

Natural hazards-related public spending in New Zealand

Tracking costs over time by the nature of spending

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Glossary

| Abbreviation | Stands for | | | |
|--------------|---|--|--|--|
| CDEM | Civil Defence and Emergency Management | | | |
| CERA | Canterbury Earthquake Recovery Authority | | | |
| CIP | Crown Infrastructure Partners | | | |
| | Note: Crown Infrastructure Partners was repurposed as National Infrastructure Funding and Financing Limited (NIFFCo) from 1 December 2024. | | | |
| CRP | Crown Resilience Programme | | | |
| CRRF | COVID-19 Response Recovery Fund | | | |
| EQC | Earthquake Commission | | | |
| | Note: The Earthquake Commission is now known as the Natural Hazards Commission, however due to the time period analysed, we will reference the Earthquake Commission in this report (except when referencing source material where the author name is listed as the Natural Hazards Commission). | | | |
| FOSAL | Future of Severely Affected Land agreement | | | |
| GDP | Gross domestic product | | | |
| GNS Science | The Institute of Geological and Nuclear Sciences Limited | | | |
| HIVE | Hazard, impact, vulnerability, and exposure | | | |
| IAG NZ | Insurance Australia Group New Zealand | | | |
| ICNZ | Insurance Council of New Zealand | | | |
| MBIE | Ministry of Business, Innovation and Employment | | | |
| MCA | Multi-category appropriation | | | |
| MfE | Ministry for the Environment | | | |
| MYA | Multi-year appropriation | | | |
| NEMA | National Emergency Management Agency | | | |
| NGO | Non-governmental organisation | | | |
| NHI Act | Natural Hazards Insurance Act 2023 | | | |
| NIWA | National Institute of Water and Atmospheric Research | | | |
| NIWE | North Island weather events | | | |
| NLTF | National Land Transport Fund | | | |
| NLTP | National Land Transport Programme | | | |
| NRP | National Resilience Plan | | | |
| NZIER | New Zealand Institute of Economic Research | | | |
| NZTA | New Zealand Transport Agency | | | |
| OAG | Office of the Auditor General | | | |
| TRF | Transport Resilience Fund | | | |



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The views expressed in this report are those of the authors only and should not be taken as representing the views of any of the individuals engaged with during the process, nor any of the organisations they are associated with. The methodology and analysis in this report is the work of Sapere and is not endorsed or validated by government agencies.

Our thoughts are with the families and loved ones of the people who have lost their lives during the natural hazard events discussed in this report.



Executive summary

Insurance Australia Group New Zealand (IAG NZ) engaged Sapere to examine central government spending relating to natural hazards, to understand how well this is captured and understood, where spending is focused, and how this may have changed over time. What we identify is a conservative measure of spending and represents a subset of the wider costs of natural hazards (as discussed below). Natural hazards include seismic and volcanic events, landslides, flooding, snow and ice, tsunamis, wildfire, storms, and climate change-related hazards like coastal inundation or drought.

There are significant data limitations, which mean we are undercounting spending

This report provides an indicative estimate of central government spending on natural hazards but is by no means a complete assessment. Data limitations, reporting arrangements, and indirect spending mean some spending will be underestimated, and components could be misattributed or not recognised. While we refined our methodology to minimise inaccuracies, there remain gaps and results should be read within this context.

The intent of this report is to give a sense of the overall quantum of spending, and the relative focus on recovery-related spending relative to risk reduction, readiness, and response. There will be spending that is missed in our analysis and we have deliberately taken a conservative approach where spending items are uncertain. We provide full details of the limitations in Appendix D.

Further, while our methodology for determining relevant appropriations was developed from the approach used by the Office of the Auditor General (2020), a number of aspects have been adjusted and our approach is even more conservative, identifying \$2.3 billion less in appropriated spending during the overlapping analysis period. We attempt to reconcile our figures in Appendix E and discuss likely drivers of these differences.

Central government spending on natural hazards is significant

Having said our measure of spending is conservative, between 2010 and 2025 we have identified at least \$33.1 billion of spending by the Crown and government entities (including those that receive funding from other sources such as levies). We note the following:

- This is primarily made up of \$18.4 billion of spending in appropriations, and a further \$14.1 billion in public insurance spending (which is partly funded by levies and reinsurance).
- Adjusting for inflation, the total amount over these 15 years would be \$41 million of spending (in 2025 dollars) by both Crown and central government entities (including public insurance).

The \$18.4 billion of natural hazard-related appropriations spending represents:

- 1.06 per cent of overall actual and planned government spending (ranging from 0.05 per cent in 2010 prior to the Canterbury earthquakes, to 1.79 per cent in 2011, and 2.02 per cent in 2024 following the North Island weather events (NIWE).
- around 0.33 per cent of GDP per year on average, with significant increases in years with significant events. For instance, in 2011, spending on natural hazards was similar to each of



the Corrections, Housing and Police portfolios. Similarly in 2023, spending on natural hazards was more than each of the Environment, Foreign Affairs and Internal Affairs portfolios. This compares to the lowest year of natural hazard-related spending in 2010, which was around the level of spending on Vote Security Intelligence.

Despite overall public insurance spend of \$14.2 billion over the period 2010 to 2023 being less than appropriated spend, it represents about 0.36 per cent of GDP per year on average. However, in 2012 following the Canterbury earthquakes, public insurance spending accounted for 1.27 per cent of GDP.

Table 1 provides the total spend we have captured on natural hazards since 2010 across government entities, the key amounts of which we have highlighted above. Here, central government spend includes those reported through:

- relevant appropriations (column two)
- government entity payments through the Earthquake Commission (EQC) and Southern Response (net of reinsurance flows), referred to as public insurance spending by government entities (column three), noting that without netting off reinsurance, claims costs were \$16.6 billion.
- external funding for transport resilience activities under the National Land Transport Programme (NLTP)
- relevant shovel-ready projects
- science challenges with a focus on natural hazards (collectively these last three bullets are captured under "other central government" in column four)

The final columns provide the totals summing these amounts with the last column adjusting spending for inflation and presenting it in 2025 dollars.



Table 1: Summary of natural hazards expenditure by central government by source, nominal and inflation adjusted (\$ millions, 2010 to 2025)

| | Nominal | | | Inflation adjusted | |
|-------|----------------|------------------|--------------------------|--------------------|--------|
| Year | Appropriations | Public insurance | Other central government | Total | Total |
| 2010 | 36 | 75 | 0 | 112 | 162 |
| 2011 | 1,437 | 1,278 | 0 | 2,715 | 3,769 |
| 2012 | 958 | 2,752 | 0 | 3,710 | 5,052 |
| 2013 | 970 | 940 | 0 | 1,910 | 2,576 |
| 2014 | 620 | 1,140 | 6 | 1,766 | 2,345 |
| 2015 | 983 | 1,769 | 6 | 2,758 | 3,637 |
| 2016 | 1,015 | 981 | 6 | 2,002 | 2,637 |
| 2017 | 968 | 1,276 | 6 | 2,250 | 2,925 |
| 2018 | 1,001 | 1,162 | 6 | 2,169 | 2,774 |
| 2019 | 900 | 713 | 6 | 1,619 | 2,033 |
| 2020 | 750 | 476 | 8 | 1,233 | 1,520 |
| 2021 | 625 | 342 | 75 | 1,042 | 1,266 |
| 2022 | 668 | 635 | 108 | 1,411 | 1,618 |
| 2023 | 1,783 | 638 | 122 | 2,543 | 2,721 |
| 2024 | 3,517 | | 143 | 3,660 | 3,741 |
| 2025 | 2,210 | | 59 | 2,269 | 2,269 |
| Total | 18,441 | 14,176 | 551 | 33,168 | 41,047 |

Source: Sapere analysis.

Note: Central government appropriations for 2024 and 2025 are appropriation allowances. December 2024 CPI is used as the base 2025 year for calculating inflation-adjusted figures for Crown-funded and central government spend.



Figure 1: Central government spending over time by source (2010 to 2025)



This spending by the Crown and government entities sits in the context of \$31.1 billion of private insurance claims for natural hazard events over the same period (0.96 per cent of GDP on average per year), or \$39.6 billion in 2025 dollars (adjusting for inflation). Collectively, spending on public and private insurance, as well as other government spending is around 1.7 per cent of GDP on average per year between 2010 and 2023. This figure is more than halved to 0.8 per cent of GDP when 2011 and 2023—notable years with significant events—are excluded.

Central government spending on natural hazards is increasing, and dominated by recovery spending, particularly following significant events

Baseline central government spending on natural hazards has been increasing over time. The main cause of this increase in spend is significant events, with the majority of money being spent on recovery. Those significant events are the Canterbury and Kaikōura earthquakes, and the NIWE and associated recovery (as well as public insurance claims costs, which are more easily identified in reporting).

Appropriated spending on risk-reduction activities was smaller but is increasing. On average, only 10 per cent of appropriated spend is associated with risk-reduction activities, though this has grown since 2015. Spending on risk-reduction activities is a greater portion of baseline expenditure on natural hazards, i.e., when excluding significant events and public insurance claims, the proportion of risk-reduction spend relative to total "baseline" appropriated spend is 47 per cent. In contrast, when costs associated with public insurance claims are considered, the proportion of risk-reduction expenditure relative to overall expenditure is falls from 10 percent to around 3 per cent.

Figure 2 shows the classification of spending across the emergency management 4Rs framework: risk reduction, readiness, response and recovery. If public insurance claims costs are included, the amounts spent on recovery following the Canterbury and Kaikōura earthquakes are larger with greater totals in these years. Including public insurance spending, 58 per cent of natural hazard spend is associated with recovery activities, while only 11 per cent associated with risk reduction, and 29 per cent with readiness and response. Ideally, we might delineate spending relating to:

- understanding natural hazards risks and resilience (science/research, data, modelling, and other information)
- risk reduction/mitigation/adaptation/resilience
- readiness
- response
- recovery.

Failing this, separating out each element of the 4Rs framework or distinguishing pre- and post-event spending, at least, would be helpful. However, the level of reporting does not support confidently attributing spending beyond the categories we have used. For instance, items reporting often includes a mix of response and readiness items, and we do not have visibility of the mix within such allocations.

In practice, we expect that our analysis misses significant spending relating to science funding – we have captured aspects that are identifiable and attributable to spending on natural hazards, but there



will be other areas of funding where components relate to natural hazards but where we do not have visibility over allocations, so have not been able to incorporate these in our totals.¹



Figure 2: Central government appropriated spend on natural hazards by the 4Rs, excluding net claims costs from EQC and Southern Response

Note: Data for 2024 and 2025 is appropriation allowances, shaded in light blue. Prior data is actuals. Source: Sapere analysis based on appropriations data from the Treasury, retrieved from <u>treasury.govt.nz</u>.

¹ For instance, while we have captured the National Science Challenge Resilience to Nature Challenge, funding from other streams will also be relevant. These could potentially include 'The Deep South', and 'Better Homes, Towns, and Cities' National Science Challenges, funding for the Institute of Geological and Nuclear Sciences Limited (GNS) and for natural hazards science, the Extreme Weather Fund (after Cyclone Gabrielle), a portion of MBIE's Endeavour programmes funding for the National Geohazards Monitoring Centre of Geonet, funding for the National Seismic Hazard Model, as well as EQC's research/resilience funding. These could add in the order of tens of millions per annum (or potentially even more).



Figure 3: Central government appropriated spend on natural hazards by the 4Rs, including net claims costs from EQC and Southern Response



Note: EQC and Southern Response financial reports for the years 2024 and 2025 were not complete at the time of writing this report, and thus are not included in this graph.

Source: Sapere analysis based on appropriations data from Treasury and annual reports from Southern Response and the Earthquake Commission, retrieved from <u>Treasury</u>, <u>Southern Response</u> and the <u>Earthquake Commission</u>.

Spending on specific events spikes with the event(s). Spending is predominantly operating spending, with some trailing capital spend following events. There can be a long tail of spending relating to large events as can be seen with the Canterbury earthquakes. However, excluding spending related to significant events, baseline expenditure on natural hazards has been growing.

Spending is mostly concentrated in a small number of agencies, with actual spending typically greater than estimates in appropriations

Between 2010 and 2025, expenses incurred by the Ministry of Transport accounted for 23 per cent of total identified appropriation expenditure. The Department of the Prime Minister and Cabinet incurred 18 per cent of total expenditure, while the Treasury accounted for 17 per cent of total identified expenditure.

If EQC and Southern Response claims costs are also included, these would account for 52 per cent of overall government expenditure between 2010 and 2023 (reaching as high as 74 per cent in 2012).

Actual appropriated spending is typically greater than estimates. Between 2013 and 2023 (the years over which this data is available), actual spending typically exceeds what was budgeted for the year, though there are three exceptions: 2018, 2019 and 2022. This is further exacerbated in years with significant events, such as 2017 (Kaikōura earthquakes) and 2023 (NIWE).

Smaller amounts can be identified across aspects of transport, shovel-ready projects, and science challenges

We separately identified that between 2010 and 2025:



- \$225 million was spent in relation to shovel-ready projects (between 2021 and 2024)
- \$311 million is identifiable in relation to transport spending (noting that this is conservative, with some NLTP activities still unassigned)
- \$75 million was spent on natural hazards in relation to science challenges (\$6 million per annum rising to \$10 million in 2025), noting other areas are also likely to be relevant but are not captured in our totals.

A greater portion of this spending relates to risk reduction and resilience than the broader appropriation and public insurance figures discussed above.

We provide insight to a subset of the overall costs of natural disasters

We focus on direct central government spending in relation to natural hazards, with amounts that we conservatively identified influenced by appropriation naming and description practices.

Natural hazards have significant impacts beyond direct and identifiable central government spending. For instance, the wider cost of recovering from natural hazards has been estimated to be 4.3 per cent of GDP per year (IAG NZ, 2023 as referenced by Department of Internal Affairs, 2024). The wider costs associated with natural disasters that fall beyond the focus of this report would also include:

- other central government spending not identifiable under our deliberatively conservative approach, such as reprioritised central government spending within existing broader appropriations, or unspecified policy advice that could relate to aspects such as earthquake prone buildings or other hazard-related policy areas (nor would we identify less direct government spending relating to natural disasters such as health, social welfare, policing, defence and the associated wellbeing aspects to individuals and communities considered as intangible costs)
- local government spending beyond the case studies we identify
- private spending by insurers, iwi/Māori, non-governmental organisations (NGOs), private entities, individuals and households
- broader economic costs such as lost revenue, lost output and associated tax income, lost productivity, structural shifts in businesses and workers (and flow on impacts), and wider social costs from the likes of fatalities, injuries, distress, crime, and environmental impacts
- financing costs when additional debt is taken on to support response and recovery from significant events (which is not separately identified in this report).

Some of these wider costs are briefly noted in section 5, but are beyond the more constrained focus of this report. However, we note analysis in Australia suggested that direct costs may underestimate the economic costs of natural disasters by at least 50 per cent (Deloitte Access Economics, 2016).



Other parties also face significant costs

Local government

Local government spending in relation to natural hazards is not easily collated and we have not sought to estimate total local government spending related to natural hazards. However, illustrative case studies looking at local council spending after significant events find that:

- between 2011 and 2048, it is estimated Christchurch City Council will spend up to \$8.2 billion on earthquake response and recovery.
- identified spending indicates \$848 million has/will be spent by Auckland Council in relation to response and recovery from the NIWE. Auckland Council is expected to face \$4 billion in whole-of-lifetime costs from the NIWE, and will need to fund \$2.924 billion itself.
- the Gisborne District Council has incurred at least \$137.8 million in NIWE response and recovery costs, with a total cost estimate of approximately \$1.2 billion over several years.
- between 2022 and March 2025, the Hawke's Bay Regional Council could have incurred \$67 million in response and recovery costs from the NIWE.

We note that nationally, total local government spending on natural hazards will be much wider than this.

Private insurance

The Insurance Council of New Zealand (ICNZ) data on natural disasters shows that since 1968, a total of \$32.2 billion has been paid in claims for damage that arose from natural hazards, or \$42.2 billion in 2025 dollars after adjusting for inflation. This includes:

- \$22.8 billion resulting from the Canterbury earthquakes
- \$2.3 billion after the Kaikoura earthquakes
- \$3.7 billion after the North Island weather events.

During the period 2010 to 2023, private insurance claims represent around 0.96 per cent of GDP on average per year. However, claims relating to the Canterbury earthquakes are significant, and private insurance claims only represent 0.19 per cent of GDP per year on average when claims from 2011 are excluded. We note that ICNZ data reports claims relevant to the year an event occurred, not when the claim was paid, and is therefore not directly comparable to public insurance costs and appropriated spending discussed above.

Other parties

Others also incur spending and are impacted by natural hazards. This includes iwi/Māori, NGOs, and private entities and individuals. Further, in addition to the insurance claims noted above, private entities, individuals and households also:

- contributed to support initiatives such as targeted support and contributions to the likes of mayoral relief funds and other NGO support
- faced the costs of excesses on insurance policies, uninsured costs and other direct and indirect costs associated with natural hazards



• incur costs related to preparing for natural disasters such as through purchasing emergency supplies.

Our analysis points to potential areas for improvement and further investigation

Our analysis highlights that:

- given the large and growing amounts involved, reporting and monitoring of natural hazardrelated expenditure should be significantly improved across government.
- better and more clearly categorised information would enable greater understanding of the relative value of, and trade-offs between, different spending in relation to natural hazards. Such information would also improve understanding of where investing in improving resilience prior to an event might be able to reduce the likelihood or cost of response.
- spending is simply one government lever, and raising awareness and other initiatives are also hugely important.



1. Introduction

We have been engaged by Insurance Australia Group New Zealand (IAG NZ) to examine public spending in relation to natural hazards, to understand how this is changing over time and where it is focused. For this analysis, natural hazards include seismic and volcanic events, landslides, flooding, snow and ice, tsunamis, wildfires, storms, and climate change-related hazards such as coastal inundation or drought.

1.1 Scope

Our scope is to derive annual direct expenditure in relation to natural hazards, from 2010. The core focus is on central government, with a more limited analysis of local government expenditure and private insurance to provide broader context.

