Working Paper 2023/01

List of Publicly Available National and Local Scenarios

This Working Paper includes scenarios published on or before 31 December 2022

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1.0 Introduction

1.1 Purpose

In times of uncertainty it can be difficult to imagine what might happen in the future. Scenarios can be used as a tool for visualising or simulating possible future outcomes.

This working paper identifies as many scenario documents as the Institute could find, and in doing so, aims to enable better understanding of the current state of institutional capacity and capability regarding scenario development. The process of identifying a range of scenarios has enabled a holistic overview of the state of scenario development across multiple types of organisations in Aotearoa New Zealand.

1.2 Background

This working paper provides a 2022 update of the research presented in *Working Paper 2021/10 – List of Existing Scenarios in Aotearoa New Zealand*. It forms part of a publication series focused on scenario development within Aotearoa New Zealand – all papers are intended to be read in conjunction with each other. The papers in this series are as follows:

1. *Working Paper 2023/01 – List of publicly available national and local scenarios as at 31 December 2022* (this paper)
2. *Discussion Paper 2023/02 – Establishing national climate-related reference scenarios*
3. *Working Paper 2021/10 – List of Existing Scenarios in Aotearoa New Zealand.*
4. *Working Paper 2021/07 – Scoping the use of the term 'climate scenarios' and other climate-related terms in Aotearoa New Zealand and international literature.*

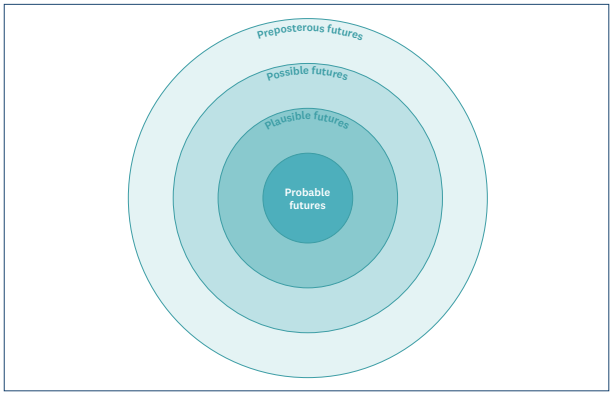
This research was undertaken in response to the development of the External Reporting Board's climate reporting standard (NZ CS 1). More specifically, the Institute hopes that it can be of use and influence in the development of national climate-related reference scenarios to satisfy the scenario component of the disclosure framework.

1.3 What is a scenario?

In the Institute's view, there are many ways to produce scenarios. Some key questions are:

- What is the problem/area you are trying to scope?
- What type of futures are you trying explore – probable, plausible, possible, and/or preposterous futures? See Figure 1 (below). The type of scenarios that are developed depends upon the nature of the problem, subject area or domain that is being explored.
- See *Discussion Paper 2023/02 – Establishing national climate-related reference scenarios* for a more detailed description of scenarios.

Figure 1: Types of futures



1.4 Terminology

Currently there are many issues with the language being used by different sectors and industries. Please note that these terms are still evolving in international literature, but for the purposes of this working paper, these are the definitions that the Institute has developed to explain the terms used throughout this paper.

Local and national scenarios

Scenarios can relate to a local community (i.e. within a specific region or regions) or a national community (i.e. considering Aotearoa New Zealand as a whole). Although both are useful, the Institute's interest is in impacts to the country from a national perspective.

Specific scenarios

Specific scenarios are scenarios that may be local or national in nature but explore a specific subject area or industry, such as climate change or the geothermal industry. This distinction is important as the Institute is more interested in some subject areas than others.

Climate-related scenarios

Climate-related scenarios are scenarios that are intended to provide an opportunity for organisations to develop their ability to better understand and prepare for the uncertain future impacts of climate change.

