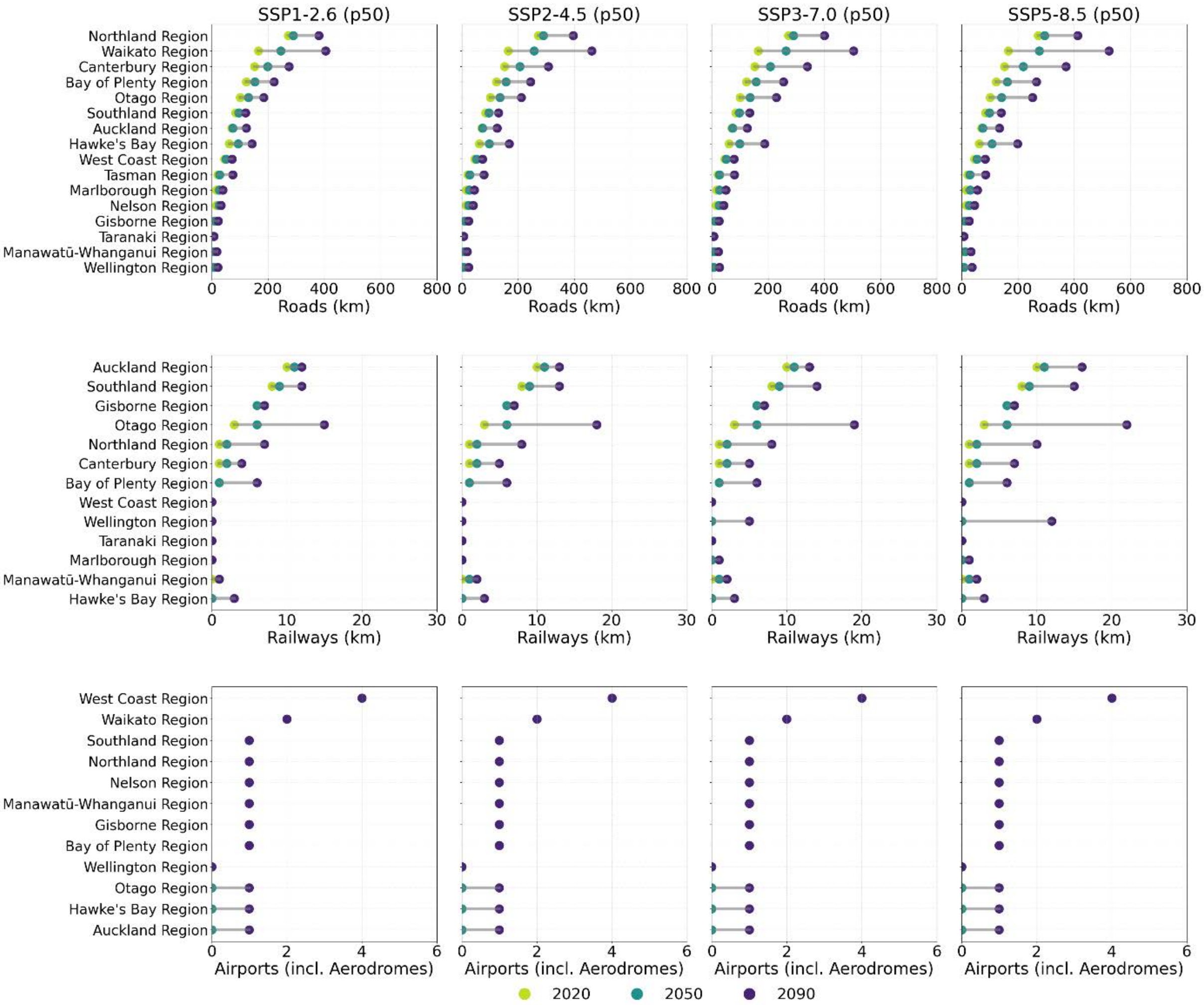

Figure 74: Projected 50th percentile (p50) exposure of A-NZ region transport infrastructure to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Exposure of transport infrastructure to MHWS flooding increases significantly with rising sea levels, though overall exposure is lower than for extreme sea levels. Waikato shows the highest road exposure, rising from 7 km at +0 m to 436 km at +2 m (Figure 75). Northland follows at +2 m, increasing reaching 409 km, while Otago and Bay of Plenty exceed 300 km and Canterbury and Hawke's Bay exceed 250 km. Railway exposure in Wellington increases from 0 km at +1 m to 62 km at +2 m, while Otago reaches 56 km at +2 m. Airport and aerodrome exposure in West Coast shows up to 3 exposed at +2 m, 2 in Waikato, and several regions including Hawke's Bay, and Wellington with 1 exposed.

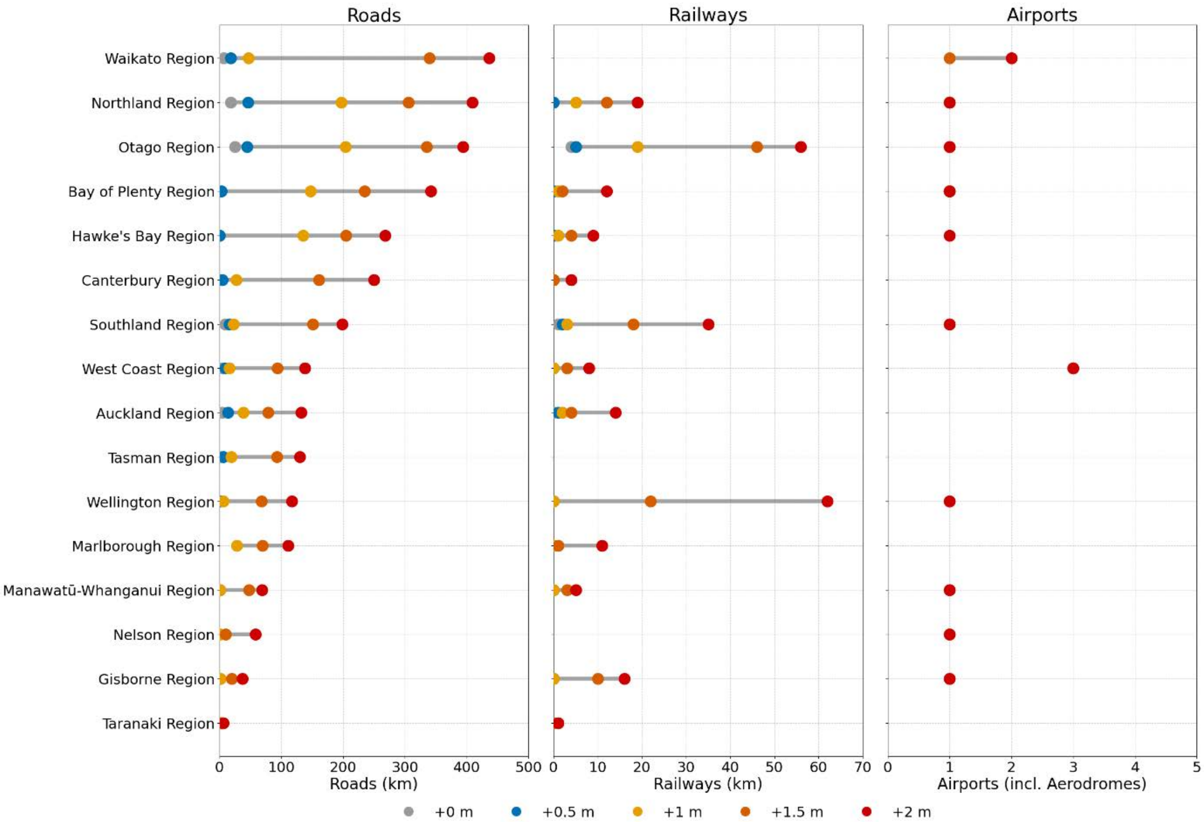

Figure 75: Projected transport infrastructure exposure in A-NZ regions to mean high water springs driven coastal flooding under sea level change.

SSP1-2.6 Scenario (2020–2090)

Otago road exposure increases slightly from 23 km in 2020 to 38 km by 2090, while Northland increases from to 6 km to 27 km over this period (Figure 76). Railways show minimal change in exposure, with Otago increasing from 2 km at 2020 to 3 km at 2090. Airports and aerodromes exposure is limited to Northland and Bay of Plenty (1 each).

SSP2-4.5 Scenario (2020–2090)

Otago road exposure increases to 39 km by 2090, and Northland to 29 km. Exposure of railways again show minimal change, with Otago reaching 3 km at 2090. Airports and aerodromes exposure remains limited to Northland and Bay of Plenty.

SSP3-7.0 Scenario (2020–2090)

Otago road exposure increases to 47 km by 2090, and Northland to 33 km. Road exposure exceeds 10 km in Hawkes Bay and Southland by 2090. Railway exposures again show minimal change. Airports and aerodromes exposure remains limited to Northland and Bay of Plenty.

SSP5-8.5 Scenario (2020–2090)

Otago road exposure increases to 70 km by 2090, and Northland to 49 km. Road exposure exceeds 25 km in Hawkes Bay and Bay of Plenty by 2090. Railways again show minimal change in exposure, with Otago reaching 5 km at 2090. Airports and aerodromes exposure remains limited to Northland and Bay of Plenty.

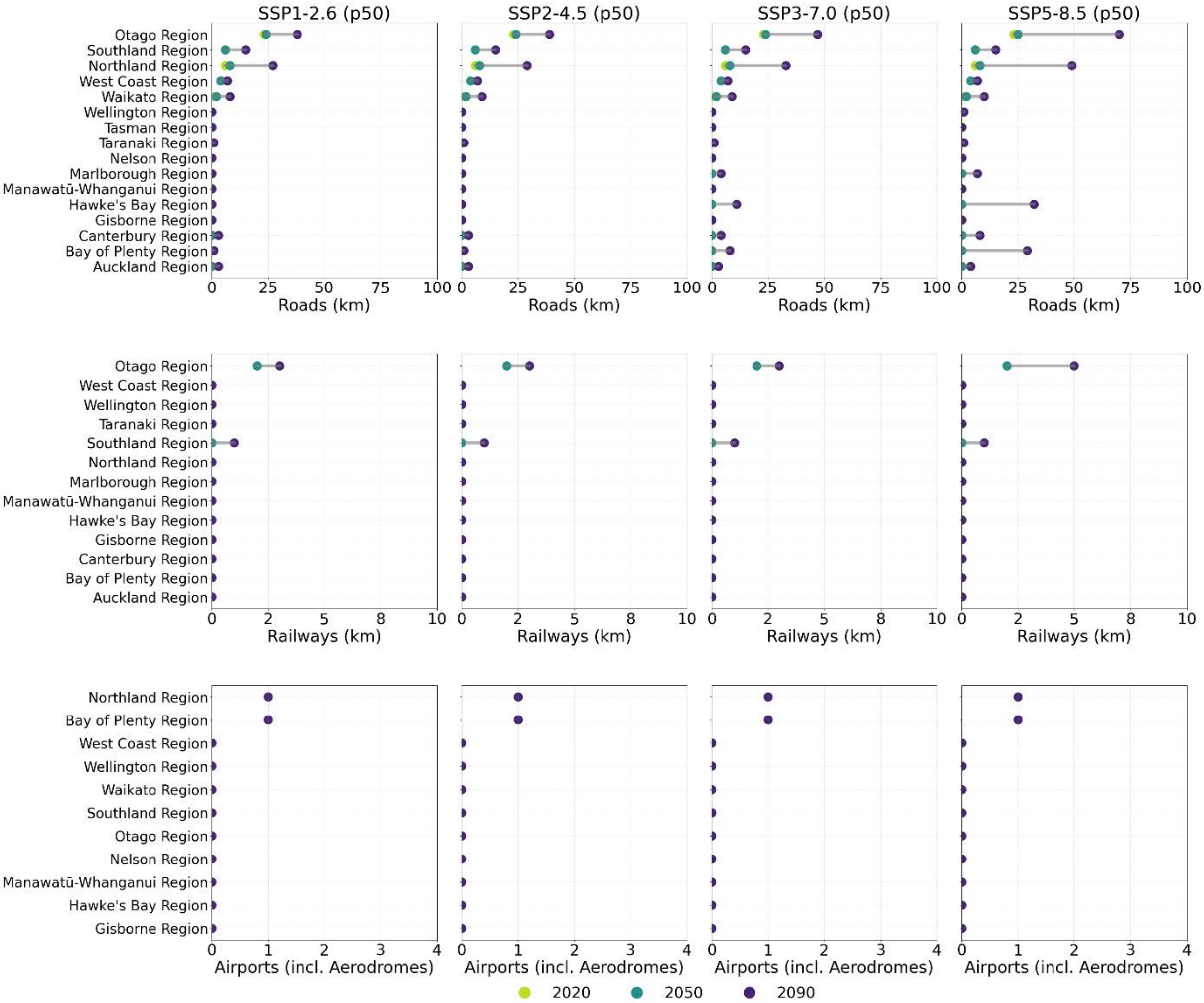

Figure 76: **Projected 50th percentile (p50) exposure of A-NZ region to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.**

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Exposure of transport infrastructure to shallow groundwater presence in coastal areas is already substantial and increases further with rising sea levels. Canterbury shows the highest road exposure, rising from 1234 km at +0 m to 1754 km at +2 m (Figure 77). Waikato is next highest with 569 km at +0 m, increasing to 636 km +2 m. Bay of Plenty, Hawke's Bay and Southland all exceed 300 km at +2 m. Railway exposure is highest in Canterbury, increasing from 48 km at +0 m to 74 km at +2 m. Auckland and Bay of Plenty railway exposure exceed 20 km at +0 m . Airport and aerodrome exposure shows Waikato, Bay of Plenty and West Coast regions with 3 exposed at +1.5 m, and at +2 m Wellington has 2 exposed respectively, while several regions including Southland, Otago, and Hawke's Bay have 1 exposed. Despite high road and railway exposure, no airport and aerodrome exposure was identified in Canterbury.

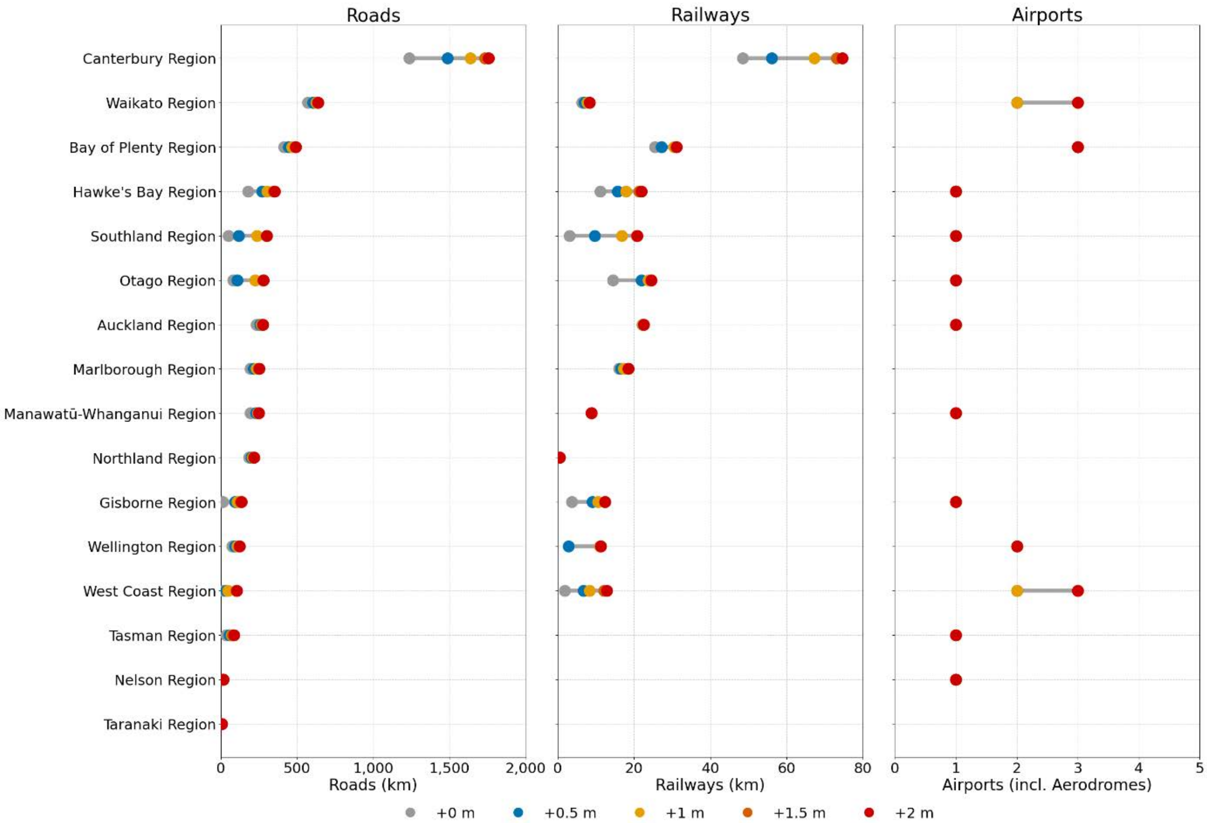

Figure 77: Projected transport infrastructure exposure in A-NZ regions on coastal land with shallow groundwater presence under sea level change.

SSP1-2.6 Scenario (2020–2090)

Canterbury road exposure increases from1229 km in 2020 to 1396 km by 2090, while Waikato and Bay of Plenty reach 587 km and 433 km respectively (Figure 78). Railway exposure shows minor change over the century, with Canterbury increasing from 48 km in 2020 to 51 km by 2090, while Auckland and Bay of Plenty exceed 20 km in 2020. Airport and aerodrome exposure shows Bay of Plenty has 3 exposed in 2020, remaining unchanged over this century.

SSP2-4.5 Scenario (2020–2090)

Exposed roads in Canterbury reach 1454 km by 2090, Waikato climbs to 594 km, and Bay of Plenty to 440km. Railway exposure increases slightly, with Canterbury reaching 52 km and Bay of Plenty at 26 km by 2090. Airport and aerodrome exposure remains unchanged relative to SSP1-2.6 scenario.

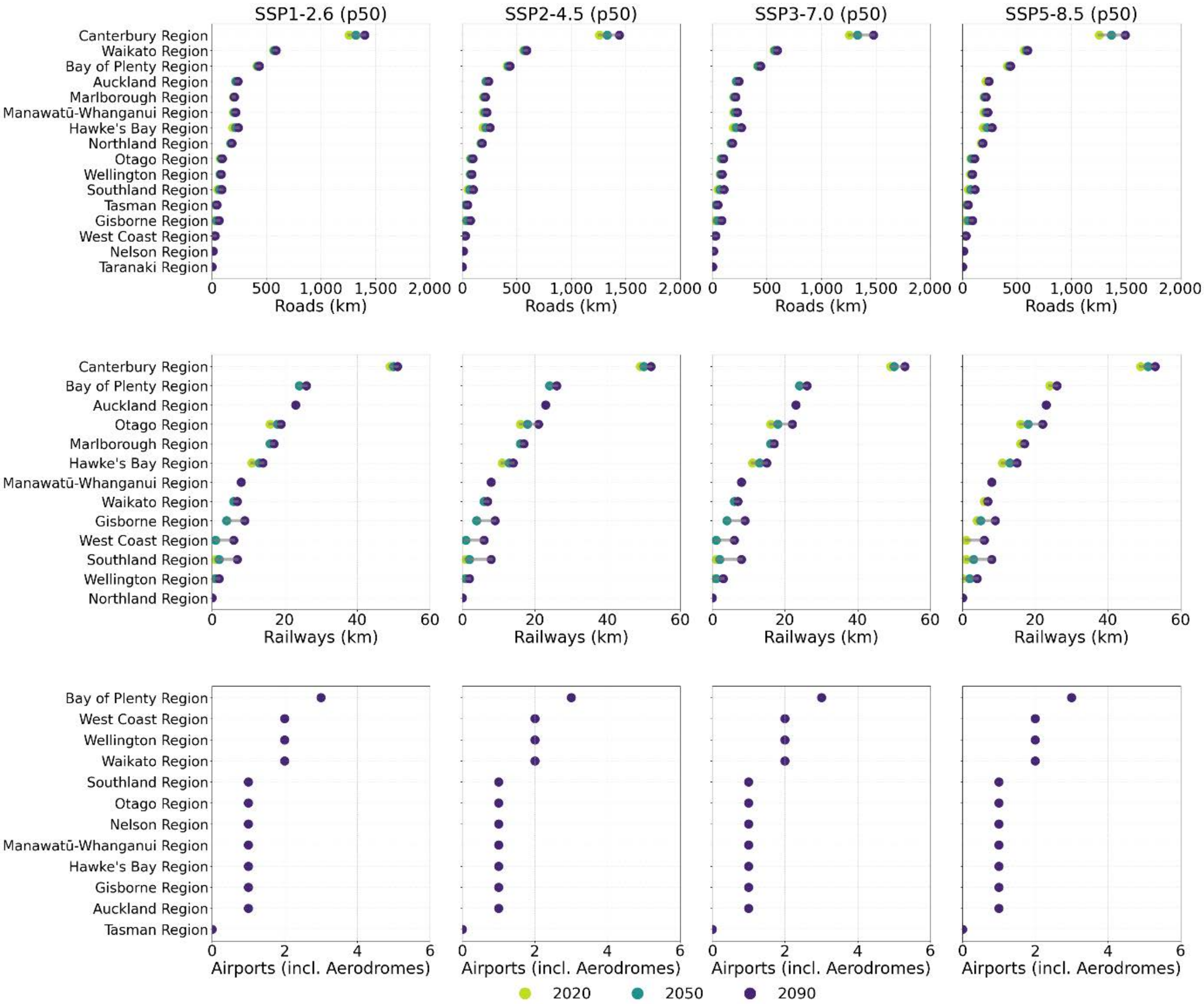

Figure 78: Projected 50th percentile (p50) exposure of A-NZ region transport infrastructure on coastal land with shallow groundwater presence under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Road exposure in Canterbury grows to 1490 km by 2090, Waikato to 597 km, and Bay of Plenty to 442 km. Railway exposure shows Canterbury reaches 53 km and Otago 22 km by 2090. Airport and aerodrome exposure remains unchanged relative to SSP1-2.6 scenario.

SSP5-8.5 Scenario (2020–2090)

Canterbury road exposure increases from 1516 km by 2090, while Waikato and Bay of Plenty reach 602 km and 445 km respectively. Railway exposure shows minor increases with Canterbury reaching 54 km by 2090. Airport and aerodrome exposure remains unchanged relative to SSP1-2.6 scenario.

Coastal erosion

Projected transport infrastructure exposure to coastal erosion at 2100 based on historic erosion trends

Exposure of transport infrastructure to coastal erosion is relatively low compared to flooding hazards but still significant for certain regions. West Coast shows the highest road exposure, with 18 km of roads located in erosion-prone areas (Figure 79). Tasman and Waikato each have 15 km of road exposed while Wellington, Auckland and Otago exceed 10 km. Railway exposure is limited but present in a few regions with Otago reaching 2.3 km, and less than 1 km exposed in other regions. Airport and aerodrome exposure shows the West Coast, Waikato, Nelson and Taranaki 1 each have one site exposed.

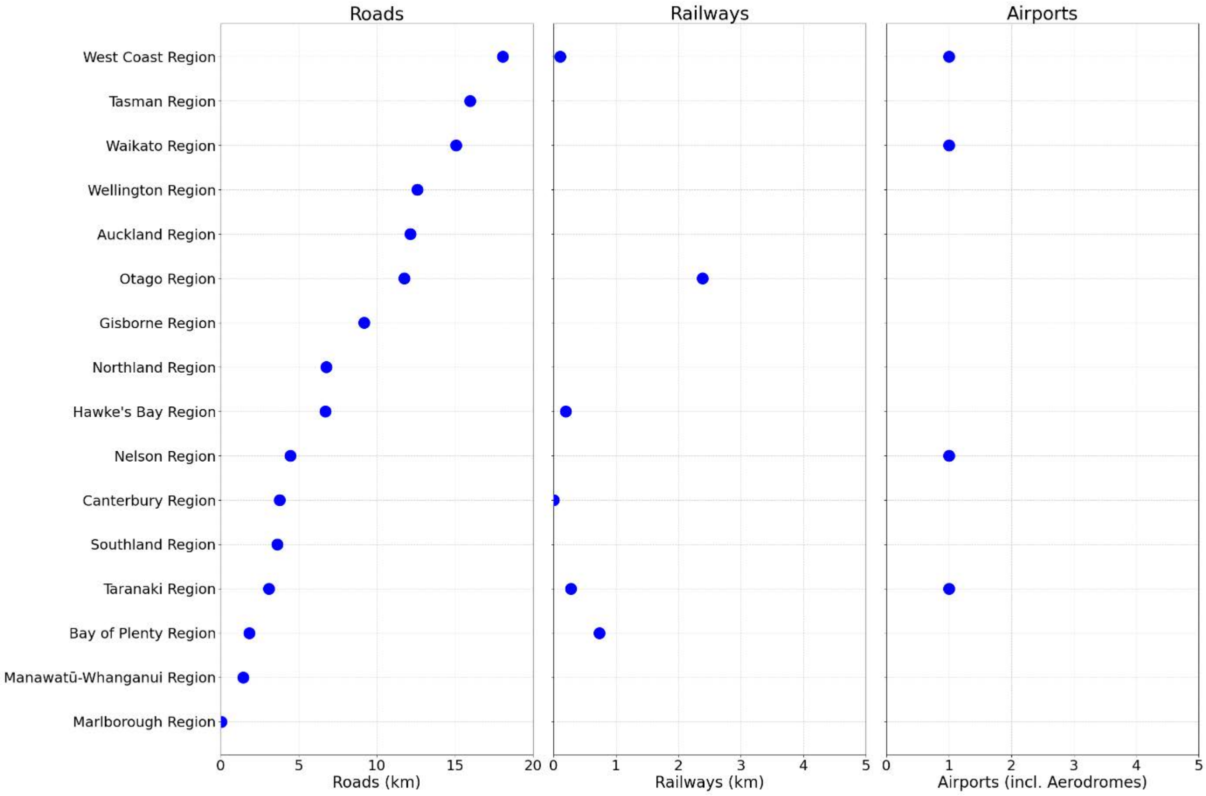

Figure 79: Projected A-NZ region transport infrastructure exposure to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Extreme Winds

By 2090 under SSP5-8.5, approximately 58,290 km of roads are exposed to wind speed increases of 0–5%, while 14,767 km fall into the 5–10% change range. Across SSPs and years, exposure in the 0–5% range generally declines from early-century levels (e.g., SSP1-2.6: 107,149 km in 2020) to late-century (SSP1-2.6: 102,505 km in 2090), while 5–10% exposure remains minimal across all scenarios.

Regional railway exposure patterns under SSP5-8.5 show in 2050, the most exposed regions are Canterbury (742.9 km), Manawatū-Whanganui (358.5 km), and Otago (343.7 km). By 2090, Canterbury remains highest at 742.9 km, followed by Manawatū-Whanganui (361.5 km) and Wellington (346.9 km).

Very Hot Days (≥30°C)

In 2050 for SSP5-8.5, regions most exposed to 10+ additional hot days include Canterbury (415 km) and Hawke's Bay (62 km), while other regions such as Bay of Plenty, Auckland, and Gisborne show negligible exposure.

Regional railway exposure under SSP5-8.5 shifts dramatically between mid- and late-century. In 2050, the top regions are Canterbury (757 km; 10+ days: 13 km), Hawke's Bay (302 km; 10+ days: 2 km), and Bay of Plenty (279 km; 10+ days: 0 km). By 2090, heat stress concentrates heavily in Canterbury (758 km; 10+ days: 644 km), Manawatū-Whanganui (790 km; 10+ days: 537 km), and Waikato (525 km; 10+ days: 509 km), highlighting critical rail corridors that will require targeted adaptation to withstand prolonged heat extremes.

2.2.4 Electricity (transmission lines, structures and sites)

Inland flooding

Temperature Change (+0°C to +3°C)

Exposure of electricity transmission infrastructure to inland flooding increases steadily with warming across all regions. Canterbury shows the highest exposure for transmission lines, rising from 307 km at +0°C warming to 338 km at +3°C warming (Figure 80). Waikato follows with 230 km at +0°C increasing to 258 km, and Auckland increases from 118 km to 132 km. Structures follow a similar pattern, with Canterbury leading with1472 structures at +0°C warming and increasing to 1652 at +3°C warming. Waikato, Bay of Plenty and Manawatū–Whanganui exceed 300 structures exposed at +3°C warming. Sites also increase slightly, with Canterbury moving from 19 at +0°C to 20 at +3°C, Waikato and Auckland reaching 8 and 7 respectively at +3°C warming.

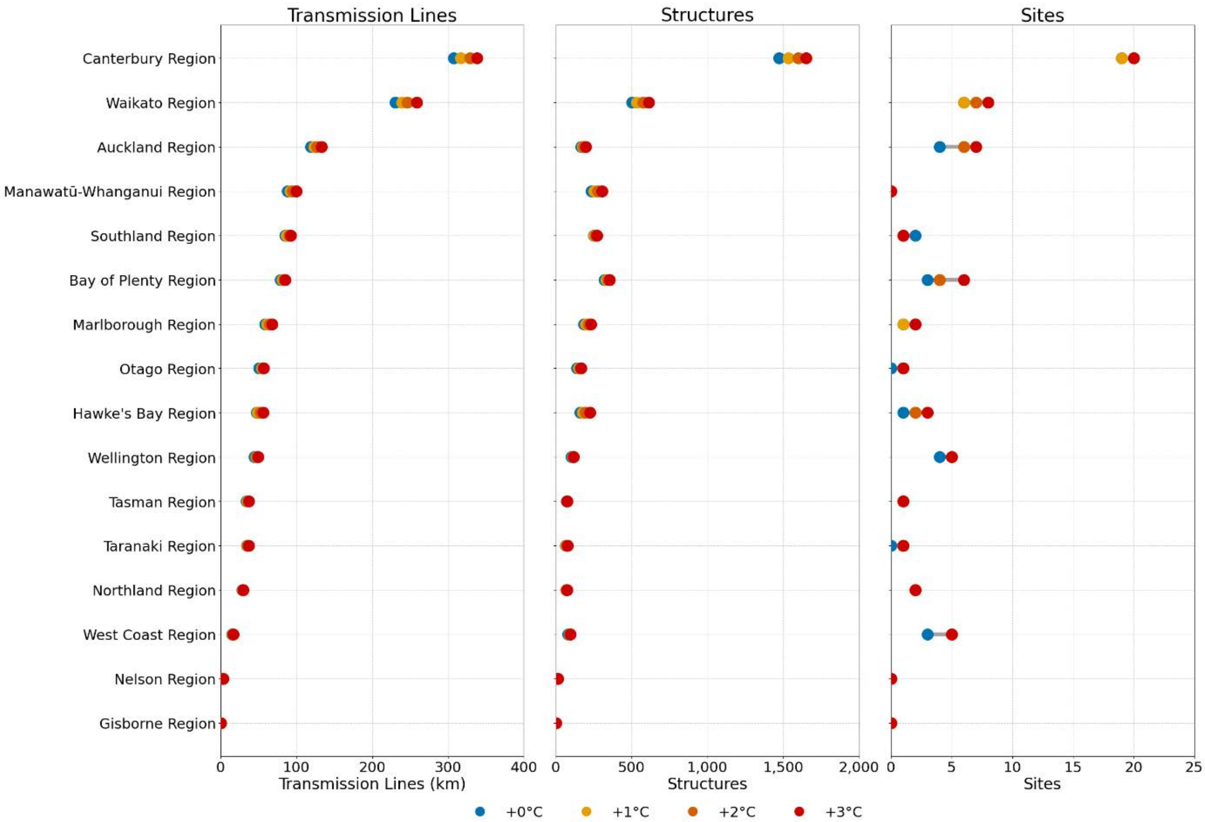

Figure 80: Projected exposure of A-NZ region national grid electricity infrastructure to inland flooding under temperature change.

SSP1-2.6 Scenario (2020–2090)

Canterbury transmission line exposure increases slightly from 312 km in 2020 to 316 km by 2090, while Auckland and Waikato both exceed 100 km in 2020 (Figure 81). Structures show minimal change, with exposures in Canterbury moving from 1503 in 2020 to 1533 by 2090, and Waikato from 524 to 531. Site exposure shows minimal change over the century, with the highest exposure observed in Canterbury with 19 in 2020.