Central government

We report on appropriation data for central government spending, which effectively covers all operational and capital expenditure. Where relevant, additional sources of data have been examined to complement appropriation data. For instance, we separately highlight information available from financial statements of the Earthquake Commission and Southern Response.

Our approach is conservative in terms of the natural hazard-related expenditure it identifies. It does not attempt to estimate wider economic or social impacts (discussed further in section 2) or the likes of financing cost or lost tax revenue, but sticks to areas where there is a high degree of confidence in the identified levels of expenditure (both operating and capital expenditure). As discussed below, we also look to distinguish spending across the 4Rs framework, which describes civil defence emergency management activity in four areas of activity: risk reduction, readiness, response and recovery (NEMA, 2020).²

Local government

For local government, we separately:

- note expenditure that is identified alongside central government spending such as transport resilience expenditure
- undertake a selection of case studies looking at publicly available information reported on expenditure, or estimates of expenditure, in relation to significant natural hazard events.

Insurance

Distinct from the Earthquake Commission (EQC) and Southern Response, we report private insurance claims drawing on information reported by the Insurance Council of New Zealand (ICNZ).

² As noted by others, other characterisations of disaster stages/cycles have also been used such as: prevention, mitigation, response and recovery (Christo Coetzee & Dewald Van Niekerk, 2024; Hopkins, 2023).



1.2 Interpretation and limitations

Our findings and analysis should be read with an understanding of the approach taken, and the limitations of this approach and the data available to us (set out more fully in Appendix D). In particular:

- the information we are interested in is not clearly set out, so identification is imperfect
- our estimates of central government spend are likely to be underestimated and this report should not be used as a complete assessment of total expenditure on natural hazards
- attribution to risk reduction, readiness, response, or recovery activities is imperfect and not always possible to estimate
- our approach relies on the terminology, budgeting and reporting by central government
- we have attempted to identify and correct any 'false positives,' but this is a risk
- there will be relevant spending that is indirect or where key search terms are not used, which is not captured in our results (e.g. maintenance or elements of wider projects/programmes).

1.3 Outline for the remainder of this report

The remainder of this report covers the:

- increasing frequency and impacts of natural hazards (section 2)
- central government finances and our approach to measuring spending (section 3)
- trends and breakdown of relevant central government spending (section 4)
- high-level cases to illustrate there is also relevant spending by local government, insurers and others (section 5).

These sections are followed by references and appendices providing further detail on central government funding/spending (Appendix A), key search terms used in our analysis (Appendix B), a summary of the sources of information used (Appendix C), information on interpretation, limitations and discrepancies with earlier analysis (Appendix D), and a reconciliation with the Officer of the Auditor General (2020) report (Appendix E).



2. Increasing frequency and impacts of natural hazards

Natural hazards, or at least weather-related natural hazards, have been increasing in frequency. They are expected to continue to do so, and their costs are also expected to increase.

2.1 Weather-related natural hazards have been more frequent

Insurance Council of New Zealand (ICNZ) (2023) state that New Zealand has experienced more than 150 severe weather events and natural disasters since it began keeping records in 1968. Figure 4 shows that the number of natural hazard events appear to have increased over this period.

Contributing to this, the impacts of climate change are already being seen. Consistent with the changes highlighted by the likes of Hausfather (2023), the Ministry for the Environment (MfE) (2023) highlights increases in average temperatures between 1909 and 2022, longer agriculture and horticulture growing seasons and declining frost days in most places, changes in annual rainfall and extreme-high rainfall, increasing frequency of medium-term (agricultural) drought in many places, and more frequent and intense extreme weather events.³



Figure 4: Number of natural hazard-related events for which ICNZ has insurance claims-related information

Source: Sapere analysis, using data from ICNZ (2023).

³ Further, Thomas et al. (2023) finds that the frequency of extreme high temperature events has doubled due to human influence.



While not sufficient to be a clear trend, National Emergency Management Agency (NEMA) (2023) reports increases in red weather events since 2019, and in states of emergency since 2006 (the latter shown in Figure 5). Providing greater detail of the more recent events in Figure 5, a natural hazards timeline produced by the Climate Change Commission (2024) highlights that since 2018, there have been:

- nine severe rain and flooding events
- one major hailstorm
- five cyclones
- two severe drought and wildfire events, and
- one marine heatwave.

However, we also acknowledge that:

- some of the increase in frequency may be due to random variation and the interaction of underlying physical phenomena
- there may also be some improved reporting of events.

Figure 5: States of emergency frequency by type, 2006-2023



Source: National Emergency Management Agency (2023).

2.2 Impacts of natural hazards have been felt across New Zealand

Natural hazards have been seen across the country, as shown in the Natural Hazards Commission's claims map shown in Figure 6. Looking at claims maps in EQC's annual reports shows variance over time.





Figure 6: Natural Hazards Commission Claims Map, 23 September 2024

Source: Natural Hazards Commission, retrieved from naturalhazardsportal.govt.nz, accessed 1 October 2024.

2.3 The costs of natural hazards have been significant

The cost of responding to and recovering from significant natural events are significant. Recently, MfE (2023) notes that Treasury estimates the cost of repairing damage caused by Cyclone Gabrielle and the Auckland floods in 2023 to be between \$9 billion to \$14.5 billion, and that the events caused 15 deaths (Radio New Zealand, 2023a, 2023b). Section 5.3 also reports the spike in insurance costs due to the increase in claims associated with weather-related events in New Zealand in 2023 and 2024 (shown in Figure 4). This shows that the recent flooding events have been hugely costly, as have the significant earthquakes.

We note that Lloyd's ranked New Zealand second out of the 43 countries it looked at in terms of expected losses from natural disasters, with an annual expected loss of 0.7 per cent of GDP (calculated by multiplying the probability of natural disaster by the cost associated with natural disasters). It notes insurance penetration increased following the Christchurch earthquakes of 2011, which caused damage equivalent to 14 per cent of GDP, but decreased between 2012 and 2018 despite further seismic events and several significant floods (Lloyd's, 2018). 185 people died in the Canterbury earthquakes, which has been estimated to have wider costs of over \$40 billion (Insurance Council of New Zealand, 2022; Royal Commission of Inquiry into Building Failure Caused by the Canterbury Earthquakes, 2012). A number of studies have looked at the wider impacts of these earthquakes (Abdeljawad & Noy, 2024; Parker, 2012; Potter et al., 2015).



2.4 Natural hazard risks are expected to be more frequent, impacting the economy and public finances

Here we turn to future projections in terms of frequency, cost, and flow-on impacts, and how these may be felt.

2.4.1 Expected increasing frequency of natural hazards

Climate change is anticipated to result in more extreme and high-impact weather and related natural hazard events. These include greater frequency of extreme weather events such as storms, heatwaves and heavy rainfall, more frequent and more severe droughts and a greater risk of wildfires, sea level rise and coastal erosion, as well as risks posed by more frequent and intense extreme weather events like flooding, storm surges, forest fires and ex tropical cyclones (Ministry for the Environment, 2022; NIWA, n.d.).

2.4.2 Increasing projected impacts and vulnerability

NEMA (2023) report risks from eruptions, earthquakes, tsunami, flooding and cyclones, collectively finding a 97 per cent likelihood of a scenario with over \$10 billion of damage over the next 50 years. In addition to the likelihood of a natural disaster and potential inflation in costs, the level of development (and where this occurs) will also be a significant contributor to the potential costs of natural disasters.

(2024b, 2024a) notes that:

"The costs of future individual natural disasters, individual events resulting in climate change, and other major events (e.g. biosecurity incursions, pandemics, financial market crisis and geopolitical events) could significantly impact on the fiscal results in the future. In general, these events would most likely impact on the economy and therefore flow through to the forecast for tax revenue and the Government may decide to introduce financial measures to support to [sic] New Zealanders through such events.

New Zealand will continue to experience natural disasters and, with some of these, the frequency and/or severity is likely to increase with climate change – for example, increased coastal flooding because of sea-level rise and extreme weather events."

A report by the Treasury and the Ministry for the Environment (2023) highlights a range of effects that physical climate change has on the economy. Beyond the direct spend attributed to natural hazards, there are wider negative economic effects that arise from climate hazards affecting labour, land, trade, consumption, investment, and overall supply chains. Scenario modelling shows that the increasing prevalence of natural hazards such as drought and flooding are expected to increase net core Crown debt by 3.77 per cent of GDP in 2061 (New Zealand Treasury, 2024b; New Zealand Treasury & Ministry for the Environment, 2023). New Zealand's economy is also more vulnerable to physical risks compared to other developed countries due to the large contribution of the primary sector. A New Zealand Institute of Economic Research (NZIER) (2020) report projects that the Crown's



annual contingent liability⁴ for all natural hazards will grow from \$0.7 billion in 2020, to between \$2.9 billion to \$3.7 billion in 2050.

Events in recent history have also caused significant disruption to New Zealand's economy. Recent reports indicate that the expected losses for natural hazards have averaged 0.6 per cent of GDP between 1960 and 2022 (second highest in the OECD), and that the cost recovering from natural hazards is 4.3 per cent of GDP per year, with the costs of natural hazards rising (IAG NZ, 2023 as referenced by Department of Internal Affairs, 2024; New Zealand Infrastructure Commission, 2025).

More frequent natural hazard events could create unaffordable insurance and significant Crown liability

The Treasury (2023) outlines that New Zealand enjoys a high market penetration for insurance, with up to 98 per cent of private homes insured. However, the increasing frequency of natural hazards could see increasing insurance premiums and the flow-on implications of premiums on the value of assets due to the shift towards risk-based pricing. This would result in insurance becoming unaffordable for those most at risk of natural hazards such as floods or sea level rise. Any reduction in insurance penetration may result in increases in potential Crown liabilities.

In addition to potential pressure from any reductions in private insurance, pressure on public natural disaster insurance have also been identified. The Treasury (2024c) identifies that over 15 years, if levy and other settings are maintained at current levels, there is only a 13 per cent probability of having funds by 2037 for the provision of public natural hazard insurance (through the Natural Hazard Fund) ⁵ under the Natural Hazards Insurance Act (NHI Act) has only, as illustrated below.

⁴ As per the Treasury, (2024e) contingent liabilities are costs that the Crown will have to face if a particular (uncertain and not probable) event occurs. These typically consist of guarantees and indemnities, legal disputes and claims, and uncalled capital.

⁵ Previously the Natural Disaster Fund.







The nature of physical risks means some regions and groups may be more impacted than others

Regions that are dependent on primary sector production are likely to face more severe effects from physical climate change and severe weather events, while those that are dependent on tourism may face long term impacts with reduced availability of tourist attractions.

MfE highlights that these effects will vary depending on geography and that the impact and resilience (and ability to adapt) will differ greatly, with most harm falling on those most vulnerable (Ministry for the Environment, 2022, p. 32, 2023).

- Sites which are of significance to Māori in Taranaki, Auckland, the Coromandel, northern Hawke's Bay, Tasman, and parts of Canterbury and Otago are at risk of coastal erosion.
- The Māori economy is particularly vulnerable as 50 per cent of Aotearoa's fishing quota, 40 per cent of forestry, 30 per cent of lamb production, 30 per cent of sheep and beef production, 10 per cent of dairy production and 10 per cent of kiwifruit production is in Māori ownership.
- Around 750,000 people and 500,000 buildings, worth more than \$145 billion, are near rivers and in coastal areas already exposed to damaging flooding.

Further, ability to respond is expected to vary:

• Older people may be more reluctant to evacuate homes (due to income, accessibility and/or mobility issues) and may suffer loss of cultural and social networks.

Source: (New Zealand Treasury, 2024c)



- Language and integration barriers may add to vulnerabilities for ethnic minorities in disaster response.
- Low-income groups have less choice in the event of needing to relocate, and mobilitycompromised and disabled people may have specific needs that could limit their options or pose additional costs.
- There is variable effectiveness of weather-related messaging for different communities based on comprehension, interpretation, and trust in the channel of delivery, noting that trust in government can be affected in times of uncertainty or fear.

Effects are also expected to vary:

- Young people and children are more prone to psychological impacts from extreme events.
- Domestic and sexual violence can increase in times of disaster, impacting women disproportionately.
- Mental health of farming and rural communities can be affected by disruptions to livelihoods.
- Those with poorer health outcomes may physically suffer more from increased heat and disease (such as Māori, Pacific peoples, children, and older people).⁶

⁶ Further, NIWA note that "hotter temperatures and heatwaves may bring health issues for vulnerable groups, particularly elderly and babies, as well as outdoor workers" (NIWA, n.d.).



3. Central government finances and our approach to measuring spending

In this section we provide context in relation to central government finances and outline our approach to measuring relevant central government expenditure in relation to natural hazards.

3.1 Central government finances

Central government finances are reported across different documents, each with a distinct focus. We set out here important distinctions in what key documents report, and how this relates to our analysis in subsequent sections.

Key distinctions we highlight here relate to the:

- nature of spending figures that are reported, which includes actual spending, the authority to spend, funds built up, and spending to date
- level of commitment, which includes spent, funded, and unfunded
- types of appropriations and funding, which includes whether expenses fall under capital or operating expenditure, the spending agency, the revenue source, and the flexibility for what, and timing for when, funds can be spent (New Zealand Parliament, n.d.; New Zealand Treasury, 2013).

We discuss relevant types of appropriation in the following sections. We detail the level of commitment and types of appropriations and funding in Appendix A.

3.1.1 The nature of spending figures

Public spending is 'voted' in Parliament at the time of the annual budget. Each year, the Minister of Finance must go to Parliament for approval of the budget and, sitting behind the budget, the estimates of departmental (and non-departmental) expenditure. If approved, the funds are 'appropriated,' and spending can occur against these estimates. The estimates can be varied through the year via supplementary estimates. Actual expenditure can vary from the estimates, and there can also be money held in departmental balance sheets or in 'funds' (used here to refer to ring-fenced assets/investments that are allocated and built up in order to manage future pressures) which have been built up from past years' appropriations. The financial year for central government ends 30 June.

The key documents setting out government spending are as follows:

• Estimates of appropriations (issued at budget time in May), outlining operating expenses and capital expenditure that may be incurred, and for what, in the following year and three years after that.⁷

⁷ The estimates of appropriations are included in an Appropriations Bill that is submitted to Parliament.



- Supplementary estimates of appropriations (issued near the end of the year), which outline the changes to operating and capital expenditure appropriations (or allowed expenditure) since the estimates for the financial year about to end, and the reasons for any variance.
- Government's year-end financial statements (issued after the end of financial year and audit of results, typically around September), which set out the Crown's actual spending with individual agency statements covering the appropriations for which they are responsible, and the year-end balance sheet movements showing accumulation of assets.

Figure 8 illustrates the distinctions in what each of these documents report and when.



Figure 8: Budget/financial documents by release date

Drawing on these documents, we distinguish between reporting on figures that represent:

- the authority to spend as set out in the government's estimates and supplementary estimates of appropriations (appropriation allowances)
- actual spending as set out in audited financial statements of the government and agency annual reports after the year is completed, and
- funds built up as reported by relevant agencies in their annual reports.⁸

The appropriations set out in the estimates and supplementary estimates provide a useful basis for understanding annual expenditure. However, where funding is appropriated and expensed may be different to when spending or investment occurs. Indeed, given the uncertain nature of natural hazards, like other areas where central government may face a significant future liability or pressure, it also uses 'funds' (as referenced earlier).

Of particular importance for this project is the Natural Hazard Fund which is managed by the Natural Hazards Commission (previously Earthquake Commission), and provides the financial resources to cover claims for damage following natural hazard events (Natural Hazards Commission, n.d.-a). However, we also separately report on the size of the fund and the payment of insurance claims as this annual expenditure can be considered in the context of the Natural Hazard Fund, and provides

⁸ Spending to date for the year in progress is separately set out in government financial statements (consolidated across government monthly) and agency reporting during the year.



the financial resources to cover claims for damage following natural hazard events (Natural Hazards Commission, n.d.-a).

Where significant areas of spending are funded through separate charges or levies, we look to separately identify this. There is other spending through local government, paid for by ratepayers, that we acknowledge but are only able to include where we can identify it (in which case it is separately identified and reported on as distinct from central government spending).⁹

3.2 Approach using appropriations data is informed by the Office of the Auditor General report

The Office of the Auditor General (OAG) analysed government expenditure related to natural hazards through the use of publicly available appropriations (2020). The report used keywords to filter appropriations data to determine where government spending was relevant to natural hazards. We have built on this approach with minor but important enhancements, and complement the approach by:

- investigating areas that would not be identified by solely relying on appropriation-level information
- considering movements in funds that appropriations may contribute to, so that the annual appropriations can be considered within the context of the size of funds (that is, whether growing or being drawn down, once calls against the funds are factored in).

We looked at data from 2010 to 2025

We analysed information for the period from 2010 to 2025. However, for the purpose of comparing estimated (or budgeted) spend with actual spend, we limit our analysis to 2013 due to limitations in the dataset. ¹⁰ We used actual spend for years 2010 to 2023, supplementary estimated spend for 2024, and estimated spend for 2025. To support interpretation of the estimated figures for 2024 and 2025, we also compared estimated and actual spend in prior years to infer how much central government may actually spend based on its authorised appropriations for 2024 and 2025.

We searched appropriation information for keywords relating to natural hazards

We applied keywords to appropriations data to determine where government spending is related to natural hazards. Our keyword search began with the development of six keyword categories:

- Events: types of natural hazards, e.g. earthquake, cyclone, tsunami.
- Event names: specific names of events, e.g. Gabrielle, NIWE.
- Impacts: the consequent outcomes of a natural hazard, e.g. erosion, landslide, sediment.
- Action: the action undertaken in preparation or in response to a natural hazard, e.g. restore, maintain, monitor, clean-up.

⁹ This is the case for the NLTP and shovel-ready projects.

¹⁰ Specifically, data prior to 2013 does not contain the *Current Scope* field, which is a key field in determining what the appropriated spend is for. 2013 appropriations contain actual spend for the past three years.



