

Southland Regional Natural Hazard Provision Review

SD Kelly

WSA Saunders

**GNS Science Consultancy Report 2020/21
March 2020**

DISCLAIMER

This report has been prepared by the Institute of Geological and Nuclear Sciences Limited (GNS Science) exclusively for and under contract to Environment Southland. Unless otherwise agreed in writing by GNS Science, GNS Science accepts no responsibility for any use of or reliance on any contents of this report by any person other than Environment Southland and shall not be liable to any person other than Environment Southland, on any ground, for any loss, damage or expense arising from such use or reliance.

BIBLIOGRAPHIC REFERENCE

Kelly SD, Saunders WSA. 2020. Southland Regional Natural Hazard Provision Review. Lower Hutt (NZ): GNS Science. 60 p. Consultancy Report 2020/21.

CONTENTS

EXECUTIVE SUMMARY.....	IV
KEYWORDS.....	V
1.0 INTRODUCTION	1
1.1 Background and Scope	1
1.2 Purpose.....	1
1.3 Southland Flood Event	1
1.4 Statutory Context.....	2
1.5 Report Structure	3
2.0 METHODOLOGY	4
2.1 Identification of Best-Practice Indicators	4
2.2 Regional Council, District Council and Civil Defence Interviews	9
3.0 ENVIRONMENT SOUTHLAND	10
3.1 Southland Regional Policy Statement.....	10
3.1.1 Chapter 8 – Natural Hazards.....	10
3.1.2 Other Chapters	12
3.1.3 Alignment with Best-Practice Indicators	13
3.2 Provision of Information	15
4.0 INVERCARGILL CITY COUNCIL	17
4.1 Invercargill City District Plan	17
4.1.1 Overview.....	17
4.1.2 Natural Hazards Chapters	17
4.1.3 Other Chapters	18
4.1.4 Alignment with Best-Practice Indicators	19
5.0 SOUTHLAND DISTRICT COUNCIL	23
5.1 Southland District Plan	23
5.1.1 Overview.....	23
5.1.2 Natural Hazards Chapters	23
5.1.3 Other Chapters	24
5.1.4 Alignment with Best-Practice Indicators	25
6.0 GORE DISTRICT COUNCIL.....	28
6.1 Gore District Plan	28
6.1.1 Natural Hazards Chapter.....	28
6.1.2 Other Chapters	29
6.1.3 Alignment with Best-Practice Indicators	29
7.0 EXISTING ANALYSIS OF PLAN PROVISIONS.....	32
7.1 Regional Natural Hazards Management Gap Analysis and Action Plan.....	32
7.1.1 Overview.....	32
7.1.2 Relevant Gaps and Actions	32

7.1.3	Southland Hazard Information.....	33
7.2	Southland Regional Coastal Plan – Effectiveness and Efficiency Assessment	33
7.3	Southland District Plan Effectiveness Report.....	35
8.0	SUPPORTING DOCUMENTS	36
8.1	Southland Civil Defence Emergency Management Group Plan 2017–2022...	36
8.2	Southland Climate Change Impact Assessment	37
9.0	SEMI-STRUCTURED INTERVIEWS	39
9.1	Technical Information	39
9.2	Development Direction	39
9.3	Regional Leadership and Guidance Sought.....	40
9.4	Perception of Natural Hazards.....	42
9.5	What Is an Ideal District Plan?.....	43
10.0	RECOMMENDATIONS.....	44
10.1	Scientific Information and Investigations.....	44
10.2	Guidelines	45
10.3	Policy Change	45
10.4	Collaboration	47
10.5	Prioritising Recommendations	47
11.0	CONCLUSION.....	49
12.0	ACKNOWLEDGEMENTS.....	50
13.0	REFERENCES	50

TABLES

Table 1.1	Mataura River at Gore flood statistics.	1
Table 1.2	Mataura River at Gore flood return periods (cumeecs).	2
Table 2.1	Best-practice indicators, adopted from Grace and Saunders (2016).	5
Table 2.2	Overview of the analysis methodology for planning documents against best-practice measures.	7
Table 3.1	Issue NH.1 – Overview of natural hazards provisions.	10
Table 3.2	A summary of the natural hazard chapter provisions in the Southland RPS.	11
Table 3.3	Overview of natural hazard provisions in other chapters of the Southland RPS.....	12
Table 3.4	Measure of the Southland RPS against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).....	13
Table 4.1	A summary of the natural hazard chapter provisions in the Invercargill DP.....	17
Table 4.2	Overview of natural hazard provisions in other chapters of the Invercargill DP.....	18
Table 4.3	Measure of the Invercargill DP against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).....	19
Table 5.1	A summary of the natural hazard chapter provisions in the Southland DP.....	23
Table 5.2	Overview of natural hazard provisions in other chapters of the Southland DP.	24

Table 5.3	Measure of the Southland DP against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).....	25
Table 6.1	A summary of the natural hazard provisions in the Gore DP.....	28
Table 6.2	Measure of the Gore DP against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).....	29
Table 7.1	Southland Regional Policy Statement natural hazard methods and identified actions.	32
Table 8.1	Southland CDEM Plan Risk Assessment Summary.....	37

FIGURES

Figure 2.1	The risk-based approach (Saunders et al. 2013).	8
------------	--	---

APPENDICES

APPENDIX 1	COMPARISON OF ALIGNMENT WITH BEST-PRACTICE INDICATORS AND GUIDANCE TO INCREASE ALIGNMENT	55
-------------------	---	-----------

EXECUTIVE SUMMARY

Environment Southland and the Southland region's territorial authorities are undertaking a programme of work aimed at reducing the region's risk to natural hazards. A key component of this is the role of land-use planning under the Resource Management Act 1991.