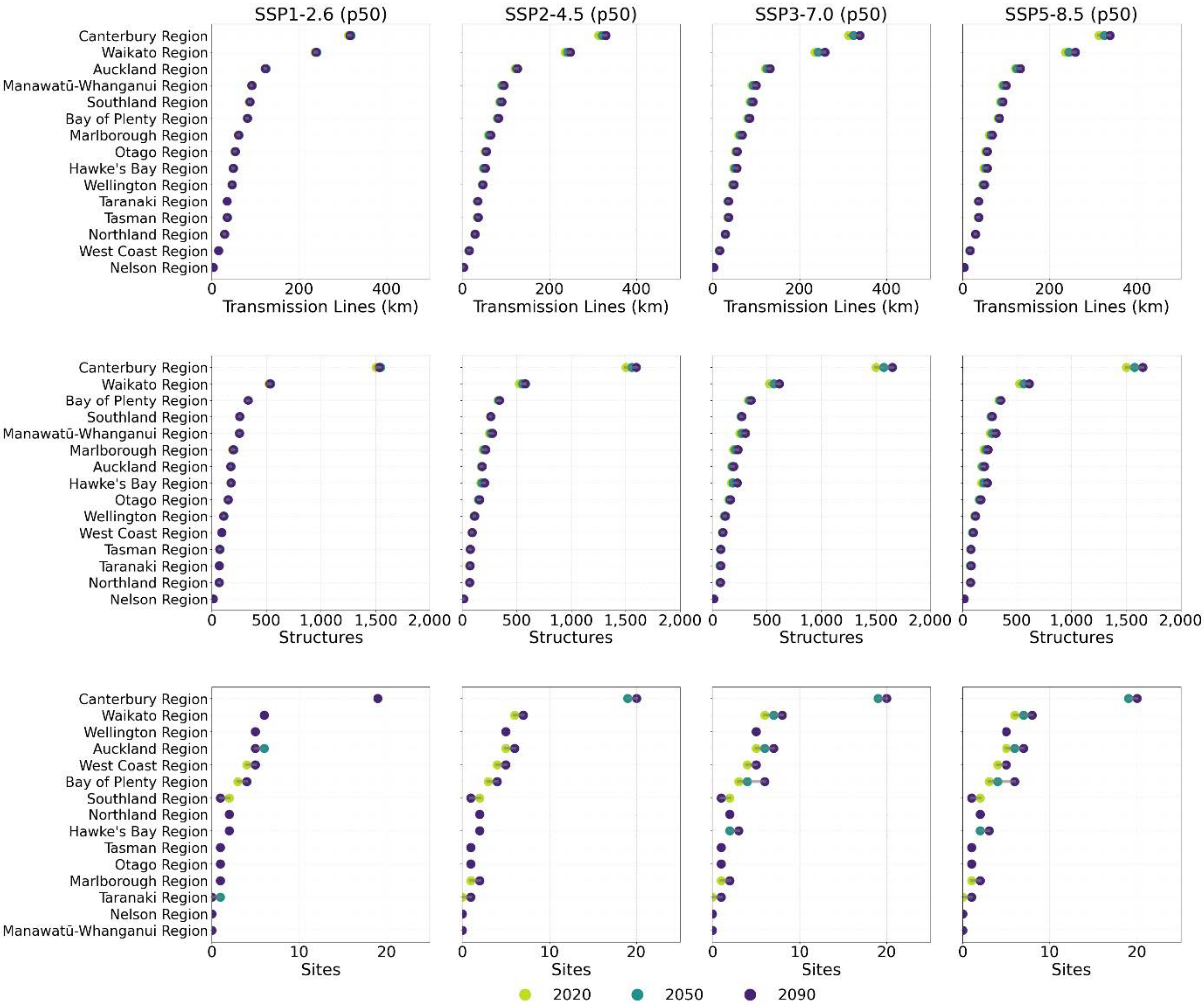

Figure 81: Projected 50th percentile (p50) exposure of A-NZ region national grid electricity infrastructure to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP2-4.5 Scenario (2020–2090)

Canterbury transmission line exposure reaches 329 km by 2090, while Waikato increases to 247 km, and Auckland to 126 km. Exposure of structures increases to 1598 in Canterbury by 2090, and exceed 300 in Bay of Plenty and Waikato. Site exposure shows minimal change over the century, with the highest exposure observed in Canterbury which reaches 20 by 2090.

SSP3-7.0 Scenario (2020–2090)

Canterbury transmission line exposure reaches 338 km by 2090, while Bay of Plenty, Manawatū–Whanganui and Southland exceed 80 km at this time. Exposure of structures increase to 1652 in Canterbury by 2090, and exceed 300 in Bay of Plenty, Manawatū–Whanganui and Waikato. Sites remain unchanged compared to SSP2-4.5.

SSP5-8.5 Scenario (2020–2090)

Canterbury transmission line exposure relative to SSP3-7.0 remains unchanged at 338 km by 2090, while Manawatū–Whanganui exceeds 100 km at this time. Exposure of structures remain unchanged at 1652 in Canterbury by 2090, and exceed 300 in Bay of Plenty, Manawatū–Whanganui and Waikato. Site exposures remain relatively unchanged compared to lower emission scenarios.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Bay of Plenty shows the highest transmission line exposure at +0°C warming with 122 km and increases to 155 km at +3°C warming (Figure 82). Waikato, however, has the highest exposure at +3°C warming, reaching 244 km. Hawke's Bay also reaches 175 km at +3°C warming. Structures show highest exposure at +0°C warming in Bay of Plenty with 330 and increasing to 466 at +3°C warming. Waikato also reaches 507 at +3°C warming. Other regions remain below 500 structures. Sites also increase slightly, with Waikato moving from 0 at +0°C to 3 at +3°C warming, Hawke's Bay and Bay of Plenty increasing from 1 to 2 sites.

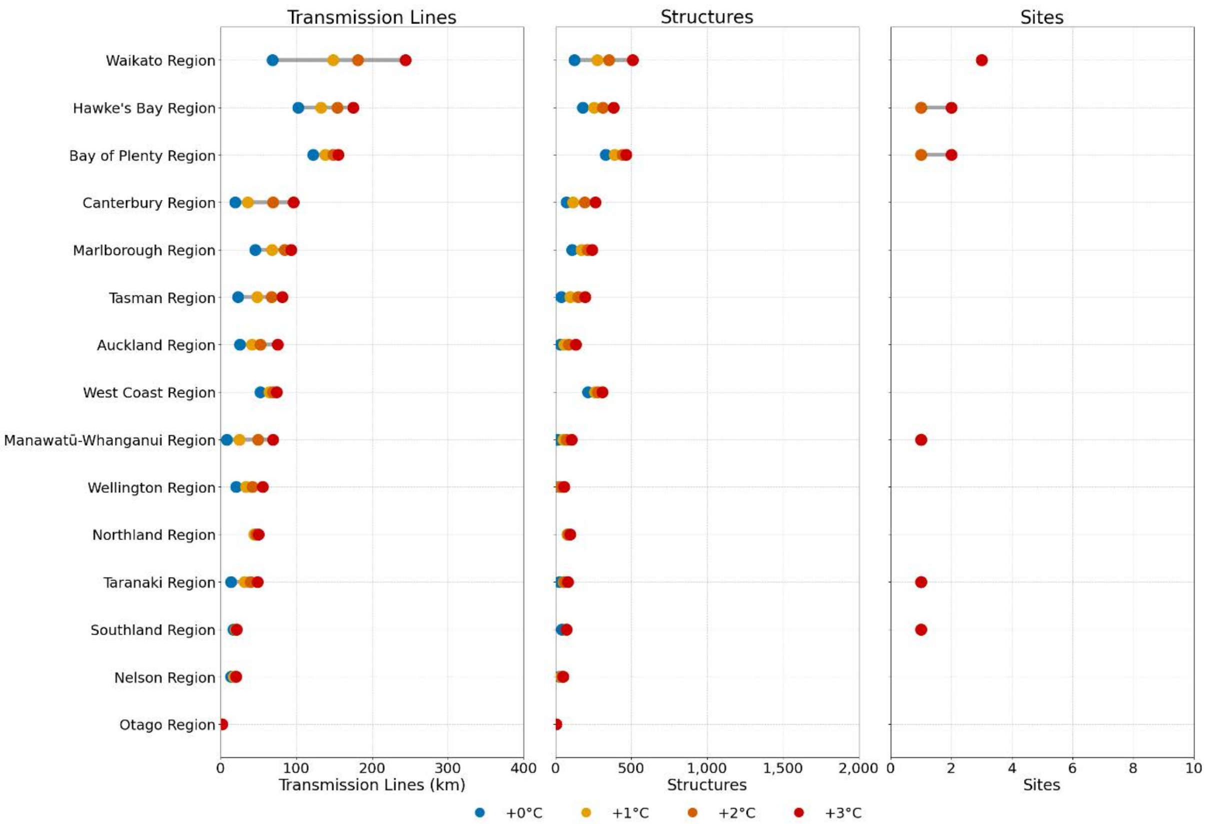

Figure 82: Projected exposure of A-NZ region national grid electricity infrastructure to rainfall-induced landslides under temperature change.

SSP1-2.6 Scenario (2020–2090)

Exposure of transmission lines increase slightly in the Bay of Plenty from 132 km in 2020 to 134 km by 2090, Waikato also rises to 139 km, and Hawke's Bay to 130 km by 2090 (Figure 83). Structure exposures show minimal change, with Bay of Plenty moving from 370 in 2020 to 388 by 2090, and Waikato and Hawke's Bay show a small increase of <10 structures each by 2090. Waikato has 3 sites exposed, and several other regions observed 1 site exposed.

SSP2-4.5 Scenario (2020–2090)

Exposed Waikato transmission lines reach 170 km by 2090, while Bay of Plenty climbs to 144 km, and Hawke's Bay to 152 km. Structure exposure shows Bay of Plenty increases from 365 in 2020 to 442 by 2090, while Waikato increases from 226 to 360. Exposure for most regions is again unchanged after 2020, with Waikato at 3, and other regions experiencing 1 site exposed.

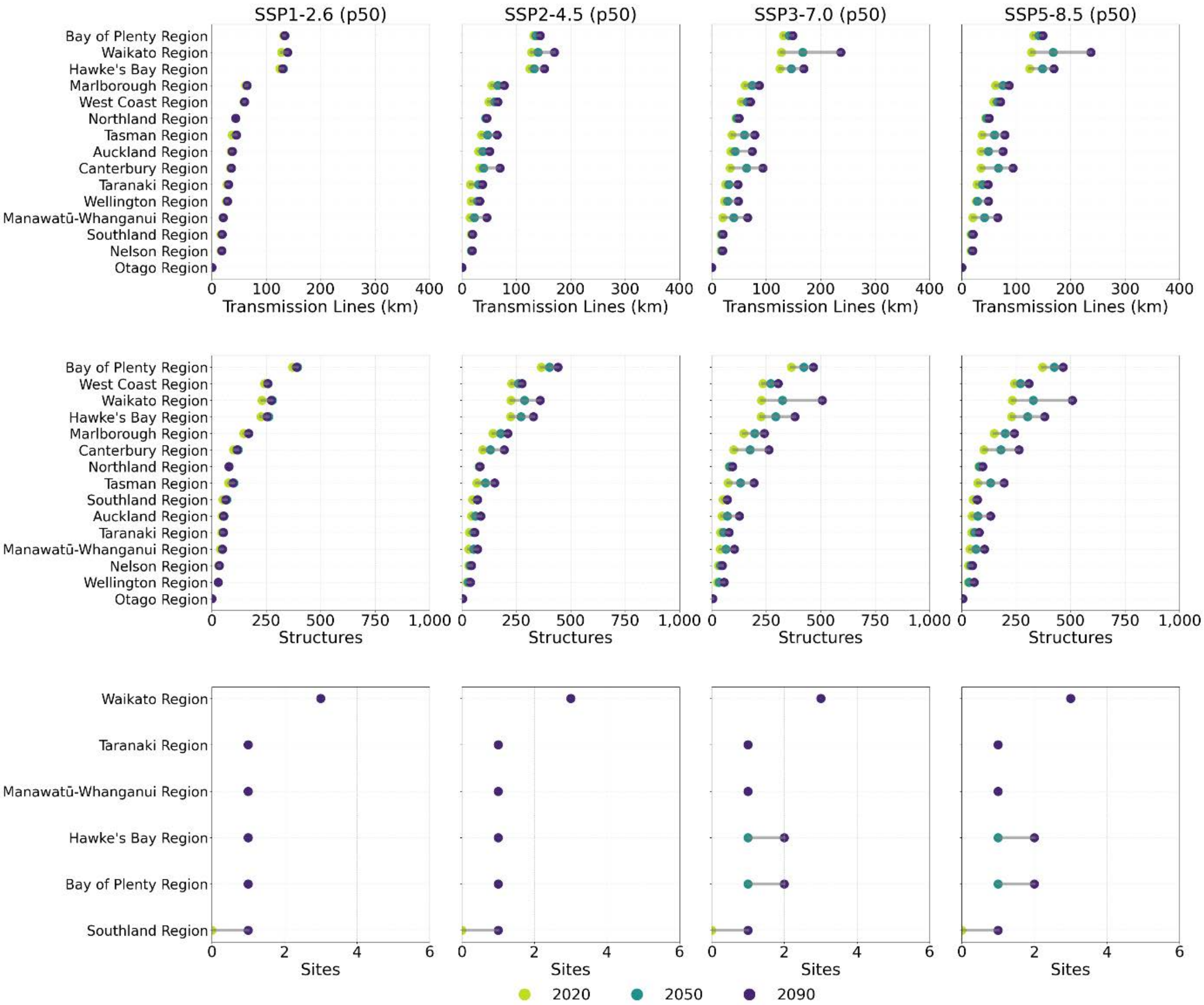

Figure 83: Projected 50th percentile (p50) exposure of A-NZ region national grid electricity infrastructure to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Waikato transmission line exposure increases to 237 km by 2090, Bay of Plenty to 149 km, and Hawke's Bay to 169 km. Structure exposure shows Bay of Plenty reaches 466 by 2090, while at this time over 300 structures are exposed in Waikato, Hawke's Bay and West Coast. Additional sites (2 each) are exposed in Bay of Plenty and Hawke's Bay regions at 2080.

SSP5-8.5 Scenario (2020–2090)

Transmission line exposure shows minor change from SSP3-7.0 with Waikato at 237 km in 2090, Bay of Plenty to 149 km, and Hawke's Bay to 169 km. Structure exposure shows minor change relative to SSP3-7.0, although Tasman and Manawatū–Whanganui each exceed 100 structures exposed by 2090. Additional sites (2 each) are exposed in Bay of Plenty and Hawke's Bay regions by 2070.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Auckland shows the highest transmission line exposure, starting at about 32 km at +0 m and reaching approximately 52 km at +2 m (Figure 84). Bay of Plenty increases considerably from 1 km at +0 m to 23 km at +2 m, while Marlborough and Canterbury exceed 10 km at +2 m. Structures also show considerable increases where Auckland increases from 39 structures at +0 m to 93 at +2 m, Bay of Plenty from 2 structures at +0 m to 110 at +2 m, and Canterbury from 9 structures at +0 m to 63 at +2 m. Sites exposure in Wellington reaches 3 at +2 m, while 2 sites in Otago are exposed at +1 m.

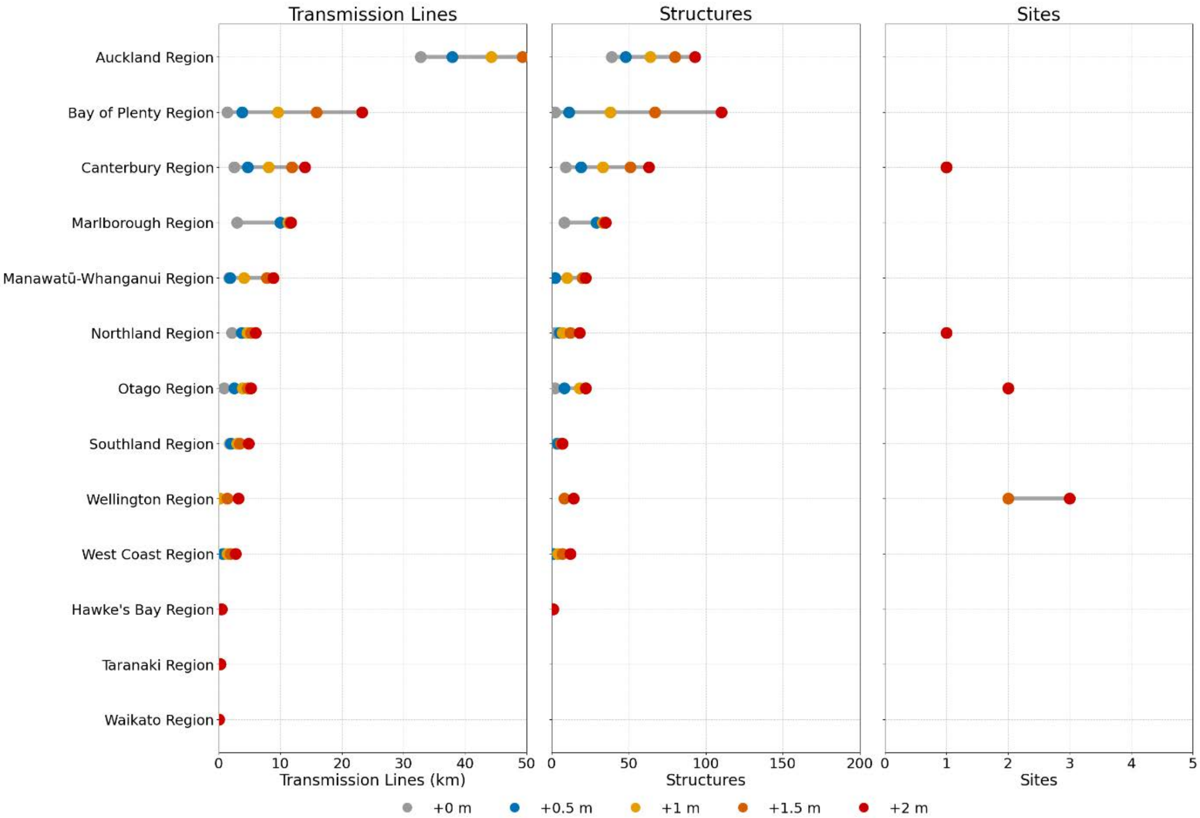

Figure 84: Projected exposure of A-NZ region national grid electricity infrastructure to extreme sea level driven coastal flooding under sea level change.

SSP1-2.6 Scenario (2020–2090)

Exposure of Canterbury transmission lines increase slightly from 3 km in 2020 to 5 km by 2090, while at this time Marlborough rises to 9 km, and Bay of Plenty to 3 km (Figure 85). Structure exposures show minimal change, with Canterbury moving from 9 to 15 and Marlborough and Bay of Plenty respectively reaching 22 and 8 structures exposed by 2090. No sites are identified as exposed by 2090.

SSP2-4.5 Scenario (2020–2090)

Canterbury transmission line exposures reach 6 km exposed by 2090, Marlborough climbs to 11 km, and Bay of Plenty slightly to 3 km. Structure exposures increase slightly by 2090, with Canterbury at 18, Marlborough 27, while Auckland reaches 48. No sites are identified as exposed by 2090.

SSP3-7.0 Scenario (2020–2090)
Exposure of transmission lines by 2090 increase to 6 km in Canterbury, Marlborough to 11 km, and Bay of Plenty to 3 km. Exposure of structures follow similar patterns, with Canterbury reaching 19, Marlborough 29, and Auckland at 49 by 2090. No sites are identified as exposed by 2090.

SSP5-8.5 Scenario (2020–2090)
Canterbury remains at 16 km of transmission lines exposed by 2090, Marlborough reaches 11 km, and Bay of Plenty 3 km. Exposure of structures rise to 23 in Canterbury, 30 in Marlborough and Bay of Plenty, and 52 in Auckland. Sites in Otago (2) and Canterbury (1) could be exposed by 2090 under 83rd percentile projections.

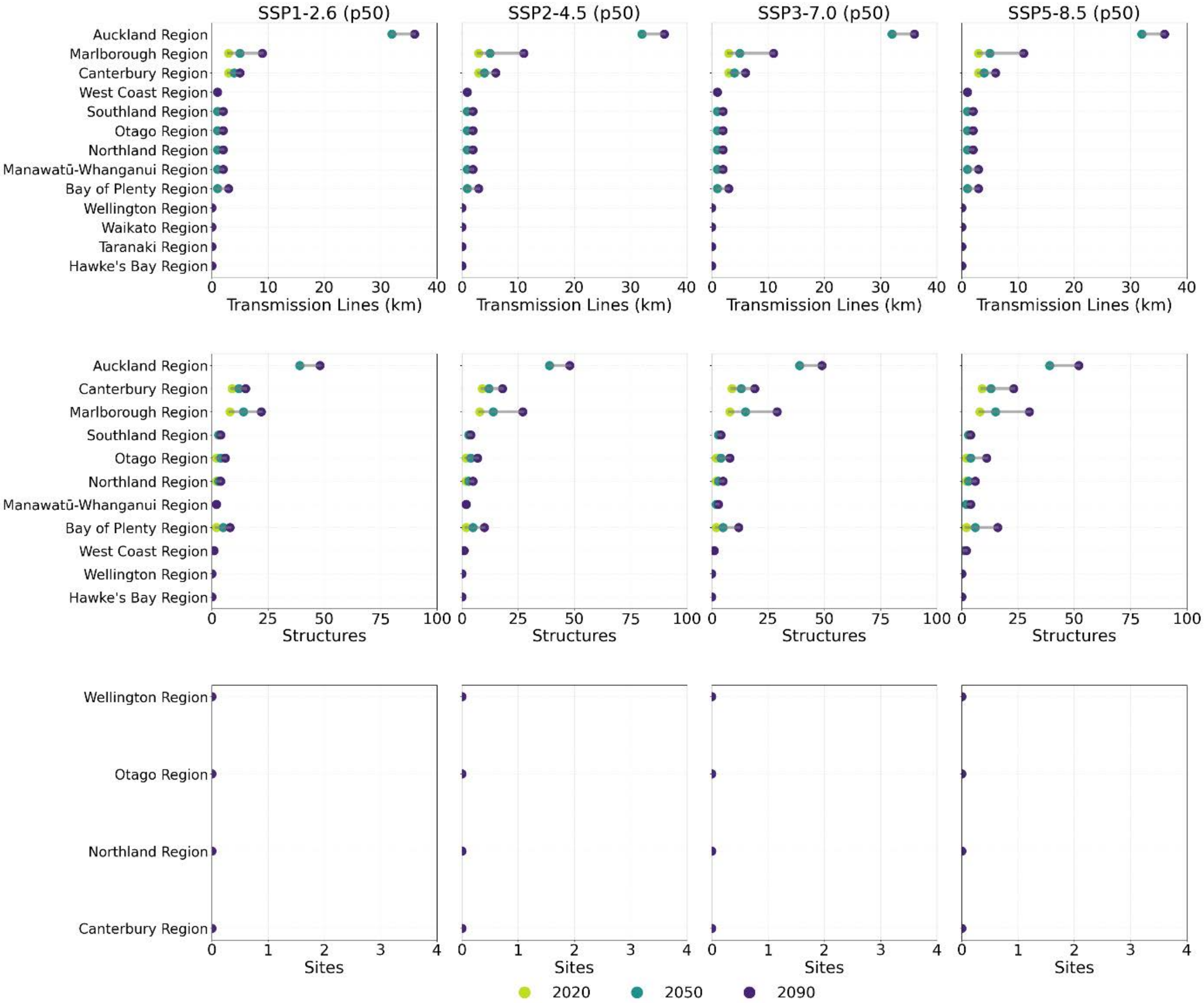

Figure 85: Projected 50th percentile (p50) exposure of A-NZ region national grid electricity infrastructure to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Transmission lines show the highest exposure in Auckland, starting at 18 km at +0 m and reaching 28 km at +2m (Figure 86). Bay of Plenty and Marlborough transmission line exposure also exceeds 10 km at +2m . Structures also show notable increases in exposure with Bay of Plenty's exposure increasing from 1 at +0 m to 47 at +2 m, and Marlborough from 0 to 34. Site exposure occurs at higher sea levels with Otago showing 1 site exposed by +1.5 m (2 at +2 m) Wellington reaching 2 sites at +2 m.

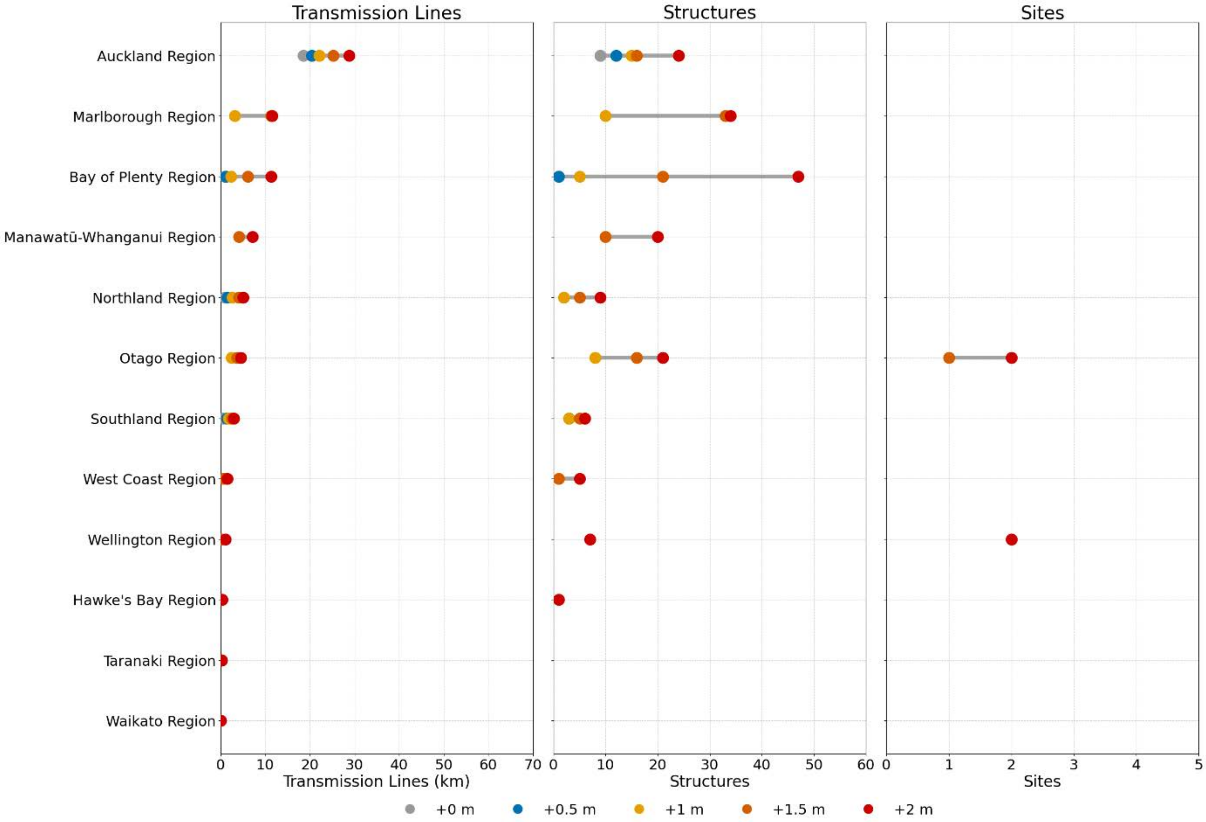

Figure 86: Projected exposure of A-NZ region national grid electricity infrastructure to mean high water springs driven coastal flooding under sea level change.

SSP1-2.6 Scenario (2020–2090)

Auckland shows the highest transmission line exposure, with 19 km in 2020 but then shows neglibable increase by 2090 (Figure 87). Bay of Plenty has 1 km of lines exposed by 2090. Structure exposures shows minimal change over the century, with Auckland increasing from 9 at 2020 to 11 at 2090. No sites are identified as exposed by 2090.

SSP2-4.5 Scenario (2020–2090)

Auckland shows neglibable transmission line exposure change, with 19 km at 2090. Structures in Auckland increase slightly to 12 in 2090. No sites are identified as exposed by 2090.

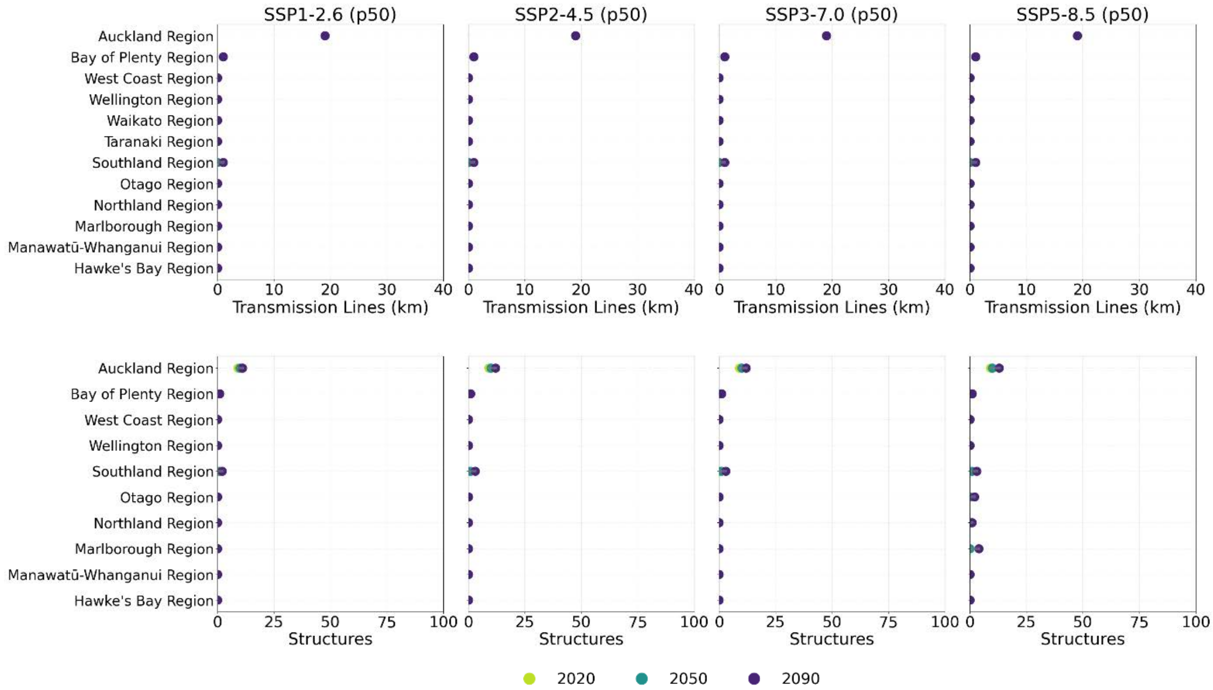

Figure 87: Projected 50th percentile (p50) exposure of A-NZ region national grid electricity infrastructure to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Note, no sites are identified as exposed by 2090.

SSP3-7.0 Scenario (2020–2090)

Auckland shows neglibable transmission line exposure change, with 19 km at 2090. Structures in Auckland remains at 12 in 2090. No sites are identified as exposed by 2090.

SSP5-8.5 Scenario (2020–2090)

Auckland shows no transmission line exposure change realtive to SSP3-7.0, with 19 km at 2090. Structures in Auckland increase slightly to 13 in 2090. No sites are identified as exposed by 2090.

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Transmission line exposure is highest in Auckland, increasing from 32 km at +0 m to 34 km at +2 m (Figure 88). Bay of Plenty and Canterbury both exceed 30 km exposed at +2 m. Structures exhibit the highest exposure in Bay of Plenty at +0 m with165, but do not increase with higher sea levels. Canterbury shows the largest exposure increase from 77 at + 0m to 181 at +2 m. Sites are most exposed in Canterbury with four sites exposed by +1m.