- **Region**: the area where the event may have taken place, e.g. Christchurch, Kaikōura, Hawke's Bay, etc.
- Sector: the sector affected by or involved with natural hazards, e.g. infrastructure, Civil Defence, etc.

There are five relevant fields within the appropriations data that we searched to determine natural hazard-related spending:

- **Appropriation name**: the name of the appropriation as reported in the vote chapter of the main estimates.
- **Category name**: the name of the multi-category appropriation (MCA) category name as reported in the estimates.
- Vote: the name of the vote where the appropriation is reported in the current main estimates.
- **Portfolio name**: the ministerial portfolio responsible for specified appropriations within the vote as reported in the current estimates.
- **Current scope**: the scope of the appropriation, category or output class as reported in the current estimates of appropriations.

We used exact keyword matching to reduce the likelihood of picking up a false positive (for example, appropriations concerning "training" picked up by the keyword "rain"), in contrast to the OAG report which used what it refers to as a 'fuzzy' search technique where searches are not limited to the exact search term. To do this, we developed an extensive list of keywords capturing different forms of words, such as the plural form of words. An implication of our search approach is that we estimate \$2.3 billion less in central government spending on natural hazards relative to the OAG report for the periods that overlap (a reconciliation is detailed in Appendix E). The list of keywords used in this analysis are included in Appendix B.

We then checked for missing information and examined key areas that would otherwise be excluded

We manually checked the appropriations to identify what would not be picked up by our keywords, but would be spending relating to a natural hazard. We determined the most material omissions were the National Land Transport Programme and the shovel-ready projects coordinated by Crown Infrastructure Partners (CIP). We then also updated NIWE-related spending to reflect the most up-to-date information based on quarterly financial reports (New Zealand Treasury, 2023a). These areas reflect enhancements to the OAG model, with more detailed descriptions provided in section 3.3.

3.2.1 Our approach to identifying relevant appropriations

We categorised appropriations data into different levels of confidence based on the information we collected from the keyword search. The confidence intervals were used to filter out appropriations that are irrelevant to natural hazards. We were most confident when an event was named, but less confident when there was no name but the event may have been related to hazard activities and functions. We refined the data by manually adjusting appropriations to reflect the most relevant spending, having assigned initial confidence criterion. For example, we looked at specific instances where our keyword approach might have picked up an irrelevant appropriation line due to an



"emergency," and then verified it to ensure that it was relevant to natural hazards (or else omitted the spending). Table 2 sets out the criteria we used. This is broadly similar to the OAG report, which reported high and medium confidence appropriations only, as we have used it to be confident that those appropriations that are included, should be.

| Criteria | Conditions | Explanation |
|----------|--|---|
| High | If there was an event name keyword detected If there was an event keyword detected | There was a specific mention of a natural hazard or disaster event from the Civil Defence list of emergencies. |
| Medium | If the event keyword was "emergency," but there were more relevant event keywords If there was an action AND an impact keyword | Occurred when the appropriation contained keywords associated with natural hazards or disaster, including action and event keywords, or actions and impact. |
| Low | If there was an action keyword detected only Other more specific conditions, for example: if the vote was Energy, Health AND the event keyword was "emergency" if the vote was Social Development AND the event keyword was "emergency" AND the appropriation name was NOT "Community Support Services" | The appropriation might be related to reduction, readiness, response, or recovery, but we were unable to determine whether it was about natural hazards. We analysed "emergency" appropriations where the votes were Energy, Health and Social Development and determined that these were likely not associated with natural hazards, except where the appropriation was for "community support services." |

Table 2: Confidence criteria and relevant conditions

Amendments to appropriations analysis

We made the following adjustments to what was identified from our keyword searches:

- EQC and Southern Response equity injections were excluded from appropriations, and reported separately for full transparency on the amount received as capital injections, and the amount paid out in claims.
- NIWE appropriations were reconciled with quarterly updates from the Treasury, as this is a significant recent event and this approach allows the most timely information to be drawn on.

3.2.2 Spending was categorised against the 4Rs framework

We assigned appropriations to one, or if necessary, more than one aspect of the 4Rs framework based on the action keywords detected in the appropriation lines. The categorisation of these keywords is outlined in Appendix B.

The 4Rs framework describes Civil Defence emergency management activity in four areas of activity: risk reduction, readiness, response and recovery (NEMA, 2020). Readiness and response account for



two of the Rs in the framework but are reported as one classification of activity, in line with the Civil Defence classifications:

- **Risk reduction**: to identify and analyse long-term risks to human life and property; taking steps to eliminate these risks or reducing the magnitude of their impact or likelihood of occurring.
- **Readiness and response**: to develop operational systems and capabilities before a civil defence emergency occurs. This includes self-help and response programmes for the public, and specific programmes for emergency services. This category generally applies to actions taken immediately before, during or directly after a civil defence emergency to mitigate harm to life and damage to property.
- **Recovery**: coordinated efforts and processes to generate medium- and long-term holistic regeneration of a community following a civil defence emergency.

This differs from the OAG report which categorises appropriations into the following:

- Response and recovery
- Risk reduction
- Other civil defence.

The OAG report acknowledges the 4Rs framework discussed here and notes that any future work of theirs might align more closely with this framework.

3.2.3 Other categorisations of expenditure

In addition to categorising expenditure against the 4Rs framework, we also separately identified and report below the:

- total, event-related, and underlying spending (once event-related is excluded)
- spending by event or nature of event
- operating and capital expenditure
- estimated and actual expenditure (we also highlight future spending as estimates, distinct from prior actuals)
- spending by the agency responsible.

3.3 Appropriations data was complemented by other publicly available sources

There are several areas of central government spending which we identified separately from our keyword search approach, upon analysing appropriations in detail and looking at key areas of spending. This was mainly because, for transport and shovel-ready projects in particular, it was not possible to isolate appropriations activities specifically linked to natural hazards. We have sourced this information directly from the NLTP dashboard for transport resilience activities (New Zealand Transport Authority, n.d.-b) and quarterly updates from Crown Infrastructure Partners (n.d.). In considering other appropriations that might not be picked up in our keyword search, we looked for funding the Crown provides for eligible response and recovery-related costs incurred by a local



authorities (sometimes referred to as the 60:40 cost sharing arrangements for infrastructure)¹¹ and are confident this is picked up by our approach. Aspects that may be relevant but are not captured by our approach and we do not have sufficient information to allocate any portions would include the likes of relevant spending by the Police.

Another enhancement is the inclusion of national science challenges with focus on natural hazards. Resilience to Nature's Challenges was one of 11 national science challenges that ran from 2014 to 2024, funded through the Ministry of Business, Innovation and Employment for a total of up to \$59.4 million (Ministry of Business, Innovation and Employment, n.d.). A new Natural Hazards Resilience Platform has now been announced with total funding of \$70 million over seven years (National Science Challenges, 2024).

While there are numerous government funding streams related to natural hazards and climate resilience science, many involve relatively small amounts that, while important for completeness, may not be material in the broader context. In some areas, we can provide a detailed breakdown, however, in areas such as portions of MBIE Endeavour Funding or other National Science Challenges, attribution or distinguishing relevant components is more complex. While we acknowledge the breadth of funding sources, our approach prioritises material expenditures and focuses on those where we can be confident in amounts relating to natural hazards.

We have also sourced information on insurance claims separately from Insurance Council of New Zealand (n.d.-b), Natural Hazards Commission (2025) and Southern Response (n.d.). ICNZ data on claims captures private spending (and is reported separately to public insurance amounts), though it will exclude all forms of private sector self-insurance or other private sector investment and spending, and may capture some claims from central or local government (IAG NZ advise this is likely to be immaterial). As noted above, we have:

- excluded EQC and Southern Response capital injections reported in appropriations, to avoid double counting with the reporting of actual claims
- used the more up-to-date North Island weather events data from quarterly reporting to the Treasury (2023a).

Lastly, we note that Budget 2024 announced a Regional Infrastructure Fund, which includes a flood resilience infrastructure component for which \$200 million has been dedicated (New Zealand Government, 2024a). Out of this, \$101 million has already been allocated. In our analysis, we show \$101 million as appropriated in 2025, and the remainder \$99 million in 2026, though we note this spend could be spread across many years.

Our approach to identifying spending related to natural hazards and specific events is intentionally conservative. By relying on a key search term method, we aim to avoid overstating central government spending, ensuring that only clearly relevant expenditure is captured. However, this approach has its limitations. In some cases, the available data might not provide sufficient detail to definitively categorise certain spending, meaning we might not be able to identify the purpose behind some appropriations. Appendix C provides a summary of the different sources of information we have used for different sectors.

¹¹ (National Emergency Management Agency, n.d.)



4. Trends and breakdown of relevant spending

In this section we present:

- an overview of relevant central government spending relating to natural hazards
- how central government spending has tracked (and is expected to track) over time, and how this varies by the nature of spending based on appropriation-level information
- relevant spending identified that complements our initial appropriations search, and context of spending relative to accumulated funds and relevant claims.

4.1 Overview of central government spending

Table 3 provides a summary of total spend we have captured on natural hazards since 2010 across the 4Rs. Here, central government spend includes that reported through (i) relevant appropriations, (ii) external funding for transport resilience activities under the NLTP, (iii) relevant shovel-ready projects, (iv) science challenges, and (v) Crown payments through EQC and Southern Response with a focus on natural hazards.

Table 3 shows that central government spending was higher in 2024 than in any of the prior years for which we have information at more than \$3 billion, representing around 2 per cent of all appropriated spending for that year—more than Police portfolios for instance.¹² This is expectedly driven by the NIWE and associated insurance claims and response and recovery efforts. In contrast, EQC and Southern Response claims payments have continued to reduce since the Canterbury and Kaikōura earthquakes, allowing for the Natural Hazard Fund to begin to recover.

Between 2010 and 2025, our conservative approach has identified at least \$33.1 billion in spending by the Crown or government entities. This is primarily made up of \$18.4 billion in spending delivered through appropriations and \$14.2 billion in public insurance spending (which is partly levy funded). This total central government spend is as high as \$41 billion when account for inflationary adjustments.

¹² We note that the collection and reporting of appropriations data related to the NIWE is more rigorous, which allows us to more easily reconcile our appropriation methodology results to actual appropriations for the NIWE; we have not been able to do for other events and baseline spending.



| Year | Crown-funded appropriations | Transport (NLTP) | Shovel- ready projects | Science challenge | Crown payments through EQC and Southern Response | Total central government spend | Inflation adjusted |
|-------|--------------------------------|---------------------|------------------------------|----------------------|--|---|-----------------------|
| 2010 | 36 | | | | 75 | 112 | 162 |
| 2011 | 1,437 | | | | 1,278 | 2,715 | 3,769 |
| 2012 | 958 | | | | 2,752 | 3,710 | 5,053 |
| 2013 | 970 | | | | 940 | 1,910 | 2,577 |
| 2014 | 620 | | | 6 | 1,140 | 1,766 | 2,346 |
| 2015 | 983 | | | 6 | 1,769 | 2,758 | 3,637 |
| 2016 | 1,015 | | | 6 | 981 | 2,002 | 2,637 |
| 2017 | 968 | | | 6 | 1,276 | 2,250 | 2,925 |
| 2018 | 1,001 | | | 6 | 1,162 | 2,169 | 2,775 |
| 2019 | 900 | 0 | | 6 | 713 | 1,619 | 2,033 |
| 2020 | 750 | 2 | | 6 | 476 | 1,233 | 1,520 |
| 2021 | 625 | 3 | 66 | 6 | 342 | 1,042 | 1,266 |
| 2022 | 668 | 0 | 102 | 6 | 635 | 1,411 | 1,619 |
| 2023 | 1,783 | 79 | 37 | 6 | 638 | 2,543 | 2,721 |
| 2024 | 3,517 | 59 | 78 | 6 | | 3,660 | 3,741 |
| 2025 | 2,210 | 49 | | 10 | | 2,269 | 2,269 |
| Total | 18,441 | 192 | 283 | 75 | 14,176 | 33,168 | 41,048 |

Table 3: Summary of central government natural hazards expenditure (\$ millions)

Source: Sapere analysis. Note central government appropriations for 2024 and 2025 are appropriation allowances. Note: December 2024 CPI is used as the base 2025 year for calculating inflation-adjusted figures.



Figure 9: Spending over time by source (2010 to 2025)



Box 1: Natural hazards spending in context – how it compares across portfolios

The 2010 financial year highlights the lowest amount of natural hazard spend we have identified from appropriations during our analysis period, prior to the Canterbury earthquakes. The level of spending is similar to that of Vote Security Intelligence.

Appropriation spending on natural hazards increased significantly in 2011 with the Canterbury earthquakes. Spending on natural hazards in this year was similar to each of the Corrections, Housing and Police portfolios.

Appropriation spending dips to around \$620 million in 2014 following the Canterbury earthquakes, with higher levels attributed towards risk reduction as seen in Figure 10. This level of spending hovers around each of the Internal Affairs, Primary Industries and Courts portfolios for those years, although sits under the Building and Housing portfolio of \$1 billion for 2014.

Significant events such as the Kaikōura earthquakes again drive increased spending on natural hazards with more than \$1 billion in appropriations spending in 2018. This was more than each of the Agriculture, Environment and Oranga Tamariki portfolios for 2018. Similarly in 2023, spending on natural hazards was more than each of the Environment, Foreign Affairs and Internal Affairs portfolios as a result of NIWE.

2024 sees the highest level of estimated appropriated spend at more than \$3 billion on natural hazards. This is around 2 per cent of all appropriated spend during this year— more than the likes of each of the Corrections, Foreign Affairs and Police portfolios during the year, and rivals that of Vote Labour Market in 2024.

4.2 Central government appropriations-related spending

Central government spending on natural hazards is large and growing, with spending facing substantial shocks in the aftermath of significant events. Baseline investment into natural hazards has been increasing over time, with a larger proportion of spending on resilience of assets in relation to recovery from events.

The remainder of this section outlines the results derived from the keyword search outlined above and developed from the Office of the Auditor General (2020). As noted in section 3.3, appropriations related to equity injections into EQC have been excluded to avoid double-counting, as we later present public insurance expenditure related to natural hazards in section 4.3. These appropriations total \$370 million and occur between 2019 and 2021.

4.2.1 Most identified appropriation spending is recovery-related

Most of the identified crown-funded appropriated spending on natural hazards is on readiness, response, or recovery activities surrounding a significant event (as shown in Figure 10). Our appropriations analysis shows that spending on risk-reduction activities constitutes around 10 per cent of spending on natural hazards. This result is perhaps unsurprising as the infrastructure investment in flood stop banks, culverts, pumping stations etc., and spatial planning activity and its costs typically occurs at a regional and district council level.

There are three immediate observations. First, spending in 2010, prior to the Canterbury Earthquake, is minimal at \$36 million, with 68 per cent of appropriated spend being towards readiness and response, and no spend associated with recovery activity.



Second, there are three periods with sizeable spending on recovery activities:

- 2010 to 2015: related to the activity associated with the Canterbury earthquakes. Spending on the Canterbury earthquakes remains persistent till this day.
- 2018 to 2020: related to the Kaikoura earthquakes.
- 2023 to 2025: recovery activities after the NIWE.

Third, there is also significant expenditure related to readiness or response, which are also related to the earthquakes, weather forecasting, and the NIWE.



Figure 10: Total spend by year and 4Rs categories

Note: Data for 2024 and 2025 is appropriation allowances, shaded in light blue. Prior data is actuals. Source: Sapere analysis based on appropriations data from the Treasury, retrieved from treasury.govt.nz

Looking beyond appropriation-level information and including net claims costs from public insurance (EQC and Southern Response) results in total spending of \$26.8 billion in natural hazard spend during the period 2010 to 2023. In Figure 11, 58 per cent of natural hazard spend is associated with recovery activities, while only 11 per cent for risk reduction, and 29 per cent for readiness and response. Low levels of risk reduction spending are more prevalent in the earlier years of the analysis, with only 2 per cent of government spending being attributed to risk reduction in 2010 and 0.2 per cent in 2013.

In contrast, around 40 per cent of government spending was attributed to risk reduction in 2021, but this drops to 10 per cent in 2023 with the NIWE. We also observe that public insurance claims costs make up 52 per cent of central government expenditure on natural hazards during the period 2010 to 2023.




Figure 11: Total spend by year and 4Rs categories, including net claims costs from EQC and Southern Response

Note: EQC and Southern Response financial reports for the years 2024 and 2025 were not complete at the time of writing this report, and thus are not included in this graph.

Source: Sapere analysis based on appropriations data from Treasury and annual reports from Southern Response and the Earthquake Commission, retrieved from <u>treasury.govt.nz</u>, <u>Southern Response</u> and the <u>Earthquake Commission</u>.



4.2.2 Increasing baseline investment

We next excluded significant events to understand how baseline natural hazard spending might trend. In doing so, we identified this 'baseline' spend on natural hazards is increasing (as shown in Figure 12). A large amount of spending still pertains to readiness or response, although a significantly larger portion of this spending is now allocated to risk reduction. We calculated that spending on risk reduction is now around 47 per cent on average, when shocks are excluded.

The risk-reduction spending is associated with erosion protection, drought protection, and other civil defence spending.



Figure 12: Total spend by year and 4Rs category, excluding significant events

Note: Data for 2024 and 2025 are appropriation allowances, shaded in light blue. Prior data is actuals. Source: Sapere analysis based on appropriations data from the Treasury, retrieved from treasury.govt.nz



4.2.3 Spending is dominated by large events

Spending on natural hazards spikes upwards during and immediately following periods of significant events, unsurprisingly. For the Canterbury earthquakes, spending occurs for years after the 2011 date of the events (as shown in Figure 13). There is also an increase in spending in 2023 and 2024 due to the NIWE, with large spending forecasted in 2025 due to this.