This report provides an analysis of the Southland Regional Policy Statement 2017 (Southland RPS), Southland's district plans, and key natural hazard and emergency management documents. The purpose of this review is to determine whether the natural hazard provisions in these documents are relevant, appropriate, complete and consistent with best-practice indicators. Semi-structured interviews were undertaken with Environment Southland, Gore District Council, Southland District Council, Invercargill City Council and Emergency Management Southland staff to provide insight into undocumented aspects of natural hazards and land-use planning in the region.

The analysis of the Southland RPS and district plans identifies that each of the documents require significant changes to align with the best-practice indicators. The indicators that require addressing include the adoption of a risk-based approach; improving the directiveness of, and linkages between, provisions; improved linkages to the Emergency Management Southland Group Plan; identification of roles and responsibilities regarding natural hazard risk management and information collection within the region; consideration of cumulative and cascading hazards; and an acknowledgement of uncertainty and a directive for a precautionary approach in the face of uncertainty.

Recommendations made following the undertaken analysis include:

- Consideration of a workshop regarding the natural hazard information produced on a regular basis by Environment Southland for planners across the Southland region to increase capacity and understanding.
- Scientific investigations, including:
 - Flooding – considering an event with a return interval greater than 1 in 100, given recent flooding events in Southland.
 - Coastal hazards (erosion, storm surge, sea-level rise and tsunamis) – recognising that current best practice maps and manages coastal hazards cumulatively.
 - Active faults – utilising the soon-to-be completed regional LiDAR dataset and the existing geomagnetic dataset;
 - Ground shaking and liquefaction – updating Glassey and Heron (2012), expanding it to a region-wide scale and utilising the findings of the active fault study.
 - Landslide and land instability – also utilising the regional LiDAR dataset.

To implement these scientific investigations within the Southland RPS and the district plans, a number of guidelines specific to each natural hazard are available from the Ministry for Business, Innovation and Employment; GNS Science; and the Ministry for the Environment. These guidelines should be considered in scoping the scientific investigations to ensure the outputs produced are fit for purpose.

Ambiguity and a lack of clarity and consistency across the region has been identified. To address this, the production of regional land-use planning guidance for natural hazards or a region-wide district plan natural hazard chapter are identified as potential solutions.

KEYWORDS

Environment Southland, Invercargill City Council, Southland District Council, Gore District Council, Southland Regional Policy Statement, Invercargill City District Plan, Southland District Plan, Gore District Plan, land-use planning, Resource Management Act 1991, natural hazards.

This page left intentionally blank.

1.0 INTRODUCTION

1.1 Background and Scope

Environment Southland, along with Southland's three territorial authorities, iwi partners and as part of a Regional Planning Working Group, have identified Resource Management Act 1991 (RMA) planning for natural hazards and climate change as an area where region-wide collaboration has the potential to efficiently address information gaps and develop aligned solutions. To assist with the Regional Planning Working Group's natural hazard planning workstream, GNS Science was commissioned to undertake a review of Southland's natural hazard provisions in the RMA plans and associated documents.

1.2 Purpose

The purpose of this review is to:

- Determine whether the natural hazard provisions in the Southland Regional Policy Statement (Southland RPS) and the operative district plans, being the Invercargill City District Plan (Invercargill DP), Southland District Plan (Southland DP) and Gore District Plan (Gore DP), are relevant, appropriate, complete and consistent with best practice.¹
- Assess the degree of policy change needed to better plan for current and future region- and district-wide natural hazard related challenges and better manage the risk of natural hazards (including identification of scientific investigations needed to inform changes).

1.3 Southland Flood Event

During the finalising of this report, the Mataura River flooded on 5th February 2020. This flood event was the highest-recorded event at Gore, with a peak flow of 2,500 cumecs, exceeding the 1-in-100-year return period event (see Tables 1.1 and 1.2)². While the stopbanks at Gore were not breached, the stormwater system was unable to cope, resulting in inundation throughout Gore, and evacuations were required in Gore, Mataura and Wyndham. This report does not contemplate the effects, management approach, cause or response of this event. However, such a recent local event of this magnitude provides a useful reminder of the role of land-use planning (among other matters) for natural hazard risk management moving forward.

Table 1.1 Mataura River at Gore flood statistics.

Peak Flow	Date
2,500.01 cumecs	5 February 2020
2,111 cumecs	14 October 1978
1882.95 cumecs	11 March 1987
1783.86 cumecs	18 November 1999

¹ It is noted that the Southland Coastal Plan and Proposed Southland Water and Land Plan are beyond the scope of this review.

² Environment Southland Environmental Data: <http://envdata.es.govt.nz/>. Accessed 5 February 2020.

Table 1.2 Mataura River at Gore flood return periods (cumecs).

Mean Annual Flood	5-Year	10-Year	20-Year	25-Year	50-Year	100-Year
570	825	1093	1415	1530	1952	2467

1.4 Statutory Context

The statutory context relating to the management of natural hazards includes, in summary, the following sections of the RMA:

1. Natural hazards are defined in Section 2 of the RMA as:

“... any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment”.
2. Section 3 of the RMA includes a definition of ‘effect’, which is relevant in terms of interpreting other sections and the functions of regional and district authorities. Of note, this definition includes “... any past, present, or future effect ...” and any effects “... regardless of the scale, intensity, duration, or frequency of the effect, and also includes ... any potential effect of low probability which has a high potential impact” (Section 3(f)).
3. Part 2 of the RMA includes the following sections and subsections relevant to the management of natural hazards, defences in relation to those hazards and the effects of climate change:
 - a. Section 5 – enabling people and communities to provide for their social, economic and cultural wellbeing and for their health and safety, while avoiding, remedying or mitigating adverse effects on the environment and to sustain the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations.
 - b. Section 6(a) – providing for the preservation of the coastal environment and the protection of this area from inappropriate subdivision, use and development.
 - c. Section 6(d) – the maintenance and enhancement of public access to and along the coastal marine area.
 - d. Section 6(h) – the management of significant risks from natural hazards.
 - e. Section 7(b) – the efficient use and development of natural and physical resources (land).
 - f. Section 7(c) – the maintenance and enhancement of amenity values.
 - g. Section 7(f) – maintenance and enhancement of the quality of the environment.
 - h. Section 7(g) – any finite characteristics of natural and physical resources.
 - i. Section 7(i) – the effects of climate change.
4. Sections 30 and 31 of the RMA specify the functions of regional and territorial authorities in relation to natural hazards. Section 31(1)(a) of the RMA requires:

“the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the effects of the use, development, or protection of land and associated natural and physical resources of the district”.

Section 31(1)(b)(i) requires:

“the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of ... the avoidance or mitigation of natural hazards”.

5. Section 106 and 220 relate to the subdivision of land and the imposition of conditions in relation to the subdivision process.
6. Sections 10 and 20A are relevant when considering existing uses and resource consents and the ‘rights’ associated with them.

The aforementioned sections contain varied language in relation to the consideration of natural hazards. In addition to these sections, the provisions in National Policy Statements and those of National Environmental Standards are also required to be given effect to / acknowledged through regional and district planning instruments. These national policy documents also contain relevant direction in relation to the coastal environment (and natural hazard risks).

1.5 Report Structure

This report is structured into 11 sections, as follows:

- | | |
|-------------------|---|
| Section 1 | Introduction. |
| Section 2 | Outlines the methodology for collecting and analysing information for this report, which utilises previous work completed by Grace and Saunders (2016), and discussions with Environment Southland, Emergency Management Southland and the three territorial authorities. |
| Section 3 | Undertakes a review and analysis of the Southland RPS. |
| Section 4 | Undertakes a review of the Invercargill DP and analyses it in accordance with the methodology set out in Section 2. |
| Section 5 | Undertakes a review of the Southland DP and analyses it in accordance with the methodology set out in Section 2. |
| Section 6 | Undertakes a review of the Gore DP and analyses it in accordance with the methodology set out in Section 2. |
| Section 7 | Provides an overview of the existing analysis undertaken of plan provisions as they relate to the natural hazard’s provisions. |
| Section 8 | Sets out the review of the supporting documents. |
| Section 9 | Provides an overview and theme analysis of the semi-structured interviews with Environment Southland, Southland District Council (SDC), Invercargill City Council (ICC), Gore District Council (GDC) and Emergency Management Southland staff. |
| Section 10 | Sets out the recommendations, including those relating to scientific investigations, relevant guidelines that can be implemented and policy change required, and encourages a collaborative approach. |
| Section 11 | Provides a brief conclusion to the report. |

2.0 METHODOLOGY

To achieve the purpose of this review, three key information collection and analysis tasks were undertaken:

1. Detailing the previous research that supports identification of 'best-practice' indicators for natural hazards planning under the Resource Management Act 1991.
2. A review and assessment of key documents within the context of current best practice.
3. Semi-structured interviews with key Environment Southland, GDC, SDC, ICC and Emergency Management Southland staff.

2.1 Identification of Best-Practice Indicators

Between 2014 and 2016, GNS Science undertook a four-part research project regarding the state of land-use planning for natural hazards in New Zealand. The four parts were as follows:

Part 1: A content analysis asking 127 questions of all 99 operative district plans, regional policy statements and CDEM Group Plans (Saunders et al. 2014a).

Part 2: A case study analysis of 10 RMA plans (operative and proposed) to identify examples of good practice (Grace and Saunders 2016).

Part 3: A survey investigating the capability and capacity of council staff for natural hazard planning (Saunders et al. 2014b).

Part 4: Utilising Parts 1–3, answer the key question: 'What is the state of planning for natural hazards in New Zealand?' (Saunders et al. 2014c).

The methodology for this review utilises the best-practice indicators identified in Part 2 (see Table 2.1 below) and employs a traffic light analysis of the Southland RPS and district plans against the good practice measures, with comments also provided to offer direction for the further work required (see Table 2.2 below).

Table 2.1 Best-practice indicators, adopted from Grace and Saunders (2016).

Best Practice	Comment on Best Practice
Planning framework	For a plan to be effective, it needs to have strong linkages between issues, objectives, policies and methods, and these elements must be internally consistent (Ericksen et al. 2003; Quality Planning 2017). Objectives should be written as outcomes, and the policies should provide clear direction to the decision-makers as to how the objectives will be achieved and the rules implemented. The rules should implement the policies and be well-supported by the policies. Maps should also be strongly linked to the planning framework, particularly rules (Quality Planning 2017). An 'all-hazard' approach to the planning framework provides simplicity and ensures that there is a consistent outcome being sought for all hazards. However, a hazard-specific approach is likely to be more effective as it provides clearer, stronger, more targeted guidance to plan users (Quality Planning 2017).
Maps	To plan for natural hazards, hazards first need to be identified. Identification of hazards on planning maps is often the basis of land-use rules. Mapping of hazard extent is important but mapping of actual risk can be a more powerful tool for managing risk associated with natural hazards. Mapping of uncertainty is also best practice, as this ensures awareness of uncertainty and better allows for policy and rules to address uncertainty (Quality Planning 2017; Saunders et al. 2014b). Information included on maps should be relevant and comprehensible (Ericksen et al. 2003).
Monitoring and evaluation	Under Section 35 of the RMA, Councils are required to monitor the efficiency and effectiveness of the provisions in their plans. Monitoring provisions are an indicator of plan quality (Berke et al. 2012). Environmental outcomes, and the means for monitoring them, should be specified in the plan so that the effectiveness of its policies and methods can later be evaluated (Ericksen et al. 2003). Objectives should be written in such a way that enables progress towards them to be measured (Quality Planning 2017). A plan that specifies procedures for monitoring the efficiency and effectiveness of the policies and methods sets up a transparent process and enables monitoring.