The External Reporting Board (XRB) defines climate-related scenarios in *Aotearoa New Zealand Climate Standard 3: General Requirements for Climate-related Disclosures (NZ CS 3)* as:

> A **plausible**, challenging description of how the future may develop based on a coherent and internally consistent set of assumptions about driving forces and relationships covering both physical and transition risks in an integrated manner. Climate-related scenarios are not intended to be probabilistic or predictive, or to identify the 'most likely' outcome(s) of climate change. They are intended to provide an opportunity for entities to develop their internal capacity to better understand and prepare for the uncertain future impacts of climate change [bold added].[1]

The term 'climate-related scenario' can be applied nationally, locally, or industrially.

2.0 Methodology

This section explains the methodology used in the research process for this paper.

2.1 Method

Stage 1: Collect a list of potential national and local scenario documents by searching the internet

A: Search broadly for potential scenario documents published in Aotearoa New Zealand
Search Google using key terms related to scenario development. Key terms searched include:

- Adapting systems
- Agriculture
- Biodiversity
- Climate change
- Economic
- Economics
- Education
- Electricity
- Energy
- Finance
- Financial
- Health
- Identity
- Infrastructure
- Land use
- Māori futures
- Policy
- Tourism
- Transport

B: Search specifically – central government and Crown research institutes
National public sector websites were searched using the term 'scenario/s'. Every search result was manually filtered to determine which documents were using the term 'scenario/s' as part of a scenario analysis (as opposed, for example, to calling something a 'worst-case scenario'). (See Appendix 1 for a list of national government entities and crown research institutes searched.)

C: Search specifically – local government
Local public sector websites were searched using the term 'scenario/s'. Every search result was manually filtered to determine which documents were using the term 'scenario/s' as part of a scenario analysis (as opposed, for example, to calling something a 'worst case scenario'). (See Appendix 2 for a list of local government entities searched.)

Stage 2: Review documents to ensure they meet the criteria of a scenario document

Documents collected in Stage 1 were reviewed to ensure that they met the criteria of a scenario document:

1. being publicly available
2. including a set of scenarios (i.e. comparing two or more future worlds)
3. exploring two or more variables within each scenario (analysis that examines the effect of changing just one variable at a time is called a sensitivity analysis, not a scenario)
4. exploring a timeframe of at least two years
5. including a method explaining how the scenarios were developed.

Note: 17 scenario documents have been included depsite not fulfilling criteria point 5. These documents instead used representative concentration pathways (RCPs) to describe different future worlds without explanation on how the RCP scenarios were specifically developed. RCPs are scenarios that "describe four different 21st century pathways of greenhouse gas (GHG) emissions and atmospheric concentrations, air pollutant emissions and land use."[2] RCPs were adopted by the IPCC in 2014 and have been widley accepted and used across climate-related models, literature and scenarios. All 17 scenario documents did provide detailed explanations as to what RCPs are, how they are used and who developed them. For this reason, we have decided to include these scenario documents.

Stage 3: Collate results into five datasets

Documents that were found to meet the criteria of a scenario document in Stage 2 were grouped into five final datasets (datasets 1–3 being national scenarios, and 4–5 being local scenarios):

1. scenarios published by a central government department,
2. scenarios published by a Crown research institute,
3. other national scenarios,
4. scenarios published by local government organisations (regional authorities [11], territorial authorities [11 city councils and 50 district councils] and unitary councils [6]), and
5. other local scenarios.

Stage 4: Identify key characteristics of each scenario document

1. **Date published**
   Date on document, or if not available, date of file name; or if not available, estimated date or recorded as not found.
2. **Publisher**
   The entity that published the document. In most cases this is the author. This determines the data set it sits in.
3. **Author**
   The person(s) or organisation cited on the document.
4. **Scenario title**
   Title cited in the inside cover. If no citation provided, the title on the cover.
5. **Time horizon**
   This is recorded in years and referenced by page number. Otherwise recorded as not found.
6. **Length of document**
   The total number of pages.
7. **Scope**
   Whether the scenario had a narrow, medium or wide focus.
8. **Primary area of focus**
   The main topic covered in the scenario.