Figure 13: Total spend by year by event or nature of spending

Canterbury Earthquakes North Island Weather Events Kaikoura/Hurunui Earthquakes Other

Note: Data for 2024 and 2025 are appropriation allowances, shaded in light blue. Prior data is actuals. Source: Sapere analysis based on appropriations data from the Treasury, retrieved from treasury.govt.nz

The cost of the Canterbury earthquakes, Kaikōura earthquakes and NIWE are exacerbated when considering the net claims costs paid by the EQC and Southern Response. These costs are not presented in Figure 13 due to the incomplete information on which costs can be attributed to individual natural events and when they were accrued. However, we note that much of EQC's and all Southern Response's claims costs presented later in Figure 15 are attributable to the Canterbury earthquakes, and a sizeable portion of EQC claims costs are attributable to the Kaikōura earthquakes and the North Island weather events. We note that the 2022 and 2023 EQC annual reports have listed most current estimates of ultimate claims expenses for these events, which are:

- \$12.3 billion for the Canterbury earthquakes ¹³
- \$667.8 million for the Kaikoura earthquakes
- \$486 million for the North Island weather events.

¹³ The last half year economic and fiscal update that reported Canterbury Earthquake costs more generally was in 2017. It recognised \$15 billion in operating and capital expenditure relevant to the event and forecasted that this figure would reach \$17.2 billion in 2022 (New Zealand Treasury, 2017)



Box 2: Expenditure estimates for NIWE

In early 2023, three severe weather events struck the North Island: Cyclone Hale (8 to 12 January), the Auckland anniversary weekend rain and floods (26 January to 3 February) and Cyclone Gabrielle (12 to 16 February) (Department of Internal Affairs, 2024). Fifteen people have died, with thousands of people being displaced from their homes as a result of the events (New Zealand Treasury, 2023c). There is an estimated \$9 to \$14.5 billion in physical damage to households, businesses, and infrastructure (New Zealand Treasury, 2023b).

Any agency which receives funding to use for initiatives responding to the NIWE is required to monitor and track their spending. The Treasury (2023c) releases this reported information through quarterly updates. We reconciled our appropriations estimates to reflect the quarterly updates, as these are likely to be more up-to-date.

A sum of \$6 billion was set aside to provide funding for medium- and long-term infrastructure resilience projects. A significant source of NIWE investment came from a \$2.96 billion allocation through phases one and two of the National Resilience Plan (NRP), and a further \$63.3 million allocation external to these phases. This left a balance of \$3.2 billion unallocated in the NRP, which was returned through Budget 2024.

The NIWE data included in our estimates for the 2023 to 2025 period reflect the most up-todate reporting by departments to the Treasury (Q3 2024 and Q4 2023).

4.2.4 Spending is mostly concentrated in a small number of agencies

There are sizeable expenses incurred by the Canterbury Earthquake Recovery Authority (CERA) after the Canterbury earthquakes, as well as the Department of the Prime Minister and Cabinet following significant events such as the Canterbury earthquakes ¹⁴ and NIWE. Figure 14 shows which departments are responsible for spend relating to natural hazards. Between 2010 and 2025:

- expenses incurred by the Ministry of Transport accounted for 23 per cent of total identified natural hazard expenditure
- the Department of the Prime Minister and Cabinet (DPMC) incurred 18 per cent
- the Treasury incurred 17 per cent.

¹⁴ CERA was established as a standalone government department on 29 March 2011 to lead and coordinate the government's response and recovery efforts following the Canterbury earthquakes. CERA was disestablished on 18 April 2016, as a business unit within DPMC was to continue policy, planning, legal and monitoring support on a range of recovery and regeneration issues across the greater Christchurch region (Department of the Prime Minister and Cabinet, 2023b). CERA was established as a standalone government department on 29 March 2011 to lead and coordinate the government's response and recovery efforts following the Canterbury earthquakes. CERA was disestablished on 18 April 2016, as a business unit within DPMC was to continue policy, planning, legal and monitoring support on a range of recovery and regeneration issues across the greater Christichurch region (Department of the Prime Gerea and coordinate the government's response and recovery efforts following the Canterbury earthquakes. CERA was disestablished on 18 April 2016, as a business unit within DPMC was to continue policy, planning, legal and monitoring support on a range of recovery and regeneration issues across the greater Christchurch region (Department of the Prime Minister and Cabinet, 2023b).



Before being merged within the DPMC, CERA's spend accounted for:

- 90 per cent of total identified natural hazard expenditure in 2013
- 78 and 79 per cent of total identified natural hazard expenditure in 2011 and 2012 respectively.

Ministry of Transport spending was also significant in 2018 and 2019 (60 per cent and 38 per cent of total spend respectively), and is expected to account for 41 per cent of total spend in 2024, and 33 per cent in 2025. Figure 14 illustrates spend in agencies where expenditure was or is forecasted to be significant.



Figure 14: Total spend by year and agency

Note: Data for 2024 and 2025 are appropriation allowances, shaded in light blue. Prior data is actuals. Some government departments have been excluded from this graph if their appropriated spend is relatively immaterial. Source: Sapere analysis based on appropriations data from the Treasury, retrieved from <u>treasury.govt.nz</u>



Looking beyond appropriation data, the cost of claims from EQC and Southern Response are also significant, particularly after the Canterbury earthquakes. Overall, spending by the EQC and Southern Response accounted for 52 per cent of overall government expenditure during the period 2010 to 2023, with this proportion being as high as 74 per cent in 2012. Figure 15 includes net claims costs presented in section 4.3, and shows that public insurance claims represent a majority of government expenditure between 2011 and 2015.



Figure 15: Total spend by year and agency, including EQC and Southern Response net claims costs

Note: Prior data is actuals. EQC and Southern Response financial reports for the years 2024 and 2025 were not complete at the time of writing this report, and thus are not included in this graph.

Source: Sapere analysis based on appropriations data from the Treasury, retrieved from <u>treasury.govt.nz</u>, <u>Southern Response</u> and <u>the Earthquake Commission</u>

4.2.5 Capital expenditure increases after operating expenses

We observe operating expenses surging followed by a longer tail of capital investment (as shown in Figure 16).

In the example of the Canterbury earthquakes, initially, operating expenses dominate as central government responds to immediate needs, and capital investment grows between 2014 and 2021 to support longer-term recovery and infrastructure projects.

The spike in operating expenditure to capital expenditure in 2023 shows the significant impact of the NIWE. Forecast capital expenditure in 2025 is largely driven by infrastructure projects such as state highway recovery after the NIWE.





Figure 16: Total spend by year and expenditure type

Note: Data for 2024 and 2025 are appropriation allowances, shaded in light blue. Prior data is actuals. We have manually determined whether expenditure was capital or operating for additional NIWE appropriations captured in Treasury Quarterly updates.

Source: Sapere analysis based on appropriations data from the Treasury, retrieved from treasury.govt.nz

Beyond appropriations, adding EQC and Southern Response claims costs (Figure 17) significantly increases the level of operating expenditure incurred by central government in relation to capital costs. Overall, operating costs account for 90 per cent of central government expenditure during the period 2010 to 2023.



Figure 17: Total spend by year and expenditure type, including Southern Response and EQC claims costs



Note: Prior data is actuals. EQC and Southern Response financial reports for the years 2024 and 2025 were not complete at the time of writing this report, and thus are not included in this graph.

Source: Sapere analysis based on appropriations data from the Treasury, retrieved from <u>treasury.govt.nz</u>, <u>Southern Response</u> and <u>the Earthquake Commission</u>



We identify a steady growth in operating costs from 2013 to 2022 when we exclude spending on significant events (Figure 18). Capital spending is very small and might suggest that most capital expenditure is related to investment specific to significant events, such as reinstatements. The key search term analysis does not identify if capital expenditure is associated with business-as-usual maintenance of infrastructure. While maintenance may not be directly associated with natural hazards, it is important for resilience of assets against natural hazards.



Figure 18: Total spend by year and expenditure type, excluding significant events

Note: Data for 2024 and 2025 are appropriation allowances, shaded in light blue. Prior data is actuals. Source: Sapere analysis based on appropriations data from the Treasury, retrieved from <u>treasury.govt.nz</u>

4.2.6 Actual spending is typically greater than estimates

Actual spending typically exceeds appropriated expenditure (reported in the estimates of appropriations or "main estimates," as shown in Figure 19), except in 2022 where they were about the same, and in 2018 and 2019 where estimates exceeded actuals.

Figure 20 shows that baseline spending is increasing, and while significant events appear to drive variation early in the period, the variation between actual and estimated spend is seen in more recent years. Overall, estimated spend is a better predictor of actual spend in the absence of natural disasters.





Figure 19: Main estimates versus actual spend by year

Note: We do not use the additional NIWE appropriations information identified in the Treasury quarterly reports here as we are not able to identify the forecasted spend for the year for these appropriations. We also exclude data from 2010 to 2012 due to the data limitations discussed in section 3.2.

Source: Sapere analysis based on appropriations data from the Treasury, retrieved from treasury.govt.nz

Figure 20: Main estimates versus actual spend by year, excluding significant events



Note: We do not use the additional NIWE appropriations information identified in the Treasury quarterly reports here as we are not able to identify the forecasted spend for the year for these appropriations. We also exclude data from 2010 to 2012 due to the data limitations discussed in section 3.2.

Source: Sapere analysis based on appropriations data from the Treasury, retrieved from treasury.govt.nz

4.3 Public insurance expenditure relating to natural hazards

Public insurance in New Zealand assists with managing the financial risks associated with natural hazards. In this section, we analyse the financial statements of the Earthquake Commission (EQC) and Southern Response, and present recovery spending from natural disasters, particularly for the Canterbury and Kaikōura earthquakes.



4.3.1 Earthquake Commission

The EQC is funded through premiums collected as part of insurance policies and has also received government contributions. The role of the EQC is to administer natural disaster insurance for residential properties, covering damage caused by natural disasters. The EQC also facilitates research and education on natural hazard risks and arranges reinsurance and other risk transfer products (New Zealand Government, 2024b). Table 4 outlines what has been received and paid by the EQC. It shows the following notable observations:

- There is a surge in claims paid in 2011, with a peak in 2012 at around \$2.8 billion. Most of this would be relevant to the Canterbury earthquakes.¹⁵
- EQC received three substantial Crown injections between 2019 and 2021, ranging from \$115 million to \$130 million per year. ¹⁶ These injections come under the Crown Guarantee, which states that the government will meet a shortfall if the EQC cannot fulfil its obligations in the event of a major natural disaster. These injections arose from an exhausted Natural Hazard Fund as EQC continued to pay out claims for the Canterbury and Kaikōura earthquakes (Natural Hazards Commission, 2018).
- EQC received substantial reinsurance payouts, including \$1.3 billion in 2013, \$1.2 billion in 2014, and \$560 million in 2021. However, reinsurance costs for EQC have been increasing over time, reaching \$305 million in 2023.
- The EQC's income from premiums has also been increasing over time, reaching \$697 million in 2023, while income received from interest and dividends (included in other) has decreased since 2010 to a relatively insignificant figure as the size of the Natural Hazard Fund has decreased (as a result of drawing from this to meet claims).¹⁷
- The EQC also pays \$10 million annually in Crown underwriting fees, which we have not reported in this table.
- Overall, EQC paid \$13.2 billion in claims over the period 2010 to 2023. If we take the amount
 of claims paid net of annual reinsurance costs (that is, adding reinsurance costs but removing
 reinsurance received), this equates to costs of \$10.6 billion over the period 2010 to 2023 (we
 note this excludes other operating costs). ¹⁸

¹⁵ The net claims cost also peaks during this period at \$2.4 billion.

¹⁶ We note that the \$130 million in Crown investment received in 2021 is not reported in EQC's financial statements, but is reported in appropriations data from Treasury.

¹⁷ Annual funding to the Natural Hazard Fund allowed it to build to over \$6 billion in 2009/10. However, following the Canterbury earthquakes, this had been drawn on to support claims, and despite increases in funding from the Crown and the levy, the fund is only slowly building back given further claims it has received since. In 2021/22, the Natural Hazard Fund balance sat at around \$250 million.

¹⁸ We calculate this as claims paid, plus reinsurance paid, less reinsurance received.



| | Cash outflows Cash inflows | | | | | | Not | |
|-------|----------------------------|---------------------|-------------------------|---------------------------------|-------------------|--------------------|-----------------|-----------------|
| Year | Claims paid | Reinsurance paid | Reinsurance received | Crown investment received | Premium income | Interest income | Other income | claims costs |
| 2010 | 36.7 | 38.8 | | | 85.7 | 238.0 | 37.9 | 75 |
| 2011 | 1,177.6 | 51.9 | 0.2 | | 88.5 | 227.1 | 32.8 | 1,229 |
| 2012 | 2,807.2 | 82.7 | 510.1 | | 133.6 | 146.4 | 13.7 | 2,380 |
| 2013 | 1,787.1 | 136.3 | 1,319.5 | | 274.5 | 24.8 | 0.0 | 604 |
| 2014 | 1,868.4 | 151.2 | 1,278.7 | | 273.4 | 14.8 | 0.2 | 741 |
| 2015 | 1,282.5 | 150.5 | 215.0 | | 280.6 | 19.8 | | 1,218 |
| 2016 | 662.6 | 152.7 | 443.9 | | 282.1 | 11.7 | | 372 |
| 2017 | 760.3 | 164.1 | 111.2 | | 285.1 | 13.1 | 0.1 | 813 |
| 2018 | 815.6 | 170.1 | 63.2 | | 336.7 | 6.9 | 0.0 | 923 |
| 2019 | 446.7 | 179.0 | 57.3 | 125.0 | 394.8 | 2.0 | | 568 |
| 2020 | 307.8 | 176.5 | 83.4 | 115.0 | 482.6 | 1.2 | | 401 |
| 2021 | 713.8 | 140.4 | 562.2 | 130.0 ¹ | 525.0 | 0.5 | | 292 |
| 2022 | 252.1 | 278.4 | 48.2 | | 530.1 | 1.6 | | 482 |
| 2023 | 239.5 | 305.9 | 32.8 | | 697.2 | 12.1 | | 513 |
| Total | 13,157.9 | 2,178.4 | 4,725.6 | 370.0 | 4,669.7 | 720.0 | 84.9 | 10,611 |

Table 4: Cash flows of the Earthquake Commission from 2010 to 2023 (\$ millions)

Notes: ¹The \$130 million of Crown Investment in 2021 is not captured in the financial statements of EQC, but is captured in government appropriations reported by the Treasury. Source: EQC Financial Statements, retrieved form <u>naturalhazards.govt.nz</u>

4.3.2 Southern Response

Southern Response is a Crown-owned company that emerged in the aftermath of the Canterbury earthquakes to handle unresolved claims from AMI policyholders. Table 5 shows the following insights:

- Claims paid increased after the Canterbury earthquakes, peaking at \$609 million in 2016, before dropping to a low of \$49 million in 2021. However, subsequent claim payouts have increased since, to back around 2019 levels in 2022 and 2023.
- Southern Response received significant government investment, totalling \$1.56 billion from its inception to 2023.
- Other income, which comes from dividends, interest and other investment income peaked in 2013, before dropping to a relatively immaterial amount in 2023.
- Overall, Southern Response paid \$3.5 billion in claims over the period 2011 to 2023. If we take the amount net of annual reinsurance costs (that is, adding reinsurance costs but removing reinsurance received), this equates to costs of \$3.6 billion over the period 2011 to 2023 (we note this excludes other operating costs).¹⁹

¹⁹ We calculate this as claims paid, plus reinsurance paid, less reinsurance received.



| Year | Expenses | | Revenue | Net claims | |
|-------|-------------|---------------------|---------------------------------|--------------|----------|
| | Claims paid | Reinsurance paid | Crown investment received | Other income | costs |
| 2011 | 48.40 | | 0.00 | 24.91 | 48.40 |
| 2012 | 326.27 | 45.49 | 100.00 | 24.03 | 371.76 |
| 2013 | 295.69 | 39.93 | 0.00 | 27.24 | 335.62 |
| 2014 | 396.99 | 2.06 | 0.00 | 24.18 | 399.06 |
| 2015 | 550.92 | | 0.00 | 16.74 | 550.92 |
| 2016 | 609.39 | | 443.00 | 7.41 | 609.39 |
| 2017 | 462.80 | | 315.00 | 2.58 | 462.80 |
| 2018 | 239.51 | | 205.00 | 1.94 | 239.51 |
| 2019 | 144.89 | | 183.00 | 1.26 | 144.89 |
| 2020 | 75.38 | | 55.00 | 0.55 | 75.38 |
| 2021 | 49.41 | | 40.00 | 0.27 | 49.41 |
| 2022 | 152.28 | | 125.00 | 0.64 | 152.28 |
| 2023 | 125.45 | | 95.00 | 1.47 | 125.45 |
| Total | 3,477.40 | 87.49 | 1,561.00 | 133.21 | 3,564.89 |

Table 5: Cash flows of Southern Response from 2011 to 2023 (\$ millions)

Note: Southern Response was established in 2012 with going concern from 2011. Source: Southern Response financial statements, retrieved from <u>southernresponse.co.nz</u>

4.3.3 Public insurance claims

Figure 20 shows natural hazard-related insurance claims costs alongside the annual claims costs paid by the Earthquake Commission (EQC) and Southern Response.

Figure 21 shows that insurance claims related to natural disasters were minimal in 2010. However, following the Canterbury earthquakes there was a significant increase in costs associated with insurance claims, for EQC and Southern Response. The Natural Hazard Fund was drawn down over following years to help meet the costs of these claims. EQC and Southern Response claims continued to remain high after the Canterbury earthquakes, though both largely reducing over time since 2016.



3,500 3,000 2,500 2,000 1,500 500 -2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 Earthquake Commission Southern Response

Figure 21: Summary of public insurance claims paid

Source: Sapere analysis based on ICNZ data, EQC and Southern Response Annual Reports

4.4 Further identified spending and context

Here, we separately discuss resilience activities under the National Land Transport Programme (NLTP) and shovel-ready projects.

4.4.1 Resilience activities under National Land Transport Programme

To avoid double counting, we have excluded NLTP spend from our appropriations analysis. This means that the NLTP spend for transport resilience improvement activities are additional to the appropriations spend we report. Based on NLTP dashboard reporting, we have not been able to isolate spend on recovery, response, and readiness activities prior to NIWE. This means that our total reporting of natural hazards spend for transport is conservative. NIWE transport spend has been included in our appropriations reporting.