Best Practice	Comment on Best Practice
Roles and responsibilities	An RPS applies in multiple districts/cities and must be 'given effect to' by regional and district plans. Therefore, an RPS has the unique ability among RMA plans to set out responsibilities for the management of risk from natural hazards (among other jurisdictional responsibilities) and the role of the district and regional councils. This can assist in creating consistency in hazard management within a region.³ Clarity of purpose is an indicator of plan quality (Ericksen et al. 2003), and an RPS that provides clear direction to regional and district plans is demonstrating best practice. The RMA sets up overlapping functions for the management of natural hazards between regional and district councils, and this has been shown to cause confusion for council staff (Ericksen et al. 2003). Assignment of responsibility for various monitoring and implementation functions is an indicator of plan quality (Berke et al. 2012). Regional plans and district plans that specify roles and are consistent with any roles specified in an RPS are helping to provide clarity, reduce overlaps and increase efficiencies. In addition, there are a number of other statutes that influence the management of risk associated with natural hazards⁴, and RPSs, regional plans and district plans are required to have regard to strategies and plans prepared under these statutes (Quality Planning 2017). Integration with plans and policy instruments prepared under these statutes is an indicator of plan quality (Ericksen et al. 2003). RMA plans that refer to the roles and responsibilities of other organisations are helping improve integration of hazard management.
Interaction with CDEM plans	Integration with other plans and policy instruments is an indicator of plan quality (Ericksen et al. 2003). CDEM Plans (among other things) identify and prioritise hazards within a region. To ensure integration with other hazard management activities in a region, the preparation of hazard provisions in a RPS, in particular, should be linked with work being undertaken, and priorities established, as part of the CDEM Group Plan (Quality Planning 2017). District plans that acknowledge CDEM Group Plans also demonstrate best practice.
Information base / management	Planning for natural hazards needs to be based on accurate information, and the quality of the information is an indicator of plan quality (Berke et al. 2012; Ericksen et al. 2003; Quality Planning 2017). Setting out the roles of the district or region in collecting, managing and disseminating hazard information within an RMA plan is a useful way to confirm responsibilities.

³ In addition, section 62 of the RMA requires RPSs to state "the local authority responsible in the whole or any part of the region for specifying the objectives, policies, and methods for the control of the use of land ... to avoid or mitigate natural hazards or any group of hazards". If no responsibilities are specified, "the regional council retains primary responsibility".

⁴ For example, the Civil Defence Emergency Management Act 2002, Local Government Act 2002 and the Building Act 2004.

Best Practice	Comment on Best Practice
	A clear process set out in plans for the inclusion of new hazard information helps ensure new information is used in land-use planning. Specifying a process for updating hazard information is an indicator of plan quality (Berke et al. 2012). The risk management approach used should be flexible enough for decision making to incorporate changing or new data on the nature and extent of the hazard, and how this impacts risk (Quality Planning 2013).
Uncertainty	The adoption of caution in situations where there is uncertainty surrounding risk is considered best practice (Quality Planning 2013; Saunders et al. 2013). Plans that address uncertainty directly can provide strong guidance and therefore create certainty of process, if not of fact.
Cumulative and cascading hazards	Cumulative hazards are multiple, unrelated natural hazards that impact on the same area. Therefore, this area has a higher likelihood of being impacted by a natural hazard event. Cascading hazards are those different types of hazards all triggered by the same event. When the trigger event occurs, the area will therefore be subject to more than one hazard at the same or a similar time (Beban and Saunders 2013). Addressing cumulative and cascading hazards in a plan provides a more sophisticated approach to be taken to the management of risk.
Definition of risk	Use of the term 'risk' in a plan is one indication of an attempt to apply a risk-based approach. Definitions provide certainty to a plan and help achieve consistent application of the planning framework (Quality Planning 2017). For these reasons, plans that define risk are demonstrating best practice.

Table 2.2 Overview of the analysis methodology for planning documents against best-practice measures.

Best-Practice Measure	Comment
Best-practice indicator 1	Provides an explanation of how the document implements the best-practice measure, as set out in Table 2.1.
Best-practice indicator 2	Provides an explanation of what parts of the measure the document does and does not implement.
Best-practice indicator 3	Provides an explanation of where / how the document does not implement the measure.
Best-practice indicator 4	Provides an explanation of why this best-practice measure is not relevant for the RPS / District Plan being analysed.
Key	
Implemented in full	Implemented in part
Not implemented	Not applicable

Further to the above, Quality Planning have prepared a guidance note about RMA planning for natural hazards that promotes a risk-based and integrated approach (Quality Planning 2013).

A risk-based approach combines the consequences and likelihood of a natural hazard event, rather than just considering the likelihood of a particular event occurring, and therefore seeks to determine the level of risk posed. A risk-based approach for natural hazard planning is based around five steps as set out in Figure 2.1.