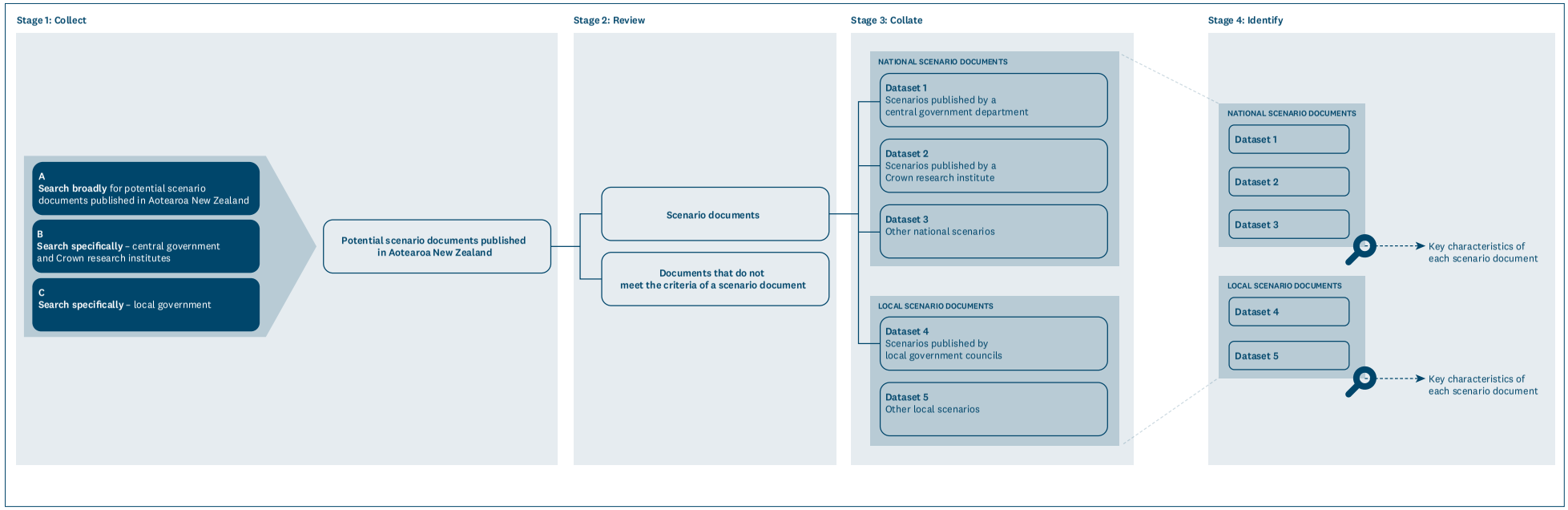
Notes:

1. Cabinet papers, confidential publications, submissions/applications, surveys, annual reports and journal articles were excluded from this research.
2. Only a technical review of the scenarios was conducted, not an analysis of the quality of the scenarios.
3. 'Wide' means the scenario held a national focus (e.g. Ministry for the Environment's Climate Change Projections for New Zealand).

   'Medium' means the scenario held a regional, sectoral or industrial focus (e.g. Marlborough District Council's Climate change projections and impacts for Marlborough).

   'Narrow' means the scenario held a focus on specific subject or issue (e.g. Ministry for Primary Industries' Foot-and-Mouth Disease Economic Impact Assessment).

Figure 2: Methodology



2.2 Limitations

As the Institute conducted this research by searching Google or an entity's website, some scenario documents may have been missed. This research is not intended to be a complete collection of every past and present scenario document, but instead aims to illustrate the current state of scenario development in Aotearoa New Zealand.