Focus on resilience improvements

Data on transport resilience expenditure was collected from the NLTP dashboard, noting that the funding sources for the NLTP include:

- the National Land Transport Fund (NLTF)²⁰
- approved organisations' local share
- Crown funds and loans
- debt finance and public private partnerships
- supplementary funding.

²⁰ Revenue collected from fuel excise duty, road user charges, vehicle and driver registration and licensing, state highway property disposal, and leasing and road tolling.



The dashboard reports on NZTA and local government spend.²¹ NZTA funding includes Crown funding (classified as external funding) in addition to levies through the NLTF.

We focused on identifying resilience activities (and specifically on Work Category 357 - Resilience Improvements (WC357)). Specifically, a project is included in WC357 if it offers a level of service improvement over and above its functional role for cars, cyclists, pedestrians, etc.). The wording is:

"provides for non-routine work to increase the resilience of the existing road network (including roads, road structures and eligible walking and cycling facilities). This work category also provides for non-routine work to minimise the threat of road closure from natural phenomena."²²

We mapped transport resilience improvements to the 'reduction' area of activity under the 4Rs framework.

We note that WC357 may include projects not directly related to natural hazards, however there is not enough information to identify those activities. Some natural hazards spend might also be captured in other work categories, though not in a straightforward way. For example, there is a resilience benefit to the renewals work in pothole prevention, and both this activity class and road improvements (WC324) include improved drainage which help with resilience, but is not explicitly related to natural hazards.

We show in Figure 22 the annual spend by NZTA on transport resilience improvements that have been approved or are likely to be approved going forward. Resilience improvement projects (under WC357) are grouped by the relevant activity class: local road improvements, regional improvements, state highway improvements, and external funding.

Overall, we identify a total of \$311 million in central government spend through the NLTP between 2015 and 2025, with an additional \$21 million approved and likely in 2026. Figure 22 shows a significant increase in external funding from 2023 onwards, which we interpret as being related to the Crown Resilience Programme (CRP)²³ announced in Budget 2023 (New Zealand Transport Authority, n.d.-a). We note that the numbers shown in Figure 22 are less than the \$419 million allocated to the CRP, and we understand this is because NLTP activities are still being assigned under this programme. Around 64 per cent of approved and likely spend between 2015 and 2026 is from external funding, while 34 per cent is for local road and state highway improvements. The remaining 2 per cent is for regional improvements.

²¹ We report local government spend separately in section 5.1

²² <u>https://www.nzta.govt.nz</u>. Examples of qualifying activities include: new works to protect existing roads from sea or river damage, new drainage for incipient slips, toe-weighting of unstable slopes, protection planting designed to arrest the slumping or displacement of a road platform, and work to overcome changes in a river's course or bed level that threaten roads, bridges or other road-related structures, but which is not attributable to one climatic event. It excludes maintenance of protection planting.

²³ Previously Transport Resilience Fund (TRF).





Figure 22: Spend on transport resilience improvements funded by NZTA (approved and likely, \$ millions)

Source: Sapere analysis based on data from the NLTP dashboard

Figure 23 shows the spend on transport resilience improvements, as a percentage of total spend in the respective asset class. It shows that while spend in 2018, 2019 and 2020 was relatively low, they made up a significant proportion of total spend during those years. On the other hand, while spend in 2023 and 2024—after the NIWE—was relatively high, the share of total resilience spend remained relatively low.



Figure 23: Spend on transport resilience improvements, as percentage asset class (approved and likely)

Source: Sapere analysis based on data from the NLTP dashboard



As noted above, resilience activities under WC 357 do not include straightforward asset replacements or reinstatements, which are covered under:

- WC 322: new or improved bridges and structures
- WC 323: new roads, and
- WC 324: road improvements.

Over the same period, approved and likely spending from these work categories have totalled \$11.42 billion in state highway improvements, and \$2.01 billion in local road improvements. However, we note that only an unknown subset of this cost will have arisen from natural hazards.

4.4.2 COVID-19 shovel-ready projects

On 11 May 2020, Cabinet agreed to a \$3 billion tagged contingency to provide investment in infrastructure to support New Zealand's economic recovery as part of the COVID-19 Response and Recovery Fund (CRRF) foundation package. Of this:

- \$200 million was agreed for flood protection and river management
- \$50 million was agreed for fire stations, including earthquake strengthening (New Zealand Treasury, 2020).

Our analysis identified a total of \$224.8 million of government spend over the 2021 to 2024 period on projects linked to natural hazards. These include flood protection and river management, fire station upgrades, replacement barge construction and berm planting. Over the same period, another \$139.11 million has been spent by local governments.



Figure 24: Shovel-ready projects spend (Crown Infrastructure Partners)

Source: Sapere analysis based on Crown Infrastructure IRG quarterly updates. Note: the chart shows additional expenditure as at Sep 2021, Sep 2022 and June 2024. Data for Sep 2023 has been extrapolated.



4.5 Comments and reflections

In this section we reflect on and highlight key context, takeouts, and potential further areas of investigation. This is in the context of limitations that are also set out in Appendix D, and case studies of expenditure from other sources discussed in the next section.

4.5.1 Reporting and monitoring of natural hazard-related expenditure could be improved

The challenge of identifying relevant spending raises the question of whether reporting and monitoring could be improved.

The inquiry into climate adaptation presented to the New Zealand House of Representatives (2024) notes that natural hazard risks will significantly increase with climate change, and that significant financial cost could be saved by:

"pre-emptively investing in protection and climate-resilient infrastructure and other proactive actions to reduce the risks of natural hazards" (p.37).

However, the inquiry report also notes that there are gaps in understanding what is actually being spent on climate adaptation. Although investment is taking place in New Zealand, it is highly insufficient. In extreme circumstances, the central government is called upon to act as the insurer of last resort—an ad hoc and reactive approach that leads to poor outcomes.

By contrast, a better understanding of what is spent on risk mitigation versus recovery (and readiness and response) can help inform the planning of investment before disasters occur, and inform strategies that are needed to create the right incentives for managing risk and investing in risk reduction and resilience. Our analysis supports the inquiry's finding that the process of gathering information on the 4Rs spend could be improved:

"We recommend to the Government that it work with local government, researchers, and the private sector to compile information about what is currently being spent on climate adaptation and improve estimates of the potential future costs of adaptation" (p.37).

We note that steps have been taken to improve visibility of spending in relation to the NIWE, and suggest this could be extended to support better understanding of spending in relation to natural hazards. For instance, it would be helpful to be able to distinguish spending by funding source (Crown, levy, local government, private, insurance, other), natural hazard event/business as usual, and whether it relates to:

- understanding and reducing risk: separating science, research, data and modelling from risk reduction, mitigation and/or adaptation
- preparing for and responding to risk: separating readiness, response, and recovery costs as well as indirect (e.g. disruption), and intangible costs (costs of social impacts).

An illustration of the kinds of breakdowns of spending that could usefully inform policy decisions might look something like Table 6.



| Table 6. Illustration | of information | that would | ideally be | distinguishable | through reporting |
|-----------------------|----------------|------------|------------|------------------|-------------------|
| | or information | | ideally be | uistinguisilable | unoughtepotung |

| rce | | Understand and reducing risk | | Preparing for and responding to risk | | | | |
|-------------|-------------------|--|---|--------------------------------------|----------|----------|-------------------|---------------------|
| Funding sou | Event | Science, research, data and modelling | Risk reduction, mitigation, adaptation | Readiness | Response | Recovery | Indirect costs | Intangible costs |
| | Canterbury EQs | | | | | | | |
| | Kaikoura EQ | | | | | | | |
| c | NIWE | | | | | | | |
| MOL | Other event | | | | | | | |
| Ū | BAU | | | | | | | |
| | Canterbury EQs | | | | | | | |
| | Kaikoura EQ | | | | | | | |
| | NIWE | | | | | | | |
| Levy | Other event | | | | | | | |
| | BAU | | | | | | | |
| | Canterbury EQs | | | | | | | |
| ent | Kaikoura EQ | | | | | | | |
| | NIWE | | | | | | | |
| ocal | Other event | | | | | | | |
| g Lo | BAU | | | | | | | |
| | Canterbury EQs | | | | | | | |
| | Kaikoura EQ | | | | | | | |
| Ð | NIWE | | | | | | | |
| ivat | Other event | | | | | | | |
| Pr | BAU | | | | | | | |
| ance | Canterbury EQs | | | | | | | |
| sura | Kaikoura EQ | | | | | | | |
| e. | NIWE | | | | | | | |
| ivat | Other event | | | | | | | |
| Pr | BAU | | | | | | | |
| | Canterbury EQs | | | | | | | |
| | Kaikoura EQ | | | | | | | |
| | NIWE | | | | | | | |
| ther | Other event | | | | | | | |
| ot | BAU | | | | | | | |

Source: Sapere drawing on discussions with Natural Hazards Commission



4.5.2 Better information would enable greater understanding of the relative value of different spending

Our analysis above serves to better inform what the level of spending from central government is in relation to natural hazards, where this is focused, how that is changing, and its fit relative to other relevant spending. This raises the question of *how* this information can best be captured and monitored (as noted), which would enable more informed assessment of *where* central government can achieve the best results in its spending.

Our analysis of spending across the 4Rs highlights that, understandably, there is significant spending that occurs following major events and on recovery from these events. A stronger information base would also allow for investments focusing on risk reduction and readiness to be understood in terms of the potential benefits that might result from reducing the impact and extent of expenditure necessary in response to, and recovery from, natural hazards, and for prioritisation and coordination of expenditure in the knowledge of the wider context in which it sits.²⁴

4.5.3 Spending is only one lever available to government

Our analysis above focuses on government spending. However, there are a number of levers available to government (Department of the Prime Minister and Cabinet, 2023a). As well as commissioning public services and providing funding and subsidies, education, information and outreach, and regulatory measures are also important roles for central government in creating the right settings to prepare for and manage the risks and impacts of natural hazards.

In particular, rules around land use planning, environmental management, and building and infrastructure are likely to be particularly important to the impacts of natural hazards. For instance, where people live, invest and spend time, the resilience built into development and the extent and state of natural protections will all be factors that influence the impacts that stem from natural hazards. Further, greater understanding and awareness of different parties of the risks and potential mitigants will also have a bearing on investment and operational decisions made by others, and the ultimate impacts. The box below provides an illustration of this in thinking about adaptation.

Box 3: Adaptation is required to mitigate negative economic impacts

The report by New Zealand Treasury and Ministry for the Environment (2023) outlines that timely and evidence-based adaption from households, communities, businesses and central government is necessary to reduce the long-term economic impact arising from physical climate change. Some examples of adaption include constraining urban development from high-risk areas, investing in measures to control exposure to physical risks, and relocating assets and infrastructure away from high-risk areas where economically feasible.

²⁴ For instance, we note that prior reports (NZIER, 2024a; Te Uru Kahika: Regional Unitary Councils Aotearoa, 2022) have made the case for resilience investments and reported the likes of positive cost benefit analyses for a number of potential flood protection projects. For instance, we note that prior reports (NZIER, 2024a; Te Uru Kahika: Regional Unitary Councils Aotearoa, 2022) have made the case for resilience investments and reported the likes of positive cost benefit analyses for a number of potential flood protection projects.



5. Spending on natural hazards by local government, insurers and others

Natural hazard events typically impact a particular location(s). In addition to central government's wider roles which are the focus of this report as discussed above, local governments also have relevant roles and incur spending in relation to natural hazards. The Department of Internal Affairs (2023) provides an overview of the core regional and territorial authority responsibilities and NEMA (2023) highlights the key participants in the emergency management system, ²⁵ with the lead agencies for each hazard set out in the National Civil Defence Emergency Management Plan Order 2015 (Parliamentary Counsel Office, n.d.). These latter references show the roles of local government as CDEM group members when it comes to emergency management.

As local government and other spending is not the focus of this report, this section provides a much more limited snapshot that is intended to provide high-level context to the central government spending that is discussed. More detailed analysis of spending by other parties is beyond the scope of our engagement.

5.1 Local council spending on road resilience projects and shovel-ready projects

The NLTP dashboard reports on relevant local government spending as well as spending by central government. Similar to section 4.4.1, we focus here on local government spending in relation to WC357 (resilience improvements). The same caveat that WC357 may include projects not directly related to natural hazards applies, however, there is not enough information to identify the relevant activities. Importantly, we also expect that some natural hazards spend is also likely to be captured in other work categories, though not in an easily identifiable way.

We acknowledge that there will be other elements of resilience spending within local councils, but these are not easily identifiable without extensive engagement with each of the relevant councils.

Figure 25 shows a general upward trend in local government resilience spending reported under WC357. A significant increase in local road improvements spend can be seen in 2018, 2019, and 2020, mostly attributable to the Quay Street seawall seismic upgrade in Auckland.

²⁵ These include NEMA, CDEM groups (of which there are currently 16 across New Zealand regions), central government agencies, lifeline utilities, research and science organisations, non-government organisations, the private sector, marae, iwi, community organisations, volunteers, and the local community.





Figure 25: Spend on transport resilience improvements by local councils (approved and likely)

Figure 26 shows that council spend on local road resilience projects tends to be around 1 to 3 per cent of total local road spending in the NLTP. It also shows that significant transport projects such as a seawall upgrade can significantly increase the share.



Figure 26: Local council spend on local road resilience projects, as percentage of asset class (approved and likely)

As in section 4.4.2, we have identified \$139.1 million in local government spend during the period 2021 to 2024, related to shovel-ready projects for flood protection, fire station upgrades, replacement barge construction and berm planting. This is presented in Figure 27, with a majority relating to risk reduction.





Figure 27: Local government shovel-ready projects spend (\$ millions)

5.2 Local government spending can be significantly impacted by natural hazard events

Our analysis in section 5.1 only identifies certain local government spending in relation to relevant transport spending and shovel-ready projects. However, an analysis of individual council annual reports, long term plans, infrastructure plans, and asset management plans (if available) may provide a wider picture of relevant local government spending. We do not provide an in-depth analysis of total local government spend in response to natural hazards, but present a narrow view on individual local government responses to a selection of natural hazard events.

We provide a selection of case studies below that show the impact that significant natural hazards can have on local government spending. These case studies are not exhaustive, and we expect that a far greater number of councils will have incurred natural hazard-related costs. As a result, these case studies will understate the full extent of relevant spending that would have been undertaken across all parts of local government in relation to natural hazards.



5.2.1 Christchurch City Council's response to the Canterbury earthquakes

The Canterbury earthquakes were a series of seismic events that struck the Canterbury region, with Christchurch being the most severely affected city. The event began with a 7.1 magnitude earthquake in September 2010, followed by a more destructive 6.3 magnitude earthquake in February 2011 (Australian Government - NEMA, n.d.). There were four major earthquakes and over 11,200 aftershocks in the region between September 2010 and the end of 2011 (Insurance Council of New Zealand, 2023). 185 people died and many were injured Figure 28: Construction work on the Christchurch Arts Centre following the Canterbury earthquakes, *image courtesy of Leonie Clough*



(Royal Commission of Inquiry into Building Failure Caused by the Canterbury Earthquakes, 2012).

Between 2011 and 2048, it is estimated Christchurch City Council will bear up to \$8.2 billion in earthquake response and recovery costs

Deloitte (2017) estimate that the Canterbury earthquakes will cost the council \$10.2 billion. Of this, \$1.6 billion is to be funded by the Crown, and \$0.4 billion to be funded by insurance. This leaves \$8.2 billion in costs to be borne solely by the council through increased rates, debt and other sources.

Deloitte (2017) shows Christchurch City Council's (CCC's) spend on costs from 2011 to 2017 relative to planned pre-earthquake spend. The report's underlying assumption is that the majority of unforeseen costs would have arisen from the Canterbury earthquakes. The report also highlights projections of what would be spent from 2018 to 2048.

Overall, Deloitte (2017) identify \$3 billion of additional spending during 2011 to 2017: \$1.9 billion in capital expenditure, and \$1.1 in operating expenditure. As outlined in Table 7, waste water-related capital expenditure was the most significant component of this.

Table 7: Variation between budgeted and actual CCC spending that would have likely arisen from the Canterbury earthquakes, 2011 – 2017 (\$ millions)

| | Waste water | Storm water | Water supply | Streets and transport | Other | Total |
|-------|-------------|-------------|-----------------|-----------------------|-------|-------|
| Capex | 1,244 | 143 | 106 | 211 | 195 | 1,899 |
| Opex | 279 | 52 | 52 | 99 | 636 | 1,118 |
| Total | 1,523 | 195 | 158 | 310 | 831 | 3,017 |

Source: Deloitte (2017)

The report finds that the additional expenditure from what was budgeted in the LTP was funded primarily by Crown contributions and increased council debt (an additional \$1 billion), with a small contribution from CCC rates (which were 16 per cent higher than forecasted pre-earthquakes) and a



CCC-owned Christchurch City Holdings Limited capital release. The overall \$3 billion sits within an estimated \$10 billion over the period 2011 to 2048 highlighted in Table 8.

| | Waste water | Storm water | Water supply | Streets and transport | Other | Total |
|-------|-------------|-------------|-----------------|-----------------------|-------|--------|
| Capex | 2,128 | 2,497 | 1,185 | 426 | 1,128 | 7,364 |
| Opex | 323 | 83 | 69 | 26 | 2,371 | 2,872 |
| Total | 2,451 | 2,580 | 1,254 | 452 | 3,499 | 10,236 |

Table 8: Variation between budgeted and actual CCC spending that would likely arise from the Canterbury earthquakes, 2011 – 2048 (\$ millions)

From Table 7, we note that 63 per cent of the earthquake-related spend between 2011 and 2017 is associated with capital expenditure, while Table 8 shows that this is expected to be even higher with an estimated 72 per cent related to capital expenditure between 2011 and 2048. This is in line with our observations across central government spending, where section 4.2.5 shows that most capital expenditure arises after significant events.