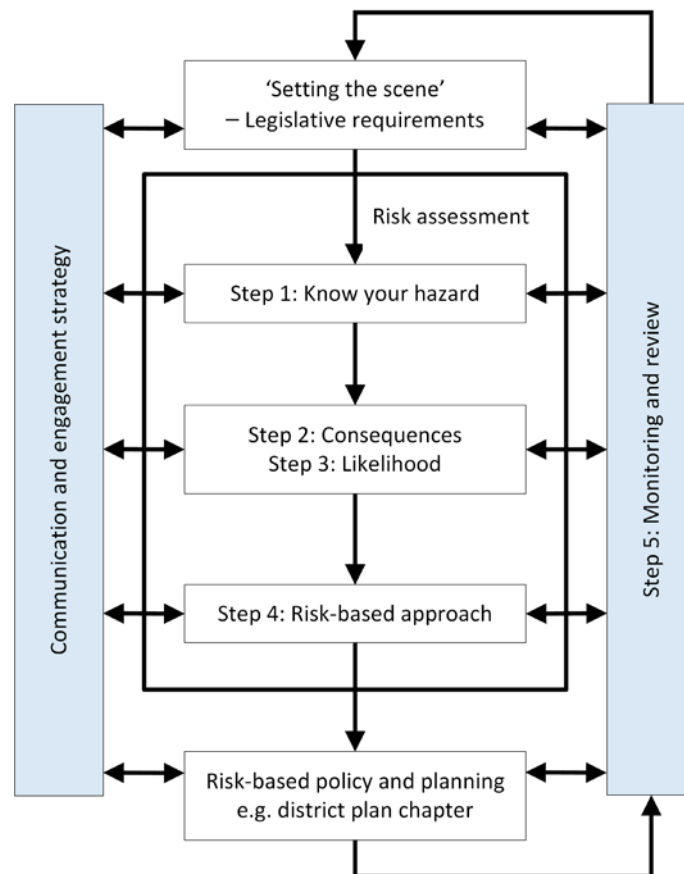


Figure 2.1 The risk-based approach (Saunders et al. 2013).

An integrated approach to natural hazard risk management seeks to manage common hazards across council boundaries, recognising that, while some hazards are site-specific, others cover large areas and cross local authority boundaries. An integrated approach also seeks to address cumulative and cascading hazards in an all-hazard approach. This recognises that one hazard event (e.g. earthquake) can trigger a range of secondary hazard events (e.g. landslides, tsunamis, liquefaction). An example of adopting an integrated approach is that, when assessing slope stability for a development, the earthquake risk for the area is considered, or the liquefaction potential of subsurface material is considered, in relation to ground conditions and earthquake risk.

Quality Planning (2013) does not deal with climate change as a natural hazard but recognises its influence on the future frequency and severity of natural hazards. However, in taking a risk-based, dynamically adaptive and integrated approach to natural hazards planning, climate change must be included as a consideration.

2.2 Regional Council, District Council and Civil Defence Interviews

On 14 and 15 November 2019, semi-structured interviews were undertaken with key Environment Southland, GDC, SDC and ICC planning and policy staff and the Emergency Management Southland Group Controller. These interviews were a mixture of group and one-on-one formats and focused on matters including:

- the council's approach to land-use planning and natural hazards;
- natural hazard information sources and application;
- challenges regarding natural hazards and land-use planning; and
- council-specific matters, such as development pressures, issues and the ideal natural hazard district plan chapter.

The key themes of these discussions are summarised in Section 9.

3.0 ENVIRONMENT SOUTHLAND

3.1 Southland Regional Policy Statement

The Southland RPS became operative on 9 October 2017 and guides resource management policy and practice in Southland. The Southland RPS contains 17 chapters, organised by subject. Chapter 8 addresses natural hazards, and the following chapters are also identified as being relevant:

- Chapter 7: Coast
- Chapter 14: Historic Heritage
- Chapter 15: Infrastructure/Transport
- Chapter 17: Urban.

3.1.1 Chapter 8 – Natural Hazards

Chapter 8 addresses natural hazards and contains the issues, objectives, policies and methods for “managing natural hazard risk in Southland”.⁵ The introductory text to the chapter sets out the following:

- A framework for managing natural hazard risk.
- The responsibilities of the local authorities in the region for the control of land use to avoid or mitigate natural hazards.
- Recognition of the need to work closely with Emergency Management Southland.
- An aim to reduce vulnerability to hazard events and build resilient communities.

Table 3.4 of the Southland RPS provides an overview of the natural hazard provisions and shows the linkages between the issues, objectives, policies and methods. An excerpt of this table is shown in Table 3.1.

Table 3.1 Issue NH.1 – Overview of natural hazards provisions.

Issues	Objectives	Policies	Methods
Issue NH.1	Objective NH.1 Communities becoming more resilient	Policy NH.2 Identify and manage risks from natural hazards	Methods NH.2–16
		Policy NH.3 Precautionary approach	Methods NH.1–3, 5–13, 15, 16
		Policy NH.4 Management priorities	Methods NH.1, 5, 7, 10, 12, 14, 16
		Policy NH.8 Natural features and landforms	Methods NH.1, 5, 7, 10, 16

⁵ Note that ‘natural hazard risk’ or ‘risk’ are not defined.

The natural hazard chapter contains four issues, one objective, eight policies and 16 methods, and Table 3.2 provides a summary of the outcomes sought by these provisions.

Table 3.2 A summary of the natural hazard chapter provisions in the Southland RPS.