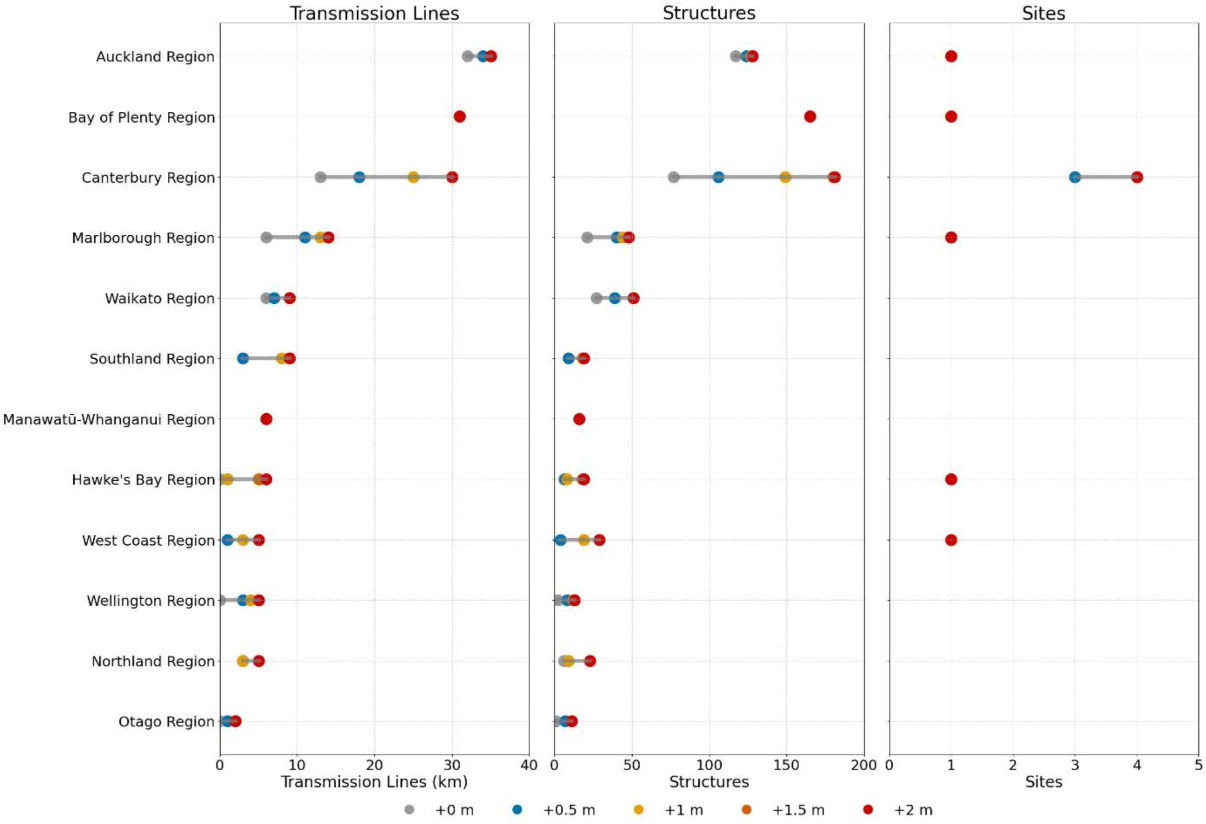

Figure 88: Projected exposure of A-NZ region national grid electricity infrastructure on coastal land with shallow groundwater presence under sea level change.

SSP1-2.6 Scenario (2020–2090)

Bay of Plenty shows the highest transmission line exposure, starting 31 km in 2020, with no further increase over this century (Figure 89). Auckland and Canterbury have 28 km and 13 km exposed in 2020 respectively with minimal increase over the century. Structure exposure in Bay of Plenty starts at 165 in 2020 with no increase thereafter this century. Auckland and Canterbury show minor exposure increases, with 18 more structures exposed in Canterbury between 2020 and 2090. Site exposure shows no increase from 2020 to 2090, with the highest exposure in Canterbury (3).

SSP2-4.5 Scenario (2020–2090)

Transmission line exposure remains relatively unchanged SSP1-2.6. Structure exposure in Auckland and Canterbury show minimal increase over the century while by 2090, 37 and 38 structures respectively are exposed in Waikato and Marlborough. Site exposure shows no increase from 2020 to 2090, with the highest exposure remaining in Canterbury (3).

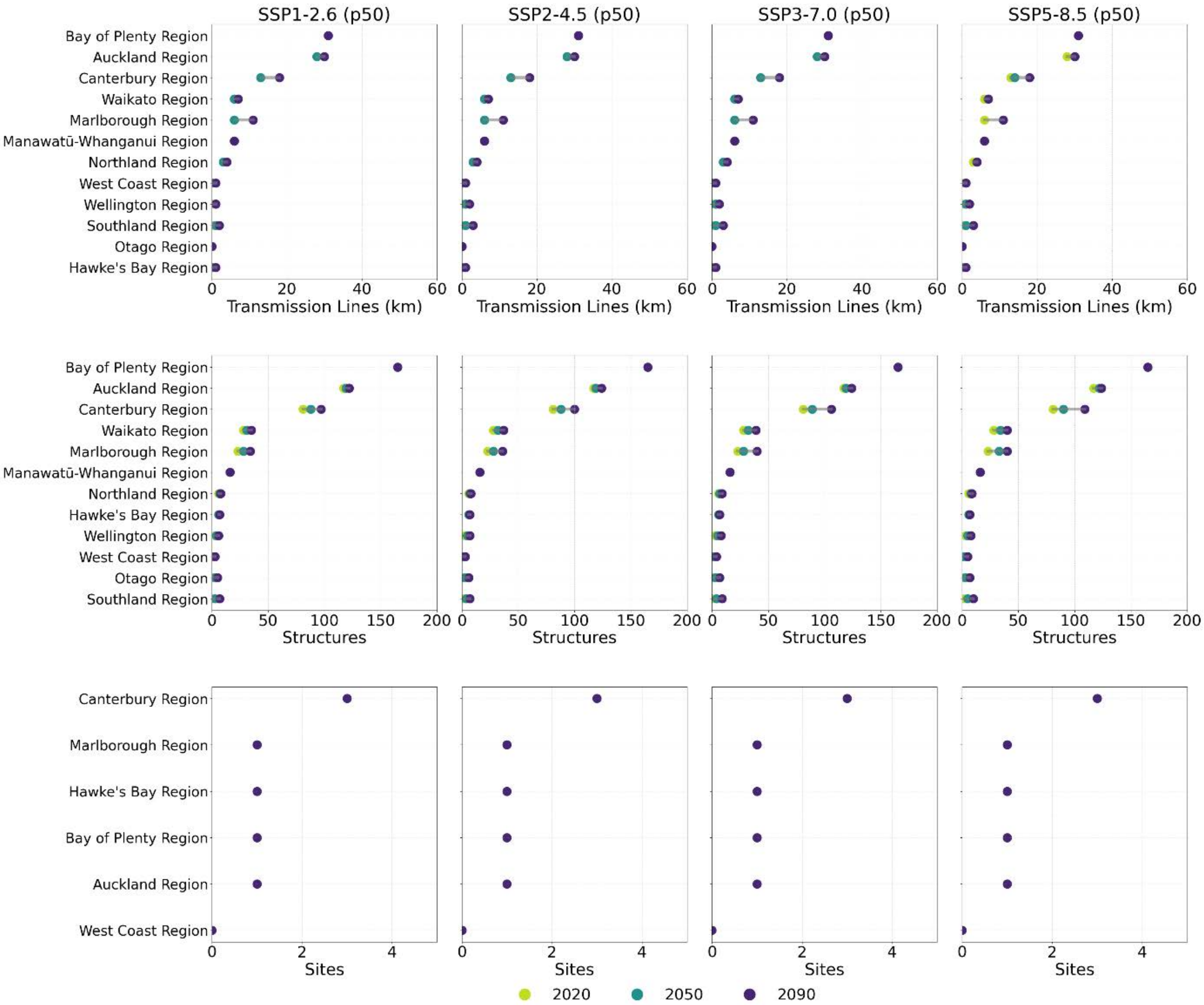

Figure 89: Projected 50th percentile (p50) exposure of A-NZ region national grid electricity infrastructure on coastal land with shallow groundwater presence in A-NZ regions under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Transmission line exposure remains relatively unchanged compared to lower emission scenarios. Structure exposure in Bay of Plenty remains unchanged over the century, while Waikato and Marlborough reach 40 exposed structures by 2090. Site exposure shows no increase from 2020 to 2090, with the highest exposure remaining in Canterbury (3).

SSP5-8.5 Scenario (2020–2090)

Transmission line exposure increases slightly by 2090 with 1 km of additional exposure in Canterbury, Southland and Waikato after 2080. Structure exposure in Bay of Plenty again remains unchanged over the century, while nine additional structures are exposed in Canterbury between 2080 and 2090. Site exposure shows no increase from 2020 to 2090, with the highest exposure remaining in Canterbury (3).

Coastal erosion

No hazard-exposed transmission lines, structures or sites were identified in the coastal erosion areas used in this study.

Climate processes

Extreme Winds

The most exposed regions in 2050 under SSP5-8.5, are Canterbury (2095 km), Otago (1025 km), and Manawatū-Whanganui (691 km). By 2090, Canterbury remains highest at 2115 km, followed by Otago (1025 km) and Southland (674 km). For SSP5-8.5, the top regions in 2050 are Canterbury (6998 structures), Otago (3641 structures), and Manawatū-Whanganui (2617 structures). By 2090, Canterbury remains highest at 7060 structures, followed by Otago (3641 structures) and Manawatū-Whanganui (2632 structures).

2.2.5 Water (potable water, stormwater, wastewater)

Inland flooding

Temperature Change (+0°C to +3°C)

Potable water infrastructure shows the highest node exposure in Canterbury and Wellington, with 152,250 and 100,596 at +0°C warming, increasing to 168,135 and at +3°C warming (Figure 90). Auckland also exceeds 100,000 nodes exposed at +3°C warming. Smaller regions by population, including Marlborough, Gisborne, and West Coast, show less than 10,000 nodes with up to +3°C warming. Potable water pipeline exposure is highest in Canterbury, reaching 4625 km at +3°C warming. Otago, Auckland and Waikato follow more than 2000 km. Wastewater infrastructure exposure is highest in Canterbury and Auckland showing over 30,000 nodes and 2000 km of pipelines at +0°C warming.

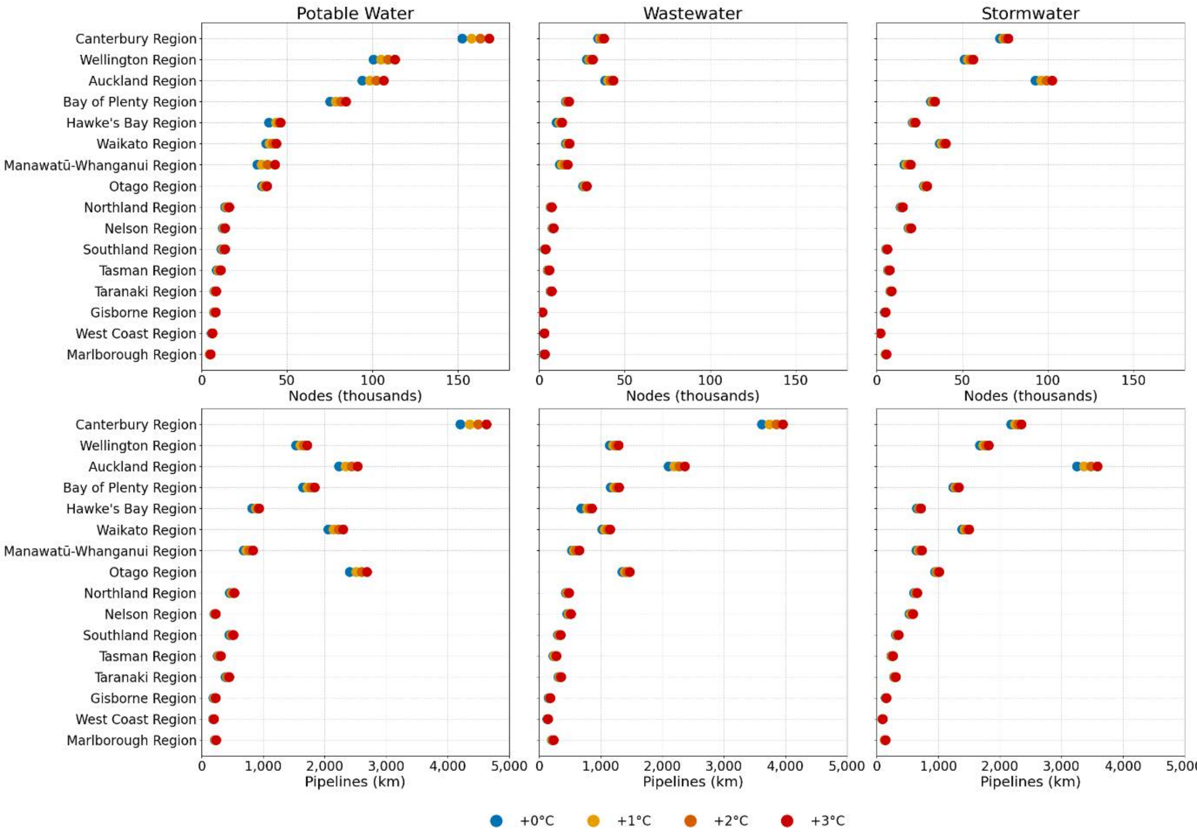

Figure 90: Projected exposure of A-NZ region water infrastructure to inland flooding under temperature change. Water node values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Potable water node exposure is highest in Canterbury and Wellington, with both regions exceeding 100,000 at 2020 (Figure 91). Auckland has the highest exposure of wastewater and stormwater nodes, exceeding 40,000 at 2020. Potable water pipeline exposure is highest in Canterbury at 4471 km in 2020 and increasing slightly to 4528 km in 2090. Otago and Auckland also exceed 2500 each by 2090 (Figure 92).

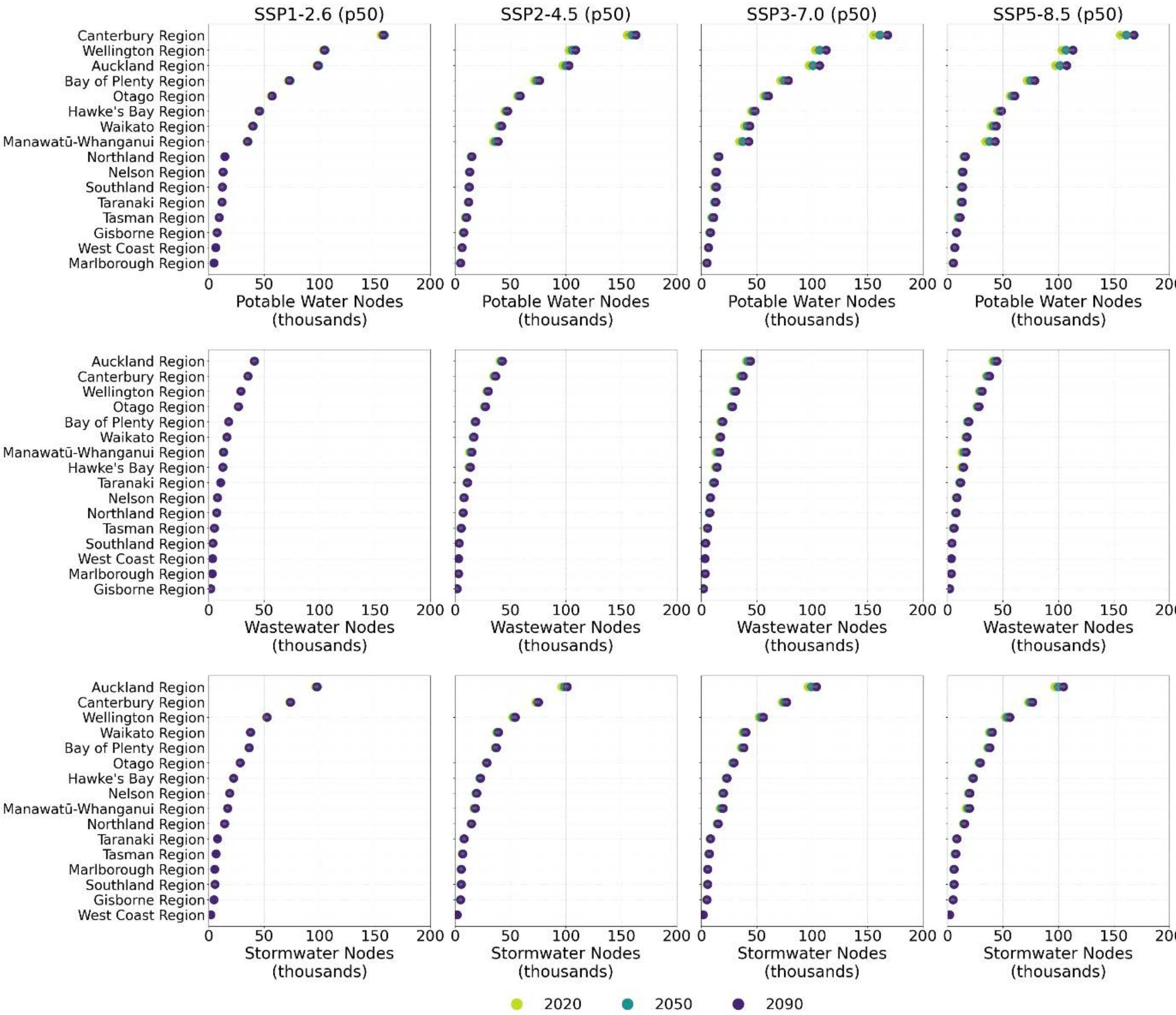

Figure 91: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure nodes to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Water node values are rounded for presentation clarity.

SSP2-4.5 Scenario (2020–2090)

Exposure trends remain consistent with SSP1-2.6. Potable water and stormwater node exposure in Auckland exceeds 100,000 by 2090. At this time potable water node exposure in Otago exceeds 50,000. Pipeline exposure at 2090 in Canterbury reaches 4678 km in Canterbury while stormwater pipelines in Auckland reach 3834 km.

SSP3-7.0 Scenario (2020–2090)

Under SSP3-7.0 emission scenarios, exposure patterns remain largely unchanged. Canterbury and Wellington continue to show the highest potable water node exposure followed by Auckland. Wastewater node exposure also exceeds 44,000 by 2090, and reaches 28,409 in Otago. Pipeline exposure in Canterbury reaches 4802 km and 4194 km for potable water and wastewater pipelines respectively at 2090, while more and 2776 km and 2385 km of potable water pipelines are exposed in Otago and Waikato respectively.

SSP5-8.5 Scenario (2020–2090)

Node and pipeline exposure shows minimal change from SSP3-7.0 for all water networks.

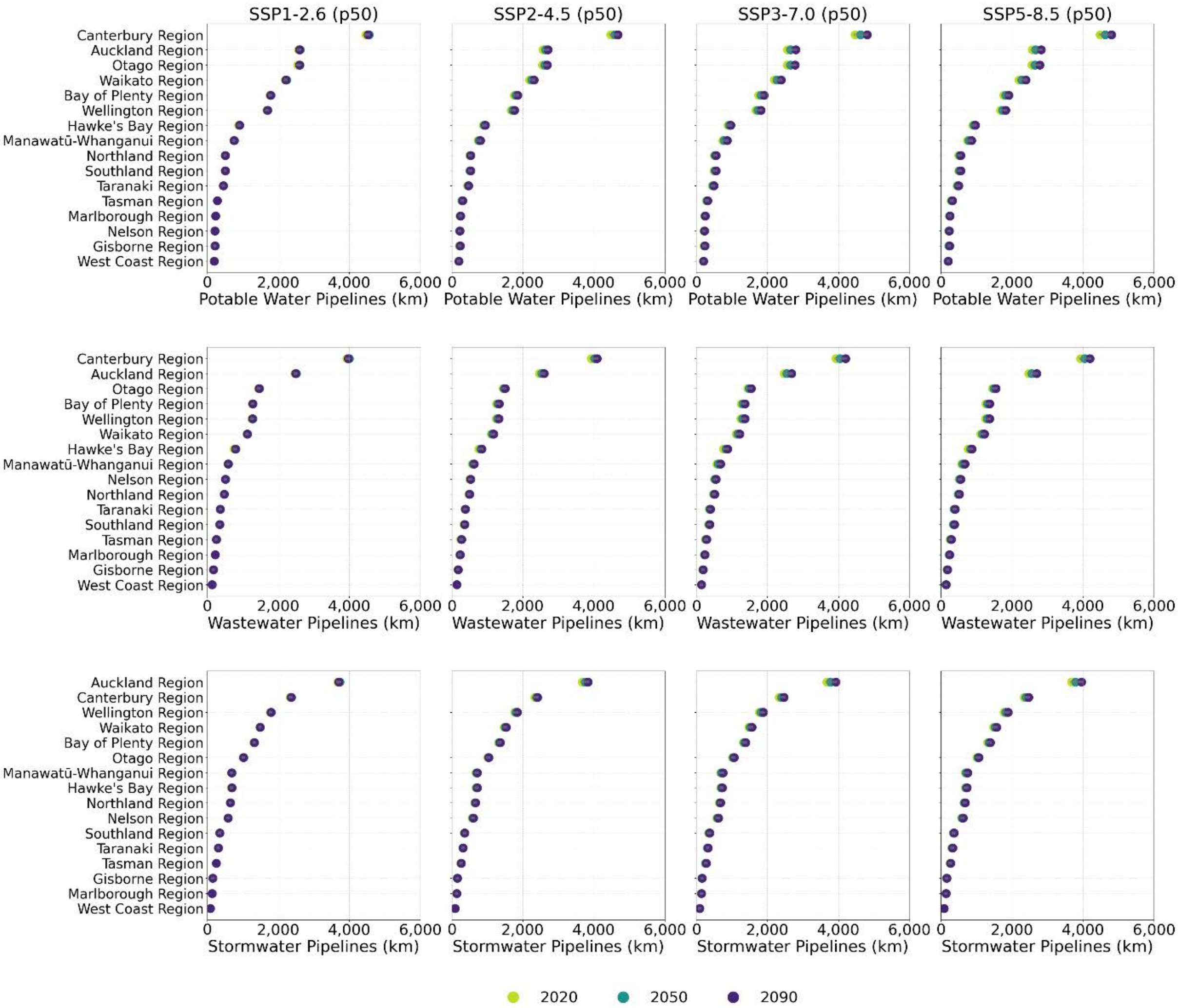

Figure 92: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure pipelines to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Potable water infrastructure shows the highest exposure in Auckland, with 5794 nodes at +0°C warming increasing to 33,161 at +3°C warming (Figure 93). Bay of Plenty follows with 21,439 nodes at +3°C warming. Potable water pipeline exposure is greatest in Auckland, beginning at 131 km at +0°C and increasing to 612 km at +3°C warming. Bay of Plenty and Northland follow with 409 km and –294 km respectively at +3°C warming, while Canterbury also exceed 250 km. Wastewater pipelines are most high exposed in Bay of Plenty (168 km) at +0°C, and Auckland (630 km) at +3°C. Stormwater pipelines show similar exposure trends, with Auckland and Bay of Plenty showing the highest exposure under all temperature scenarios.

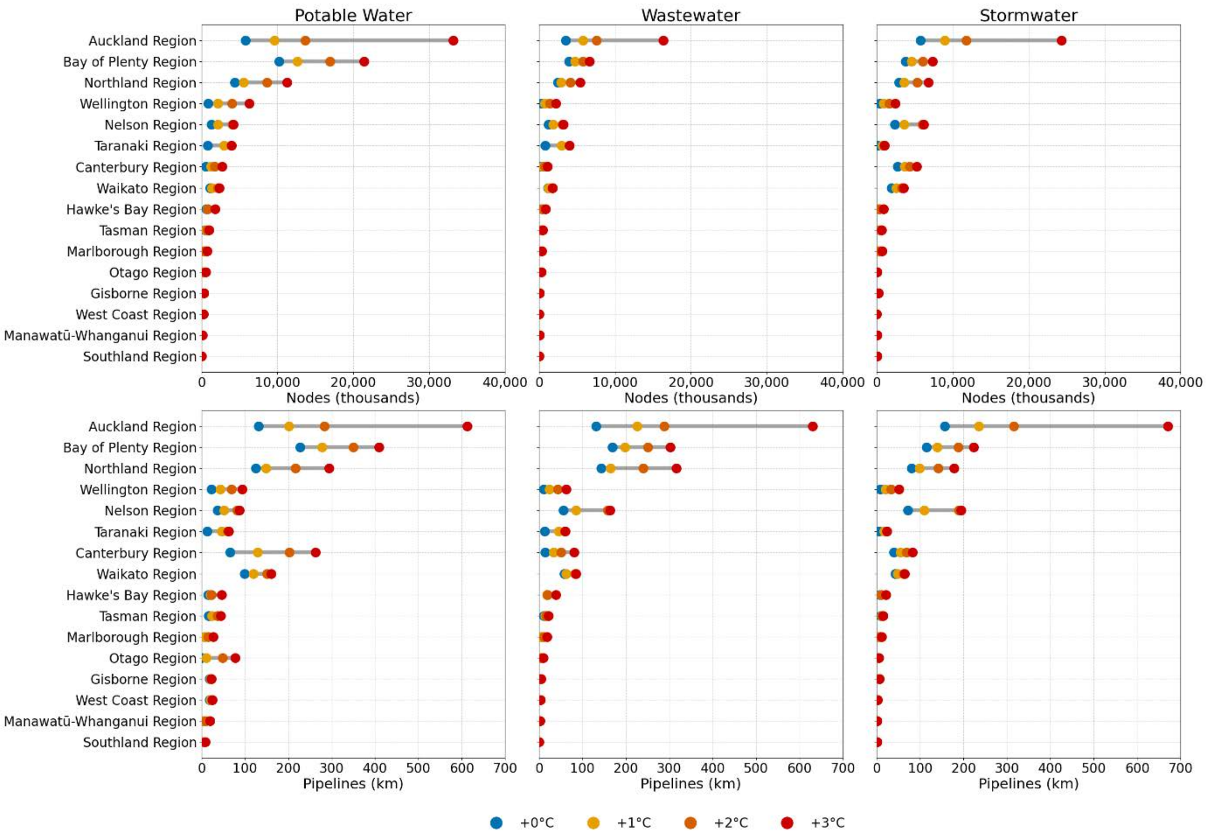

Figure 93: Projected exposure of A-NZ region water infrastructure to rainfall-induced landslides under temperature change. Water node values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Potable water node exposure is highest in Bay of Plenty, exceeding 11,700 in 2020 then increases to 12,500 by 2090 (Figure 94). Auckland and Northland with 8920 and 5472 nodes exposed by 2090. Wastewater and stormwater nodes are mostly highly exposed in Auckland, reaching 5389 and 8408 by 2090. Pipelines show similar trends to nodes where in 2020, potable water and wastewater pipelines are most exposed in Bay of Plenty (256 km and 186 respectively), and stormwater pipelines most exposed in Auckland at 201 km (Figure 95). Minimal exposure change for pipelines is observed by 2090.

SSP2-4.5 Scenario (2020–2090)

Exposure trends remain consistent with SSP1-2.6, with Bay of Plenty and Auckland showing the highest exposure. Potable water node exposed in Bay of Plenty reaches 17,379 by 2090, and

13,390 in Auckland. Wastewater exposure in Auckland reaches 7404 by 2090. Pipeline exposure shows a considerable increase relative to SSP1-2, particularly in Bay of Plenty for potable water (348 km) and Auckland (283 km) for wastewater and stormwater (305 km).

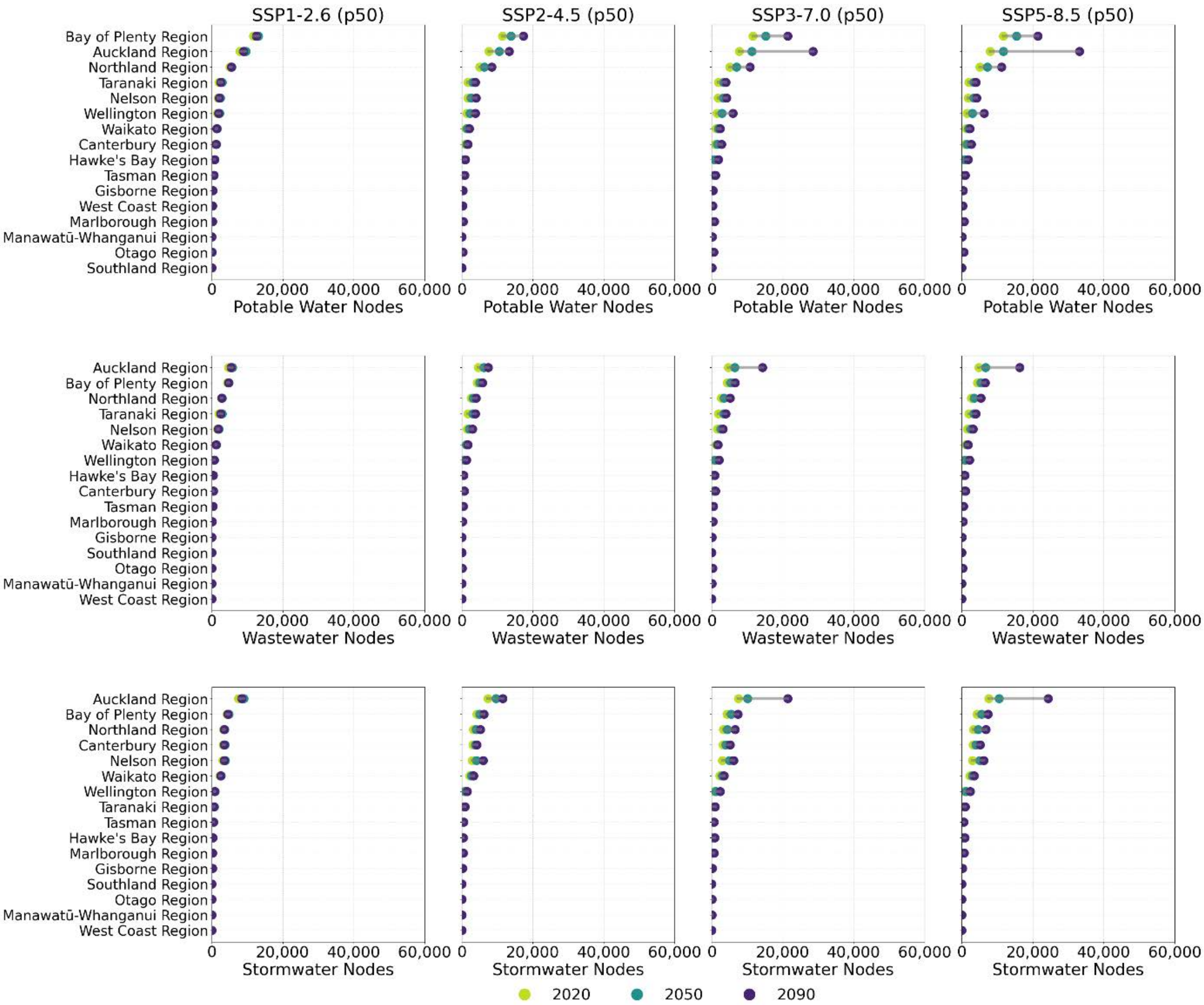

Figure 94: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure nodes to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Auckland potable water nodes reach 28,556 exposed by 2090, with Bay of Plenty at 21,378 and Northland at 10,820. Wellington exposure remains at 5,991 nodes, and Nelson at 4,209 nodes. Pipeline exposure shows moderate increases by 2090, with Auckland at 536 km, Bay of Plenty at 404 km, and Northland at 282 km for potable water. Wastewater and stormwater networks exhibit similar patterns, with exposed Auckland wastewater pipelines at 546 km and stormwater at 585 km, and exposed Bay of Plenty wastewater at 297 km and stormwater at 220 km.

SSP5-8.5 Scenario (2020–2090)

Exposure in Auckland reaches 33,161 potable water nodes by 2090, while Bay of Plenty records 21,439 nodes and Northland 11,262 nodes by 2090. Exposure in Wellington stays at 6,275 nodes, and Nelson stays at 4,209. Potable water pipeline exposure in Auckland is 613 km by 2090, and Bay of Plenty 405 km. Wastewater and stormwater networks follow similar trends, with Auckland wastewater pipelines at 626 km and stormwater at 664 km, and Bay of Plenty wastewater at 298 km and stormwater at 221 km.