The Crown is significantly involved in contributing to the cost of the Canterbury earthquakes

According to the 2019 Global Settlement Agreement between the Crown and CCC, the Crown had spent \$14 billion, with an additional \$4 billion expected to be incurred. The scope of Crown spending includes EQC and Southern Response claims and Crown assets, and therefore exceeds estimates reported by Deloitte (2017) who report on the city rebuild and horizontal infrastructure rebuilds. CCC had incurred \$3.65 billion of capital earthquake related expenses, with an additional \$4 billion of capital expenditure expected to be incurred. Furthermore, the Crown had committed \$300 million for regeneration projects as part of the Global Settlement.

While elements of the Global Settlement Agreement have been redacted under s9(2)(i) of the Official Information Act, a cost sharing agreement between CCC and the Crown highlights the degree of central government involvement. A summary of the agreement is outlined in Table 9. However, this is not an exhaustive list of earthquake-related expenditure. Of central government spending noted above under the Global Settlement, where this has been committed and appropriated it will be picked up in our appropriations analysis to the extent that the appropriation names and descriptions include any of our key search terms. Any amounts that are simply tagged or subject to the likes of business cases may be excluded though which could include a proportion of committed/expected spend.

| Aspect of agreement | Details |
|------------------------------------|--|
| Residential red zone (RRZ land) | The Crown purchased severely affected land from property owners, however, the cost sharing agreement states that RRZ land owned by CCC must be transferred to the Crown at no cost. The Crown is then responsible for the cost of demolition on this land. |
| Port Hills RRZ | The cost of land in the Port Hills RRZ purchased by the Crown is equally shared between CCC and the Crown. |

Table 9: Summary of the cost sharing agreement between CCC and the Crown, 2013



| Aspect of agreement | Details |
|------------------------------|--|
| Horizontal infrastructure | The Crown would contribute to horizontal Infrastructure costs, bearing up to \$1.8 billion of eligible infrastructure costs consisting of: Up to 60 per cent of eligible three-waters infrastructure (through CERA) Up to 83 per cent of eligible road infrastructure (through NZTA) |
| Anchor projects | Some Anchor Projects set out in the Christchurch Central Recovery Plan would be carried out by both the CCC and the Crown. |

5.2.2 Council Response to the North Island weather events

In early 2023, three severe weather events struck the North Island: Cyclone Hale (8 to 12 January), the Auckland Anniversary Weekend rain and floods (26 January to 3 February) and Cyclone Gabrielle (12 to 16 February) (Department of Internal Affairs, 2024). The impact of these events was significant; 15 people have died, with thousands of people being displaced from their homes as a result of the events (New Zealand Treasury, 2025). There is estimated to be \$9 billion- \$14.5 billion in physical damage to households, businesses, and infrastructure (Department of Internal Affairs (2023) and NZIER (2024b)).

Table 10 provides a high-level summary of identified council spending relating to the NIWE, although the whole-of-lifetime costs incurred by councils in response to NIWE are expected to far exceed these figures. We provide additional information on cost-sharing agreements and additional funds for resilience within these councils in the remainder of this section. As noted in the prior section, where central government has contributed to costs, this will be captured in appropriations and identified in our earlier analysis if there is a match with key search terms.

| | Identified spending towards NIWE response and recovery |
|------------------------------|--|
| Auckland Council | 848 |
| Hawke's Bay Regional Council | 67 |
| Gisborne District Council | 138 |

Table 10: Identified council response and recovery costs towards the NIWE (\$ millions)

Notes: Identified spending for Hawke's Bay and Gisborne occurred during the 2023 and 2024 financial years, while the timing for identified Auckland spend remains unclear

5.2.2.1 Auckland Council response to the NIWE

Identified spending indicates \$848 million has/will be spent by Auckland Council, although estimates place the total cost borne by Auckland Council to be as high as \$2.924 billion

A media release by Auckland Council (2023a) places recovery costs, property buy-outs and longer term investment as high as \$4 billion. A subsequent media release (Auckland Council, 2023b) details the cost sharing agreement for three projects, detailed in Table 18. Collectively, the Crown has agreed to fund \$1.076 billion of NIWE costs in Auckland. This suggests that Auckland Council will bear up to



\$2.924 billion of NIWE costs if its initial estimates are reached and no further cost sharing arrangements are made. However, the timing of this spending remains unclear.

| Project | Council share | Crown share |
|---|---------------|-------------|
| Making Space for Water Initiatives ¹ | 380 | 380 |
| Transport Network Recovery | 81 | 309 |
| Category 3 Buyouts | 387 | 387 |
| Total | 848 | 1,076 |

Table 11: Cost sharing agreements between Auckland Council and the Crown following the NIWE (\$ millions)

Source: Sapere analysis based on information from the Auckland Council, retrieved from <u>aucklandcouncil.govt.nz</u> Note: ¹An initial media release places the total value of these projects at \$820 million, however, documentation released subsequent to this places the total value at \$760 million (retrieved from <u>aucklandcouncil.govt.nz</u>). The Crown share of this project is inferred from the initial media release and may form part of central government spending identified above in relation to the NIWE.

Given that the NIWE are still relatively recent, there are limited resources to provide a detailed estimate of council spend on the region's response and recovery. NIWE costs that occurred in the 2022/23 financial year were largely met by reductions in other council expenditure, insurance recoveries, and an increase in debt over and above previous forecasts. In particular, this included:

- operational funding for the Recovery Office (to deliver on council share of Category 3 buyouts)
- reprioritisation of capital expenditure to remediate damaged assets
- an increase in Watercare's capital budget to accommodate storm-related capital expenditure
- budget for reactive clearing and maintenance requirements if future heavy rainfall events impact assets that are already damaged.

Emergency management is listed as an emerging risk in Auckland's long-term plan

Auckland Council (2024) makes numerous statements throughout their long-term plan on the uncertainty of budgeting, given the increasing effects of climate change and population growth in Auckland. While not directly attributable to the NIWE themselves, the NIWE played a significant role in prioritising council budget towards infrastructure resilience against natural hazards. There has been additional spending towards risk-reduction in the face of future weather events, namely:

- the inception of a Storm Response Fund for operating activities to prepare for and respond to future storm events. This provides \$20 million per year of operating funding for programmes to increase infrastructure maintenance and monitoring, and enhance resilience.
- Auckland Transport projects valued at \$2.3 billion over 30 years to enhance resilience and adaptation of the transport network.
- Tātaki Auckland Unlimited fund of \$3.6 million over 10 years for proactive infrastructure resilience.
- the Shoreline Adaptation Plan Programme of \$34 million over 10 years to implement coordinated adaptation planning for council-owned coastal land and assets.



We understand that these areas of spending exceed the initial \$11 million laid out in the Climate investment package outlined in the 2021-2031 Long Term Plan.²⁶ This \$11 million was considered part of the 'base' spending for increasing capability to plan for and respond to natural hazards (Auckland Council, 2021).

5.2.2.2 Hawke's Bay Regional Council's response to the NIWE

The Hawke's Bay Regional Council (HBRC) Annual Report for the financial year 2022/23 outlines major spending and variances relative to its original budget (Hawke's Bay Regional Council, 2023), attributing a majority of these variances to the North Island Weather Events. Below we draw on more recent information to capture the latest information on HBRC's spending relating to the NIWE and noting relevant contributions from central government (which should be captured in our analysis in section 4).

Between 2023 and 2025, HBRC have incurred \$67 million in direct response and recovery costs from the NIWE

The HBRC Corporate and Strategic Committee identify \$66.85 million of spending by HBRC relating to the NIWE (Hawke's Bay Regional Council, 2025). Of this, around 67 per cent was for infrastructure,13 per cent was for welfare, while 20 per cent was for other response and recovery related expenses. Details of these expenses are outlined in Table 12.

Close to 70 per cent of these expenses are funded through the other income line, which includes \$13.8 million in NEMA funding. Additionally, central government provided \$5.8 million of funding for welfare-related costs.

Council reserves funded 16 per cent of NIWE expenditure. However, reserves played a more significant role in the immediate response following the NIWE, funding 38 per cent of expenditure in 2022/23, and scheme disaster reserves funding 15 per cent of expenditure in 2023/24.

| | 2022/23 | 2023/24 | 2024/25 year to March | Forecast | Total |
|----------------|---------|---------|--------------------------|----------|--------|
| Costs | | | | | |
| Infrastructure | 22.46 | 20.14 | 2.24 | | 44.84 |
| Welfare | 8.49 | | | | 8.49 |
| Other | 8.79 | 4.20 | 0.53 | | 13.52 |
| Total costs | 39.74 | 24.34 | 2.77 | | 66.85 |
| Funding | | | | | |
| Other income | -15.16 | -12.55 | -4.85 | -13.73 | -46.29 |
| General rate | | -3.12 | -0.13 | | -3.25 |
| Internal loans | -9.64 | -5.66 | | 8.53 | -6.76 |
| Reserves | | | | | |

Table 12: HBRC expenditure on the NIWE to date (\$ millions)

²⁶ This is outlined as the preferred option on p. 435 of Auckland Council (2021) which we understand was subsequently recognised following discussion with the Auckland Council Natural Hazards Team.



| | 2022/23 | 2023/24 | 2024/25 year to March | Forecast | Total |
|--------------------------|---------|---------|--------------------------|----------|--------|
| Scheme disaster reserves | | -3.54 | | | -3.54 |
| Council disaster damage | -6.81 | 0.18 | 2.61 | 2.52 | -1.50 |
| reserves | | | | | |
| General reserve | -5.45 | 0.36 | -0.40 | | -5.49 |
| Emergency management | -2.68 | | | 2.68 | |
| reserve | | | | | |
| Total funding | -39.74 | -24.34 | -2.77 | | -66.85 |

Source: Hawke's Bay Regional Council (2025), retrieved from hawkesbay.infocouncil.biz

Further, following discussion with HBRC, central government has allocated sediment, debris and commercial funds in response to the silt and debris across the Hawke's Bay region. This is outlined in Table 13.

Table 13: Breakdown of sediment, debris and commercial funds allocated by central government in the Hawke's Bay region (\$ millions)

| Central government funding allocation | Spent |
|---------------------------------------|--------|
| Woody debris | 3.71 |
| Commercial fund | 40.40 |
| Silt debris | 154.30 |
| Total | 198.41 |

Source: Sapere correspondence with HBRC

The central government allocation for silt debris is broken down in Figure 29. From the \$154.30 million, five per cent was allocated to HBRC, while 79 per cent was allocated to the taskforce to bridge locally led recovery plans with government and private sector work.

Figure 29: Silt debris funding allocation across Hawke's Bay councils



Source: Sapere correspondence with HBRC



HBRC is also part of the Future of Severely Affected Land (FOSAL) agreement with central government, which allocates \$256 million for cyclone-recovery work. \$209 million of this is from central government, while \$47 million is from HBRC.

5.2.2.3 Gisborne District Council's response to the NIWE

The Gisborne District Council incurred at least \$137.8 million in NIWE response and recovery costs, with a total cost estimate of approximately \$1.2 billion over several years

The Gisborne District Council 2022/23 and 2023/24 annual reports highlight an estimated \$137.8 million in response and recovery costs following the NIWE in the 2023 and 2024 financial years, including:

| Areas of expenditure | 2022/23 | 2023/24 |
|----------------------------------|---------|---------|
| Road reinstatement costs | 51.0 | 68.1 |
| Water network reinstatement | 2.9 | |
| Waipaoa flood control | 4.0 | 8.7 |
| Mayoral Disaster Relief payments | 2.8 | 0.3 |
| Total | 60.7 | 77.1 |

Table 14: NIWE-related expenditure incurred by Gisborne District Council (\$ millions)

The 2022/23 annual report estimates that the total lifetime response and recovery costs from the NIWE could reach \$1.2 billion. This includes:

- estimates that fully restoring the road network could reach \$425 to \$725 million, noting that a portion of this cost would be covered by NZTA Waka Kotahi
- \$31.4 million allocated for silt and woody debris emergency response (2022/23) with central government funding of \$53.4 million in 2023/24
- enhancing resources in monitoring and compliance areas with forestry practices in Te Tairāwhiti
- the expansion of the council land management team as part of the Integrated Catchment Management activity
- enhancing the resilience of flood protection infrastructure in Te Tairāwhiti.

5.3 Private insurance claims expenditure on natural hazards

The Insurance Council of New Zealand publishes data on natural disasters that have occurred in New Zealand since 1968, along with the total cost to the insurance industry in paying claims for damage that arose from those natural disasters. Over the period, a total of \$32.2 billion has been paid in claims, with nearly \$23 billion paid in 2011.

The claims data is summarised below, noting these are reported by calendar year rather than financial year which is used for the central government's finances. Further, claims are grouped around the year that the event(s) occurred which may differ (likely earlier) to when the associated claim or spending



occurred. The spike in private insurance claims in 2016 reflects the Kaikōura earthquake. A spike in private insurance claims is then seen in 2023 due to the NIWE.



Figure 30: Insurance claims costs relating to natural disasters in New Zealand (\$ millions)

Source: Sapere analysis, using data from Insurance Council of New Zealand (2023)

5.4 Others also incur costs as a result of natural disasters

In addition to central government, local government, and private insurance costs associated with natural disasters, others also incur spending and are impacted by natural hazards as illustrated when talking about the costs of natural disasters in sections 2.3 and 2.4.2. This includes iwi/Māori, NGOs, and private entities and individuals. For instance, Kenney et al. (2015) discuss "a Māori response to Ōtautahi (Christchurch) earthquakes." Additionally, NGOs such as the Red Cross have supported responses to natural disasters, and initiatives such as the Student Volunteer Army and "Pack the Bus" followed the Canterbury earthquakes and NIWE.

Further, in addition to the insurance claims noted above, private entities, individuals and households also:

- contribute to support initiatives such as targeted support and contributions to the likes of mayoral relief funds and other NGO's support noted above
- face the costs of excesses on insurance policies, uninsured costs and other direct and indirect costs associated with natural hazards
- incur costs related to preparing for natural disasters such as through purchasing emergency supplies.



References

Abdeljawad, Y., & Noy, I. (2024). The impact of the Christchurch earthquakes (2010–2011) on labour productivity in the Canterbury region in New Zealand. *Environmental Hazards*, *0*(0), 1–16. https://doi.org/10.1080/17477891.2024.2355312

Auckland Council. (2021). 10-year Budget 2021-2031.

https://www.aucklandcouncil.govt.nz/externalcontentdelivery/consultations/budgets/10-yearbudget-2021-2023/10-year-budget-2021-2031-supporting-information.pdf

Auckland Council. (2023a, July 25). Cost of flooding and cyclone events could hit \$4 billion. OurAuckland. https://ourauckland.aucklandcouncil.govt.nz/news/2023/07/cost-of-floodingand-cyclone-events-could-hit-4-billion/

Auckland Council. (2023b, October 10). Auckland Council and Crown agree to cost sharing agreement for storm recovery and resilience work. OurAuckland.

https://ourauckland.aucklandcouncil.govt.nz/news/2023/10/auckland-council-and-crownagree-to-cost-sharing-agreement-for-storm-recovery-and-resilience-work/

Auckland Council. (2024). Long-term Plan 2024-2034, vol. 1.

https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plansstrategies/budget-plans/Documents/long-term-plan-2024-2034-vol-1.pdf

Australian Government - NEMA. (n.d.). *Earthquake—Christchurch, New Zealand 2011*. Retrieved November 29, 2024, from https://knowledge.aidr.org.au/resources/earthquake-christchurchnew-zealand-2011/

Climate Change Commission. (2024). *Progress report: National Adaptation Plan*. https://www.climatecommission.govt.nz/public/Monitoring-and-reporting/NAPPA-2024/CCC-NAPPA_bookmarked2.pdf



Crown Infrastructure Partners. (n.d.). Publications. *CIP*. Retrieved October 11, 2024, from https://crowninfrastructure.govt.nz/about/publications/

Deloitte. (2017). Cost of the Earthquake to the Council.

https://www.ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Strategies/Global-Settlement/Cost-of-the-earthquakes-Deloitte-Report-Final.pdf

Deloitte Access Economics. (2016). The economic cost of the social impact of natural disasters.

Department of Internal Affairs. (2023). Briefing to the Incoming Minister of Local Government.

Department of Internal Affairs. (2024, April 23). *Government Inquiry into the Response to the North Island Severe Weather Events—Dia.govt.nz.* https://www.dia.govt.nz/Government-Inquiry-intothe-Response-to-the-North-Island-Severe-Weather-Events

Department of the Prime Minister and Cabinet. (2023a, January 26). *Policy and law*. https://www.dpmc.govt.nz/our-programmes/policy-project/policy-advice-themes/policy-andlaw

- Department of the Prime Minister and Cabinet. (2023b, January 27). *Disestablishment of CERA*. https://www.dpmc.govt.nz/our-programmes/greater-christchurch-recovery-and-regeneration/greater-christchurch-group/roles-and-responsibilities/disestablishment-cera
- Department of the Prime Minister and Cabinet. (2023c, September 18). CO (23) 9: Investment Management and Asset Performance in Departments and Other Entities. https://www.dpmc.govt.nz/publications/co-23-9-investment-management-and-assetperformance-departments-and-other-entities
- Hausfather, Z. (2023, January 18). *State of the climate: How the world warmed in 2022*. Carbon Brief. https://www.carbonbrief.org/state-of-the-climate-how-the-world-warmed-in-2022/



Hawke's Bay Regional Council. (2023). *Hawke's Bay Regional Council Annual Report 2022/23*. https://www.hbrc.govt.nz/assets/Document-Library/Reports/Annual-Report-2022-2023/HBRC-2022-2023-Annual-Report.pdf

Hawke's Bay Regional Council. (2025). *Meeting of the Corporate and Strategic Committee*.

https://hawkesbay.infocouncil.biz/Open/2025/05/CS_21052025_AGN_AT.PDF

Insurance Council of New Zealand. (n.d.). *Insurance Council of New Zealand—Te Kāhui Inihua o Aotearoa*. ICNZ | Insurance Council of New Zealand. Retrieved February 21, 2025, from https://www.icnz.org.nz/

Insurance Council of New Zealand. (2022). Canterbury Earthquakes.

https://www.icnz.org.nz/industry/canterbury-

earthquakes/#:~:text=Total%20economic%20losses%20for%20the,were%20received%20in%2 0that%20time.