Issues
• Climate change will affect the intensity, frequency and risk of some natural hazard events. • There is a lack of public awareness and contingency planning regarding natural hazards. • Impacts of natural hazards are ongoing. • There is ongoing pressure for development in areas prone to natural hazards.
Objective
• Risks are understood and avoided, remedied or mitigated, resulting in communities becoming more resilient.
Policies
• Raise public awareness, promote understanding of risk and encourage a reduction in long-term risk. • District Plans identify areas subject to natural hazard risk, and active engagement occurs in managing those areas. • Take a precautionary approach in managing the effects of climate change and sea-level rise. • In order of priority: avoid exposure, mitigate the effects and undertake physical works. • Avoid new subdivision, development and placement of critical infrastructure in areas at significant risk unless there is no reasonable alternative, or avoidance is impossible or impractical and adverse effects are mitigated, or subdivision is for boundary adjustment. • Mitigate the adverse effects of natural hazards on new subdivision and development in areas other than those at significant risk. • Avoid, where practical, or mitigate the potential for activities to have adverse off-site natural hazard effects on other land. • Protect, recreate or enhance natural features and landforms that provide protection from natural hazards.
Methods
Regional Council: • Establish and maintain provisions in regional plans and bylaws. • Identify, investigate and/or monitor land that is subject to coastal and freshwater inundation, erosion and accretion, active fault lines, liquefaction, tsunami risk and land instability. • Maintain and provide information held on historic and projected natural hazard risk, and the impact of predicted climate change on that risk, and provide technical assistance and information. • Maintain a flood monitoring and warning system and investigate and monitor coastal hazards. Territorial authorities will: • Establish and maintain provisions in district plans. • Provide information through Land Information Memoranda, establish and maintain inundation hazards information, and provide information on earthquake-prone building policies.

Territorial authorities will be encouraged to:

- Collaborate on district plans and resource consent applications in relation to land subject to natural hazard risk.
- Encourage the adoption of methods that reduce exposure to natural hazard risk, encourage the development of community response plans and promote the adoption of guidelines and strategies to mitigate potential effects on existing development.
- Undertake natural hazard risk assessments prior to the development of new critical infrastructure.
- Consider imposing conditions on resource consents that avoid or mitigate adverse effects.
- Enable critical infrastructure to be suitably resilient and/or protected from reasonably anticipated natural hazard risk.
- Collaborate with central government agencies, other local authorities, industry, research agencies, and landowners regarding research and information dissemination.
- Collaborate with agencies to prepare, maintain and implement emergency response plans in response to identified natural hazard risks.
- Provide for tangata whenua involvement in resource management decisions on natural hazard risk management where tangata whenua values are affected.
- Develop, implement and maintain natural hazard management and response strategies.
- Collaborate with other local authorities, tangata whenua and interested stakeholders to investigate additional methods that may be used to implement the policies of this chapter of the RPS.

3.1.2 Other Chapters

A number of other chapters within the Southland RPS are identified as being relevant to the management of natural hazards. Table 3.3 contains a summary of those provisions that directly address natural hazards, recognising that these chapters also contain broadly worded provisions under which these more specific provisions sit.

Table 3.3 Overview of natural hazard provisions in other chapters of the Southland RPS.

Objective
• Objective HH.3 seeks appropriate management of historic heritage values to avoid or mitigate potential adverse effects of natural processes and climate change.
Policies
• Policy COAST.2(d) seeks to utilise measures and methods within the coastal environment when making provision for subdivision, use and development to avoid or mitigate the impacts of natural hazards, including predicted sea-level rise and climate change. • Policy HH.4 implements Objective HH.3, encouraging and directing provisions for the use of appropriate techniques to manage historic heritage at risk of the adverse effects of natural processes and climate change. • Policy INF.4 seeks to avoid, remedy or mitigate the risks to infrastructure from natural hazards and climate change.
Methods
• Methods INF.1 and INF.2 direct that regional and district plans include provisions that take into account the potential adverse effects of natural hazards and climate change on infrastructure. • Methods URB.1 and URB.2(a) direct that regional and district plans establish and maintain provisions to recognise urban growth, while managing the natural and physical environment, and protect people and property from unacceptable risk from natural hazards and the potential adverse effects associated with climate change.

3.1.3 Alignment with Best-Practice Indicators

Section 2 of this report outlines current best practice and identified opportunities for improvement to best practice regarding planning for natural hazards. Table 3.4 provides an analysis of the Southland RPS against the best-practice matters identified in Section 2.

Table 3.4 Measure of the Southland RPS against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).

Best-Practice Indicator	Comment
Tables showing linkages between provisions.	Table 8 of the Southland RPS demonstrates this.
Policies and methods that are directive to lower-order plans.	While not all policies and implementation methods are directive towards lower-order plans, the Southland RPS exhibits this practice where appropriate.
Adoption of a risk-based approach.	While the introductory text to Chapter 8 states that the chapter “provides a framework for managing natural hazard risk”, and a number of provisions address risk, the Southland RPS stops short of taking a risk-based approach. It does not provide direction in relation to how risk is to be calculated (likelihood and consequence), only identifying areas potentially at significant risk. It would be anticipated that a risk-based approach within an RPS would be prescriptive of a process for lower-order documents to follow regarding risk. A risk-based approach within an RPS should ideally provide a framework or outline a process for achieving a risk-based approach.
A structure comprising a small number of objectives, more policies and even more methods.	The Southland RPS natural hazards chapter contains one objective, eight policies and sixteen methods.
Requirement for consultation regarding levels of risk.	Objective NH.1 and Policy NH.1 consider the risk from natural hazards on people, communities, businesses, properties and infrastructure, raising public awareness and promoting understanding, while Policy NH.2 directs active engagement with individuals and the community in managing natural hazard risk areas. These provisions stop short of implementing a consultation process with regard to the levels of risk being adopted by communities as the risk-based framework is not in place, recognising that an evaluative process with the community is required in this regard. However, the direction of Policies NH.1 and NH.2 could be implemented as part of the establishment of a risk-based consultation approach.
Policies directive of the types of consequences that must be considered (e.g. loss of life, injury, social and economic disruption, civil defence implications, cost to the community).	Policies are generally directive with actions sought, or they provide a broad effects-based directive of avoidance and mitigation. The policies are reflective of the language contained within the RMA and do not consider the type of consequences of natural hazards.