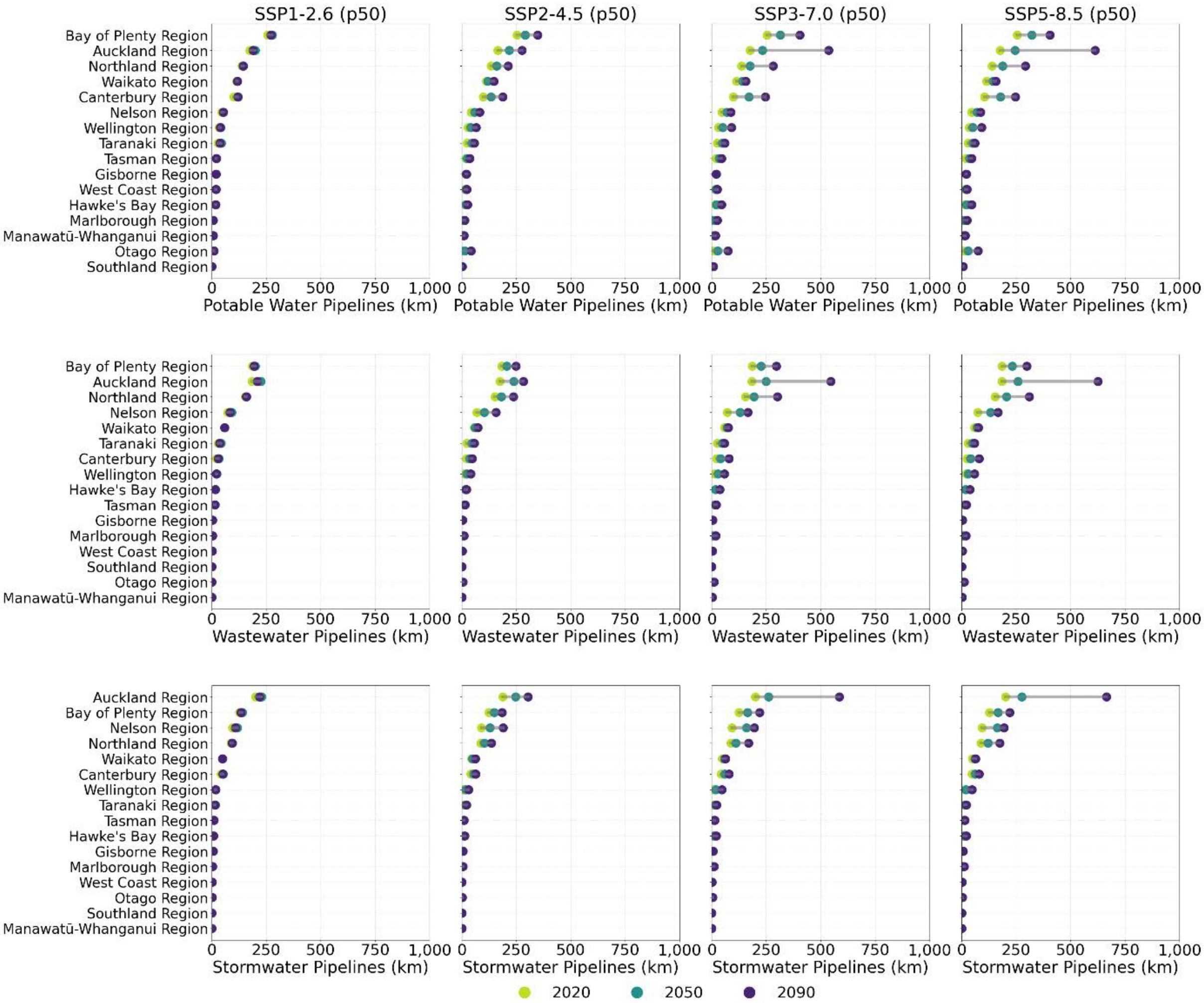

Figure 95: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure pipelines to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Potable water infrastructure shows the highest exposure in Canterbury and Hawke's Bay, starting at 7330 and 7269 nodes respectively at +0 m, increasing to 48,759 and 33,908 nodes at +2 m (Figure 96). Potable water nodes exposed at +2 m also exceeds 20,000 in Bay of Plenty, Wellington and Otago. Potable pipeline exposure is greatest in Canterbury at +0 m with 171 km and exceeds 100 km in Bay of Plenty and Otago. At +2 m, pipeline exposure in Otago reaches 1077 km. Wastewater infrastructure exposure is highest in Canterbury with 12,177 nodes and 1199 km of pipelines at +2 m. Stormwater infrastructure shows similar trends, with Canterbury exceeding 20,000 nodes and 661 km pipelines at +2 m, and Auckland 17,000 nodes and 569 km pipelines.

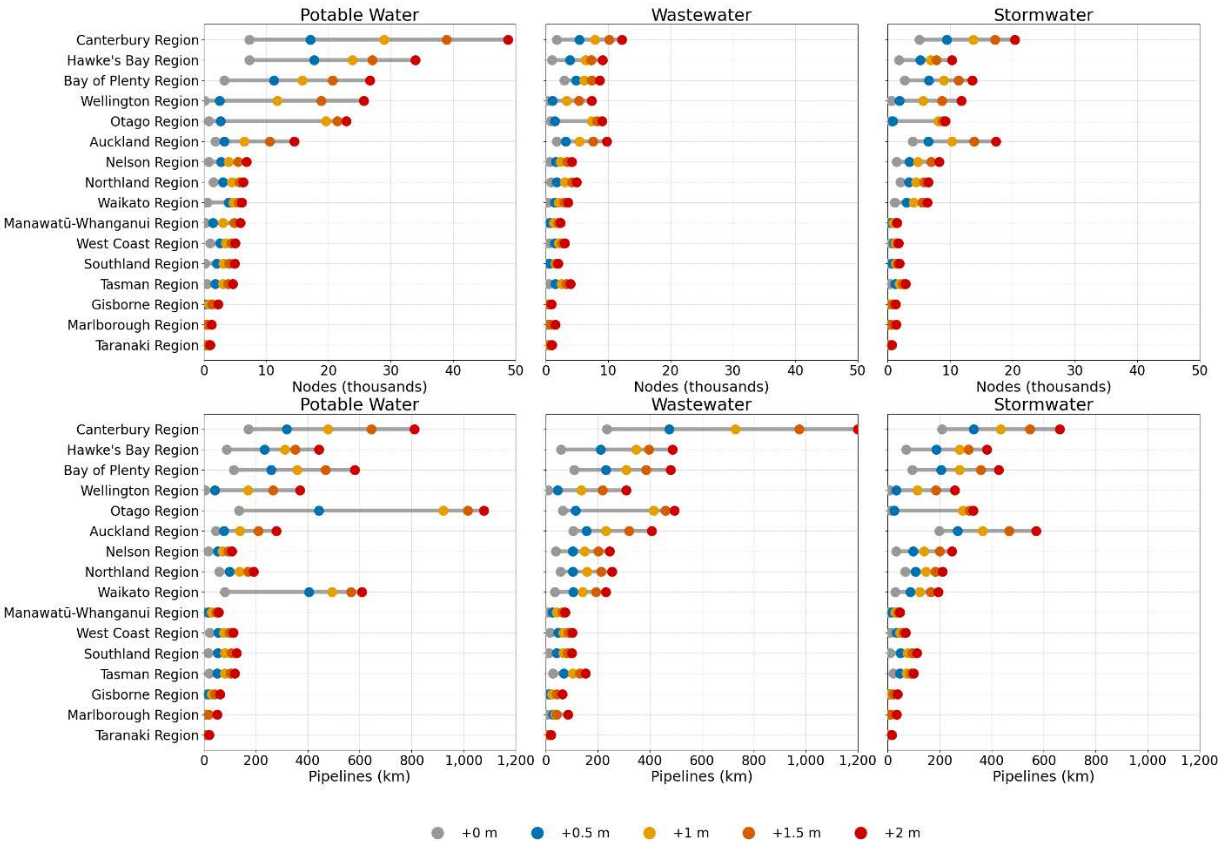

Figure 96: Projected exposure of A-NZ region water infrastructure to extreme sea level driven coastal flooding under sea level change. Water node values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Water node exposure is highest in Canterbury, with potable water nodes starting at 7330 in 2020 and increasing to 13,594 by 2090 (Figure 97). Hawke's Bay and Bay of Plenty follow with 7269 and 3,285 nodes exposed in 2020, rising to 13,925 and 8574 nodes by 2090, respectively. Auckland grows from 1,830 exposed nodes in 2020 to 2,821 by 2090, while Wellington increases from 106 to 1657 nodes. Wastewater and stormwater networks show similar patterns, with Canterbury consistently leading in exposure and Hawke's Bay and Bay of Plenty maintaining high exposure. Exposed pipeline lengths also increase, though modestly. Exposed Canterbury potable pipelines grow from 169 km in 2020 to 266 km by 2090, while Hawke's Bay rises from 86 km to 181 km, and Bay of Plenty from 113 km to 215 km (Figure 98). Exposed Auckland potable pipelines expand from 39 km to 68 km, and Wellington from 1 km to 26 km. Stormwater pipeline exposure in Canterbury reaches 286 km by 2090, while Bay of Plenty reaches 169 km.

SSP2-4.5 Scenario (2020–2090)

Exposure trends remain broadly consistent with SSP1-2.6, but with more pronounced increases by 2090. Canterbury has the highest potable water node exposure, increasing from 7330 in 2020 to 15,751 by 2090. Hawke's Bay increases from 7269 to 16,212 nodes by 2090, and Bay of Plenty from 3285 to 10,168 nodes. Auckland exposure also climbs significantly, from 1830 to 3153 nodes, while Wellington increases from 106 to 2194 nodes. Wastewater and stormwater networks follow similar trajectories, with exposed Canterbury stormwater nodes increasing from 5050 to 8864, while Bay of Plenty's nodes increase from 2683 to 6022. Pipeline exposure shows moderate growth rather than remaining unchanged. Canterbury potable pipeline exposure nearly doubles from 169 km in 2020 to 297 km by 2090, Bay of Plenty from 113 km to 239 km, and Hawke's Bay from 86 km to 212 km. Auckland potable pipeline exposure increase from 39 km to 69 km, and Wellington from 1 km to 34 km. Stormwater pipelines in Canterbury reach 312 km exposed by 2090.

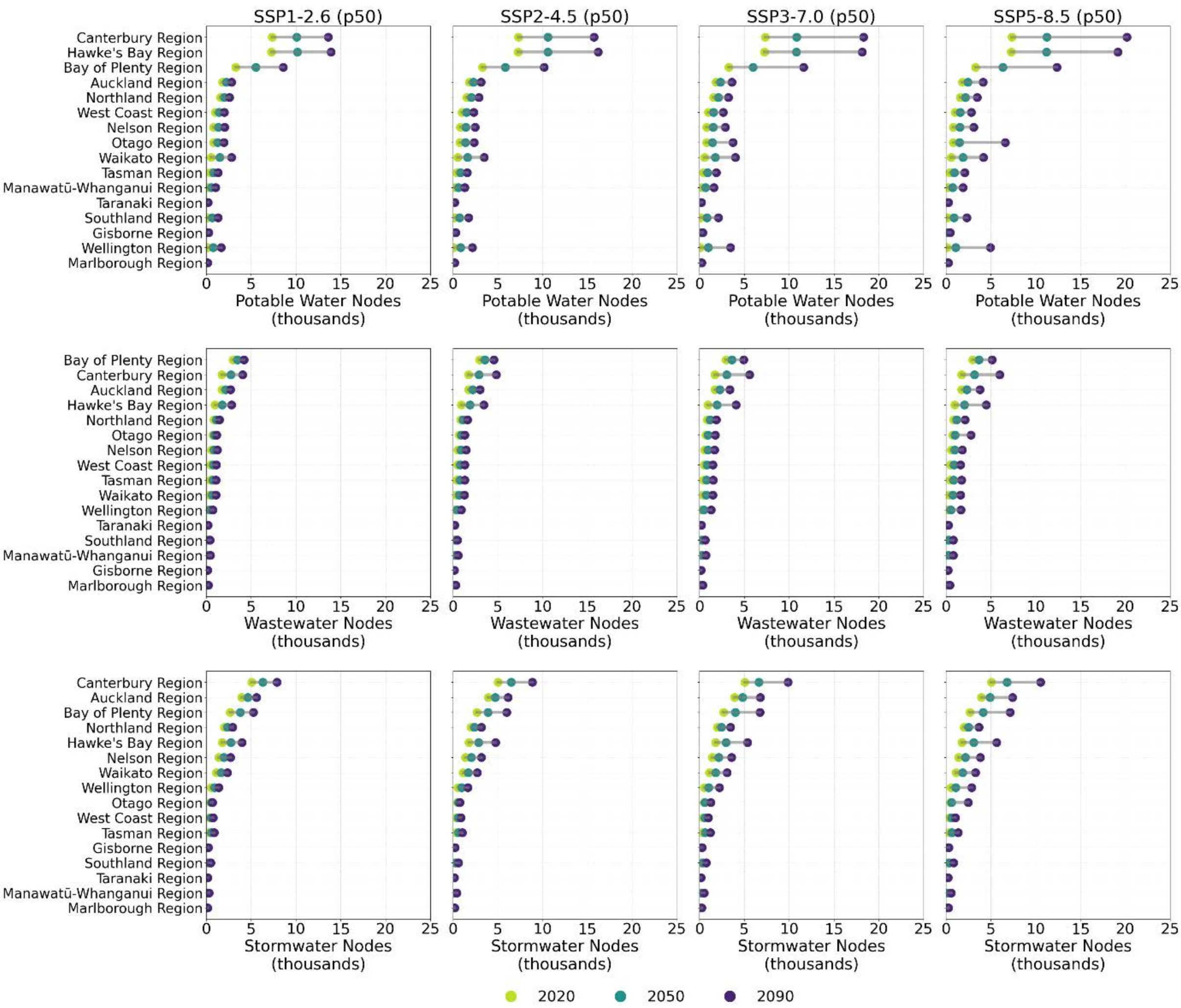

Figure 97: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure nodes to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios. Water node values are rounded for presentation clarity.

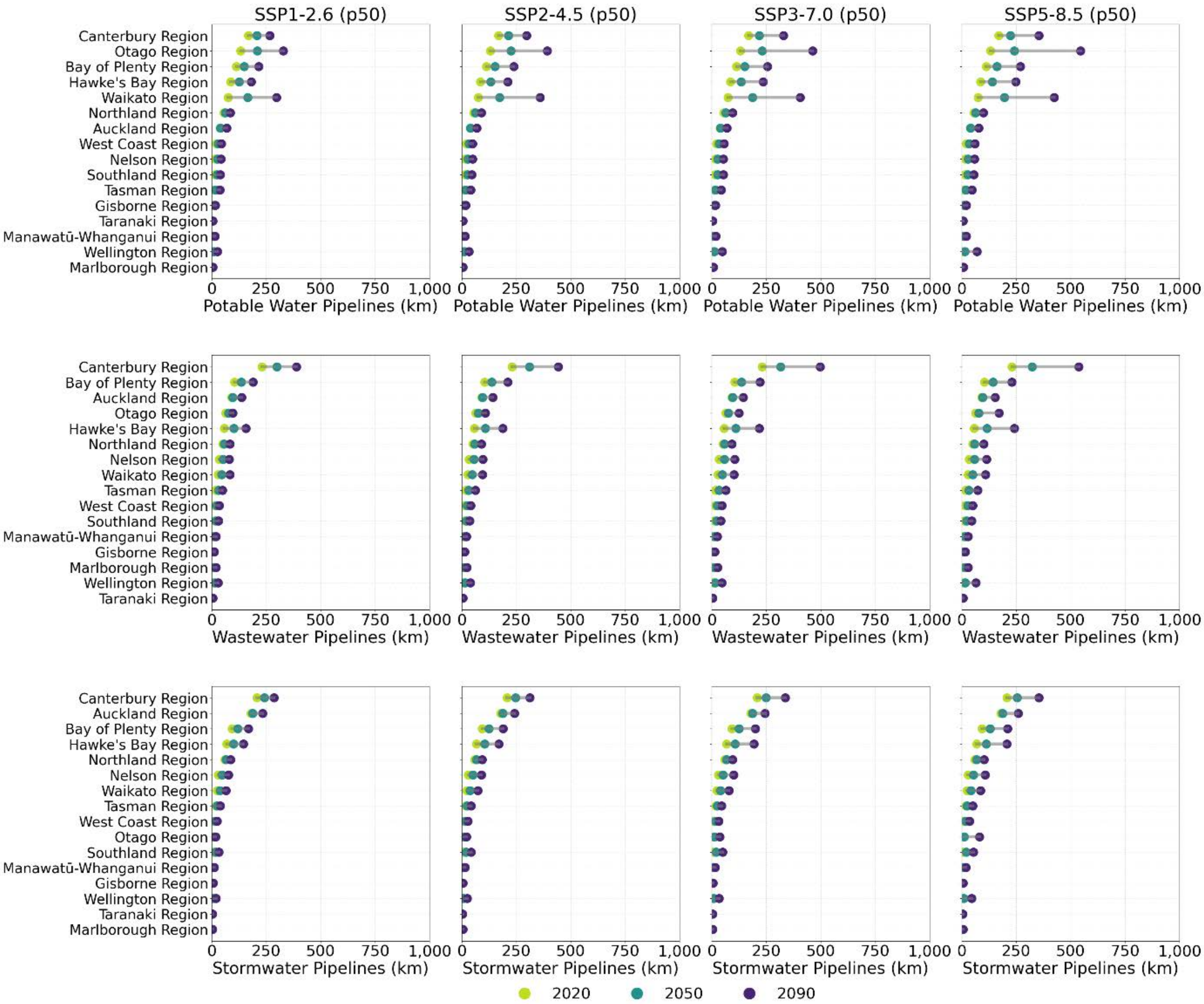

Figure 98: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure pipelines to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Under higher-emission scenarios, exposure grows substantially between 2020 and 2090. In 2020, Canterbury potable water nodes start at 7330, Hawke's Bay at 7269, and Bay of Plenty at 3285. By 2090, Canterbury reaches 18,295 nodes, Hawke's Bay 18,160 nodes, and Bay of Plenty 11,637 nodes. Auckland increases from 1830 nodes in 2020 to 3635 nodes in 2090, while Wellington grows from 106 nodes to 3459 nodes. Pipeline exposure also shows significant growth. In 2020, Canterbury potable pipeline exposures reach 169 km, Hawke's Bay 86 km, and Bay of Plenty 113 km. By 2090, exposure increases to 330 km for Canterbury, 237 km for Hawke's Bay, and 256 km for Bay of Plenty. Auckland potable pipeline exposures increase from 39 km in 2020 to 70 km in 2090, and Wellington from 1 km to 48 km. Exposed stormwater pipelines in Canterbury increase from 208 km in 2020 to 337 km in 2090.

SSP5-8.5 Scenario (2020–2090)

In 2020, exposed Canterbury potable water nodes start at 7330, Hawke's Bay at 7269, and Bay of Plenty at 3285. By 2090, Canterbury exposure reaches 20,175 nodes, Hawke's Bay 19,151 nodes, and Bay of Plenty 12,374 nodes. Auckland exposure increases from 1830 nodes in 2020 to 4144 nodes in 2090, while Wellington rises from 106 exposed nodes to 4931 nodes. In 2020, Canterbury potable pipeline exposures increase to 354 km for Canterbury, 248 km for Hawke's

Bay, and 269 km for Bay of Plenty. Auckland potable pipeline exposures grow from 39 km to 79 km, and Wellington from 1 km to 71 km. Stormwater pipeline exposurs in Canterbury increase from 208 km in 2020 to 354 km in 2090.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Potable water infrastructure at +2 m, shows over 20,000 nodes are each exposed in Hawkes Bay and Otago, and more than 15,000 each in Bay of Plenty and Wellington (Figure 99). Potable pipeline exposure at +2 m is highest in Otago with 964 km, while exposure in Hawke's Bay, Bay of Plenty and Waikato exceeds 300 km. Wastewater infrastructure follows potable water patterns, where at +2 m Otago and Hawke's Bay respectively reach 7852 and 6956 exposed nodes, and 440 km and 378 km exposed pipelines. Stormwater infrastructure shows similar trends, with Otago, Auckland and Bay of Plenty exceeding 8000 exposed nodes at +2 m, and over 250 km of exposed pipelines.

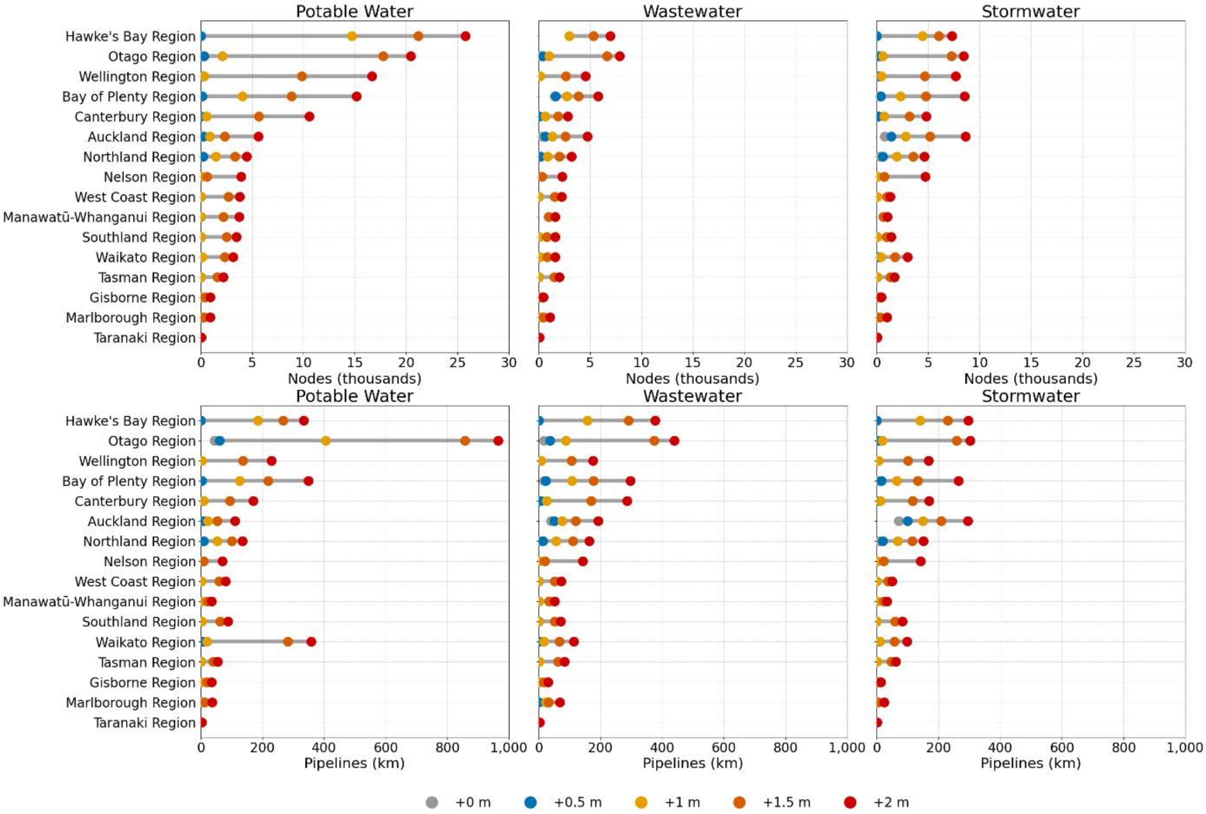

Figure 99: Projected exposure of A-NZ region water infrastructure to mean high water springs driven coastal flooding under sea level change. Water node values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

In 2020, Auckland has 100 potable water nodes exposed, Bay of Plenty 41 nodes, and Otago 127 nodes (Figure 100). By 2090, these exposure values increase to 240 nodes for Auckland, 114 nodes for Bay of Plenty, and 244 nodes for Otago. Wastewater node exposure shows Bay of Plenty, rising from 213 nodes in 2020 to 337 nodes in 2090, while Auckland grows from 760 to 1189 nodes. In 2020, Auckland exposed potable pipelines measure 1 km, Bay of Plenty 1 km, and Otago 43 km (Figure 101). By 2090, these increase slightly to 3 km for Auckland, 1 km for

Bay of Plenty, and 57 km for Otago. Wastewater pipeline exposurtes in Auckland grow from 34 km to 40 km, while Otago rises from 14 km to 30 km.

SSP2-4.5 Scenario (2020–2090)
In 2020, Auckland has 100 exposed potable water nodes, Bay of Plenty 41 nodes, and Otago 127 nodes. By 2090, these values rise to 282 exposed nodes for Auckland, 133 nodes for Bay of Plenty, and 288 nodes for Otago. Wastewater node exposure is highest in Auckland, increasing to 1344 nodes in 2090. Stormwater node exposure is highest in Northland, increasing from 289 nodes in 2020 to 527 nodes in 2090. In 2020, Auckland potable pipeline exposure reaches 1 km, Bay of Plenty 1 km, and Otago 43 km. By 2090, these increase only slightly to 1 km for Auckland, 1 km for Bay of Plenty, and 44 km for Otago. Stormwater pipeline exposures in Auckland reach 85 km by 2090.

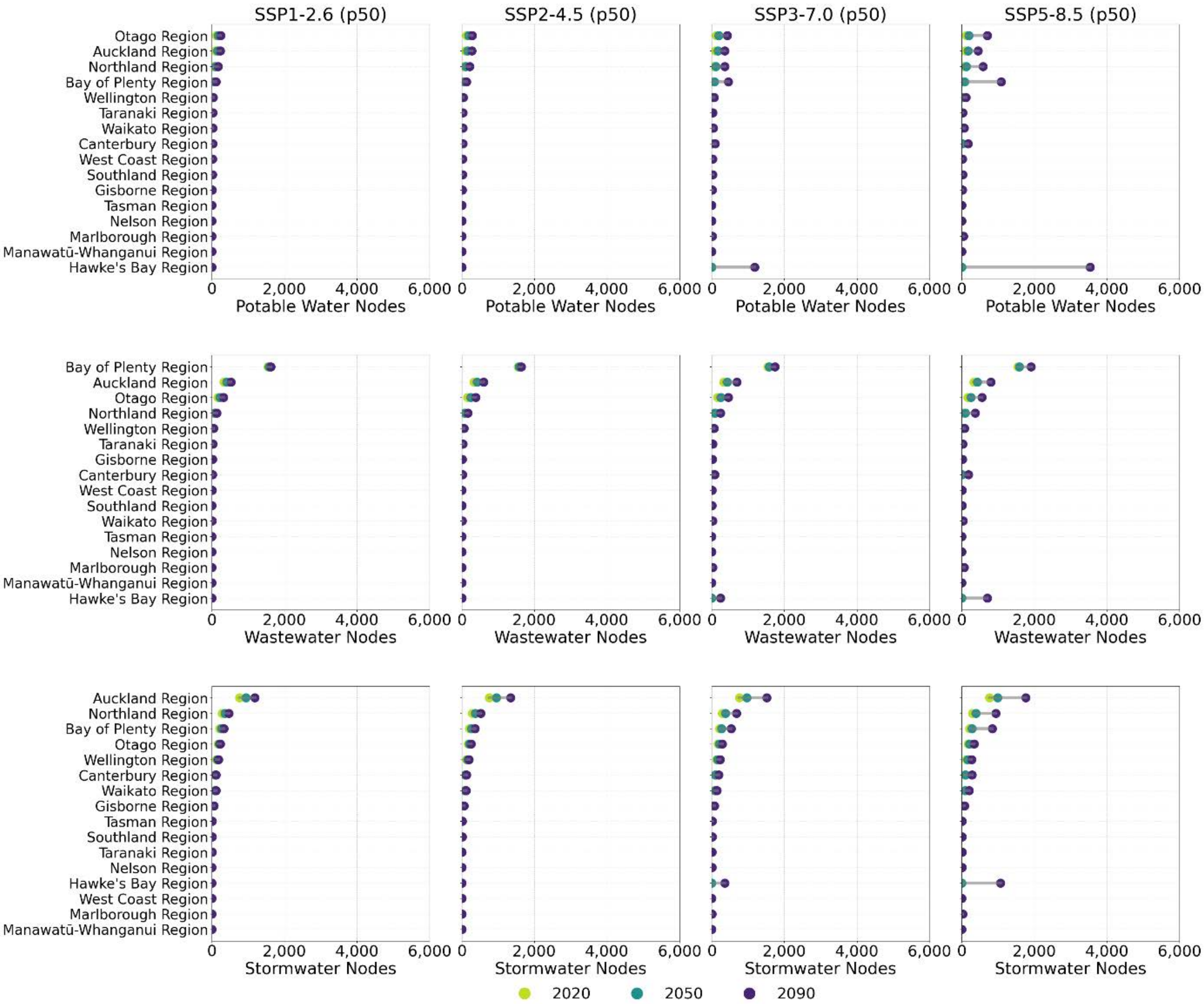

Figure 100: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure nodes to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

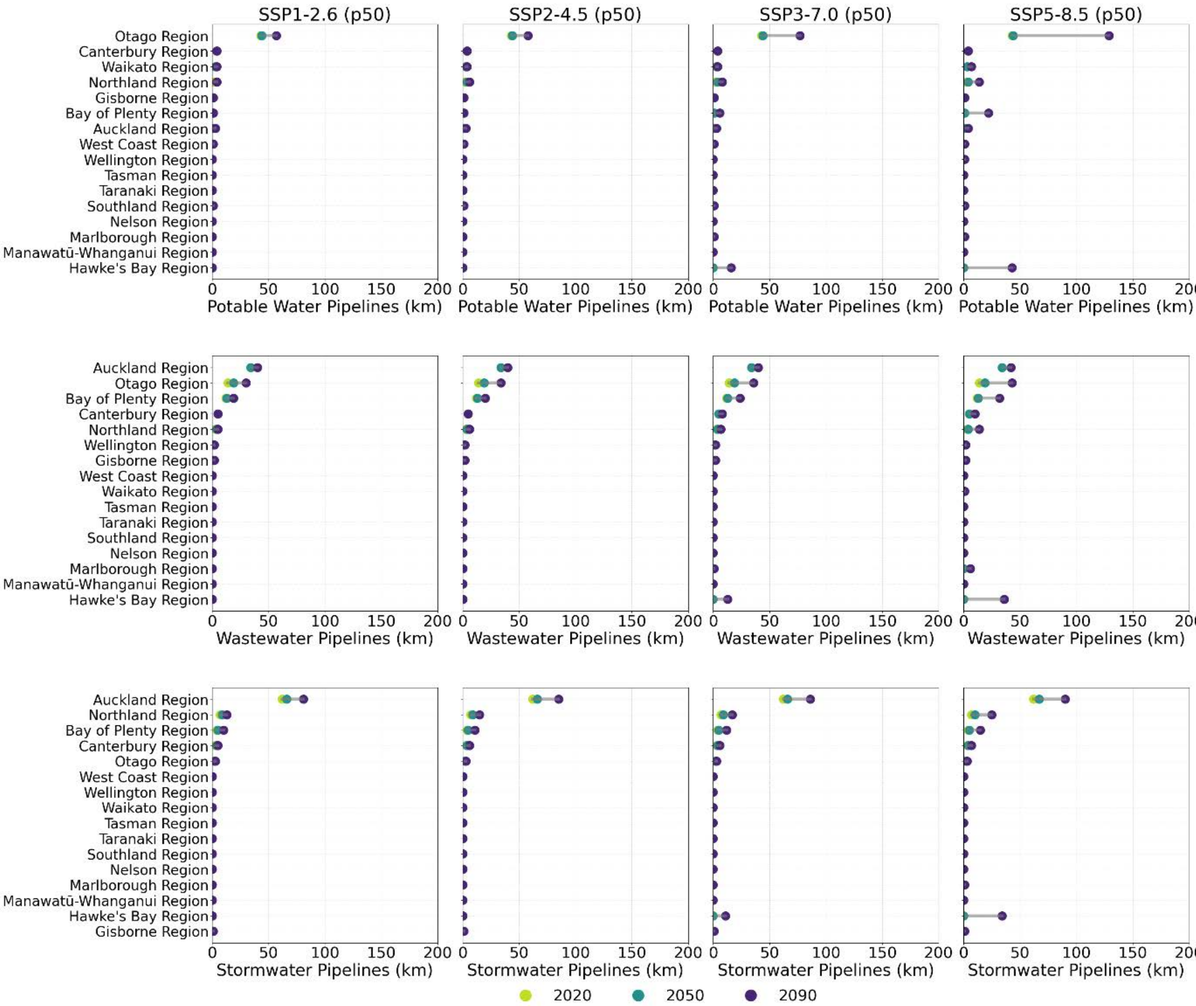

Figure 101: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure pipelines to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP3-7.0 Scenario (2020–2090)

Otago potable water node exposure increases to 425 by 2090, with Hawke's Bay reaching 1179 nodes. Auckland grows from 100 exposed nodes in 2020 to 357 nodes in 2090, while Bay of Plenty climbs from 41 to 462 nodes. In 2090, Otago potable pipeline exposure increases to 77 km, while Hawke's Bay reaches 16 km. Stormwater pipeline exposures in Auckland reach 85 km by 2090.