Insurance Council of New Zealand. (2023). Cost of natural disasters. ICANZ.

https://www.icnz.org.nz/industry/cost-of-natural-disasters/

- Kenney, C. M., Phibbs, S. R., Paton, D., Reid, J., & Johnston, D. M. (2015). *Community-led disaster risk* management: 19(1).
- Lloyd's. (2018). A world at risk: Closing the insurance gap. https://assets.lloyds.com/assets/pdf-lloydsunderinsurance-report-final/1/pdf-lloyds-underinsurance-report-final.pdf
- Ministry for the Environment. (2022). *Aotearoa New Zealand's first national adaptation plan*. https://environment.govt.nz/assets/publications/climate-change/MFE-AoG-20664-GF-National-Adaptation-Plan-2022-WEB.pdf



Ministry for the Environment. (2023, October 11). *New report highlights pressures on Aotearoa New Zealand's climate*. Ministry for the Environment. https://environment.govt.nz/news/new-report-highlights-pressures-on-aotearoa-new-zealands-climate/

Ministry of Business, Innovation and Employment. (n.d.). *Resilience to Nature's challenges* | *Kia manawaroa—Ngā Ākina o Te Ao Tūroa*. Retrieved October 11, 2024, from https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/investment-funds/national-science-challenges/the-11-challenges/resilience-to-natures-challenges

National Emergency Management Agency. (n.d.). *Response, other response and recovery claims following an emergency event*. Retrieved April 9, 2025, from https://www.civildefence.govt.nz/cdem-sector/guidelines/claims-factsheets/response-other-

response-and-recovery-claims-following-an-emergency-event

National Emergency Management Agency. (2023). Briefing to the Incoming Minister for Emergency Management.

National Science Challenges. (2024, June 26). *What Happens to Resilience to Nature's Challenges from July 2024?* Https://Resiliencechallenge.Nz/. https://resiliencechallenge.nz/what-happens-to-resilience-to-natures-challenges-from-july-2024/

Natural Hazards Commission. (n.d.-a). *Natural Hazard Fund*. Retrieved November 22, 2024, from https://www.naturalhazards.govt.nz/about-nhc/how-we-work/natural-hazard-fund/

Natural Hazards Commission. (n.d.-b). *Natural Hazards Portal: Claims map*. Retrieved September 22, 2024, from https://www.naturalhazardsportal.govt.nz/s/claims-map

Natural Hazards Commission. (2018, October 29). *EQC's Crown guarantee funding*. https://www.naturalhazards.govt.nz/news/eqcs-crown-guarantee-funding/



Natural Hazards Commission. (2025, February 21). Our publications.

https://www.naturalhazards.govt.nz/our-publications/

NEMA. (2020, November 9). The 4 Rs. https://www.civildefence.govt.nz/cdem-sector/the-4rs

New Zealand Government. (2024a, May 30). *Regional resilience and prosperity focus of new fund*. https://www.beehive.govt.nz/release/regional-resilience-and-prosperity-focus-new-fund

New Zealand Government. (2024b, July 1). *Natural Hazards Commission*. New Zealand Government. https://www.govt.nz/organisations/natural-hazards-commission/

New Zealand House of Representatives. (2024). *Inquiry into climate adaptation*.

https://selectcommittees.parliament.nz/download/SelectCommitteeReport/73e0779f-249d-4067-9ec8-08dce18146d9

New Zealand Infrastructure Commission. (2025). *Invest or insure? Preparing infrastructure for natural hazards*. New Zealand Infrastructure Commission/Te Waihanga.

https://tewaihanga.govt.nz/our-work/research-insights/invest-or-insure

New Zealand Parliament. (n.d.). *Chapter 31 Appropriations and Authorisations*. Retrieved July 31, 2024, from https://www.parliament.nz/mi/visit-and-learn/how-parliament-works/parliamentarypractice-in-new-zealand/chapter-31-appropriations-and-authorisations/

New Zealand Transport Authority. (n.d.-a). *Crown Resilience Programme (CRP)*. Retrieved October 11, 2024, from https://www.nzta.govt.nz/planning-and-investment/crown-resilience-programme/

New Zealand Transport Authority. (n.d.-b). *National Land Transport Programme funding data* | *NZ Transport Agency Waka Kotahi*. Retrieved October 11, 2024, from https://www.nzta.govt.nz/planning-and-investment/learning-and-resources/transportdata/national-land-transport-programme-funding-data/



New Zealand Treasury. (2013). A Guide to Appropriations. The Treasury, New Zealand. https://www.treasury.govt.nz/sites/default/files/2013-11/guide-appropriations-2013.pdf

New Zealand Treasury. (2017). *Half Year Economic and Fiscal Update 2017*. https://www.treasury.govt.nz/sites/default/files/2018-02/hyefu17.pdf

New Zealand Treasury. (2020). Update on Infrastructure Reference Group (IRG) Infrastructure Projects Information Release. https://nationalinfrastructure.govt.nz/wp-content/uploads/Cabinetpaper_update-on-infrastructure-reference-group-irg-infrastructure-projects-24-jun-2020.pdf

New Zealand Treasury. (2021, March 26). *Better Business Cases—Investing for Change for Better Value*. The Treasury. https://www.treasury.govt.nz/information-and-services/state-sectorleadership/guidance/planning/better-business-cases-investing-change-better-value

New Zealand Treasury. (2023a). *Half Year Economic and Fiscal Update 2023*. The Treasury, New Zealand. https://www.treasury.govt.nz/sites/default/files/2023-12/hyefu23.pdf

New Zealand Treasury. (2023b). Impacts from the North Island weather events.

https://www.treasury.govt.nz/sites/default/files/2023-04/impacts-from-the-north-islandweather-events.pdf

- New Zealand Treasury. (2023c). North Island Weather Events Response and Recovery Funding. The Treasury. https://www.treasury.govt.nz/information-and-services/nz-economy/climatechange/north-island-weather-events-response-and-recovery-funding
- New Zealand Treasury. (2024a). *Budget Economic and Fiscal Update 2024*. The Treasury, New Zealand. https://www.treasury.govt.nz/sites/default/files/2024-05/befu24.pdf

New Zealand Treasury. (2024b). *Climate Adaptation: Priorities for Future Work* (Treasury Report T2024/584). The Treasury, New Zealand. https://www.treasury.govt.nz/sites/default/files/2024-10/oia-20240728.pdf


New Zealand Treasury. (2024c). Funding and Risk Management Statement for Natural Hazards Commission Toka Tū Ake. The Treasury, New Zealand.

https://www.treasury.govt.nz/sites/default/files/2024-08/funding-risk-management-

statement-natural-hazards-commission.pdf

New Zealand Treasury. (2024d, May 30). Guide to the Budget process.

https://www.treasury.govt.nz/publications/guide/guide-budget-process

New Zealand Treasury. (2024e, August 20). Glossary.

https://www.treasury.govt.nz/publications/guidance/glossary

- New Zealand Treasury. (2025, March 28). North Island Weather Events Response and Recovery Funding. https://www.treasury.govt.nz/information-and-services/nz-economy/climate-change/northisland-weather-events-response-and-recovery-funding
- New Zealand Treasury & Ministry for the Environment. (2023). Ngā Kōrero Āhuarangi Me Te Ōhanga: Climate Economic and Fiscal Assessment 2023.

https://www.treasury.govt.nz/sites/default/files/2023-04/cefa23.pdf

- NIWA. (n.d.). *Climate change and possible impacts for New Zealand*. Retrieved August 9, 2024, from https://niwa.co.nz/climate-change-information-climate-solvers/climate-change-and-possible-impacts-new-zealand
- NZIER. (2020). Investment in natural hazards mitigation: Forecasts and findings about mitigation investment.
- NZIER. (2024). Economics of flood risk mitigation: . A report for Greater Wellington Regional Council and Rivers Group of Regional Councils. Greater Wellington Regional Council. https://www.gw.govt.nz/assets/Documents/2024/05/NZIER-Economic-assessment-of-Climate-Resilience-Flood-Risk-Mitigation-9-May-2024-FINAL.pdf



Office of the Auditor General. (2020). Analysing government expenditure related to natural hazards. https://oag.parliament.nz/2020/natural-hazards/docs/natural-hazards.pdf

Parker, M. (2012). The economic impact of the Canterbury earthquakes. 75(3).

- Parliamentary Counsel Office. (n.d.). *National Civil Defence Emergency Management Plan Order 2015* (*LI 2015/140*) (as at 05 April 2023). Retrieved September 24, 2024, from https://www.legislation.govt.nz/regulation/public/2015/0140/latest/whole.html#DLM6486666
- Potter, S. H., Becker, J. S., Johnston, D. M., & Rossiter, K. P. (2015). An overview of the impacts of the 2010-2011 Canterbury earthquakes. *International Journal of Disaster Risk Reduction*, *14*, 6–14. https://doi.org/10.1016/j.ijdrr.2015.01.014
- Radio New Zealand. (2023a, January 31). *Auckland flood victims: The four people killed in extreme and unprecedented weather event*. RNZ. https://www.rnz.co.nz/news/national/483404/auckland-flood-victims-the-four-people-killed-in-extreme-and-unprecedented-weather-event
- Radio New Zealand. (2023b, February 20). *Cyclone Gabrielle: Who are the 11 victims?* RNZ. https://www.rnz.co.nz/news/national/484536/cyclone-gabrielle-who-are-the-11-victims
- Royal Commission of Inquiry into Building Failure Caused by the Canterbury Earthquakes. (2012). Canterbury Earthquakes Royal Commission. https://canterbury.royalcommission.govt.nz/
- Southern Response. (n.d.). *Annual Reports*. Retrieved February 21, 2025, from https://www.southernresponse.co.nz/library/annual-reports/

Te Uru Kahika: Regional Unitary Councils Aotearoa. (2022). Flood Risk Mitigation Aotearoa.

The Treasury. (2023, May 17). North Island Weather Events (NIWE) Recovery and Response Funding Document Library. https://www.treasury.govt.nz/publications/data/north-island-weatherevents-niwe-recovery-and-response-funding-document-library

The Treasury, & Ministry for the Environment. (2023). Climate Economic and Fiscal Assessment 2023.



Appendix A Further detail on central government funding

Having discussed the nature of spending figures that are reported for central government in section 3.1.1, below we discuss the other key distinctions highlighted in relation to the level of commitment and types of appropriations and funding. This extends slightly further than the distinctions highlighted earlier in the report.

Level of commitment

The level of commitment, at its broadest, includes (in decreasing order of commitment):

- spent
- funded
- unfunded.

There are a number of further distinctions or sub-components, which we illustrate in Table 14.

| Broad category | Distinct components |
|---------------------------|---|
| Spent | Actual expense |
| Funded | Appropriated (and committed) |
| | Appropriated (and planned) |
| | Appropriated only |
| | Tagged contingency or in-principle approvals to draw on general contingency ²⁷ |
| Unfunded/pre- approval | Being considered (business case or budget/funding initiative in decision-making process) ²⁸ |
| | In planning (business case or budget/funding initiative being developed), (capital) intentions, or ideas yet to be approved for development |

Table 15: Categories of potential expenditure (from most to least committed or certain)

²⁷ Contingencies are where funding is put aside as part of the government's budget but is not yet allocated to appropriations. There is usually a 'between budget contingency' for items that come up between budget, but can also be specific tagged contingencies when further detail (and approval) is needed prior to allocating the funding to particular appropriations.

²⁸ Cabinet requires the use of the Better Business Cases framework for all significant investment proposals from all state sector agencies in scope of the circular, (see (Department of the Prime Minister and Cabinet, 2023c; New Zealand Treasury, 2020). Separately, central government budget processes require budget initiatives for funding proposals, see the Treasury, (2024d). Cabinet requires the use of the Better Business Cases framework for all significant investment proposals from all state sector agencies in scope of the circular, (see (Department of the Prime Minister and Cabinet, 2023c; New Zealand Treasury, 2021). Separately, central government budget processes require budget initiatives for processes require budget initiatives for funding proposals, see New Zealand Treasury (2024d).



| Broad category | Distinct components |
|----------------|--|
| | Risks, including contingent liabilities (potential costs or income to the Crown that depend on whether particular events occur) and general and specific fiscal risks (such as those relating to policy change, cost pressure or variance risks) ²⁹ |

We focus on the first two of these categories in the sections below, and distinguish which we are referring to. As contingencies are not separately reported, our reporting of funding for future years will not pick up funding set aside in contingencies (so will understate by the extent of any tagged contingencies). As discussed next, we separately consider the size of built up funds.

Different types of appropriations and funding

We set out the different types of appropriations here, how these relate to different funding arrangements, and how this relates to our analysis in the sections below.

The key aspects over which appropriations can differ are:

- **capital/operating**: depending on whether the funding is for operational expenses or to acquire or develop assets (including the purchase of equity of making a loan)—these can be used to support different forms of central government funding as illustrated in Box 4 below.
- **spending agency**: where appropriations distinguish between outputs supplied by departments (*departmental*) or supplied to or on behalf of the Crown, typically by Crown entities and non-government organisations (*non-departmental*).
- **revenue source:** most appropriations are paid for directly by the Crown, but there are also Revenue Dependent Appropriations (RDAs) that allow for expenses to be incurred from non-Crown revenue sources (such as levies, fees, and user charges).
- **flexibility**: where (typical) *annual output class* appropriations allow for expenditure within one output class only for a particular year, *multi-category appropriations (MCAs)* which allow funding to be used flexibly across more than one category of outputs that all contribute to a single overarching purpose (but within a particular year), and *multi-year appropriations (MYAs)* which allow flexibility in the use of funding across years where the timing of outputs or capital expenditure between the years is uncertain.
- Other: this includes the following:
 - **Permanent legislative authorities (PLAs)** where approval is needed for spending of a technical nature, where assurance is needed, or to signal commitment.
 - **Benefits or related expenditure** where the Crown wishes to transfer resources and does not expect anything directly in return (e.g. social security, student allowances, education scholarships).
 - **Borrowing expenses** used to authorise the payment of interest and other financing expenses on loans or public securities.



- Intelligence and security appropriations, which authorise both expenses and capital expenditure for the New Zealand Security Intelligence Service or the Government Communications Security Bureau.
- **Other** such as subscriptions.

These distinctions are shown in Table 15. Separately, people often talk of initiatives (which could be funded through funds), projects and programmes. These are all different types of things that the government may fund. For our purposes, it is not necessary to make such distinctions, so these terms are not discussed further. However, we illustrate the different options for flexibility in appropriations in Figure 30, and set out how different forms of funding arrangements would be picked up in appropriations in the box that follows.

| Factor | Distinct options | | | | |
|------------------------------------|---------------------------|---|--|--|--|
| Туре | Capital | Operating | | | |
| Spending agency | Department | Non-departmental | | | |
| Revenue source | Crown | Other (Revenue Dependent Appropriation) | | | |
| Flexibility: scope of category/ies | Output class (individual) | Multi Category Appropriation | | | |
| Flexibility: timing | Annual | Multi Year Appropriation | | | |
| Authority | Appropriations Act | Permanent Legislative Authority granted in other Acts | | | |

Table 16: Key points of distinction for different appropriation types







MYA = Multi Year Appropriation

Box 4: Forms of central government funding provision

The following are key forms of funding by the Crown where we explain how these relate to appropriations and the Crown's balance sheet.

Grants/expenses: these expenses are appropriated and expensed (so come through the statement of profit and loss without impacting the balance sheet).

Equity: a purchase of equity is a capital injection. A capital contribution to a department does not require an appropriation, but beyond that would require a capital appropriation, and any revaluations or loss on sale would require a separate appropriation. These would impact the Crown's balance sheet as well.

Debt: like equity, a non-departmental capital appropriation would be required for the Crown to purchase debt instruments, and if there were a write-off or forgiveness of Crown debt, this would require a non-departmental 'other' expense. These would impact the Crown's balance sheet as well.

Funds: any funding invested in a particular fund (e.g. the Natural Hazard Fund) requires an appropriation at the time of the investment for the amount invested, with the types reflecting the nature of the funding (e.g. operating or capital). If capital funding, then these investments and any revaluations would impact the Crown's balance sheet also. In some circumstances, a tagged contingency may be agreed, with finding appropriated separately only when decisions are made to allocate funding from the tagged contingency.