Best-Practice Indicator	Comment
Hazard-specific anticipated environmental results.	Table 19 of the Southland RPS contains an overview of the anticipated environmental results (AERs), which are the implementation of methods by local authorities. Method NH.4 addresses flooding and coastal hazards; Method NH.5 specifically addresses inundation, flooding and erosion; Method NH.12 addresses flooding, coastal erosion and inundation, fault lines, liquefaction ground-shaking, tsunami and storm surge.
Policies clarifying roles and responsibilities.	The introductory text to Chapter 8 contains the following section headings: • Statement of local authority responsibilities • Regional Council responsibilities, and • Territorial authorities' responsibilities. These sections set out which hazards each council is responsible for setting provisions for. Further, the methods are split into regional council, territorial authority and local authority sections, setting out roles and responsibilities of each of these groups.
Strong links to the CDEM groups and plans.	The introductory text to Chapter 8 "... recognises the need to work closely with Emergency Management Southland"; Method NH.13 seeks collaboration with emergency management organisations to prepare, maintain and implement emergency response plans. The explanation for Method NH.16 recognises the Civil Defence Emergency Management Act 2002.
Definitions of hazard- and risk-related terms.	Regarding natural hazards, risk and climate change, the Southland RPS defines the following terms in its glossary: • Annual exceedance probability • Climate change⁶ • Liquefaction • Natural hazard⁶ • Precautionary approach⁷ Terms utilised that could be included within the glossary include: • Risk • Unacceptable risk • Long-term risk • Reasonably anticipated natural hazard risk • High natural hazard risk • Suitably resilient and/or protected. The use of multiple terms surrounding risk has the potential to result in confusion, and consistency should be sought in this regard.

⁶ As per the Resource Management Act 1991.

⁷ Presently used in a Regional Plan prepared by the Southland Regional Council.

Best-Practice Indicator	Comment
	Furthermore, the explanation / principal reasons part to Policy NH.5 includes an outline of areas potentially at significant risk from natural hazards. It is unclear how this relates to the unacceptable risk and long-term risk throughout the RPS.
Improved linkages between policy direction and land-use planning rules to achieve a specific level of risk rather than just seeking to maintain or not increase risk.	Methods NH.1 and NH.5 provide direction to regional and district plans. The directives do not include the achievement of certain levels of risk or how this level of risk may feasibly be set through a Schedule 1 process for inclusion in RMA document.
Consideration of uncertainty and cumulative and cascading hazards.	Policy NH.3 directs a precautionary approach regarding climate change and sea-level rise, recognising the need to be cautious if there is scientific and technical uncertainty about risks. Bell et al. (2017) provide guidance in this regard. Policy NH.5 seeks to avoid areas at significant risk from natural hazards. The explanation for this policy notes that areas potentially at significant risk include "areas subject to multiple hazards, none of which in themselves would constitute a significant risk".
A definition of risk.	As detailed above, the Southland RPS does not include a definition of risk, but does provide an overview of areas potentially at significant risk, which is limited to identification of hazard-prone areas without regard to the likelihood or consequences.
Key	
Implemented in full	Implemented in part
	Not implemented

3.2 Provision of Information

Environment Southland is recognised as being the leading authority regarding natural hazards within the region. This is reflected in that Environment Southland holds and maintains regionally mapped natural hazard information (i.e. the Beacon database⁸) and expertise and that territorial authorities (and members of the public) often approach Environment Southland for this information and expertise when sites are located in areas identified as being subject to natural hazard risk.⁹

That Environment Southland hold this information and expertise was collectively identified by all councils (including Environment Southland) as an issue / single point of failure. Discussions with Environment Southland identified that they are in the process of training a number of personnel to be able to respond to requests for natural hazard information.

Environment Southland provided their Statement of Practice for responding to requests for natural hazard information and 13 of their responses from around Southland as part of the information and reports reviewed for this report. Reflective of the Statement of Practice, regularity

⁸ <http://gis.es.govt.nz/index.aspx?app=natural-hazards&ext=1126883,4821543,1373775,4939103>

⁹ Despite Method NH.6 of the RPS directing that local authorities provide information through Land Information Memoranda, establish and maintain inundation hazards information, and provide information on earthquake-prone building policies.

of requests (approximately 215 per year) and regional hazard-scape being predominantly flood-based, responses follow a templated approach.

Information provided by Environment Southland regarding flooding largely relies on historical flooding events as a reference. Information includes the relevant district plan maps and photos of flood events. Also included (as available) are the relevant flood warning factsheet and assistance to enable recipients to understand the more technical information provided.

Natural hazards other than flooding are addressed as appropriate and include seismic (recently included to raise awareness) and coastal hazards (including sea-level rise and climate change). Seismic hazard information in the responses viewed is limited to that provided in the Invercargill City District Plan regarding liquefaction and ground shaking amplification (Glassey and Heron 2012) and a Southland-wide report prepared in 2006 (Glassey 2006). Because of the scale of these assessments, it is highlighted that this information is not a substitute for a site-specific assessment, reflecting the coarse scale of these datasets.