3.0 National scenarios

Table 1: Central government department scenarios

Publisher	Author	Scenario title #	Date published	Time Horizon	Length of document	Scope	Primary area of focus	Notes
Ministry of Business, Innovation and Employment (MBIE) (published under Department of Labour)	Business and Economic Research Limited and Department of Labour	Economic Impacts of Immigration: Scenarios Using a Computable General Equilibrium Model of the New Zealand Economy	2009	10 years (2011–2021) (p. 24)	88	Wide	Economics	
Ministry of Business, Innovation and Employment (MBIE)	Adams, M. (Michael Adams Reservoir Engineering Ltd)	Oil Resource Play - Development Scenario Models	Oct-12	8 years (2012–2020) (p. 10)	45	Medium	Energy	
Ministry of Business, Innovation and Employment (MBIE)	Ministry of Business, Innovation and Employment (MBIE)	Electricity demand and generation scenarios: Scenario and results summary	Aug-16	34 years (2016–2050) (p. 3)	26	Medium	Energy	
Ministry of Business, Innovation and Employment (MBIE)	Ministry of Business, Innovation and Employment (MBIE)	Electricity Demand and Generation Scenarios: Scenario and results summary	Jul-19	31 years (2050) (p.3)	40	Medium	Energy	
Ministry for the Environment (MfE)	Ministry for the Environment (MfE)	Climate Change Projections for New Zealand: Atmospheric projections based on simulations undertaken for the IPCC 5th Assessment 2nd edition*	Sep-18	34-, 74-, 84-years (2040, 2090, 2100) (p. 13)	131	Wide	Climate Change	
Ministry for the Environment (MfE)	NIWA	Changes in drought risk with climate change	May-05	75 years (2005-2080) (p. v)	68	Wide	Climate Change	
Ministry for the Environment (MfE)	Infometrics	General Equilibrium Analysis of Options for Meeting New Zealand's International Emissions Obligations	Oct-07	18 years (2007-2025) (p. 2)	15	Wide	Climate Change	
Ministry for Primary Industries (MPI)**	Lake, R., et al. (Institute of Environmental Science and Research, AgResearch, Massey University & NIWA)	Adapting to climate change: Information for the New Zealand food system*	n.d.	50-, 100-years (p. 11)	135	Medium	Climate Change	
Ministry for Primary Industries (MPI)	Greenhalgh, S. & Djanibekov, U. (Manaaki Whenua – Landcare Research)	Impacts of climate change mitigation policy scenarios on the primary sector	Sep-22	8 years (2022-2030) (p.26)	105	Mitigation	Climate Change	

Ministry of Social Development	Callister, P. & Rose, D.	Implications of Labour Market Change for Retirement Income Policy	2001	50 years (2001–2051) (p. 10)	84	Wide	Economics	
Ministry of Transport (MoT)	Lyons, G., et al. (Ministry of Transport (MoT))	Future Demand: How could or should our transport system evolve in order to support mobility in the future?	Nov-14	28 years (2042) (p. 1)	66	Wide	Infrastructure	
Ministry of Transport (MoT)	Ministry of Transport (MoT)	Regulation 2025 Scenarios summary and key findings	Aug-16	10 years (2025–2035) (p. 2)	35	Medium	Infrastructure	
Ministry of Transport (MoT)	Ministry of Transport (MoT)	Transport Outlook: Future State	Nov-17	25 years (2017–2042) (p. 5)	89	Medium	Infrastructure	
Ministry of Transport (MoT)	Inayatullah, S. & Milojević, I.	Mauri Oia ki Mua: Visions of wellbeing for Aotearoa New Zealand 2050–2070	Jun-21	49 years (2021–2070) (p. 11)	41	Wide	Infrastructure	
New Zealand Treasury	National Infrastructure Unit	Infrastructure Evidence Base	Feb-14	50 years (2067) (p. 2)	43	Medium	Infrastructure	
New Zealand Treasury	Bell, M., et al. (New Zealand Treasury)	Challenges and Choices: Modelling New Zealand's Long-term Fiscal Position	Jan-10	40 years (2010-2050) (p. i)	91	Wide	Economics	
New Zealand Treasury	Binning, A. (New Zealand Treasury)	Shocks and Scenarios Analysis Using a Stochastic Neoclassical Growth Model	Sep-21	40 years (2021–2061) (p. i)	118	Wide	Economics	
Te Puni Kōkiri	Te Puni Kōkiri	Ngā Kaihanga Hou, For Māori Future Makers	Oct-07	23 years (2030) (p. 9)	48	Narrow	Economics	