SSP5-8.5 Scenario (2020–2090)

By 2090, Otago rises to 710 exposed potable nodes, Hawke's Bay to 3533 nodes, and Canterbury to 172 nodes. Auckland grows from 100 exposed nodes in 2020 to 453 nodes in 2090, while Bay of Plenty increases from 41 to 1092 nodes. In 2020, exposed Otago potable pipelines measure 43 km, and Hawke's Bay 0 km. Otago potable pipeline exposure increases to 129 km by 2090, while Hawke's Bay reaches 43 km. Stormwater pipeline exposures in Auckland reach 123 km by 2090.

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Potable water nodes show the highest exposure in Canterbury with 81,377 nodes at +0 m and increasing to 114,854 at +2 m (Figure 102). Auckland and Bay of Plenty follow with 22,303 and 30,568 exposed nodes respectively at +2 m. Wastewater and stormwater nodes are also most highly exposed in Canterbury, reaching 22,390 and 44,995 respectively at +2 m. Pipeline exposure is also highest in Canterbury across all three water networks. Potable water pipeline exposure in Canterbury reaches 1390 at +0 m increasing to 1926 km at +2 m, while wastewater increases from 1941 km to 2654 km, and stormwater from 1178 km to 1530 km. At +2 m, potable water pipeline exposure exceeds 500 km in Otago and Bay of Plenty, while wastewater and stormwater pipelines each exceed 400 km in Auckland.

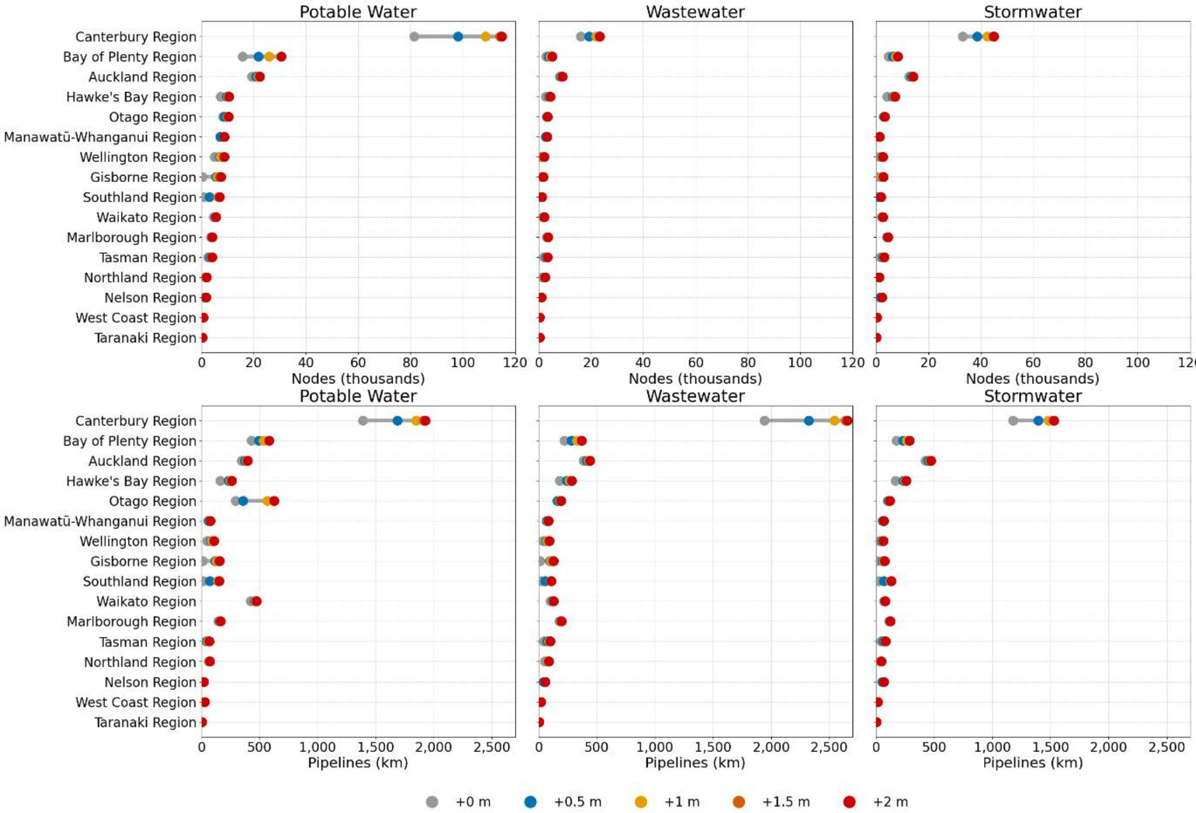

Figure 102: Projected A-NZ region water infrastructure exposure on coastal land with shallow groundwater presence under sea level change. Water node values are rounded for presentation clarity.

SSP1-2.6 Scenario (2020–2090)

Exposed potable water nodes in Canterbury start at about 81,000 in 2020 and increase modestly to approximately 92,000 by 2090 (Figure 103). Auckland and Bay of Plenty exposures follow similar upward trajectories, rising from 19,000 to 20,400 nodes and 15,800 to 19,700 nodes, respectively. Hawke's Bay and Otago exposures remain much lower, increasing from 7,400 to 8,900 nodes and 8,200 to 8,600 nodes. Canterbury's exposed potable water pipelines increase from 1385 km in 2020 to 1578 km by 2090, while exposure in Auckland reaches 364 km by 2090 (Figure 104).

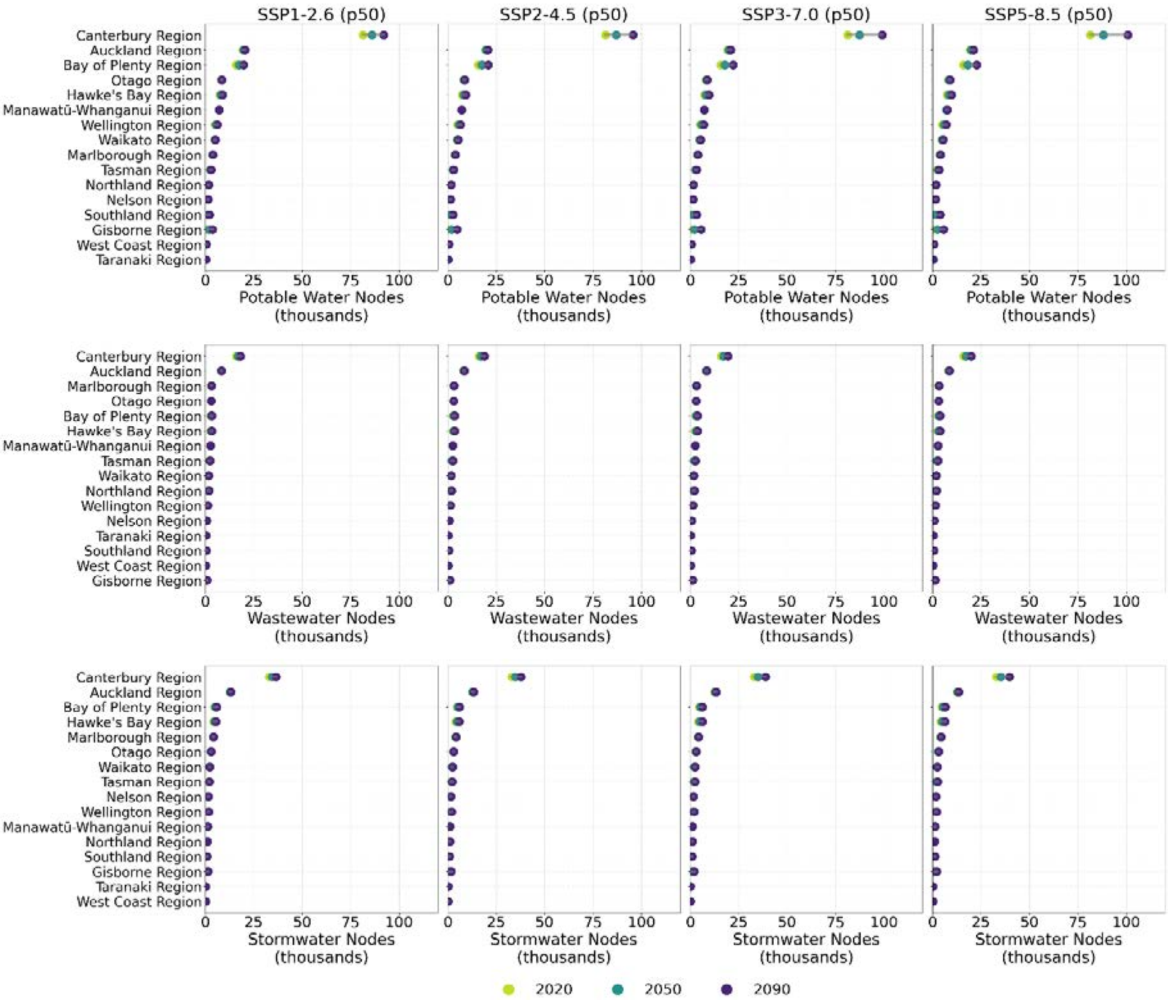

Figure 103: Projected 50th percentile (p50) exposure A-NZ region water infrastructure nodes on coastal land with shallow groundwater presence under medium confidence shared socio-economic pathway (SSP) scenarios. Water node values are rounded for presentation clarity.

SSP2-4.5 Scenario (2020–2090)

Exposure trends under SSP2-4.5 remain broadly consistent with SSP1-2.6, with Canterbury experiencing the highest exposure. Exposed potable water nodes in Canterbury increase from about 81,377 in 2020 to nearly 95,732 by 2090, while Auckland increases from 19,384 to 20,744 nodes and Bay of Plenty from 15,814 to 20,948 nodes. Hawke's Bay and Otago remain much lower, reaching 9,386 and 8,751 exposed nodes respectively by 2090. Wastewater and stormwater networks follow similar trajectories, with Canterbury leading and Auckland and Bay of Plenty showing moderate increases in exposure. Canterbury's potable pipeline exposures increasing from 1385 km in 2020 to 1645 km by 2090, while Auckland and Bay of Plenty increase to 369 km and 485 km respectively.

SSP3-7.0 Scenario (2020–2090)

Under higher-emission scenarios, Canterbury retains the highest exposure, with potable water nodes increasing to 99,126 by 2090. Auckland increases to 21,024 exposed nodes, and Bay of Plenty to 22,109 nodes. Pipeline exposure shows only slight increases, with Canterbury's potable pipelines increasing to 1699 km by 2090, while Auckland and Bay of Plenty rise to 369 km and 495 km, respectively.

SSP5-8.5 Scenario (2020–2090)

Canterbury's potable water node exposure reaches 100,833 by 2090, while Auckland increases slightly to 21,161 nodes and Bay of Plenty to 22,764 nodes. Pipeline exposure increases slightly, with Canterbury's potable pipelines increasing to 1,725 km by 2090, while Auckland and Bay of Plenty rise to 372 km and 501 km, respectively.

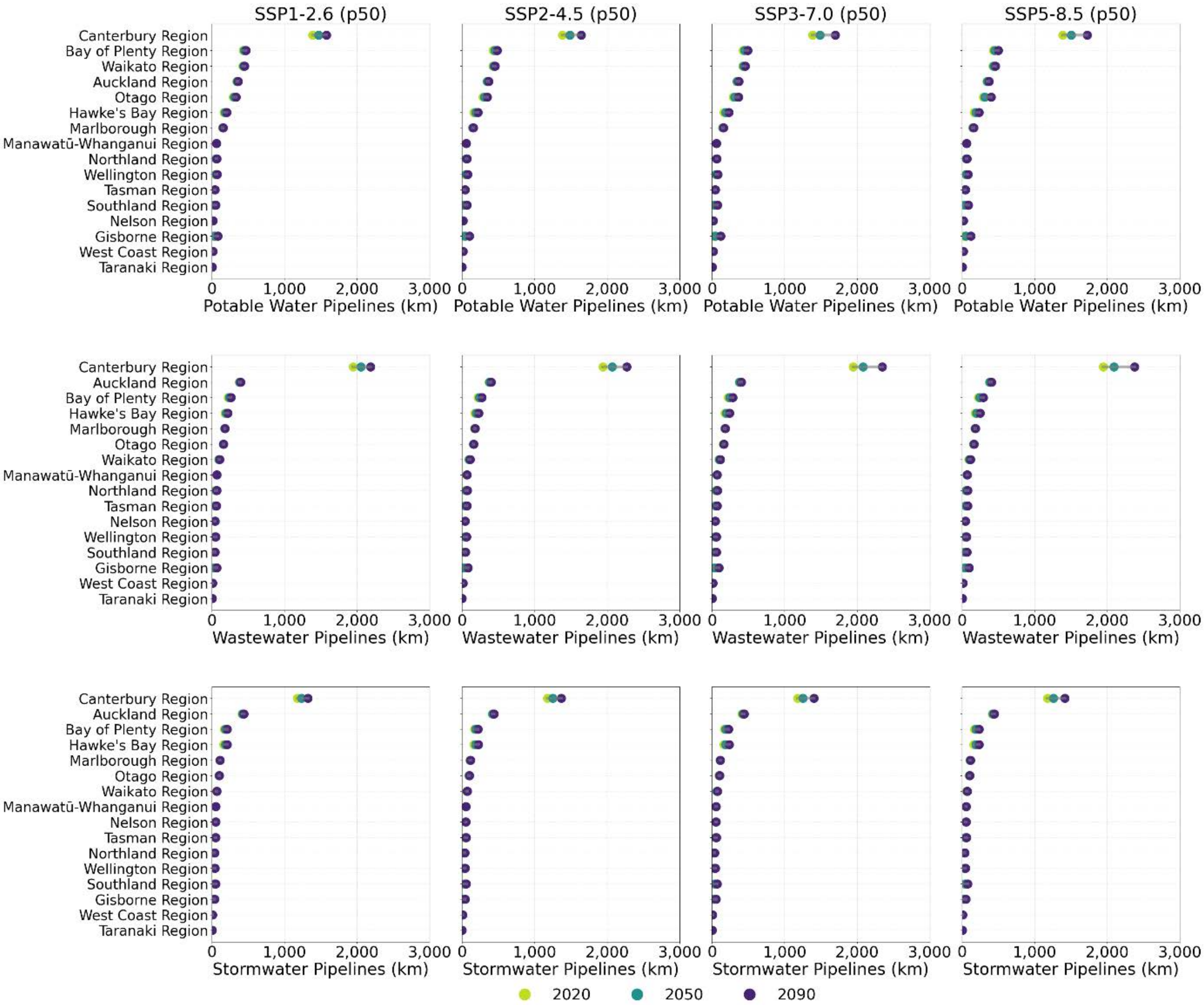

Figure 104: Projected 50th percentile (p50) exposure of A-NZ region water infrastructure pipelines on coastal land with shallow groundwater presence under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal erosion

Projected water infrastructure exposure to coastal erosion at 2100 based on historic erosion trends

Potable water infrastructure shows the highest exposure in Hawke's Bay, with 238 nodes, while Bay of Plenty, Auckland, Nelson and Tasman exceed 90 nodes (Figure 105). Pipeline exposure is greatest in Hawke's Bay, reaching 6 km, followed by Otago (4 km) and Waikato (3 km). Wastewater infrastructure shows Auckland and Nelson exceed 100 exposed nodes and 4 km of exposed pipelines. Northland also exceeds 7 km of exposed wastewater pipeline. Stormwater infrastructure node exposure exceeds 100 in Auckland, Northland, Waikato and Wellington. Stormwater pipeline exposure exceeds 3 km in Auckland and Waikato.

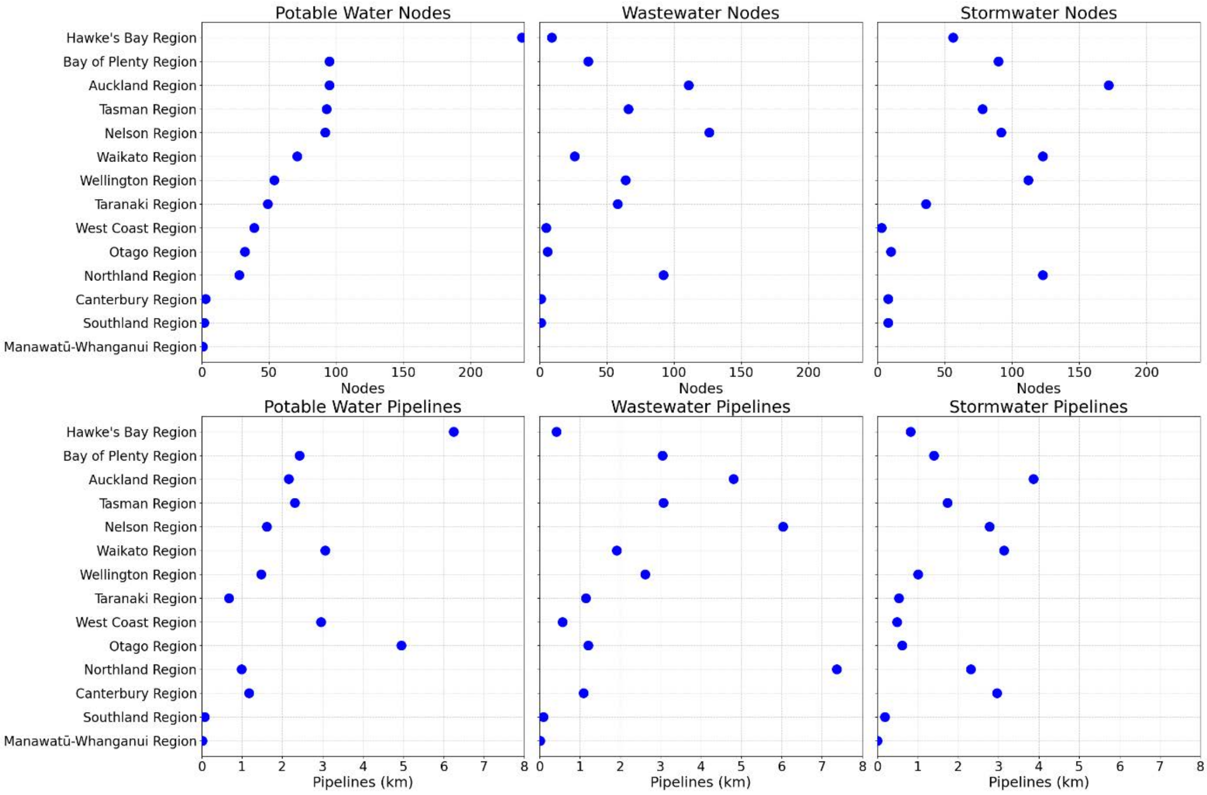

Figure 105: Projected A-NZ regions water infrastructure exposure to coastal erosion at 2100, based on historic erosion rates.

2.2.6 Land (cover and use)

Inland flooding

Temperature Change (+0°C to +3°C)

Built land cover shows the highest exposure in Canterbury, increasing from 77 km^2 at +0°C to 89 km^2 at +3°C warming (Figure 106). Auckland and Waikato follow with 42 to 49 km^2 and 32 to 39 km^2, respectively. Production land cover exposure is highest in Canterbury, increasing from 3028 km^2 at +0°C to 3473 km^2 at +3°C warming. Southland follows with 1482 km^2 to 1655 km^2 and Waikato from 1059 km^2 to 1202 km^2. Undeveloped land cover shows high exposure in Canterbury and West Coast, increasing from 326 km^2 to 363 km^2 and 275 km^2 to 305 km^2, respectively. Residential land use follows similar trends, with Canterbury increasing from 64 km^2 at +0°C to 75 km^2 at +3°C warming. Commercial and industrial land use exposure is also highest in Canterbury, rising from 17 km^2 at +0°C to 19 km^2 at +3°C warming. Rural land use exposure in Canterbury increases from 3102 km^2 at +0°C to 3538 km^2 at +3°C warming, while Southland and Waikato follow at 1650 to 1834 km^2 and 1110 to 1253 km^2, respectively.

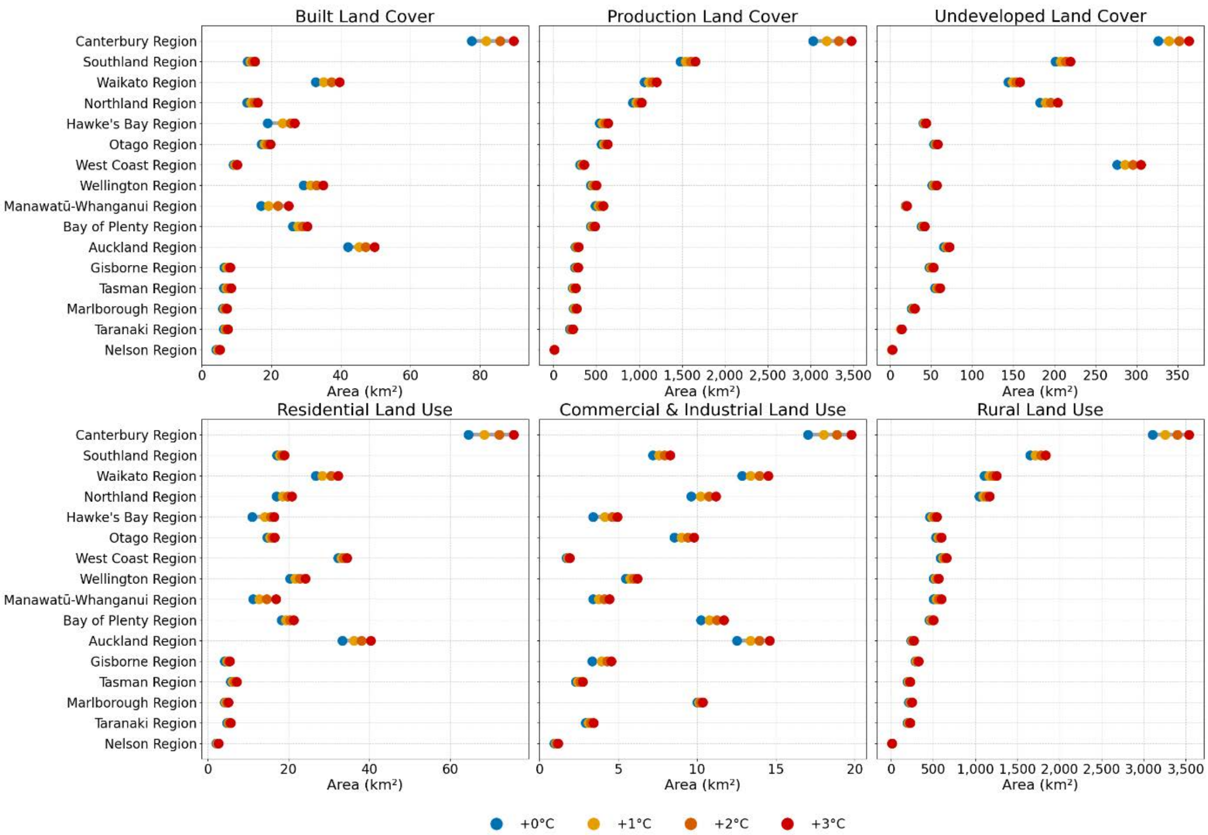

Figure 106: Projected exposure of A-NZ region land cover and land use to inland flooding under temperature change.

SP1-2.6 Scenario (2020–2090)

Exposure remains highest in Canterbury across all land cover and land use categories, with built land cover increasing slightly from 79 km^2 in 2020 to 81km^2 by 2090 (Figure 107). Auckland and Waikato follow with 44 km^2 and 34 km^2 exposed by 2090 respectively. Production land cover exposure in Canterbury increases from 3115 km^2 to 3178 km^2, Southland from 1509 km^2 to 1541 km^2, and Waikato from 1090 km^2 to 1106 km^2. Undeveloped land cover exposure remains concentrated in Canterbury and West Coast, increasing from 333 km^2 to 339 km^2 and 281 km^2 to

284 km^2, respectively. Residential land use exposure increases slightly from 66km^2 to 68 km^2 by 2090, and commercial and industrial land use increases from 17.6 km^2 to 17.9 km^2. Rural land use exposure in Canterbury increases from 3187 km^2 to 3249 km^2 between 2020 and 2090, while Southland and Waikato follow respectively at 1678 to 1712 km^2 and 1142 km^2 to 1159 km^2.

SSP2-4.5 Scenario (2020–2090)
Exposure trends remain consistent with SSP1-2.6, with Canterbury showing the highest exposure. Built land cover exposure increases to 86 km^2, while Auckland and Waikato increase slightly to 47 km^2 and 37 km^2, respectively. Production land cover exposure in Canterbury increases to 3341 km^2, and Southland and Waikato reach 1598 km^2 and 1159 km^2, respectively. Natural land cover exposure in Canterbury reaches 352 km^2, while West Coast increases to 294 km^2. Residential land use exposure in Canterbury increases to 72 km^2, and commercial and industrial land use increases slightly to 18.9 km^2. Rural land use exposure in Canterbury reaches 3407 km^2 and exceeds 1000 km^2 in Northland.

SSP3-7.0 Scenario (2020–2090)
Canterbury's built land cover exposure increases to 89 km^2 by 2090, and production land cover exposure expands to 3472 km^2. Auckland and Waikato built land exposure increases by 2090 to 49 km^2 and 39 km^2, respectively. Undeveloped land cover exposure in Canterbury and West Coast increases to 363 km^2 and 302 km^2 respectively by 2090. Canterbury land use exposure is considerable by 2090, with residential reaching 75 km^2, commercial and industrial 19.7 km^2, and rural land use 3537 km^2.

SSP5-8.5 Scenario (2020–2090)
Land exposure shows minimal increase compared to SSP3-7.0. Exposure of Canterbury's built land cover remains roughly at 89 km^2, production land at 3473 km^2, and natural land at 364 km^2. Southland and Waikato exposures follow with built land at 15 km^2 and 39 km^2, and production land at 1656 km^2 and 1202 km^2. Residential land use exposure in Canterbury reaches 75 km^2, and commercial and industrial land use exposure rises to 19.7 km^2, while rural land use grows to 3538 km^2.

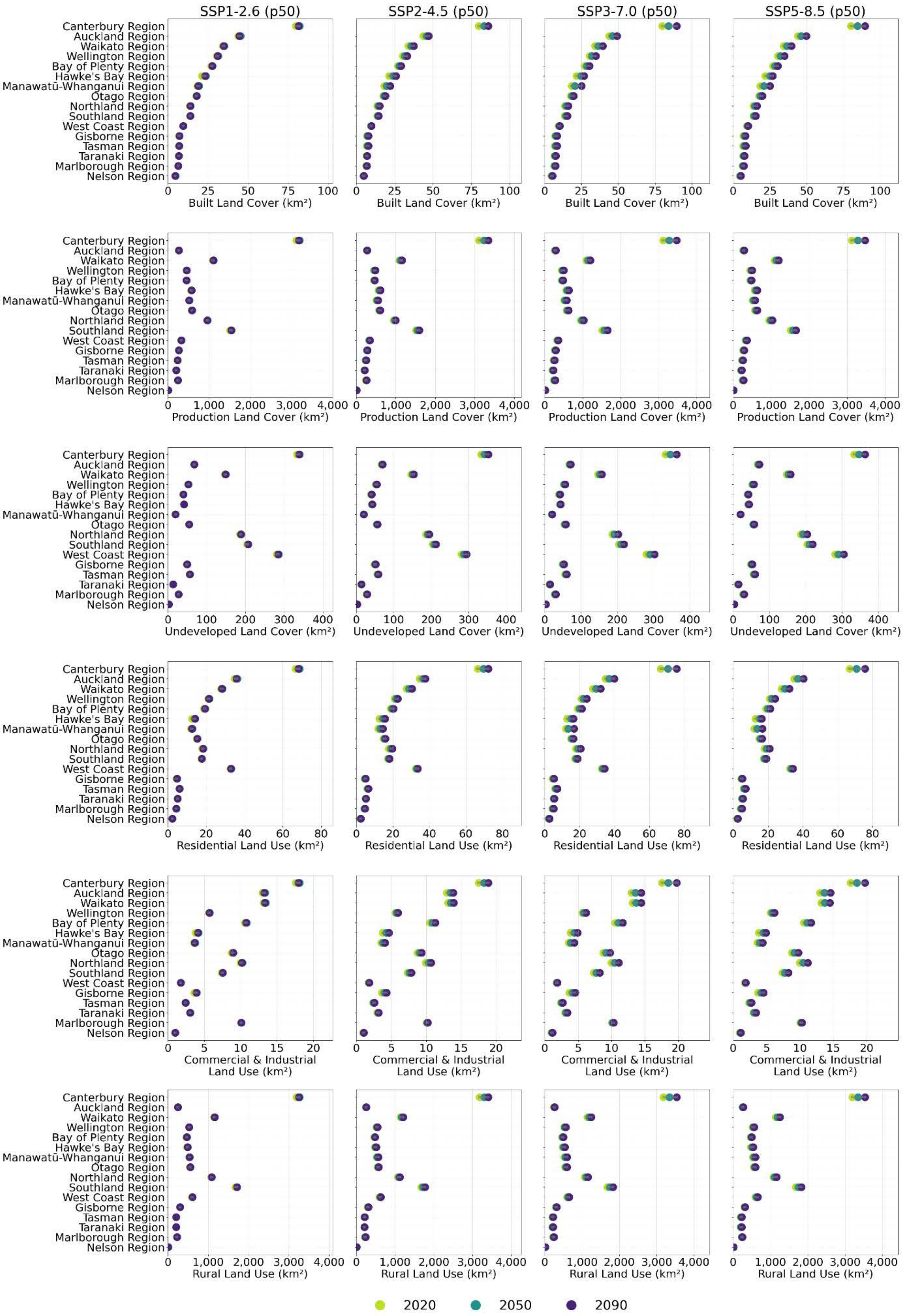

Figure 107: Projected 50th percentile (p50) exposure of A-NZ region land cover and land use to inland flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

Rainfall-induced landslides

Temperature Change (+0°C to +3°C)

Built land cover shows the highest exposure in Auckland, increasing dramatically from 6 km^2 at +0°C to 25 km^2 at +3°C warming (Figure 108). Bay of Plenty exposures also rises from 6 km^2 to 11 km^2, while Canterbury remains very low, increasing only from 0.6 km^2 to 2.8 km^2. Production land cover exposure is highest in Gisborne increasing from 3206 km^2 at +0°C to 3855 km^2 at +3°C warming. Hawkes Bay follows with 2167 km^2 to 3425 km^2 exposed, while Northland increases from 1593 km^2 to 2532 km^2. Undeveloped (natural) land cover shows high exposure in West Coast and Canterbury, increasing from 7621 km^2 to 8139 km^2 and 8690 km^2 to 10,901 km^2, respectively. Marlborough exposure also grows from 3537 km^2 to 4456 km^2. Residential land use shows Northland increases in exposure from 27 km^2 at +0°C to 47 km^2 at +3°C, Auckland jumps from 15 km^2 to 44 km^2, while Canterbury rises from 10 km^2 to 21 km^2. Commercial and industrial land use exposure remains very low across regions, with Auckland increasing from 0.2 km^2 to 1.1 km^2, Bay of Plenty from 2.4 km^2 to 3.4 km^2. Rural land exposure in Canterbury increases from 7206 km^2 to 10,259 km^2, while Hawke's Bay grows from 3598 km^2 to 5220 km^2, and Bay of Plenty from 3735 km^2 to 4483 km^2.