Appendix B Key search terms used

We searched through the appropriations data for any of the key search terms below, and subsequently assigned a confidence level based on the information that was available.

| Event | storms | renewal |
|-------------------|----------------------|------------------|
| earthquake | emergency management | resilience |
| earthquakes | civil emergency | recover |
| aftershocks | emergency | recovery |
| seismic | bushfire | inquiry |
| cyclone | erosion | protection |
| weather | geohazard | protect |
| tsunami | geohazards | respond |
| natural event | | response |
| natural events | Impact | enhancement |
| natural hazard | stormwater | enhance |
| natural hazards | landslide | demolition |
| natural disaster | landslip | demolish |
| natural disasters | sediment | rebuild |
| flood | debris | strengthening |
| floods | disaster | strengthen |
| flooding | hazard | awareness |
| tornado | runoff | monitoring |
| volcano | dam breach | monitor |
| eruption | drains | readiness |
| snow | floodgates | ex gratia |
| rain | pump stations | prepare |
| drought | river structures | reduce |
| storm | | warning |
| frost | | detection |
| hail | Action | detect |
| lightening | restoration | relocate |
| thunder | restore | relocation |
| storm | maintain | stop bank |
| deluge | maintenance | bank |
| rainfall | renew | temporary bridge |



| Bailey bridge | R |
|---------------------------|---|
| research | C |
| support | C |
| clean-up | Н |
| cleanup | К |
| clean up | K |
| insure | Ν |
| insurance | А |
| reinstatement | Т |
| reinstate | Ν |
| claim | V |
| claims | Н |
| control | Н |
| geonet | В |
| forecast | V |
| retrofit | G |
| writing off | Ν |
| standard | S |
| Sector | В |
| biodiversity | C |
| forestry | L |
| rail | G |
| state highway | Ν |
| infrastructure | E |
| regional development | C |
| economic development | S |
| infrastructure investment | G |
| water | V |
| Civil Defence | C |
| CDEM | Р |
| | Н |

Region Christchurch Canterbury lurunui aikoura laikōura lelson uckland asman Iorthland Vairoa lawke's Bay lawkes Bay Suller Vest Coast ireymouth /arlborough eddon lenheim larence ake Grassmere Sisborne lapier sk Valley Coromandel outhland iore Vaiau Queenstown ort Hills lastings Tairawhiti

Tairāwhiti **Pleasant Point** White Island Ngongotaha North Island Edgecumbe Bay of Plenty Milford Hurunui/Kaikoura **Event name** Gita Fehi Pam Lusi Gabrielle Gretel Dovi Auckland Anniversary Weekend floods Auckland Anniversary floods Hale Hunga-Tonga-Hunga-Ha'pai eruption North Island Weather Events Debbie NIWE NISWE North Island severe weather events Southern Response Earthquake Commission EQC



Using 'action' keywords to determine 4Rs category

| Risk Reduction | Recovery |
|----------------|--|
| reduce | restoration |
| strengthen | restore |
| strengthening | rebuild |
| maintain | recover |
| maintenance | recovery |
| resilience | renew |
| enhance | renewal |
| enhancement | temporary bridge |
| protect | Bailey bridge |
| protection | ex gratia |
| control | reinstatement |
| retreat | reinstate |
| relocate | clean up |
| stop bank | clean-up |
| geonet | cleanup |
| standard | claim |
| | claims |
| | insurance |
| | insure |
| | demolition |
| | demolish |
| | demolition |
| | demolish |
| | Risk Reduction reduce strengthen strengthening maintain maintenance resilience enhancement protection control retreat relocate stop bank geonet standard |



Appendix C Summary of sources of information used to determine natural hazards spend

Table 17: Summary of sources of information used to determine natural hazards spend

| Vote/category | Appropriations data used? | Other data used |
|--|---------------------------|---|
| Arts, Culture and Heritage | Yes | N/A |
| Building and Housing | | |
| Canterbury Earthquake Recovery | | |
| Defence | | |
| Defence Force | | |
| Economic Development and Employment | | |
| Finance | | |
| Internal Affairs | | |
| Lands | | |
| Primary Industries | | |
| Primary Industries and Food Safety | | |
| Science and Innovation | | |
| Agriculture, Biosecurity, Fisheries and Food Safety | Yes | NIWE-related spend over 2023-2024 is based on the latest NIWE quarterly |
| Building and Construction | | financial reporting (Q3 2024). |
| Business, Science and Conservation | | |
| Forestry | | |
| Housing | | |
| Prime Minister and Cabinet | | |
| Social Development | | |
| Statistics | | |
| Te Arawhiti | | |
| Transport | | |
| Education | Not captured by | NIWE-related spend over 2023-2024 is |
| Māori Development | keyword search | based on the latest NIWE quarterly |
| Health | | financial reporting (Q3 2024). |
| | | |



| Vote/category | Appropriations data used? | Other data used |
|--------------------------|---|---|
| Transport | Yes, excluding National Land Transport Programme | Risk mitigation spend is based on resilience projects from the NLTP dashboard. NIWE-related spend over 2023-2024 is based on the latest NIWE quarterly financial reporting (Q3 2024). This spend is classified as recovery or readiness and response. Given the nature of reporting of the NLTP dashboard, it was not possible to determine central government spend (nor levy-based or local government spend) specifically on recovery and response NLTP activities before NIWE. |
| Shovel-ready projects | No | Crown Infrastructure Partners IRG Quarterly reports |
| Private insurance claims | No | ICNZ data |
| EQC claims | No | Cash Flow Statements in EQC Annual Reports |
| Southern Response claims | No | Notes the accounts in Southern Response Annual Reports |
| Science Challenges | No | Resilience Challenge funded by MBIE over 2014-2024 for a total of up to \$59.5M (\$5.94M p.a. on average). New Natural Hazards Resilience Platform of \$10M p.a. over 2025-2032. |



Appendix D Interpretation, limitations and discrepancies with earlier analysis

Our findings and analysis should be read with an understanding of the approach taken, and the limitations of this approach and the data available to us. In particular:

- the information we are interested in examining is not clearly set out, so it has been necessary to develop an approach to identify relevant spending.
- our estimates of central government spend are likely to be underestimated. We have, as a base, relied on government appropriations data and a keyword search to determine whether spend was related to natural hazards. If an appropriation was used for natural hazard spending but does not explicitly mention this in the particulars of an appropriation, it will not be captured.
- where we do identify relevant appropriations, the scope of appropriations may be broad and difficult to attribute solely to risk reduction, readiness, response, or recovery activities.
- our results rely on the approach used and data available, including the terminology, budgeting, and reporting developed by officials and agreed by decision-makers.
- we have attempted to identify any spending that our approach would have incorrectly identified as a relevant category of spending (false positives) and correct for this where possible, but our results otherwise rely on the criteria for inclusion that we have applied.
- there will be relevant spending that is indirect or where key search terms are not used, which
 is not captured in our results (e.g. maintenance or elements of wider projects/programmes). In
 acknowledgment of this, we have separately examined larger areas of expenditure where we
 expect this to be the case, but there may be a number of other areas which will not be
 captured.

Here we note that:

- our approach is likely to underestimate central government spending
- we are constrained by the naming conventions applied to appropriations
- it is possible that we could pick up 'false positives' but have taken steps to manage this risk
- our results do not fully reconcile with earlier OAG analysis and we note the extent of variation and why this may be.

Our approach is likely to underestimate central government spend

As noted, using a keyword approach only captures government appropriations that are specifically for the purpose of natural hazard spending. There are a number of appropriations where the scope is broad and would reasonably capture spending on business-as-usual activities that respond to natural hazards, as well as potentially responding to or reducing the risk of natural hazards.



In our analysis, we estimate that central government spending on the Canterbury earthquakes totalled \$9.2 billion.³⁰ However, a review of New Zealand Government financial statements reveals approximately \$15 billion in expenditure related to the earthquakes. The discrepancy is primarily due to the exclusion of EQC claims from the appropriations data, which is consistent with the findings of the Office of the Auditor General (OAG) in their 2020 report which we have reported separately.

It is important to note that when we compare appropriations from 2011 to 2017 against the financial statements, our estimate exceeds what is reported in the financial statements. This suggests that there may be timing differences between appropriated spending and what is recorded in financial statements. Given that financial statements also account for losses, we believe that our appropriations-based analysis may provide a more precise estimate of government expenditure for the Canterbury earthquakes in the years covered by our study.

Furthermore, as noted previously, we have undertaken a separate analysis for key spend areas that would not otherwise be picked up by a pure keyword search.

Limitations of the appropriations analysis

As noted by Office of the Auditor General (2020), the analysis on appropriations was limited to the information provided in the appropriation dataset. Appropriation scope statements are required to be short and therefore cannot always be detailed when there is authorisation for a broad scope.

We are therefore confident that this analysis has accurately captured central government expenditure that is directly associated with natural hazards and natural disasters but may not capture their associated indirect costs.

As with the OAG, this analysis is an exploratory piece of work, although we have carried out wider engagement to complement the results from this analysis.

There is a possibility of picking up false positives

There may be instances of capturing appropriations in our analysis that do not involve spending on natural hazards. In particular, this occurs with vague keywords such as "emergency." While we find that most appropriations that contain the keyword "emergency" pertain to natural hazards, there are also a few that do not, including fuel and energy, health, and social emergencies.

In this particular instance, we have manually refined the data to exclude "emergency" appropriations that are not relevant to natural hazards and have also gone through the data manually to remove any further irrelevant appropriations. However, due to the large number of appropriations, we have not perused low value "emergency" appropriations. We do not perceive this to be a significant issue as we are likely underestimating central government spend.

³⁰ For the purpose of comparison, we extended our analysis to 2011, noting potential data discrepancies with older expenditure tables.



Our results differ to those reported by the OAG

As outlined earlier, we have drawn from the approach taken by the Office of the Auditor General (2020). However, we have extended the approach taken in that paper and included additional information sources and more recent data. Given this, our results differ from those stated in Office of the Auditor General (2020). In the following Appendix, we present our findings if we limit our information source and approach to be more similar to that taken by the OAG. However, our results still differ when undertaking this exercise as outlined together with the potential reasons for this.



Appendix E Reconciliation with the OAG (2020) Report

The Office of the Auditor General (2020) estimates an additional \$2.2 billion in natural hazard spend between 2010 and 2018. The report breaks down spending by event, and we find that our calculations are equivalent to the OAG report for erosion, flood, and weather events. Our calculations for earthquakes are also equivalent to the OAG report between 2012 and 2013.

Between 2014 and 2018 we estimate an additional \$642 million in earthquake spending, while the OAG estimates an additional \$2,706 million in unnamed event spending. We have searched the appropriations data extensively, and have not been able to identify the appropriations behind the shortfall.

| Fiscal year | Earthquake | Erosion | Earthquake, tsunami | Flood | Weather | Unknown | Natural disaster | Other emergency | Total value |
|----------------|------------|---------|------------------------|-------|---------|---------|---------------------|--------------------|-------------|
| 2010 | 1.5 | 0.0 | 0.0 | 5.0 | 18.6 | 280.6 | 0.0 | 0.0 | 305.7 |
| 2011 | 2182.0 | 3.3 | 1.0 | 10.0 | 18.6 | 285.0 | 0.0 | 0.0 | 2,499.9 |
| 2012 | 902.6 | 2.1 | 0.0 | 6.2 | 18.6 | 276.0 | 0.0 | 0.0 | 1,205.5 |
| 2013 | 913.6 | 2.2 | 0.0 | 0.0 | 18.6 | 281.7 | 0.0 | 0.0 | 1,216.1 |
| 2014 | 550.6 | 1.7 | 0.0 | 0.0 | 20.0 | 280.8 | 0.0 | 0.0 | 853.1 |
| 2015 | 1134.4 | 2.1 | 0.0 | 0.0 | 18.6 | 289.6 | 0.0 | 0.0 | 1,444.7 |
| 2016 | 1068.7 | 2.1 | 0.0 | 0.0 | 21.2 | 305.2 | 0.0 | 0.0 | 1,397.2 |
| 2017 | 956.6 | 2.0 | 0.0 | 0.2 | 21.9 | 411.8 | 0.0 | 0.0 | 1,392.5 |
| 2018 | 394.1 | 2.6 | 0.0 | 0.2 | 23.4 | 390.5 | 0.0 | 0.0 | 810.8 |
| Total | 8104.1 | 18.1 | 1.0 | 21.6 | 179.5 | 2801.2 | 0.0 | 0.0 | 11,125.5 |

Table 18: Comparison of natural hazard spend against the OAG (2020) report

Sapere (\$m)

OAG (\$m)

| Fiscal year | Earthquake | Erosion | Earthquake, tsunami | Flood | Weather | Unknown | Natural disaster | Other emergency | Total value |
|----------------|------------|---------|------------------------|-------|---------|---------|---------------------|--------------------|-------------|
| 2010 | 0.0 | 0.0 | 0.0 | 5.0 | 18.6 | 0.0 | 0.0 | 12.9 | 36.5 |
| 2011 | 1,347.0 | 3.3 | 1.0 | 10.0 | 18.6 | 26.0 | 0.0 | 31.4 | 1,437.2 |
| 2012 | 902.6 | 2.1 | 0.0 | 6.2 | 18.6 | 13.2 | 0.0 | 15.4 | 958.0 |
| 2013 | 913.6 | 2.2 | 0.0 | 0.0 | 18.6 | 14.7 | 0.0 | 21.0 | 970.1 |
| 2014 | 568.6 | 1.7 | 0.0 | 0.0 | 20.0 | 14.6 | 0.0 | 14.9 | 619.8 |
| 2015 | 1,173.5 | 2.1 | 0.0 | 0.0 | 18.6 | 14.2 | 0.0 | 107.7 | 1,316.1 |
| 2016 | 1,080.4 | 2.1 | 0.0 | 0.0 | 21.2 | 11.8 | 0.0 | 121.3 | 1,236.8 |
| 2017 | 1,080.2 | 2.0 | 0.0 | 0.2 | 21.9 | 0.0 | 0.5 | 171.7 | 1,276.5 |
| 2018 | 827.8 | 2.6 | 0.0 | 0.2 | 23.4 | 0.0 | 1.3 | 145.4 | 1,000.7 |
| Total | 7,893.7 | 18.1 | 1.0 | 21.6 | 179.5 | 94.5 | 1.8 | 641.7 | 8,851.8 |



| Fiscal Year | Earthquake | Erosion | Earthquake, Tsunami | Flood | Weather | Unknown | Natural Disaster | Other Emergency | Total Value |
|----------------|------------|---------|------------------------|-------|---------|----------|---------------------|--------------------|----------------|
| 2010 | -1.5 | 0.0 | 0.0 | 0.0 | 0.0 | -280.6 | 0.0 | 12.9 | -269.2 |
| 2011 | -835.0 | 0.0 | 0.0 | 0.0 | 0.0 | -259.0 | 0.0 | 31.4 | -1,062.7 |
| 2012 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -262.8 | 0.0 | 15.4 | -247.5 |
| 2013 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -267.0 | 0.0 | 21.0 | -246.0 |
| 2014 | 18.0 | 0.0 | 0.0 | 0.0 | 0.0 | -266.2 | 0.0 | 14.9 | -233.3 |
| 2015 | 39.1 | 0.0 | 0.0 | 0.0 | 0.0 | -275.4 | 0.0 | 107.7 | -128.6 |
| 2016 | 11.7 | 0.0 | 0.0 | 0.0 | 0.0 | -293.4 | 0.0 | 121.3 | -160.4 |
| 2017 | 123.6 | 0.0 | 0.0 | 0.0 | 0.0 | -411.8 | 0.5 | 171.7 | -116.0 |
| 2018 | 433.7 | 0.0 | 0.0 | 0.0 | 0.0 | -390.5 | 1.3 | 145.4 | 189.9 |
| Total | -210.4 | 0.0 | 0.0 | 0.0 | 0.0 | -2,706.7 | 1.8 | 641.7 | -2,273.7 |

Difference (\$m - Sapere less OAG)

Note: reported spend is in \$ millions. We do not exclude EQC or Southern Response injections in this reconciliation exercise as these would likely have been included in the OAG report.

Source: Sapere analysis based on the Office of the Auditor General (2020) and appropriations data from the Treasury, retrieved from treasury.govt.nz.

Potential reasons for discrepancies

We acknowledge that a difference of almost \$2.3 billion is material. While the OAG (2020) report outlines aspects of their methodology, we do not have full visibility into the detailed processes and judgements underpinning their results, which limits our ability to replicate their findings precisely. For instance, the complete set of key phrases and associated logic used in their analysis has not been made publicly available. We have identified a number of potential factors that could explain the observed discrepancies, though we are not in a position to quantify the contribution of each. Notably, a significant portion of the difference appears to stem from events that the OAG (2020) categorises as "unknown."

Additional refinement of data

We perform additional refinement of data to categorise appropriations appropriately. This involved identifying appropriations related to events like the Canterbury earthquakes, even when specific terms such as "earthquake" were not explicitly mentioned. For example, we included appropriations tied to the management of Anchor Projects by Ōtākaro Limited, which, while not directly mentioning earthquakes, are linked to earthquake recovery efforts. We are aware that the OAG had a similar refinement process, however their approach is not explicitly detailed, meaning there may be differences between our categorisation and theirs due to variation in how each process was applied.

Use of exact search terms

We understand that the OAG implemented a search technique which can allow for *partial matches* to be picked up. We apply an *exact search* technique where the query must target the text exactly, without allowing for variations, typos or partial matches. We initially considered using a partial match



approach, but found there was strong potential to pick up appropriations that did not relate to natural hazards, for instance, spending towards "personnel training" being picked up by the keyword "rain."

As a result, our method may overlook some relevant items, but we have confidence that the appropriations identified are directly relevant. In addition, we have included variations on keywords to minimise risk of inappropriate omissions. Conversely, the OAG's search could capture a broader range of items, though they have indicated that their data has been verified so they may have addressed this risk in their analysis too (but taken a different approach to doing so).

Manual adjustments

We have made manual adjustments during the analysis, recognising that we may have categorised appropriations where there may be arguments for or against inclusion differently to the OAG.

Reconciling EQC and Southern Response injections

The notes to Table 17 set out that we have not excluded EQC or Southern Response injections in this reconciliation exercise as these would likely have been included in the OAG report. Table 18 shows how these figures reconcile with those in the body of the report once these aspects are accounted for.

Table 19: Reconciliation of central government spend in appropriations (Table 3) and final reported central government spend (Table 1)

| | (1) | (2) | (3) | (4) | (5) | (6) |
|------|---|---|--|-----------------------|-------------------|--|
| | Central Government Spend (Table 3) | EQC and Southern Response Injections | National Hazards Research Challenge | Net change (2 + 3) | Result (1 + 4) | Central Government Spend (Table 2 - check against 5) |
| 2010 | 36.5 | | | | 36.5 | 36.5 |
| 2011 | 1,437 | | | | 1,437 | 1,437 |
| 2012 | 958 | | | | 958 | 958 |
| 2013 | 970 | | | | 970.2 | 970.2 |
| 2014 | 620 | | 5.94 | 5.94 | 625.7 | 625.7 |
| 2015 | 1,316 | -333 | 5.94 | -327.06 | 988.9 | 988.9 |
| 2016 | 1,237 | -222 | 5.94 | -216.06 | 1,020.8 | 1,020.8 |
| 2017 | 1,276 | -308 | 5.94 | -302.06 | 974.4 | 974.4 |
| 2018 | 1,001 | | 5.94 | 5.94 | 1,006.6 | 1,006.6 |



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