Table 2: Crown research institute scenarios

Publisher	Author	Scenario title #	Date published	Time Horizon	Length of document	Scope	Primary area of focus	Notes
Manaaki Whenua – Landcare Research	Frame, B., et al. (Manaaki Whenua – Landcare Research & Delaney and Associates Pty Ltd)	4 Future Scenarios for New Zealand	2007	48 years (2055) (p. 17)	112	Wide	Economics	
National Institute of Water and Atmospheric Research	Clemens, T., et al. (CRL Energy Ltd & Industrial Research Limited (IRL))	Transitioning to a Hydrogen Economy: Identification of Preferred Hydrogen Chains	Nov-07	43 years (2007–2050) (p. 5)	62	Medium	Energy	
National Institute of Water and Atmospheric Research	McCormack, C. & Gabriel, G. (MWH)	Modelling Future Water Demand for Wellington using Multiple Climate Change Scenarios	Jun-11	79 years (2011–2090) (p. 11)	28	Medium	Climate Change	

Table 3: Other national scenarios

Publisher	Author	Scenario title #	Date published	Time Horizon	Length of document	Scope	Primary area of focus	Notes
BusinessNZ Energy Council	BusinessNZ Energy Council	New Zealand Energy Scenarios - Navigating our flight path to 2060	n.d.	45 years (2015–2060) (p. 1)	74	Wide	Energy	
Energy Efficiency and Conservation Authority	Energy Efficiency and Conservation Authority	New Zealand Energy Scenarios	May-21	42 years (2018–2060) (p. 17)	92	Wide	Energy	
Parliamentary Commissioner for the Environment (PCE)	Potter, N., et al.	Future Currents: Electricity scenarios for New Zealand 2005–2050	2005	45 years (2005–2050) (p. 11)	96	Medium	Energy	
Sports New Zealand	Sports New Zealand	Scenarios report: The Future of Play, Active Recreation and Sport In New Zealand	Nov-20	20 years (2020–2040) (p. 1)	18	Medium	Education	
The Aotearoa Circle	KPMG	Climate-related risk scenarios for the 2050s: Exploring plausible futures for aquaculture and fisheries in New Zealand	2020	30 years (2050) (p. 12)	63	Medium	Climate Change	
Victoria University	Yeoman, I. (Victoria University)	Tourism2050: Scenarios for New Zealand	Oct-12	36 years (2050) (p. 1)	136	Wide	Economics	

4.0 Local scenarios

Table 4: Local government organisation scenarios

Publisher	Author	Scenario title #	Date published	Time Horizon	Length of document	Scope	Primary area of focus	Notes
Auckland Regional Council	Auckland Regional Council	Auckland Plan Scenario Evaluation Workstream	Sep-11	45 years (2006–2051) (p. 7)	228	Medium	Infrastructure	
Auckland Council	NIWA	Auckland region climate change projections and impacts*	2020	34-, 74-, 89-years (2040, 2090, 2110) (p. 18)	361	Medium	Climate Change	
Bay of Plenty Regional Council	NIWA	Climate change projections and impacts for the Bay of Plenty Region*	Oct-19	34-, 74-, 84-years (2040, 2090, 2100) (p. 11)	177	Medium	Climate Change	
Central Hawkes Bay District Council	Squillions Ltd	Central Hawke's Bay District Demographic and Economic Growth Projections 2020-2051	n.d.	31 years (2020–2051) (p. 1)	46	Medium	Economics	
Central Otago District Council	Bodeker Scientific	The Past, Present and Future Climate of Central Otago*	Aug-17	10 years (2018 - 2028) (p.6)	40	Medium	Climate Change	
Environment Canterbury	NIWA	Climate change projections for the Canterbury Region*	Feb-20	34-, 74-, 84-years (2040, 2090, 2100) (p. 9)	156	Medium	Climate Change	
Environment Southland, Gore District Council, Invercargill City Council, and Southland District Council	NIWA	Southland climate change impact assessment*	Aug-18	34-, 74-years (2040, 2090) (p. 9)	138	Medium	Climate Change	
Gisborne District Council and Hawke's Bay Regional Council	NIWA	Climate change projections and impacts for Tairāwhiti and Hawke's Bay*	Nov-20	34-, 74-, 84-years (2040, 2090, 2100) (p. 14)	247	Medium	Climate Change	
Greater Wellington Regional Council	NIWA	Climate change and variability - Wellington Region*	Jun-17	34-, 74-, 84-years (2040, 2090, 2100) (pp. 13, 47)	192	Medium	Climate Change	
Greater Wellington Regional Council	NIWA	Wellington Region climate change extremes and implications*	Dec-19	34-, 74-years (2040, 2090) (p. 15)	132	Medium	Climate Change	