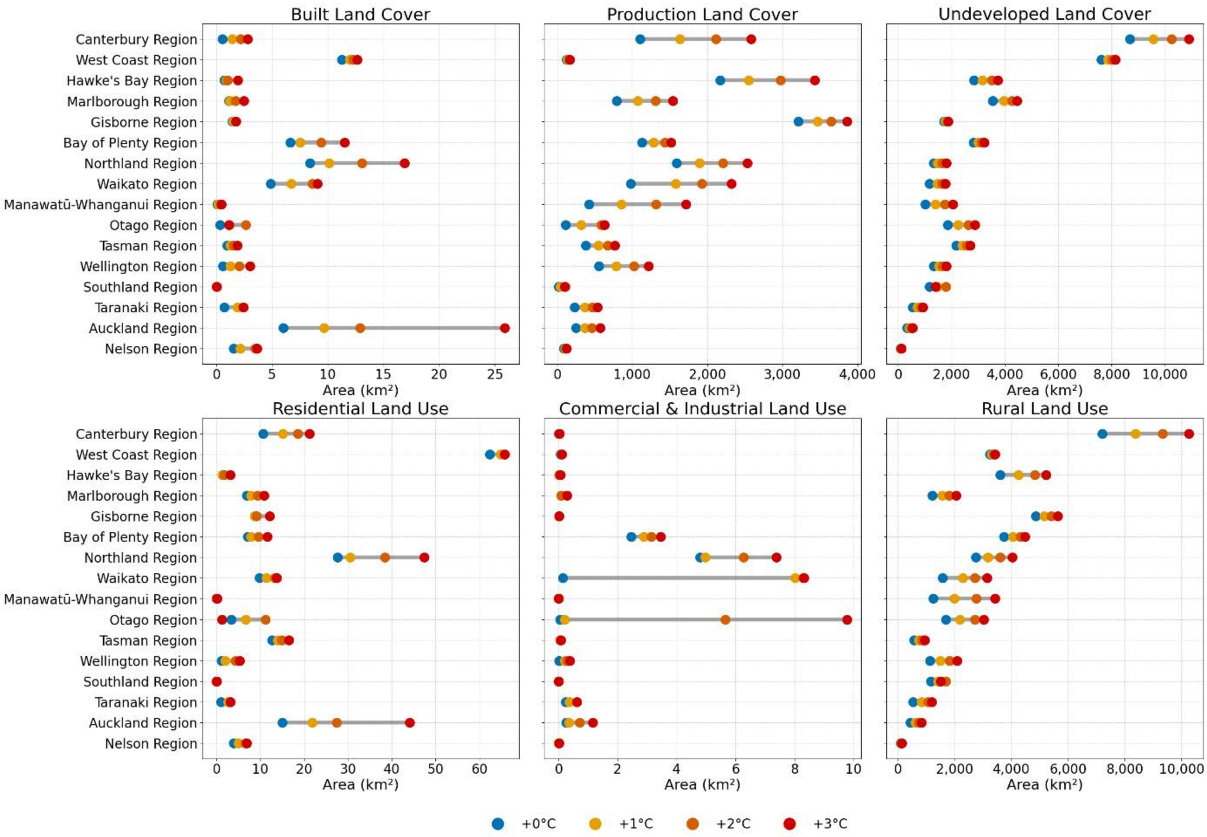

Figure 108: Projected A-NZ region land cover and land use exposure to rainfall-induced landslides under temperature change.

SSP1-2.6 Scenario (2020–2090)

Canterbury has the highest rural land exposure with 7861 km^2 in 2020 increasing to 8361 km^2 in 2090. Gisborne follows, with exposure reaching 5160 km^2 by 2090. Residential land use exposure in Auckland increases from 18.8 km^2 in 2020 to 20.7 km^2 in 2090, and Canterbury 12.8 km^2 to 14.6 km^2.

SSP2-4.5 Scenario (2020–2090)
Exposure trends remain consistent with SSP1-2.6, but moderate emissions drive larger increases in rural land use and production land cover. Canterbury's rural land use exposure extends from 7,848 km^2 in 2020 to 9,426 km^2 by 2090, while undeveloped land cover reaches 10,311 km^2. Gisborne also has high exposure of rural land use with 5446 km^2. Auckland's built land cover increases to 12.7 km.

SSP3-7.0 Scenario (2020–2090)
Under higher-emission scenarios, Canterbury's rural land use exposure increases to 10,254 km^2 by 2090, and undeveloped land cover reaches 10,896 km^2. Gisborne rural land use exposure reaches 5635 km^2, and Hawke's Bay reaches 5220 km^2. Auckland built land cover increases to 22.9 km^2.

SSP5-8.5 Scenario (2020–2090)
Canterbury's rural land use reaches 10,259 km^2 by 2090, and undeveloped land exceeds 10,901 km^2. Gisborne rural land use exposure reaches 5635 km^2, and Hawke's Bay remains 5220 km^2. Auckland's built land cover exposure increases to 25.9 km^2.

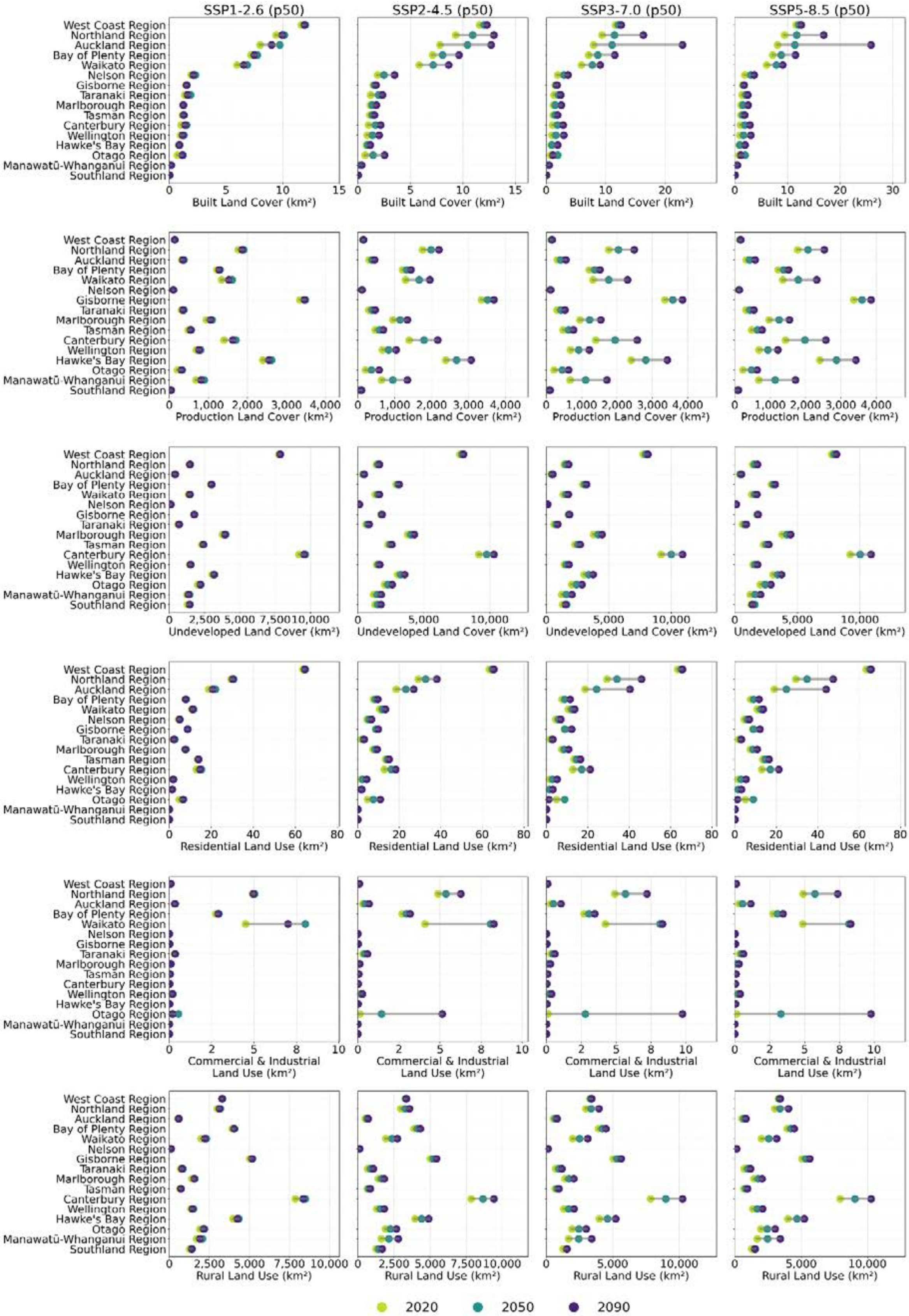

Figure 109: Projected 50th percentile (p50) exposure of A-NZ region land cover and land use to rainfall-induced landslides under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal flooding (extreme sea levels)

Sea Level Change (+0 m to +2 m)

Built land cover exposure shows the greatest increase in Waikato, increasing from 1.7 km^2 at +0 m to 10.6 km^2 at +2 m (Figure 110). Production land cover dominates exposure nationally. Northland shows the highest exposure increase from 223 km^2 at +0 m to 361 km^2 at +2 m, followed by Waikato (from 79 km^2 to 284 km^2) and Canterbury (from 51 km^2 to 182 km^2). Otago and Southland also show substantial exposure at +2 m, reaching 172 km^2 and 139 km^2, respectively. Undeveloped land cover exposure is highest in Northland, increasing from 29 km^2 to 71 km^2, and Canterbury, which grows from 18 km^2 to 29 km^2. Residential land use follows similar patterns, with Waikato leading at 8.4 km^2 by +2 m, up from 1.4 km^2 at +0 m. Northland grows from 2.2 km^2 to 7.5 km^2, and Canterbury from 0.3 km^2 to 5.9 km^2. Commercial and industrial land use is highest in Canterbury, reaching 0.89 km^2. Rural land use in Northland increases from 244 km^2 at +0 m to 404 km^2 at +2 m, Waikato from 95 km^2 to 286 km^2, and Canterbury from 50 km^2 to 145 km^2.

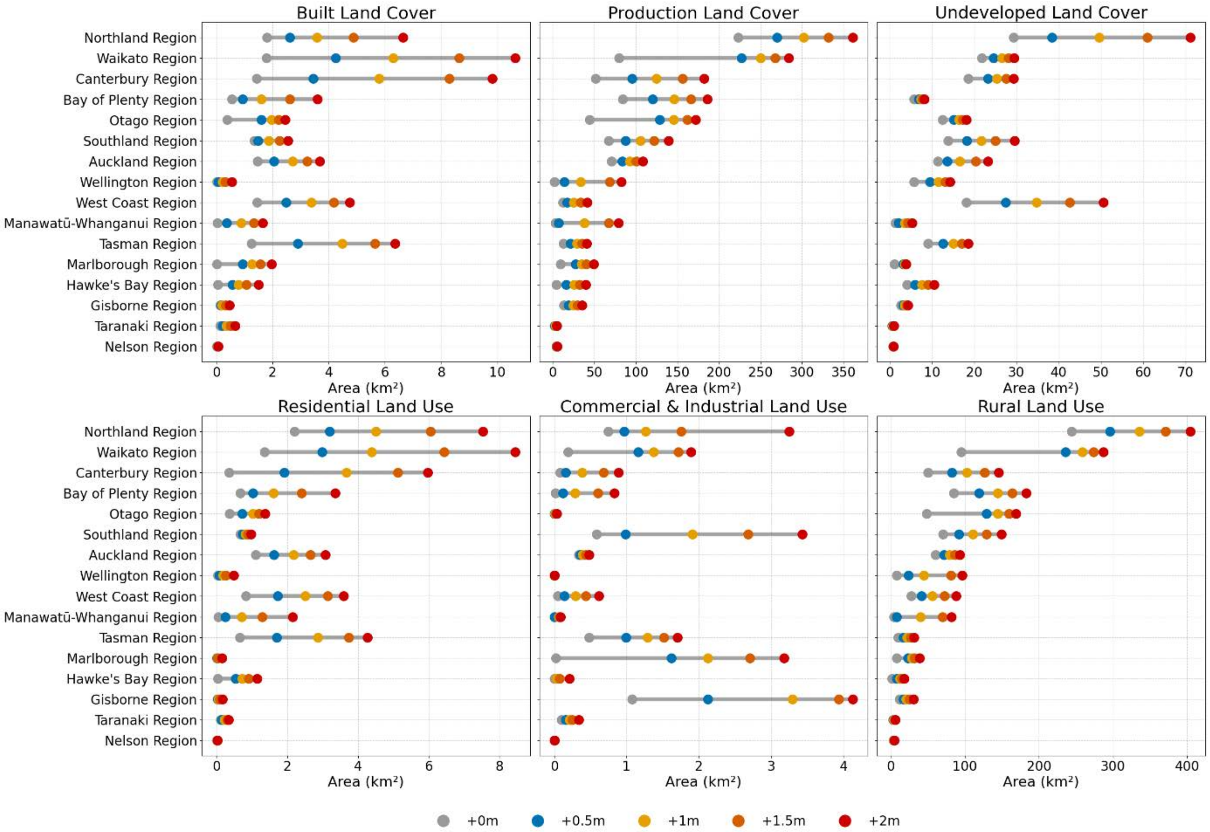

Figure 110: Projected exposure of A-NZ region land cover and land use to extreme sea level driven coastal flooding under sea level change.

SSP1-2.6 Scenario (2020–2090)

Production land cover exposure in Waikato increases from 72 km^2 in 2020 to 166 km^2 by 2090, while Northland increases from 197 km^2 to 225 km^2, and Canterbury from 49 km^2 to 80 km^2 (Figure 111). Rural land use exposure follows similar patterns, with Waikato reaching 171 km^2, Northland 235 km^2, and Canterbury 68 km^2 by 2090. Undeveloped land cover exposure increases modestly by 2090, with Waikato reaching 13 km^2, Northland 11 km^2, and Canterbury 17 km^2. Residential and commercial land use exposures remain low, with most regions not exceeding 1 km^2 by 2090.

SSP2-4.5 Scenario (2020–2090)
Built land cover exposure remains small in extent, with Auckland and Canterbury reaching 1 km^2 by 2090. Production land cover exposure increasing to 192 km^2 in Waikato, 232 km^2 in Northland, and 85 km^2 in Canterbury. Bay of Plenty exposure also reaches 106 km^2, and Otago climbs to 112 km^2. Rural land use exposure increases steadily, with Waikato reaching 196 km^2, Northland 241 km^2, and Canterbury 73 km^2 by 2090. Natural land cover exposure in Waikato increases to 13 km^2 at 2090, Northland at 11 km^2, and Canterbury at 17 km^2.

SSP3-7.0 Scenario (2020–2090)
Waikato production land cover exposure reaches 210 km^2 by 2090, exceeded by Northland at 233 km^2. Built land cover remains minimal, with most regions under 1 km^2, except Canterbury and Auckland, which reach 1 km^2. Undeveloped land cover exposure grows slightly, with Waikato at 13 km^2, Northland at 11 km^2, and Canterbury at 17 km^2.

SSP5-8.5 Scenario (2020–2090)
Waikato production land cover increases slightly to 211 km^2 by 2090, Northland to 236 km^2. Bay of Plenty and Otago continue upward trends, reaching 111 km^2 and 122 km^2 for production land cover respectively. Built land cover exposure remains low, with most regions under 1 km^2.

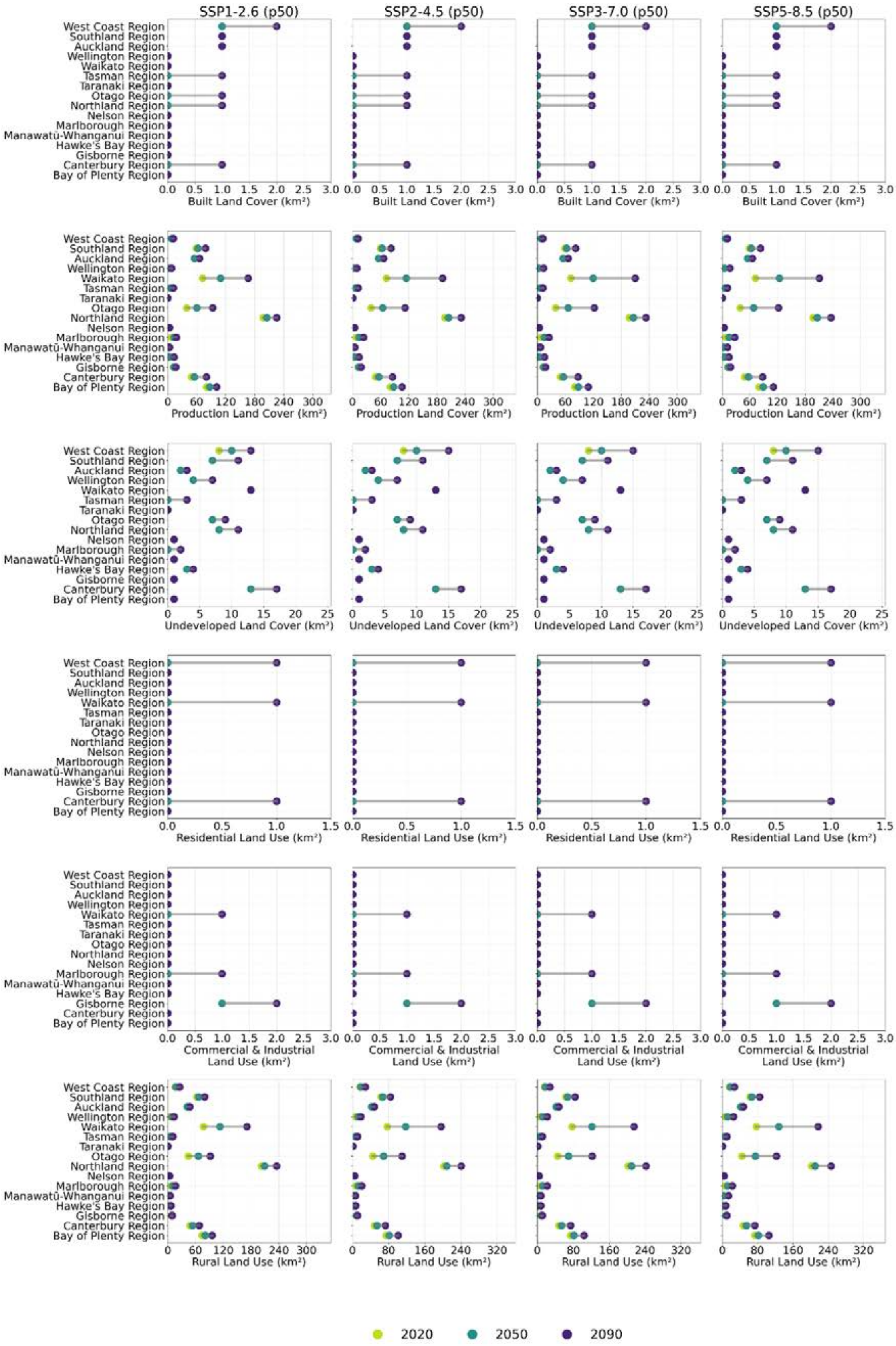

Figure 111: Projected 50th percentile (p50) exposure of A-NZ region land cover and land use to extreme sea level driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal flooding (mean high water springs)

Sea Level Change (+0 m to +2 m)

Built land cover shows the highest exposure in Hawke's Bay, starting near 0 km^2 at +0 m and increasing to 14.4 km^2 at +2 m (Figure 112). Bay of Plenty and Canterbury follow at +2 m with around 8.5 km^2, while Otago reaches 7.1 km^2 and Auckland 6.9 km^2. Most other regions, including Wellington, West Coast, and Tasman, remain below 5 km^2 exposed. Production land cover exposure in, Northland reaches 184 km^2 by +2 m, followed by Otago at 153 km^2, Bay of Plenty at 137 km^2. Undeveloped land cover is most highly exposed in Northland at +2 m, increasing from 5.5 km^2 at +0 m to 48 km^2 at +2 m, while West Coast reaches 36 km^2 by +2 m. Residential land use shows Hawke's Bay reaches 8.9 km^2 exposed at +2 m, with Northland (4.6 km^2), Bay of Plenty (4.5 km^2) the next most exposed regions. Commercial and industrial land use exposure is highest in Bay of Plenty (4.5 km^2) at +2 m, followed by Gisborne (4.1 km^2), and Southland (4.1 km^2). Rural land use exposure in Northland increases considerably from 17 km^2 at +0 m to 219 km^2 at +2 m, while Otago reaches 151 km^2, Bay of Plenty 135 km^2 at +2 m.

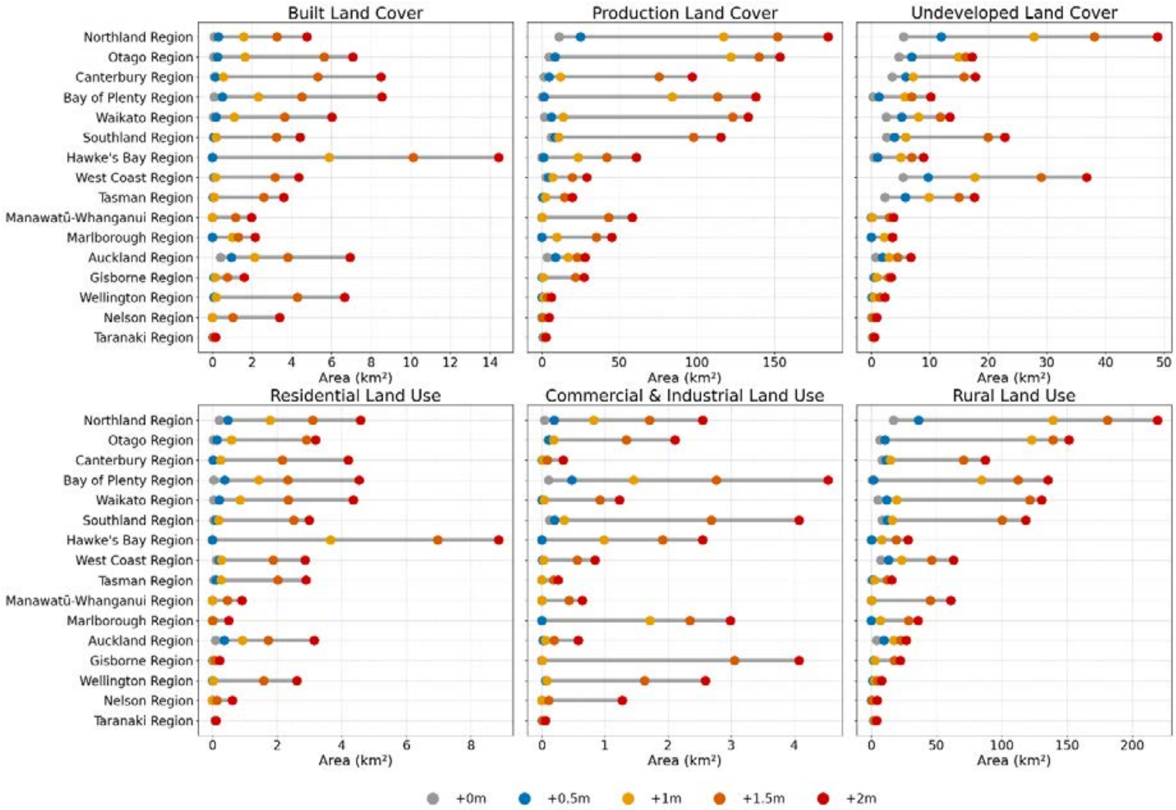

Figure 112: Projected exposure of A-NZ region land cover and land use to mean high water springs driven coastal flooding under sea level change.

SSP1-2.6 Scenario (2020–2090)

Exposed built land cover is 0 km^2 for all regions throughout the century (Figure 113). Production land cover shows the highest exposure in Northland, increasing from 8 km^2 in 2020 to 17 km^2 by 2090, followed by Southland and Otago at 6 km^2 each, and Canterbury at 3 km^2. Exposed natural land cover remains concentrated in Northland and West Coast, reaching 4 km^2 by 2090. Residential and commercial land use exposures remain at 0 km^2, and rural land use grows modestly, with Northland most exposed at 20 km^2, followed by 8 km^2 and Southland 7 km^2.

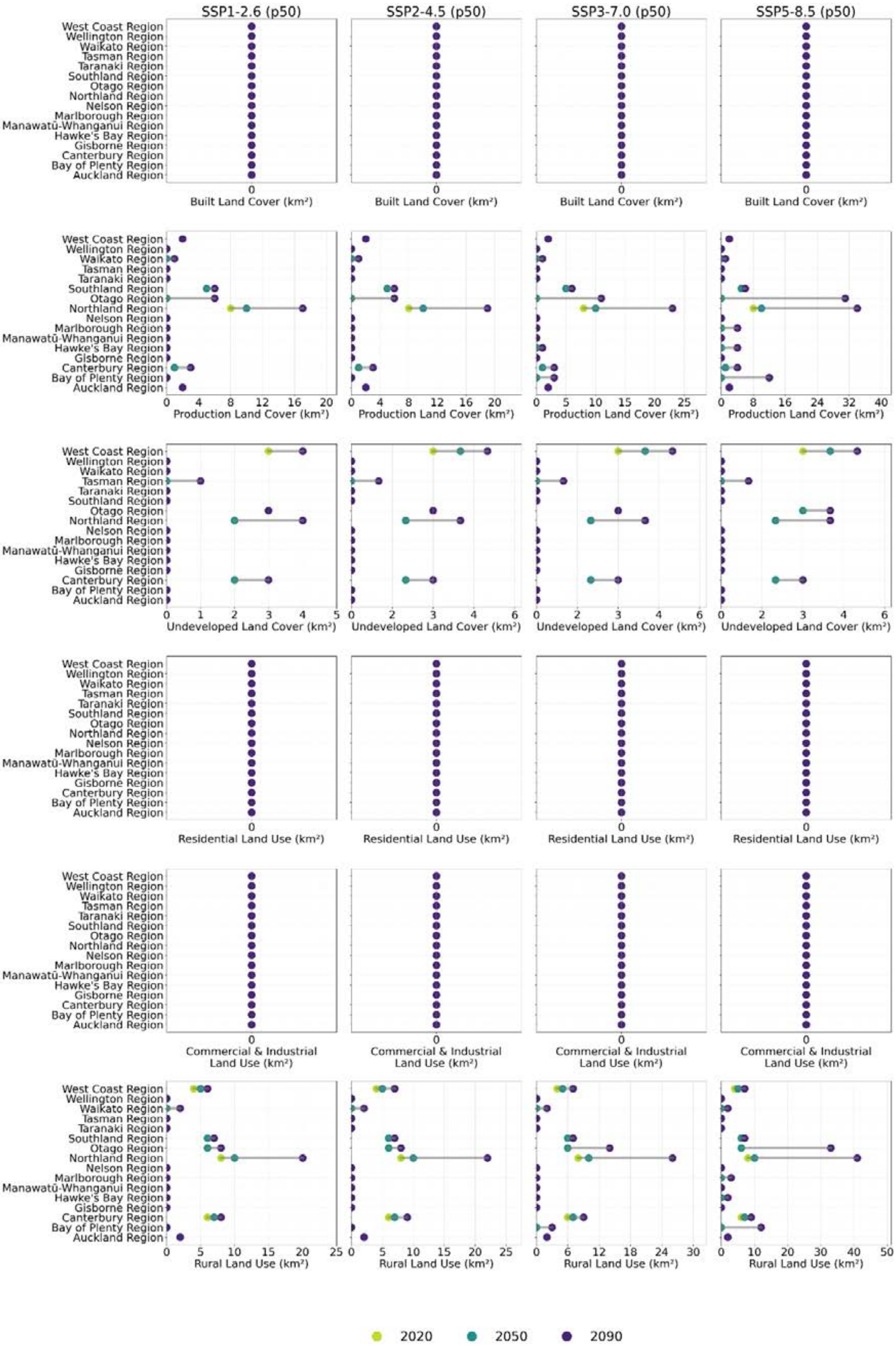

Figure 113: Projected 50th percentile (p50) exposure of A-NZ region land cover and land use to mean high water springs driven coastal flooding under medium confidence shared socio-economic pathway (SSP) scenarios.

SSP2-4.5 Scenario (2020–2090)
Exposed production land cover is highest in Northland at 19 km^2, followed by Southland and Otago at 6 km^2 each, and Canterbury at 3 km^2 by 2090. Undeveloped land cover is most exposed in Northland (4 km^2) and West Coast (5 km^2). Residential, and commercial and industrial land use exposure remain negligible across all regions, and rural land use with Northland reaching 22 km^2 and other regions remain below 10 km^2.

SSP3-7.0 Scenario (2020–2090)
Exposed production land cover rises to 23 km^2 in Northland by 2090, 11 km^2 in Otago, and remains at 6 km^2 in Southland. Undeveloped land cover shows minimal change in Northland and West Coast. Rural land use exposure grows modestly, with Northland reaching 26 km^2 and Otago 14 km^2 by 2090.

SSP5-8.5 Scenario (2020–2090)
Exposed production land cover reaches 34 km^2 in Northland by 2090, 31 km^2 in Otago, and 12 km^2 in Bay of Plenty. Undeveloped land cover exposure change is negligible in Northland and West Coast. Rural land use exposure in Northland and Otago increase to 41 km^2 and 33 km^2 respectively by 2090, while other regions remain below 15 km^2.

Shallow groundwater (coastal)

Sea Level Change (+0 m to +2 m)

Built land cover shows the highest exposure in Canterbury, starting at 59 km^2 at +0 m and increasing to 82 km^2 at +2 m (Figure 114). Auckland has 18 km^2 exposed at +0, increasing slightly to 20 km^2 at +2 m, while Bay of Plenty reaches 12 km^2. Production land cover exposure in Canterbury exceeds 253 km^2 at +0 m and increases to 372 km^2 at +2 m. Waikato and Manawatū-Whanganui follow with 231 km^2 and 210 km^2 exposed at +2 m. Undeveloped land cover is highest in Canterbury at +0 m with 20 km^2, while Southland (39 km^2) and West Coast (37 km^2) show highest exposure at +2 m . Residential land use follows built land cover patterns, reaching 55 km^2 exposed in Canterbury at +2 m, and 12 km^2 in Auckland. Commercial and industrial land use at +2 m is most exposed in Canterbury with 10.3 km^2, while Southland and Gisborne exceed 8 km^2 4 km^2 respectively. Rural land use exposure in Canterbury exceeds 291 km^2 at +2 m, with Waikato and Manawatū-Whanganui also exceeding 200 km^2.

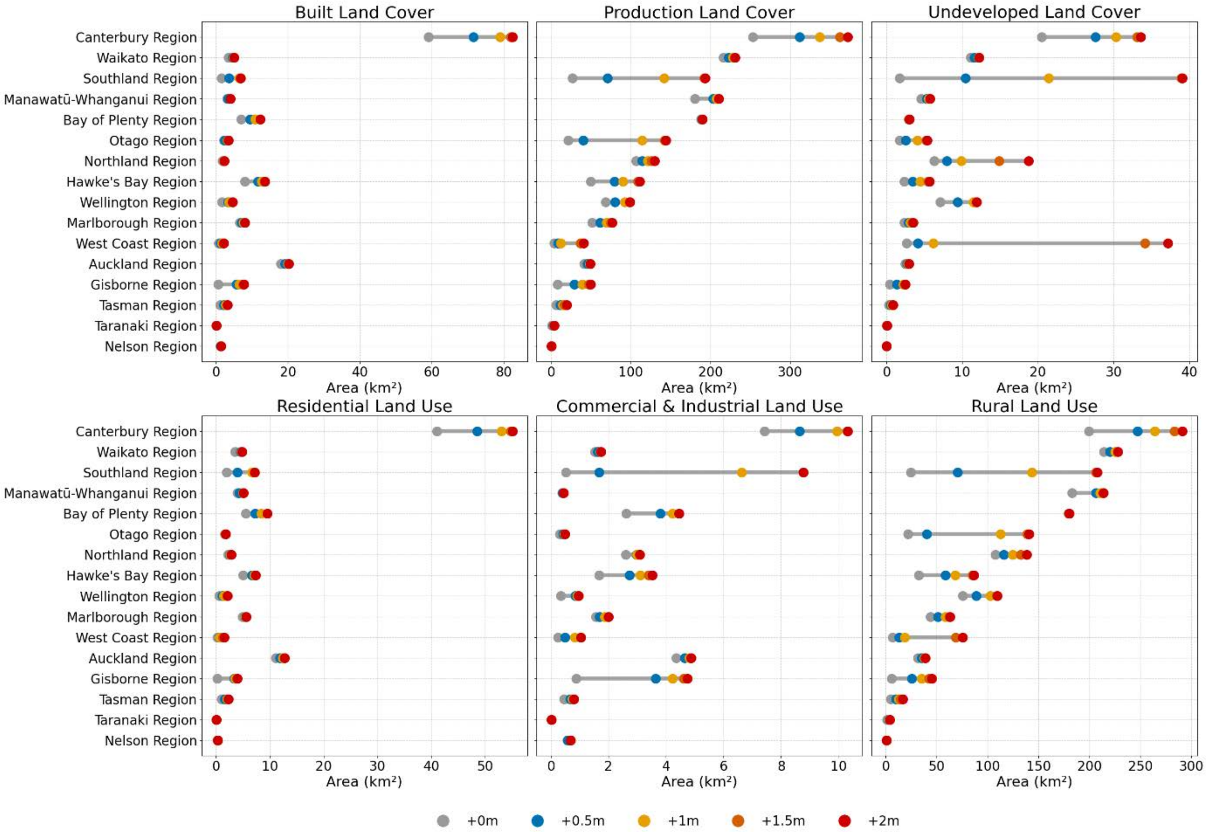

Figure 114: Projected exposure of A-NZ region land cover and land use in coastal areas with shallow groundwater presence under sea level change.

SSP1-2.6 Scenario (2020–2090)

Canterbury remains the most exposed region across all categories, with built land cover increasing slightly from 58 km^2 at 2020 to 71 km^2 at 2090, production land rising from 251 km^2 to 293 km^2, and natural land from 15 km^2 to 23 km^2 (Figure 115). Residential land use exposure in Canterbury increases from 37 km^2 to 45 km^2, commercial reaches 1 km^2, and rural land expands from 194 km^2 to 229 km^2. Waikato shows minimal change, with built land steady at 1 km^2 exposed, production land from 209 km^2 to 214 km^2, and rural land from 207 km^2 to 212 km^2. Southland exposure increases modestly, with built land increasing from 1 km^2 to 3 km^2, production land from 24 km^2 to 56 km^2, and rural land from 21 km^2 to 54 km^2.

SSP2-4.5 Scenario (2020–2090)
Canterbury's built land cover exposure increases to 72 km^2 by 2090, production land from 251 km^2 to 300 km^2, and undeveloped land remaining at 23 km^2. Residential grows to 47 km^2, commercial remains at 1 km^2, and rural land reaches 237 km^2. Exposure in Waikato remains stable with production land at 214 km^2 and rural land at 213 km^2. Southland sees exposure of production land increase to 63 km^2 and rural land to 62 km^2, while built land remains low at 3 km^2.

SSP3-7.0 Scenario (2020–2090)
Canterbury continues show the highest exposure with built land cover reaching 73 km^2 at 2090, production land 303 km^2, and rural land 240 km^2. Residential land use exposure rises to 47 km^2, while commercial and industrial remain at 1 km^2. Waikato has high exposure of production land cover and rural land use, with 214 km^2 and 213 km^2 respectively, though built land cover exposure is minimal at 1 km^2. Bay of Plenty exhibits high production land cover (186 km^2) and rural land use (173 km^2) exposure. Auckland's exposure of built land cover and residential land use reaches 10 km^2 and 5 km^2 respectively by 2090.

SSP5-8.5 Scenario (2020–2090)
Canterbury retains the highest regional land exposure, with built land cover by 2090 increasing to 75 km^2, production land steady at 303 km^2, and rural land at 240 km^2. Residential exposure rises slightly to 48 km^2. Production land cover and rural land use exposure in Waikato and Bay of Plenty shows minimal change from SSP3-7.0 scenario projections, while at 2090 Manawatū-Whanganui and Northland exceed 200 km^2 and 100 km^2 respectively.

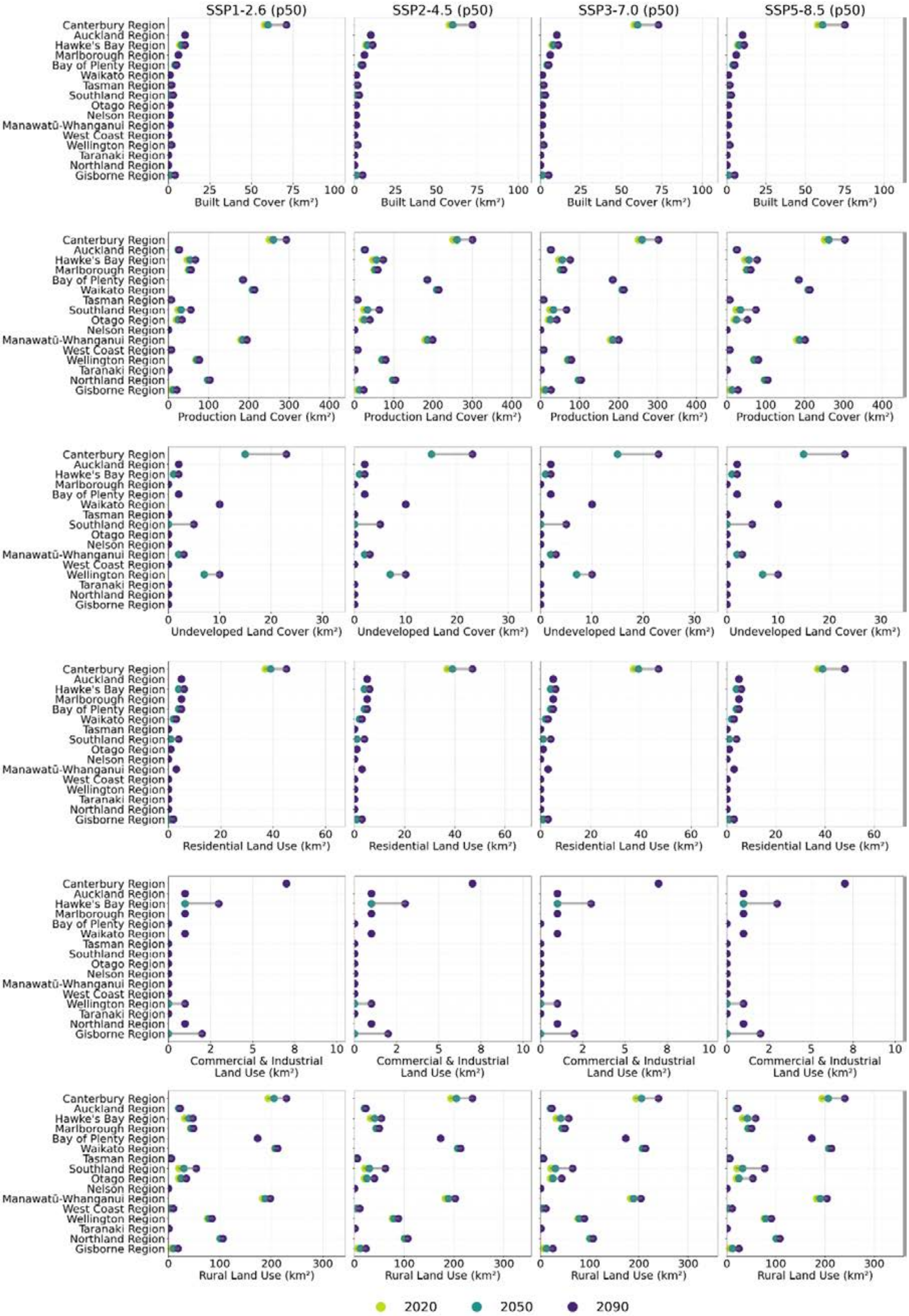

Figure 115: Projected 50th percentile (p50) exposure of A-NZ region land cover and land use in coastal areas with shallow groundwater presence under medium confidence shared socio-economic pathway (SSP) scenarios.

Coastal erosion

Projected water infrastructure exposure to coastal erosion at 2100 based on historic erosion trends

Built land cover shows the highest exposure in Waikato and Tasman, each exceeding 0.2 km^2, followed by Hawkes Bay and Taranaki at 0.17 km^2 (Figure 116). Production land cover is most exposed in Canterbury at 4 km^2, followed by Auckland and Taranaki which each exceed 2.5 km^2. Undeveloped land cover shows concentrated exposure in Canterbury and Northland which exceed 3 km^2. Residential land use is most exposed in Tasman and West Coast with both exceeding 0.3 km^2. Exposure of commercial and industrial land use is highest in Otago at 0.1 km^2. Rural land use exposure exceeds 6 km^2 in Canterbury, and 3 km^2 in both Auckland and West Coast regions.

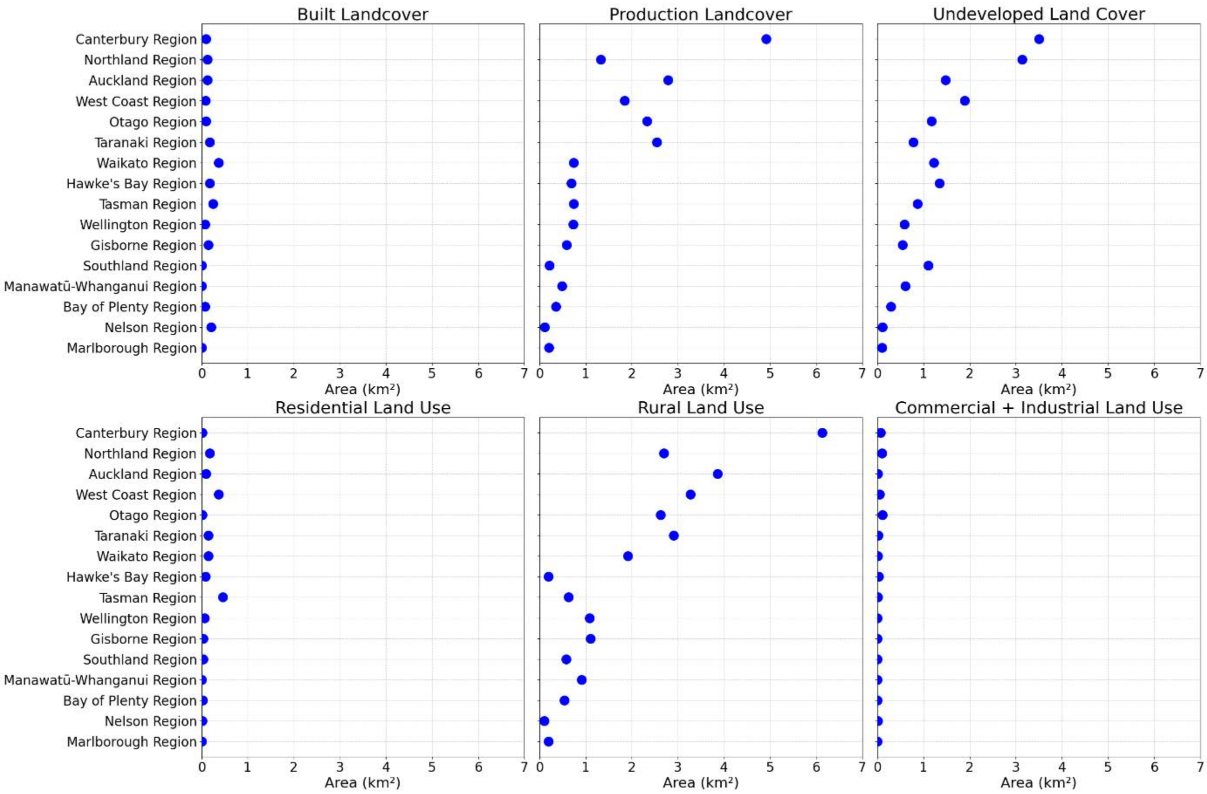

Figure 116: Projected A-NZ region water infrastructure exposure to coastal erosion at 2100, based on historic erosion rates.

Climate processes

Potential evapotranspiration deficit (PED)

Production land continues to account for the largest share of high-deficit exposure (≥75 mm), with Canterbury the clear national hotspot by 2090 at ~21,176 km^2 of production area in the 75–100 mm and >100 mm ranges combined; Manawatū-Whanganui follows with ~13,006 km^2, while Waikato and Otago register ~9700 km^2 and ~7896 km^2 respectively; Southland is comparatively low at ~745 km^2. For undeveloped (natural) land, Canterbury also leads the area exposed at ~14,520 km^2, with Otago ~5,586 km^2, Waikato ~1,662 km^2, Manawatū-Whanganui ~2282 km^2, and Southland ~1139 km^2 in the combined 75–100 mm and >100 mm range. These figures are drawn directly from the PED regional table by selecting, for each region in 2090, the maximum values observed in the 75–100 mm and >100 mm ranges.

Frost days (< 0 ℃)

Canterbury remains the largest contributor to frost exposure, with approximately 18,300 km^2 of production land affected in 2090 under SSP5-8.5. While most land stays in the –25 to 0 range, significant areas shift into –50 to –25 by late century, indicating reduced frost frequency but continued risk for cropping systems. Otago shows notable redistribution by 2090, with large areas moving into the –50 to –25 range under SSP3-7.0 and SSP5-8.5. Waikato retains high exposure of around 12,150 km^2 through 2090, with most land in the –25 to 0 range. Frost decline is less pronounced here compared to southern regions, reflecting cooler inland conditions and persistent frost risk. Southland experiences the greatest proportional shift in exposure, with substantial areas entering the –50 to –25 range by 2090 under SSP5-8.5. While frost risk decreases, it remains significant for dairy and sheep farming systems. Manawatū-Whanganui maintains about 13,200 km^2 of exposure, primarily in the –25 to 0 range, with only minor reductions by 2090. Frost remains a persistent hazard for cropping and pastoral systems in this region.

Very hot days (≥30℃)

Canterbury experiences the most dramatic increase: by 2090 under SSP5-8 around 8972 km^2 of production land shifts into the 10–20 very-hot-day band and 4861 km^2 into 20–30 days. Built-up land also rises, with about 251 km^2 exposed to 10–20 days and 60 km^2 to 20–30 days. Otago follows, with inland production landscapes reaching about 2548 km^2 in 10–20 days and 534 km^2 in 20–30 days, alongside built-up land increases to 18 km^2 and 13 km^2, respectively. Production land in Waikato reaches 4847 km^2 in 10–20 days and 3032 km^2 in 20–30 days, while built-up land rises to around 116 km^2 and 45 km^2 in the same bands.

Extreme winds

At 2090, land exposure in the 5–10% range is highest in Canterbury, with 11,249 km^2 of production land and 60 km^2 of built-up land. Otago follows with 1,355 km^2 of production land and 11 km^2 of built-up land exposed, while Southland shows 20 km^2 of production land exposed. All other regions, show no increased land exposure in the 5–10% band at the 2020, 2050 and 2090.

3 Methodology

3.1 Model framework

The model framework to deliver a national climate hazard census was developed in RiskScape, open-source software for multi-hazard risk modelling (Paulik et al. 2023). RiskScape is a modular and configurable system designed to support customised model pipelines that evaluate hazard-exposure and impacts for elements at risk to climate hazards under present-day and projected climate conditions. The model pipelines used in this study are represented in Figure 117, with pipeline steps (input data, geoprocessing and sampling, hazard-exposure analysis) described in Section 3.2 to Section 3.5.

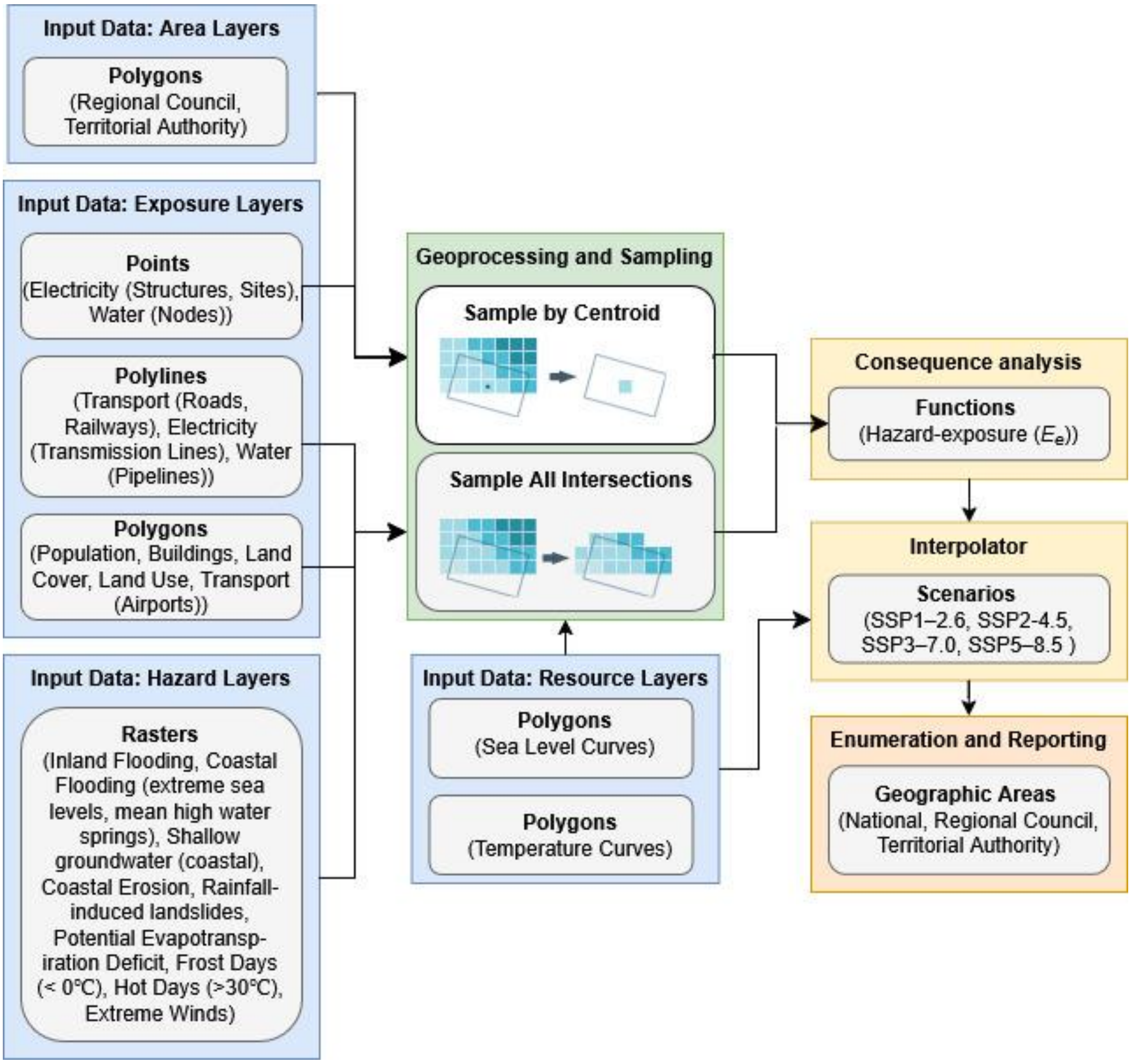

Figure 117: Conceptual diagram of the RiskScape model pipeline steps and functions used in this study.

3.2 Model step: input data

3.2.1 Hazard layers

The exposure census uses nationwide spatiotemporal climate hazard datasets for A-NZ, developed since 2020. All data used were in a raster (.tif) file format, thereby hazard intensities (e.g., water depth) or hazard presence were represented as a grid. Table 20 summarises the climate hazard data used in this study.

Table 20: Model input hazard data summary for national climate hazard exposure census.

Climate Hazard	Climate Hazard Description	Hazard Metric	Annual Recurrence Interval (ARI)	Climate Process Scenarios	SSP Scenarios	Source
Coastal flooding (mean high water springs)	Flood inundation above mean high water springs caused by extreme sea levels and mean sea level rise.	m	100	+0 m, +0.5 m, +1.0 m, +1.5 m, +2.0 m	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Paulik et al. (2023b)
Coastal flooding (mean high water springs)	Flood inundation above mean high water springs caused by mean sea level rise.	m	~1	+0 m, +0.5 m, +1.0 m, +1.5 m, +2.0 m	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Stephens & Paulik (2023)
Inland Flooding	Flood inundation from fluvial, pluvial and tidal sources, and exacerbated by higher temperatures change.	m	100	+0°C, +1°C, +2°C, +3°C	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Harang et al. (2024)
Shallow groundwater (coastal)	Shallow groundwater presence (<1 m of ground surface) exacerbated by mean sea level rise.	1= Present; 0= Not present	-	+0 m, +0.5 m, +1.0 m, +1.5 m, +2.0 m	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Westerhoff et al. (2025)
Rainfall-induced landslides	Rainfall-induced landslide susceptibility rating	1-5	-	+0°C, +1°C, +2°C, +3°C	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Massey et al. (2021)
Coastal Erosion	Land susceptible to erosion	1= Present; 0= Not present	-	-	2100	Tuck et al. (2024)
Potential evapotranspiration deficit (PED)	Potential evapotranspiration deficit accumulation	mm	-	-	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Gibson et al. (2024a, 2024b)
Extreme Winds	99th percentile wind change	%	-	-	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Gibson et al. (2024a, 2024b)
Extreme Temperatures	Number of very hot days (≥30°C)	days	-	-	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Gibson et al. (2024a, 2024b)
	Number of frost days (<0°C)	days	-	-	SSP1–2.6, SSP2–4.5, SSP3–7.0, SSP5–8.5	Gibson et al. (2024a, 2024b)

Coastal flooding
Coastal flooding in this study was represented by 100-year annual recurrence interval (ARI) extreme sea level-driven (ESL) flooding and mean high water springs (MHWS). Coastal flood hazard layers were sourced from Paulik et al. (2023b). The hazard layers represent inundation extent and water depth at 10 m and 30 m grid resolutions, based on a composite digital elevation model (DEM) of Airborne Light Detection and Ranging (LIDAR) (10 m grid) and bias corrected Shuttle Radar Topography Mission (SRTM) (30 m grid). Coastal flooding protection from stopbanks were represented using a national stopbank inventory, with land protection uniformly applied for a 100-year ARI ESL elevation. Present-day and future flood regime changes in response to mean sea level rise (MSL) were represented by simulating ESL inundation under 0.1 m increments from 0 m to 2 m.

Future coastal flooding frequency and magnitude will be influenced by global sea level change. In this study, future rates and timing of mean sea level rise around A-NZ's coastline for medium confidence SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5 global emission scenarios were based on probabilistic relative sea level (RSL) projections developed for 7435 coastal sites by the NZ SeaRise programme (Levy et al. 2023; Naish et al. 2024). In this study, RSL projections from a 1995-2014 baseline (mid-point (zero) at ~2005) were used, which is consistent with the latest IPCC AR6 global sea-level rise assessment. RSL projections to the year 2100 were used (17th, 50th and 83rd percentiles). RSL projection sites were represented as point geometries that were converted to Voronoi polygons, then spatially joined to elements to evaluate the future timing and uncertainty of projected hazard-exposure from coastal flooding. Figure 118 provides and illustrative example of sea level change corresponding to SSP emission scenarios which is replicated in the model process.

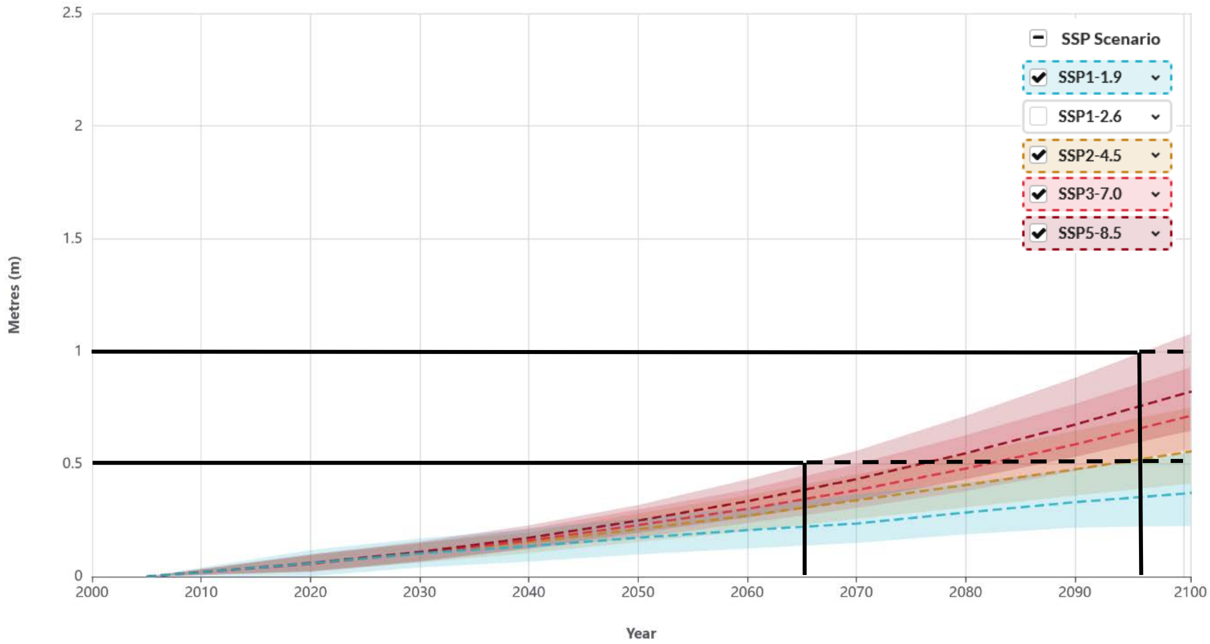

Figure 118: Illustrative example of translating sea level rise scenarios to projected relative sea level change under Shared Socio-Economic Pathway (SSP) scenarios. Here it is demonstrated how a sea level rise increment of 0.5 m and 1 m may correspond to a single year or range of years based on SSP sea level projections (Note. This figure is a reproduction of Site ID 2275 from NZSeaRISE – Public Map (https://searise.takiwa.co/map)).

Inland flooding

Inland flooding in this study was represented by fluvial and pluvial-driven inundation with a 1% annual exceedance probability (AEP) (i.e., 100-year ARI). Inland flooding inundation hazard layers were sourced from Harang et al. (2024). The hazard layers represent inundation extent and water depth at 4 m grid resolutions, based on a LIDAR DEM. The inland flood hazard model domain represented ~73% (197,415 km^2) of A-NZ's mainland area (Figure 119). While not complete coverage of the mainland area, the area represents ~95% of mapped building objects. Future flood regime changes in response to changing climatic conditions were represented by simulating inundation under 0°C (i.e., mean temperature from a historic baseline period), 1°C , 2°C and 3°C of temperature warming.

The temperature baseline applied in these simulations was based on the High Intensity Rainfall Design Systems (HIRDS) historical temperature observations between 1853 and 2016 (Carey-Smith et al. 2018). However, most of the historical temperature observations are recent with approximately two-thirds collected after 1970. The 1986–2005 historical baseline sits approximately midway between 1970 and 2016. Under the assumption of a roughly linear long-term warming trend, as indicated by NIWA's seven-station series, mean temperature between 1986–2005 is expected to be similar to the longer 1970–2016 observation period. This consistency supports the use of the 1986–2005 historical baseline for simulating inland-flood inundation responses to proportional changes in the HIRDS-based 100-year ARI rainfall intensity under temperature warming increments of 0°C, 1°C, 2°C and 3°C.

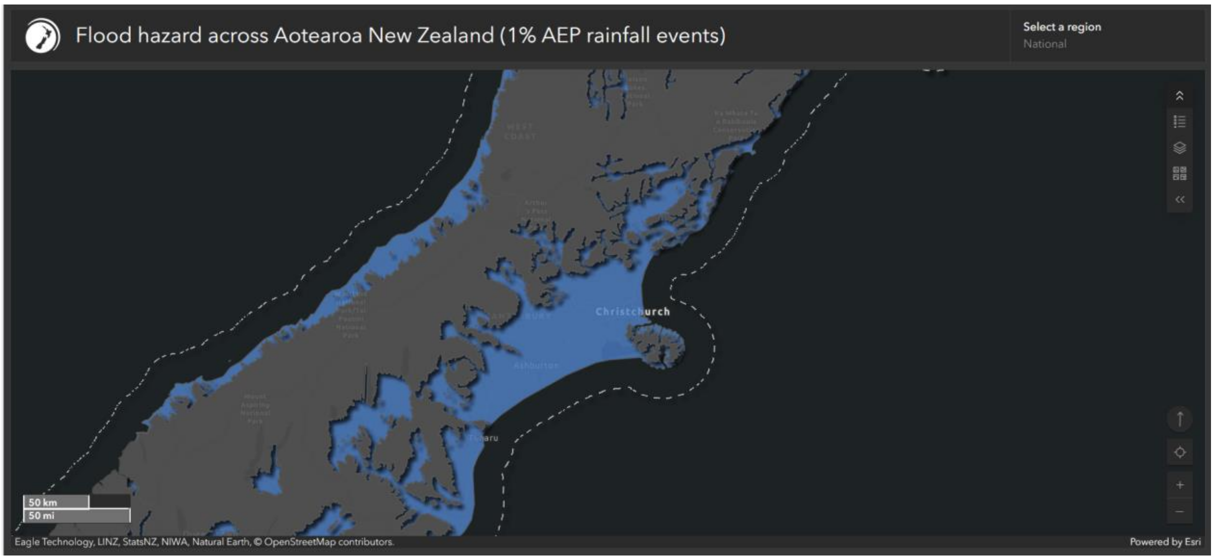

Figure 119: Inland flood hazard layer coverage for A-NZ can be viewed following this link. Here, A-NZ land areas with 1% AEP flood hazard layers are represented in blue. Grey areas denote land areas either steep topography or land without high resolution topographical data (i.e., LIDAR).

Importantly, the baseline period for the exposure modelling in this report is different from that commonly used in climate-change projections used by the IPCC. That's because the IPCC baseline starts "before modern industry" (around the late 1800s). It is designed to answer global questions like: "How much warmer is the planet compared with a natural climate?". The HIRDS baseline starts much later, around 1986–2005, when we already had good measurements across New Zealand. It is designed to answer practical questions like: "How much stronger might future rainfall be compared with what our infrastructure was designed for?"

Global temperature change is commonly described using IPCC definitions, where warming levels such as 1 °C, 2 °C, or 3 °C are measured relative to pre-industrial conditions (approximately 1850–1900). This provides a consistent way to compare climate change across the globe.

For local hazard modelling, including the High Intensity Rainfall Design System (HIRDS), a more recent baseline period (1986–2005) is used. This period reflects a well-observed climate for New Zealand and aligns with the climate conditions under which most existing infrastructure was designed.

In this analysis, mean annual temperature for each grid cell was first calculated for the 1986–2005 baseline. Future temperature change was then estimated by comparing projected 20-year rolling mean temperatures (2020–2090) against this baseline under different emissions scenarios (Figure 120).

Because the 1986–2005 period is already approximately 1 °C warmer than pre-industrial conditions, global warming levels expressed by the IPCC can be translated into equivalent temperature increases relative to the HIRDS baseline. For example, a global warming level of 2 °C above pre-industrial conditions corresponds to approximately 1 °C of additional warming relative to the 1986–2005 baseline.

Figure 120 illustrates how specific temperature increments (e.g. 1 °C, 2 °C, 3 °C) correspond to different years or ranges of years under Shared Socio-economic Pathway (SSP) scenarios. This approach allows flood hazard and exposure to be assessed based on the level of warming, rather than a single calendar year, acknowledging uncertainty in future emissions and climate response.

In more detail: the future rates and timing of temperature change across the mainland area were derived from probabilistic temperature projections developed by downscaling six global climate models (GCMs) from CMIP6 (Gibson et al. 2024). Temperature change was expressed as 20-year rolling mean annual temperature change (17th, 50th and 83rd percentiles) calculated at ~5 km^2 grid resolution for medium confidence SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5 global emission scenarios. These rolling means provide centred temperature estimates, such that each reported year reflects the average change over a 20-year window (e.g., the value reported for 2020 represents conditions over 2010–2029). For each grid cell, mean annual temperature over the 1986–2005 historical baseline period was first calculated from the ensemble. Temperature change for each emissions scenario was then computed by comparing projected 20-year rolling mean temperatures for the effective period 2020–2090 against this baseline. Temperature projections for each scenario were spatially joined to elements to evaluate the timing and uncertainty of inland flood hazard-exposure under temperature warming. Figure 120 provides and illustrative example of temperature change corresponding to SSP scenarios which is replicated in the model process.