Horizons Regional Council	NIWA	Climate Change and Variability - Horizons Region*	Sep-16	34-, 74-, 84-years (2040, 2090, 2100) (p. 8)	91	Medium	Climate Change	
Horizons Regional Council	NIWA	Climate change implications for the Manawatū-Whanganui Region*	Jun-19	34-, 74-years (2040, 2090) (p. 12)	109	Medium	Climate Change	
Marlborough District Council	NIWA	Climate change projections and impacts for Marlborough*	Mar-21	34-, 74-, 84-years (2040, 2090, 2100) (p. 9)	159	Medium	Climate Change	
Northland Regional Council	NIWA	Climate Change Projections and Implications for Northland*	Sep-16	34-, 74-, 84-years (2040, 2090, 2100) (p. 13)	105	Medium	Climate Change	
Otago Regional Council	NIWA	Climate change projections for the Otago Region*	Oct-19	34-, 74-, 84-years (2040, 2090, 2100) (p. 8)	136	Medium	Climate Change	
Tasman District Council	NIWA	Climate Change and Variability - Tasman District*	Aug-15	34-, 74-, 84-years (2040, 2090, 2100) (p. 7)	72	Medium	Climate Change	
Tasman District Council	NIWA	Climate change projections for Tasman and impacts on agricultural systems*	Oct-19	34-, 74-years (2040, 2090) (p. 7)	59	Medium	Climate Change	
Waipa District Council	Waipa District Council	Waipa District Growth Strategy	Jun-09	41 years (2009–2050) (p.4)	72	Medium	Economics	
Waitaki District Council	Barker & Associates Ltd. (B&A)	Ōamaru Weston & Kakanui Spatial Plan	May-22	30 years (2022–2052) (p. 8)	69	Narrow	Economics	

Table 5: Other local scenarios

Publisher	Author	Scenario title #	Date published	Time Horizon	Length of document	Scope	Primary area of focus	Notes
Deloitte	Deloitte	COVID-19 scenario analysis - Auckland: Navigating uncertainty through macroeconomic scenario modelling	Jun-20	10 years (2020–2030) (p. 5)	26	Narrow	Economics	
Deloitte	Deloitte	COVID-19 scenario analysis - Waikato: Navigating uncertainty through macroeconomic scenario modelling	Jun-20	10 years (2020–2030) (p. 5)	26	Narrow	Economics	
Deloitte	Deloitte	COVID-19 scenario analysis – Bay of Plenty: Navigating uncertainty through macroeconomic scenario modelling	Jun-20	10 years (2020–2030) (p. 5)	26	Narrow	Economics	
Deloitte	Deloitte	COVID-19 scenario analysis - Wellington: Navigating uncertainty through macroeconomic scenario modelling	Jun-20	10 years (2020–2030) (p. 5)	26	Narrow	Economics	
Deloitte	Deloitte	COVID-19 scenario analysis - Canterbury: Navigating uncertainty through macroeconomic scenario modelling	Jun-20	10 years (2020–2030) (p. 5)	26	Narrow	Economics	
Deloitte	Deloitte	COVID-19 scenario analysis - Otago: Navigating uncertainty through macroeconomic scenario modelling	Jun-20	10 years (2020–2030) (p. 5)	26	Narrow	Economics	
Koi Tū: The centre for informed futures	Gluckman, P., et al. (Koi Tū: The centre for informed futures)	Reimagining Tāmaki Makaurau Auckland: harnessing the region's potential	Mar-22	48 years (2022–2070) (p. 9)	91	Medium	Economics	