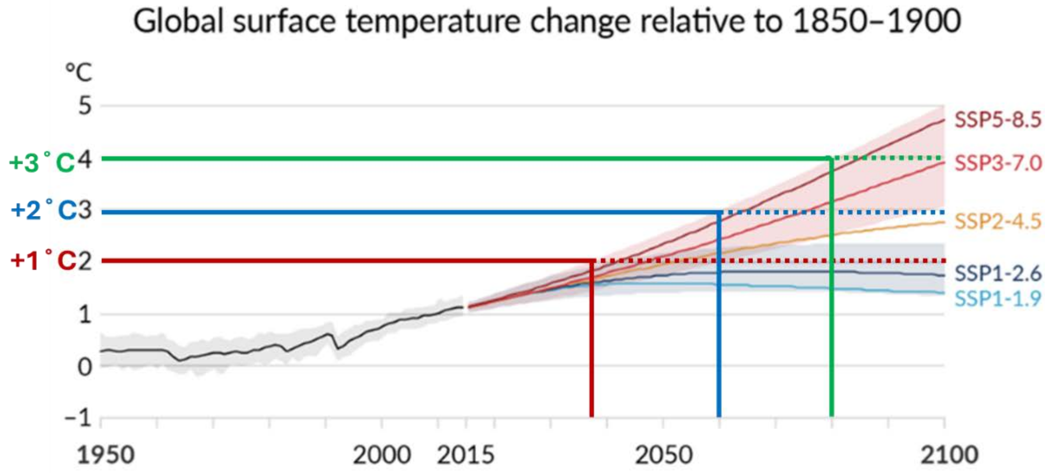

Figure 120: Illustrative example of translating temperature scenarios to projected temperature change under Shared Socio-economic Pathway (SSP) scenarios. Here it is demonstrated how a temperature increment of 1℃, 2℃ or 3℃ and 1 m may correspond to a single year or range of years based on SSP temperature projections. The 2015-2034 temperature baseline is approximately 1℃ above pre-industrial global surface temperatures (Note. This figure is a reproduction of Figure SPM.8 from the IPCC 6th Assessment Report WGI Summary for Policy Makers).

Shallow groundwater (coastal)
Shallow groundwater presence (i.e., <1 m below land surface) was modelled by Westerhoff et al. (2025) for 'low-lying coastal land' areas up to 10 m above MSL. Modelled shallow groundwater presence coverage represented ~2% (5409 km^2) of A-NZ's mainland area. Shallow ground in these areas is sensitive to MSL change therefore, depth-to-water data represented its presence under present-day (i.e., 0 m) and future MSL rise increments of 0.5 m, 1 m, 1.5 m and 2 m. The projected timing and uncertainty of shallow ground change for low-lying coastal land under medium confidence SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5 global emission scenarios was evaluated using the same relative sea level rise projections (1995-2014 baseline) and approach used for coastal flooding.

Coastal erosion
Future coastal erosion projections used in this assessment are based on a first-pass approach applying linear regression to historic shoreline change trends (Tuck et al. 2024), with vector polygons representing potential erosion extents by 2100. This method does not incorporate sea-level rise effects, assumes historically accreting coasts continue to accrete, and therefore likely underestimates future erosion risk. Additional buffers were applied to account for extreme storm events (20 m for beaches, 10 m for soft cliffs), but these values remain conservative compared to documented storm-cut magnitudes elsewhere. Spatial coverage is incomplete, with gaps in urban areas, harbour coasts, and some open-coast segments, resulting in national exposure estimates that may be underestimated by a factor of two. Polygons were generated through automated processes and may contain minor artefacts, though these are considered negligible relative to the overall underestimation caused by omitted areas and unmodelled sea-level rise effects.

Potential evapotranspiration deficit (PED), extreme temperatures and extreme winds
CMIP6 projections of change to potential evapotranspiration deficit (PED), extreme temperatures (i.e., very hot days, frost days) and extreme winds were expressed as 20-year rolling mean annual temperature change (17th, 50th and 83rd percentiles) calculated at ~5 km^2

grid resolution for medium confidence SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5 global emission scenarios. These rolling means provide centred temperature estimates, such that each reported year reflects the average change over a 20-year window (e.g., the value reported for 2020 represents conditions over 2010–2029). For each grid cell, mean annual temperature over the 1986–2005 historical baseline period was first calculated from the ensemble. Temperature change for each emissions scenario was then computed by comparing projected 20-year rolling mean temperatures for the effective period 2020–2090 against the 1986–2005 baseline.

Rainfall-induced landslides
A nationwide landslide susceptibility dataset (Massey et al. 2021) and extreme rainfall statistics from the high intensity design-rainfall system (HIRDS) (Carey-Smith et al. 2018) were combined to formulate a proxy-based rainfall-induced landslide susceptibility dataset for A-NZ. Landslide susceptibility ratings from 1 to 5 were calculated at 8 m^2 resolution for A-NZ by Massey et al. (2021). Corresponding high intensity rainfall ratings from 1 (very low) to 5 (very high) for A-NZ were then calculated at 2 km^2 resolution based on HIRDS 100-year ARI (i.e., 1% AEP) rainfall quintiles. Landslide susceptibility and high intensity rainfall ratings 8 m^2 resolution were summed (i.e., 2-10) and divided by two to derive an ordinal rating of rainfall-induced landslide susceptibility from 1 (lowest) to 5 (highest).

The projected timing and uncertainty of rainfall-induced landslide susceptibility change were evaluated using proportional changes in HIRDS-based 100-year ARI rainfall intensity under temperature-warming increments of 0°C, 1°C, 2°C and 3°C. As with inland flooding, temperature change from the CMIP6 six-model ensemble (Gibson et al. 2024) was expressed as 20-year rolling mean annual temperature change (17th, 50th and 83rd percentiles), calculated at ~5 km^2 grid resolution for medium-confidence SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5 emissions scenarios. Projected temperature change for each scenario was derived by comparing 20-year rolling mean temperatures for the effective period 2020–2090 against the 1986–2005 baseline. These temperature projections were then spatially joined to elements to quantify the timing and uncertainty of rainfall-induced landslide hazard-exposure under progressive temperature warming.

3.2.2 Exposure layers

The exposure census uses nationwide element datasets for A-NZ, developed within the last 5-years. All data used were in a geopackage (.gpkg) file format, with element object geometries represented as points, polylines or polygons. Table 21 summarises the element datasets used in this study, with reference to relevant research publications or online datasets.

Population
Usually-resident populations for residential buildings were estimated using a A-NZ population model developed by Scheele et al. (2021). The model downscales 2023 Statistical Area 2 (SA2) census population and demographic information to residential buildings (Scheele et al. (2023) located within the corresponding SA2 boundary.

Buildings
Land Information New Zealand (LINZ) provides a national dataset of building outlines for individual structures (Land Information New Zealand, 2025). Scheele et al. (2023) modelled physical and non-physical characteristics for the national building outlines to inform multi-hazard risk modelling in A-NZ. Buildings used for residential purposes identified in this dataset

represent 1,623,795 objects and were used in this study. The building inventory used was last updated in June 2024.

Infrastructure
Infrastructure network components were available from central and local government agencies. Nationwide transport component data representing airports and road (centrelines) were provided by LINZ (2025b,c), and railway (centrelines) from KiwiRail (2025). Electricity components representing structures (e.g., pylons), substations and transmission lines for the national grid were provided by Transpower (2025a,b,c). Three-waters (i.e., stormwater, potable water, wastewater) component datasets are developed and maintained by territorial or unitary authorities, or Council Control Organisations (e.g., Watercare). Component datasets for each three-water network supplied by these agencies were aggregated into nodes (e.g., tanks, pumps, fittings etc.) and pipelines to form nationwide datasets.

Land cover and land use
LINZ maintains the NZ Properties dataset, including land parcels and National District Valuation Roll dataset. Here, the land use zoning for properties (i.e., Multi-use at the primary level, Rural industry, Lifestyle, Transport, Community services, Recreational, Utility services, Industrial, Commercial, Residential) is reported from the NZ Properties dataset. Land cover was represented by The New Zealand Land Cover Database (LCDBv5) (Manaaki Whenua Landcare Research 2025). LCDBv5 identifies 33 mainland land cover classes, which have been simplified for reporting in this study to: built land (Built-up Area, Urban Parkland/Open Space, Transport Infrastructure, Surface Mine or Dump), production land (Short-rotation Cropland, Orchards/Vineyards, High Producing Exotic Grassland, Low Producing Grassland, Exotic Forest, Forest – Harvested), and undeveloped land (all remaining natural cover classes such as indigenous forest, shrubland, tussock grassland, wetlands, alpine areas, and other non-built environments).

Table 21: Model input exposure data summary for national climate hazard-exposure census.

Element-at-Risk		Attributes	Units/ Metric	Enumeration	Geometry	Source
Population	Building	-	-	Sum	Polygon	Scheele et al. (2021)
Buildings	Building	Replacement Value	NZD	Count, Sum	Polygon	Scheele et al. (2023) LINZ (2025a)
Infrastructure	Transport (Roads)	-	km	Sum	Polyline	LINZ (2025b,c)
	Transport (Railways)	-	km	Sum	Polyline	KiwiRail (2025a,b)
	Transport (Airports and aerodromes	-	-	Count	Polygon	LINZ (2025d)
	Electricity (Transmission Lines)	-	km	Sum	Polyline	Transpower (2025a)
	Electricity (Structures)	-	-	Count	Point	Transpower (2025b)
	Electricity (Substations)	-	-	Count	Point	Transpower (2025c)

	Water (nodes)	-	-	Count	Point	Unitary and Territorial Authorities (including council controlled organisations)
	Water (pipelines)	-	km	Sum	Polyline	Unitary and Territorial Authorities (including council controlled organisations)
Land	Land Cover	Built, Production, Undeveloped	km^2	Sum	Polygon	Manaaki Whenua Landcare Research (2025)
	Land Use	Commercial, Community, Industrial, Recreational, Residential Rural, Other Specific Zone, Other_Broad_Zone, Other	km^2	Sum	Polygon	LINZ (2025)

3.2.3 Area layers

This study enumerates and reports on element hazard-exposure at 2025 Regional Council and 2025 Territorial Authority areas (Statistics New Zealand, 2025a,b).

3.2.4 Consequence functions

Element hazard-exposure (E_e) was determined for several hazards (i.e., coastal erosion, drought, extreme temperatures, extreme winds, rainfall-induced landslides, shallow groundwater) based on hazard phenomena's presence h_p at an element's location:

$$E_e = \begin{cases} 1, & \text{if } h_p = 1 \\ 0, & \text{if } h_p = 0 \text{ or } h_p = \text{Null} \end{cases} \tag{3}$$

Equation 3 was applied to all hazard and element combinations with the exception of building and household population hazard-exposure to coastal (extreme sea levels and MHWS) and inland flooding determined when:

$$E_e = \begin{cases} 1, & \text{if } d \geq 0.05 \text{ m and } R_E \geq 0.5 \\ 0, & \text{if } d < 0.05 \text{ m or } R_E < 0.5 \end{cases} \tag{4}$$

Where, d is the maximum water depth in meters (m) within a building outline and, $R_E = \frac{A_E}{A_T}$ is the exposed area ratio, representing the proportion of the building outline area (A_E) inundated by flood waters relative to the total building outline area (A_T). A value of F_e = 1 indicates water depth within a building outline exceeds a threshold of 0.05 m and, the inundation area covers at least 50% of the building outline. Water depth d and the exposed area ratio (R_E) are computed from all hazard layer grid cells intersecting a building outline. The conditions for F_e = 1 indicate a higher likelihood of direct or indirect impacts to buildings and their household populations compared to E_e = 0.

3.3 Model step: geoprocessing and sampling

Geoprocessing and sampling steps transformed model input data geometries to extract spatial information for hazard-exposure analysis. Model data were represented as raster grid (hazard layers), and vector points, polylines and polygon (exposure and area layers) geometries. Exposure layer polylines and polygons were segmented by hazard grids for spatial sampling. A georelational coverage data file, created by the sampling process, was used to convert hazard and area information into indexed values at defined locations, e.g. building outline centroids. Indexed values were extracted to the coverage data file, with lookup functions used access to hazard layer and area layer information for each element.

3.4 Model step: hazard-exposure analysis

Future element hazard-exposure change was projected under medium-confidence projections for SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5 scenarios. For each hazard-exposed element (E_e), a piecewise linear function was fitted to the relationship between climate variables and hazard-exposure :

$$f(x) = \begin{cases} b_0 + m_1(x - x_0),\ x_0 < x < x_1 \\ b_1 + m_2(x - x_1), x_1 < x < x_2 \\ \vdots \\ b_{n-1} + m_n(x - x_{n-1}), x_{n-1} < x < x_{n-1} \end{cases} \quad (5)$$

Where, x is the climate variable (i.e., sea-level rise in meters, temperature in °C), x_n is the maximum value of the climate variable, $f(x)$ is the function for hazard-exposed element (E_e), m_i is the slope between points and b_i is the point intercepts. The slope for individual segments (m_i) is computed as:

$$m_i = \frac{y_i - y_{i-1}}{x_i - x_{i-1}} \quad (6)$$

Where, x_i is the sea level or temperature value, and y_i is the hazard-exposed element (E_e) corresponding to x_i. The continuity between point segments is enforced by recursively defining the point intercepts (b_i)

$$b_i = b_{i-1} + m_i(x_{i-1}) \quad (7)$$

Here, the piecewise linear function minimises the residual error between modelled and interpolated hazard-exposure values. The fitted function f was then applied to future climate variables in each SSP scenario to estimate hazard-exposure $E_e(t)$ as follows for coastal flooding (extreme sea levels, mean high water springs, shallow groundwater)

$$E_e(t) = f\big(SLR(t)\big) \quad (8)$$

Where, $SLR(t)$ is projected relative sea level rise in meters (Levy et al., 2023; Naish et al., 2024) at decade t. The approach is similar for inland flooding and rainfall-induced landslides:

$$E_e(t) = f\big(\Delta T(t)\big) \quad (9)$$

Where, $\Delta T(t)$ is projected temperature (℃) at decade t (Gibson et al., 2024). In this study, t represents each decade between 2020 and 2090 (e.g., 2020,2030,...,2090). This flexible approach enables computation of $E_e(t)$ for any climate scenario, climate variable and percentile, while avoiding the need to simulate flood hazard layers representing such scenarios using expensive and time-consuming numerical models.

Hazard-exposure (*HE*) were computed for geographical areas (*GA*) representing regional council and territorial authority jurisdictional areas on mainland A-NZ. Hazard-exposure (HE) were calculated for each GA unit k ($GA1_k$(k = *1, 2,.....,*m)) by summing hazard-exposed elements and/or their geometries (e.g., length, area)

$$HE(GA1_k) = \sum_{i \in GA1_k} 1(E_e(t)_i = 1), \quad k = 1, 2, \ldots, m \tag{10}$$

Where, $1(E_e(t)_i = 1)$ returns 1 if element i if $E_e(t)_i$ = 1.

3.5 Model step: output data

Model pipelines executed in the RiskScape engine produce hazard-exposure $HE(SA1_k)$ output data in tabular (.csv) and geopackage (.gpkg) file formats. These file formats enable data post-processing and analysis in geographical information systems (GIS), spreadsheets and other programming software applications. Model output data files were provided as a digital appendix to this report (see Appendix A).

3.6 Limitations of the current study

The national climate hazard exposure census is constrained by several overarching limitations that must be acknowledged. First, the analysis assumes static exposure conditions, meaning future changes in land use, infrastructure development, and adaptation measures are not incorporated. Second, hazard projections rely on climate models and socio-economic pathways that carry inherent uncertainty, particularly for late-century scenarios. Third, spatial resolution and data completeness vary across hazard and exposure datasets, influencing the precision of exposure estimates. Finally, the census approach quantifies hazard-exposure for elements-at-risk to climate hazard and processes but does not assess vulnerability or risk, limiting its ability to predict actual direct or indirect impacts.

General limitations with hazard and exposure model input data used in the current study are outlined in Table 22 and Table 23.

Table 22: Methodological limitations summary of model input hazard data used for national climate hazard exposure census.

Hazard	Limitations
Coastal Flooding (extreme sea levels)	Static inundation model excludes dynamic processes (wave action, storm surge and tide interactions). Elevation data merges LiDAR (10 m) and SRTM (30 m), introducing spatial inconsistencies. Stopbank protection assumed uniform at 1% ESL elevation, ignoring variability in design and maintenance.
Coastal Flooding (mean high water springs)	Exposure estimates are sensitive to tidal datum and stopbank protection assumptions and do not incorporate local hydrodynamic effects on tidal flooding processes.
Inland Flooding	Hydrological model at 4 m resolution lacks representation of small-scale features (culverts, drains). Coverage is limited to 73% of NZ mainland (95% of

	buildings), leaving gaps in rural areas. Not directly comparable with local-scale models due to differences in calibration and parameters.
Shallow Groundwater	Groundwater hazard layers assume uniform response to sea-level rise and do not include local hydrogeological variability or anthropogenic groundwater management interventions.
Landslides (Rainfall-Induced)	Hazard layers are based on empirical susceptibility models calibrated to historic rainfall patterns, which may not reflect future rainfall intensity extremes or soil moisture dynamics.
Coastal Erosion	Projections rely on historic erosion rates and do not incorporate potential acceleration under climate change or sea level rise.
Potential Evapotranspiration Deficit (PED)	PED layers assume uniform soil and vegetation response to climate forcing and do not account for irrigation or land management practices that could mitigate water stress.
Extreme Winds	Wind hazard projections are based on percentile changes in modelled wind speed and may not accurately capture localised topographic amplification.
Extreme Temperatures	Temperature hazard layers represent exposure to threshold exceedance (e.g., ≥30°C) may not capture compound heatwave effects or urban heat island amplification.

Table 23: Methodological limitations summary of model input exposure data used for national climate hazard-exposure census.

Element	Object Type	Limitations
Population	Building	Population estimates are derived from 2023 building outlines and census data (2023), using top-down disaggregation from SA2 census data which introduces uncertainty at a building level. Household demographics (e.g., age, ethnicity) was not simulated by Scheele et al. (2021) at household level. In the absence of household level census information, modelled representations of household demographic profiles should be considered in future studies.
Buildings	Building	Building locations represent 2023 building outlines and replacement values are derived from simulated characteristics (e.g., primary use, structural frame, storeys) for building outlines. This introduces uncertainty for replacement value estimation at a building level.
Infrastructure	Transport	Roads are represented from the LINZ Topo50. Minor roads and recent developments may be missing or generalised. Airports are represented as simplified polygons or symbols without detailed infrastructure such as runway dimensions, taxiways, or lighting systems.
	Electricity	Limited to the national grid assets and excludes local distribution networks, which may represent significant service exposure to climate.
	Water	Water nodes are a simplified geometric (i.e., vector points) of a wide range of components from small assets such as water tobys to large facilities like treatment plants. Water pipelines are linear features without depth or material attributes, constraining interpretation of hazard interaction. Nodes and pipeline datasets may not represent the complete water network for some territorial authority areas.
Land	Land Cover Land Use	Land cover and use layers are static and do not incorporate projected changes in land use including changes in agricultural practices, urban expansion, or ecological restoration.

3.7 Future extensions

Future extensions of the current study should focus on improving the accuracy, completeness, and functionality of the national hazard exposure census. Enhancements should include expanding hazard layers to represent multiple intensity metrics (e.g., flood water depth and velocities), improving exposure datasets with broader physical or non-physical attributes to influencing an elements susceptibility to social or economic impact, and incorporating vulnerability and/or adaptive capacity datasets to move beyond exposure analysis toward comprehensive national risk assessment. These improvements will enable more robust evaluations of climate hazard impacts that can help inform climate adaptation planning at national and regional scales.

General limitations with hazard and exposure model input data used in the current study are outlined as follows:

Hazard Layers

- Extend coastal and inland flood hazard maps to include dynamic processes such as wave action, storm surge, and flow velocity, which influence human safety and structural damage.
- Improve spatial coverage by replacing coarse DEM areas with LiDAR where available and filling gaps using bias-corrected satellite DEMs.

- Simulate future hazard intensities under a broader range of climate scenarios and event frequencies to enable expected annual exposure or damage calculations.
- Incorporate additional hazards such as compound flooding, drought, and windstorms with higher spatial and temporal resolution.

Exposure Layers

- Enhance building datasets with critical attributes such as floor elevation, construction material, and age to improve vulnerability modelling.
- Update population models using the demographic variables representing vulnerability (e.g., age, income, health status).
- Expand infrastructure datasets to include local electricity distribution networks, complete water asset inventories, and additional transport network component attributes such as traffic volumes, asset replacement values, elevation and design standards (e.g., bridges).
- Improve land-use and land-cover layers to reflect projected changes in urban development, agriculture, and ecological restoration.

Consequence Functions

- Incorporate vulnerability functions for direct and indirect damage metrics, including monetary loss, displacement duration, and health impacts.
- Evaluate the expect annual frequency of exposure and direct or indirect damage.
- Incorporate adaptive capacity indicators to evaluate household and community resilience under different climate scenarios.
- Move toward integrated risk modelling that combines hazard, exposure, vulnerability, and adaptation measures to support cost-benefit analysis of mitigation strategies over the future time horizons of evolving climate hazards.

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Appendix A Supplementary files

Table 24: Supplementary data files for the hazard-exposure information presented in this study.

File Name	File Type	Description
Airports_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Airports_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Airports_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Airports_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Airports_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Airports_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Airports_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Coastal_Shallow_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to Unknown hazard under climate process-based hazard scenarios at Regional Council level.
Airports_Coastal_Shallow_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to Unknown hazard under climate process-based hazard scenarios at Territorial Authority level.
Airports_Coastal_Shallow_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.

File Name	File Type	Description
Airports_Coastal_Shallow_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Airports_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Airports_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Airports_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Airports_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Potential_Evapotranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Potential_Evapotranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.

File Name	File Type	Description
Airports_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Airports_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Airports_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing airport (incl. aerodrome) exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Buildings_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Buildings_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Buildings_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Buildings_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Buildings_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Buildings_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Buildings_Coastal_Shallow_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to Unknown hazard under climate process-based hazard scenarios at Regional Council level.
Buildings_Coastal_Shallow_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to Unknown hazard under climate process-based hazard scenarios at Territorial Authority level.
Buildings_Coastal_Shallow_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Coastal_Shallow_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Buildings_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Buildings_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Buildings_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Buildings_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Buildings_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Buildings_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Buildings_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing residential and commercial buildings exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Land_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Land_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Land_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Land_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.

File Name	File Type	Description
Land_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Land_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Coastal_Shallow_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under climate process-based hazard scenarios at Regional Council level.
Land_Coastal_Shallow_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under climate process-based hazard scenarios at Territorial Authority level.
Land_Coastal_Shallow_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Coastal_Shallow_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_InlandFlooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under climate process-based hazard scenarios at Regional Council level.
Land_InlandFlooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under climate process-based hazard scenarios at Territorial Authority level.
Land_InlandFlooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_InlandFlooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.

File Name	File Type	Description
Land_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Land_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Landslide_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under climate process-based hazard scenarios at Regional Council level.
Land_Landslide_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under climate process-based hazard scenarios at Territorial Authority level.
Land_Landslide_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Landslide_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to Unknown hazard under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Land_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Land_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing land cover and land use exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.

File Name	File Type	Description
Population_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Population_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Population_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Population_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Population_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Population_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Population_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Population_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Population_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Population_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Population_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Population_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Population_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Potential_Evapotranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Potential_Evapotranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Population_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Population_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing population exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Potablewater_Nodes_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Potablewater_Nodes_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Potablewater_Nodes_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Potablewater_Nodes_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Potablewater_Nodes_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Nodes_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Potablewater_Nodes_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Potablewater_Nodes_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Nodes_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Potablewater_Nodes_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Potablewater_Nodes_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Potablewater_Nodes_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Nodes_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Potablewater_Nodes_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Potablewater_Nodes_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Nodes_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Potablewater_Nodes_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Potablewater_Nodes_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Nodes_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Nodes_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Potablewater_Nodes_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Nodes_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water node exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Potablewater_Pipelines_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Potablewater_Pipelines_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Potablewater_Pipelines_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Potablewater_Pipelines_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Potablewater_Pipelines_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Potablewater_Pipelines_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Potablewater_Pipelines_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.

File Name	File Type	Description
Potablewater_Pipelines_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Potablewater_Pipelines_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Potablewater_Pipelines_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Potablewater_Pipelines_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Potablewater_Pipelines_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Potablewater_Pipelines_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Potablewater_Pipelines_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Potablewater_Pipelines_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing potable water pipeline exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Railways_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Railways_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Railways_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Railways_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Railways_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Railways_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Railways_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Railways_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Railways_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Railways_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Railways_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Railways_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Railways_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Railways_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Railways_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Railways_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing railway exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Roads_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Roads_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Roads_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Roads_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Roads_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.

File Name	File Type	Description
Roads_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Roads_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Roads_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Roads_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Roads_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Roads_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.

File Name	File Type	Description
Roads_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Potential_Evapotranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Potential_Evapotranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Roads_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Roads_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing road exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Sites_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Sites_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Sites_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Sites_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Sites_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Sites_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Sites_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Sites_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Sites_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Sites_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Sites_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Sites_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Sites_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Sites_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Sites_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Sites_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid sites exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Stormwater_Nodes_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Stormwater_Nodes_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Stormwater_Nodes_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.

File Name	File Type	Description
Stormwater_Nodes_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Stormwater_Nodes_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Stormwater_Nodes_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Stormwater_Nodes_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Stormwater_Nodes_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Stormwater_Nodes_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.

File Name	File Type	Description
Stormwater_Nodes_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Stormwater_Nodes_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Stormwater_Nodes_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Nodes_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Nodes_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater node exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Stormwater_Pipelines_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.

File Name	File Type	Description
Stormwater_Pipelines_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Stormwater_Pipelines_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Stormwater_Pipelines_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Stormwater_Pipelines_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Stormwater_Pipelines_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Stormwater_Pipelines_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Stormwater_Pipelines_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Stormwater_Pipelines_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Stormwater_Pipelines_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Stormwater_Pipelines_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Stormwater_Pipelines_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Stormwater_Pipelines_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Stormwater_Pipelines_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Stormwater_Pipelines_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing stormwater pipeline exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Structures_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Structures_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Structures_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Structures_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Structures_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Structures_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Structures_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Structures_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Structures_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Structures_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Structures_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Structures_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Structures_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Structures_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Potential_Evapotranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Potential_Evapotranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.

File Name	File Type	Description
Structures_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Structures_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Structures_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid structures exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Transmission_Lines_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Transmission_Lines_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Transmission_Lines_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Transmission_Lines_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Transmission_Lines_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Transmission_Lines_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Transmission_Lines_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Transmission_Lines_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Transmission_Lines_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Transmission_Lines_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Transmission_Lines_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Transmission_Lines_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Transmission_Lines_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.

File Name	File Type	Description
Transmission_Lines_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Transmission_Lines_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Transmission_Lines_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing national electricity grid transmission line exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Wastewater_Nodes_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Wastewater_Nodes_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Wastewater_Nodes_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Wastewater_Nodes_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Wastewater_Nodes_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Wastewater_Nodes_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Wastewater_Nodes_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Wastewater_Nodes_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Wastewater_Nodes_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Wastewater_Nodes_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Wastewater_Nodes_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

File Name	File Type	Description
Wastewater_Nodes_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Wastewater_Nodes_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Wastewater_Nodes_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Nodes_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Nodes_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater node exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Coastal_Erosion_2100_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to coastal erosion at 2100 under historic erosion trends at Regional Council level.
Wastewater_Pipelines_Coastal_Erosion_2100_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to coastal erosion at 2100 under historic erosion trends at Territorial Authority level.
Wastewater_Pipelines_Coastal_ESL_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Wastewater_Pipelines_Coastal_ESL_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to extreme sea level driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.

File Name	File Type	Description
Wastewater_Pipelines_Coastal_ESL_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Coastal_ESL_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to extreme sea level driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Coastal_MHWS_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Regional Council level.
Wastewater_Pipelines_Coastal_MHWS_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to mean high water springs driven coastal flooding under sea level change (+0 m, +0.5 m, +1 m, +1.5 m, +2 m) at Territorial Authority level.
Wastewater_Pipelines_Coastal_MHWS_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Coastal_MHWS_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to mean high water springs driven coastal flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Coastal_Shallow_Groundwater_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to shallow groundwater presence under climate process-based hazard scenarios at Regional Council level.
Wastewater_Pipelines_Coastal_Shallow_Groundwater_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to shallow groundwater presence under climate process-based hazard scenarios at Territorial Authority level.
Wastewater_Pipelines_Coastal_Shallow_Groundwater_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Coastal_Shallow_Groundwater_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to shallow groundwater presence under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Frost_Days_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Frost_Days_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to frost days (<0°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Inland_Flooding_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Wastewater_Pipelines_Inland_Flooding_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to inland (fluvial and pluvial) flooding under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.

File Name	File Type	Description
Wastewater_Pipelines_Inland_Flooding_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Inland_Flooding_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to inland (fluvial and pluvial) flooding under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Landslides_Scenario_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Regional Council level.
Wastewater_Pipelines_Landslides_Scenario_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to rainfall-induced landslide susceptibility areas under temperature change (+0°C, +1°C, +2°C, +3°C) at Territorial Authority level.
Wastewater_Pipelines_Landslides_SSP_Interpolated_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Landslides_SSP_Interpolated_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to rainfall-induced landslide susceptibility areas under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Potential_Evaportranspiration_Deficit_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Potential_Evaportranspiration_Deficit_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to potential evapotranspiration deficit (PED) accumulation (mm) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Very_Hot_Days_30_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Very_Hot_Days_30_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to very hot days (≥30°C) under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.
Wastewater_Pipelines_Wind_SSP_Regional_Council.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Regional Council level.
Wastewater_Pipelines_Wind_SSP_Territorial_Authority.csv	Comma Separated Value (.csv)	Tabular data representing wastewater pipeline exposure to extreme wind (99th percentile) change percentage under Shared Socio-economic Pathways (SSP) projections for 1-2.6, 2-4.5, 3-7.0, and 5-8.5 at Territorial Authority level.

Appendix B Data Dictionary

Field Name	Description
0.5m	Exposure under sea-level rise scenario of 0.5 m above present mean sea level.
0_degrees	Exposure under temperature increase scenario of 0 °C.
0m	Exposure under sea-level rise scenario of 0 m above present mean sea level.
1.5m	Exposure under sea-level rise scenario of 1.5 m above present mean sea level.
1_degree	Exposure under temperature increase scenario of 1 °C.
1m	Exposure under sea-level rise scenario of 1 m above present mean sea level.
2_degrees	Exposure under temperature increase scenario of 2 °C.
2m	Exposure under sea-level rise scenario of 2 m above present mean sea level.
3_degrees	Exposure under temperature increase scenario of 3 °C.
Change.range_-100_-75.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-100_-75.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_-5.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_-5.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_-10_0.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-10_0.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-15_-10.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-15_-10.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-20_-15.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-20_-15.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-25_0.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-50_-25.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_-50_-25.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-5_0.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-5_0.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-75_-50.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_-75_-50.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_10.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_0_25.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_25.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_5.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_0_5.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_100_+.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_100_+.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_+.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_+.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_10_20.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_20_30.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_20_30.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_+.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_+.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_25_50.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_30_40.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_30_40.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_40_50.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_40_50.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_+.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_50_75.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_50_75.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_5_10.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_5_10.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_75_100.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_<_-10.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-10.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-100.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-100.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-20.Exposed.Count	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-20.Exposed.NZD	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Built_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Commercial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Community_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Industrial_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Natural_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Other_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Other_Broad_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Other_Specific_Zone_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Production_Landcover_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.

Field Name	Description
Change.range_<_-25.Exposed.Recreational_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Residential_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Rural_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Change.range_<_-25.Exposed.Total_Area_km2	Exposure metric for a specified percentage and measurement unit (e.g., days, mm) change range.
Exposed.Area_m2	Total exposed area in square meters.
Exposed.Length_Km	Total exposed length in kilometers.
Exposed.NZD_Value	Estimated exposed asset value in New Zealand Dollars.
Exposed.Population_Count	Population count exposed to hazard.
Regional_Council	Name of the Regional Council jurisdiction.
SSP	Shared Socio-economic Pathway scenario identifier (e.g., SSP1-2.6, SSP2-4.5, SSP3-7.0, SSP5-8.5).
SSP1-2.6_p50	Exposure under Shared Socio-economic Pathway scenario SSP1-2.6 p50.
SSP2-4.5_p50	Exposure under Shared Socio-economic Pathway scenario SSP2-4.5 p50.
SSP3-7.0_p50	Exposure under Shared Socio-economic Pathway scenario SSP3-7.0 p50.
SSP5-8.5_p50	Exposure under Shared Socio-economic Pathway scenario SSP5-8.5 p50.
Territorial_Authority	Name of the Territorial Authority jurisdiction.
Year	Year of the scenario.