Appendix 1: List of publishers' websites searched for national scenarios

- AgResearch
- Crown Law Office
- Department of Conservation
- Department of Corrections
- Department of Internal Affairs
- Department of the Prime Minister and Cabinet
- Education Review Office
- Government Communications Security Bureau
- Institute of Environmental Science Research (ESR)
- Institute of Geological and Nuclear Science (GNS Science)
- Inland Revenue Department (IRD)
- Land Information New Zealand (LINZ)
- Manaaki Whenua Landcare Research
- Ministry for Children
- Ministry for Cultural Heritage
- Ministry for Pacific Peoples
- Ministry for Primary Industries
- Ministry for the Environment
- Ministry for Women
- Ministry for Business, Innovation and Employment
- Ministry of Defence
- Ministry of Education
- Ministry of Foreign Affairs and Trade
- Ministry of Health
- Ministry of Housing and Urban Development
- Ministry of Justice
- Ministry of Social Development
- Ministry of Transport
- National Institute of Water and Atmospheric Research (NIWA)
- NZ Customs
- New Zealand Security Intelligence Service (NZSIS)
- Plant and Food Research
- Public Service Commission
- Scion
- Serious Fraud Office
- Stats NZ
- Te Puni Kōkiri
- Treasury

Appendix 2: List of publishers' websites searched for local scenarios

North Island:

1. Auckland Council
2. Bay of Plenty Regional Council
3. Carterton District Council
4. Central Hawke's Bay District Council
5. Far North District Council
6. Gisborne District Council
7. Greater Wellington Regional Council
8. Hamilton City Council
9. Hastings District Council
10. Hauraki District Council
11. Hawke's Bay Regional Council
12. Horizons Regional Council
13. Horowhenua District Council
14. Hutt City Council
15. Kaipara District Council
16. Kāpiti Coast District Council
17. Kawerau District Council
18. Manawatū District Council
19. Masterton District Council
20. Matamata-Piako District Council
21. Napier City Council
22. New Plymouth District Council
23. Northland Regional Council
24. Ōpōtiki District Council
25. Ōtorohanga District Council
26. Palmerston North City Council
27. Porirua City Council
28. Rangitikei District Council
29. Rotorua Lakes Council
30. Ruapehu District Council
31. South Taranaki District Council
32. South Waikato District Council
33. South Wairarapa District Council
34. Stratford District Council
35. Taranaki Regional Council
36. Tararua District Council
37. Taupō District Council
38. Tauranga City Council
39. Thames-Coromandel District Council
40. Upper Hutt City Council
41. Waikato District Council
42. Waikato Regional Council
43. Waipū District Council
44. Wairoa District Council
45. Waitomo District Council
46. Whanganui District Council
47. Wellington City Council
48. Western Bay of Plenty District Council
49. Whakatāne District Council
50. Whangarei District Council

South Island:

51. Ashburton District Council
52. Buller District Council
53. Central Otago District Council
54. Chatham Islands Council
55. Christchurch City Council
56. Clutha District Council
57. Dunedin City Council
58. Environment Canterbury
59. Environment Southland

60. Gore District Council
61. Grey District Council
62. Hurunui District Council
63. Invercargill City Council
64. Kaikōura District Council
65. Mackenzie District Council
66. Marlborough District Council
67. Nelson City Council
68. Otago Regional Council
69. Queenstown Lakes District Council
70. Selwyn District Council
71. Southland District Council
72. Tasman District Council
73. Timaru District Council
74. Waimakariri District Council
75. Waimate District Council
76. Waitaki District Council
77. West Coast Regional Council
78. Westland District Council

Endnotes

1 See External Reporting Board (XRB). (December 2022). *General Requirements for Climate-related Disclosures*, p. 14. Retrieved 22 May 2023 from www.xrb.govt.nz/standards/climate-related-disclosures/aotearoa-new-zealand-climate-standards/aotearoa-new-zealand-climate-standard-3

2 See Intergovernmental Panel on Climate Change (IPCC). (2014). *Climate Change 2014 Synthesis Report*, p. 57. Retrieved 9 November 2023 from ar5-syr.ipcc.ch/ipcc/ipcc/resources/pdf/IPCC_SynthesisReport.pdf

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