Responses regarding coastal hazards generally follow a template. Where relevant, the Southland District Plan Coastal Hazard Overlay is cited. The explanation around this considers that the line is indicative of properties that may be subject to coastal hazards. This is likely reflective of the level of detail of information underpinning the line; however, in a regulatory sense the line is absolute. The National Institute of Water and Atmospheric Research's (NIWA) report on Colac Bay (NIWA 2015) was also cited. Further to these geographically constrained matters, the template also outlines the following matters:

- Mean high water springs in relation to the property and nearby known elevation points, and information on storm surge.
- The influence of wind direction on inundation.
- Sea level and barometric pressure correlations.
- A note that sea-level rise will lead to increased insurance premiums, exclusions and an inability to get coverage in some locations.
- Ministry for the Environment sea-level rise guidance (Bell et al. 2017).
- A likely recommendation from Environment Southland that the territorial authority place a Section 73 Building Act Notice against the title.
- Identification that protection works would require resource consent and that gaining this is not a certainty as the protection works may compromise the coastal environment or adversely affect other property.

It is recommended that Environment Southland endeavour to reference peer-reviewed and published material where possible; for example, the first four bullet points above should be supported by a reference. Ideally the flooding information provided would be underpinned by modelling of at least the 1-in-100-year event as opposed to a historical event which differs in magnitude and return period across the region. This has been acknowledged by Environment Southland in the discussions summarised in Section 9.

4.0 INVERCARGILL CITY COUNCIL

4.1 Invercargill City District Plan

4.1.1 Overview

The Invercargill DP became operative on 30 August 2019 following a six-year process from notification of a proposed plan to the plan becoming operative. The proposed Invercargill DP was included in the analysis undertaken at Part 2 of GNS Science's 2014 plan review; see Section 2.

The Invercargill DP is structured as a cascading logic in four parts, as follows:

1. Introduction and Interpretation
2. Issues, Objective and Policies
3. Rules
4. Appendices.

Two sets of maps are provided: planning maps and hazard maps. Furthermore, a series of related maps are provided on the Invercargill DP webpage, which include seismic amplification susceptibility and seismic liquefaction susceptibility maps (Glassey and Heron 2012). This series of related maps does not have statutory weighting.

4.1.2 Natural Hazards Chapters

The natural hazard chapters of the Invercargill DP are nested within Parts 2 and 3 of the plan under the title 'Natural Hazards'. Natural hazards are identified as a district-wide matter. The chapter contained within Part 2 contains five issues, two objectives, twelve policies and six methods of implementation, and the chapter within Part 3 contains five rules.

Table 4.1 contains a summary of the issues, objectives policies and rules in the Invercargill DP.

Table 4.1 A summary of the natural hazard chapter provisions in the Invercargill DP.

Issues
• Hazard-prone areas tend to be subject to more than one hazard. • Climate change will affect the intensity, frequency and risk of some natural hazards. • There is a lack of public awareness of risks and how natural hazards may affect sites or areas; this results in a lack of contingency planning. • The impacts and effects of natural hazards are always present and likely to increase. • There is pressure for development in areas prone to natural hazards.
Objectives
• Understand and avoid, mitigate or reduce actual or potential effects of natural hazards. • Over time, reduce the exposure of the district to adverse effects arising from natural hazards.
Policies
• Raise awareness and promote understanding of risks and effects of natural hazards. • Encourage a reduction in exposure to natural hazards. • Identify areas at risk from effects of natural hazards. • Identify areas less than three metres above sea level (ASL) and delineate as 'hazards-prone'. • Identify the Modified Mercalli intensity (MMI) 8 earthquake as the 475-year return period event around which planning for earthquakes should be based and identify areas at risk from liquefaction.

- Identify risks from riverine inundation in four categories (Level 1, 2, 2A, and 3), and discourage and limit development dependent upon risk.
- Recognise areas less than 5 m ASL could be impacted by sea-level rise, and areas less than 3 m ASL are most at risk.
- Avoid subdivision in hazard-prone areas where this would lead to intensification that would exacerbate consequences.
- Protect areas or features that offer protection against the effects of natural hazards.
- Adopt an assessment criterion for the degree to which natural hazards have been understood and addressed in relation to any resource consent for development on land affected by natural hazards.
- Take a precautionary approach to managing the effects of natural hazards.
- Seek advice from Environment Southland and relevant government agencies.

Rules

The natural hazards rules make consent requirements regarding the following:

- The erection of new residences and extensions to existing residences in areas identified as having a Level 2 or 2A risk from riverine inundations (restricted discretionary or non-complying activity statuses).
- The erection of new residences and extensions to existing residences in areas identified as being most at risk from sea-level rise and storm surge, and less than 50 m inland from mean high water springs along any coastline most prone to erosion (permitted or restricted discretionary activity status).
- Earthworks on the seaward side of coastal sand dunes and on stopbanks (as identified on plan maps) (permitted [for asset management authorities] or non-complying activity status).
- Formation of hard surfaces for specific purposes within the Industrial 2A zone, with a minimum site level of 2 m ASL, and buildings with a finished ground level of at least 2.7 m ASL (permitted or restricted discretionary activity status).

4.1.3 Other Chapters

Further to the natural hazard chapters, the infrastructure, subdivision, industrial, utilities, ecosystem and indigenous biodiversity chapters also contain provisions that address climate change and natural hazards. The outcomes sought by these provisions are set out in Table 4.2.

Table 4.2 Overview of natural hazard provisions in other chapters of the Invercargill DP.

Issues
• Infrastructure Issue 4 recognises that climate change and natural hazards can have adverse effects on critical infrastructure.
Objectives
• Subdivision Objective 6 seeks that a precautionary approach is adopted regarding subdivision and development in areas subject to natural hazards.
Policies
• Infrastructure Policy 5 seeks that appropriate risk management strategies are considered and adopted to protect essential infrastructure from natural hazards and climate change, and to ensure its location does not exacerbate effects. • Subdivision Policy 6 seeks that subdivision in hazard-prone areas is restricted and that each new allotment contains a hazard-free building site. • Industrial 2A Zone Policy 4 seeks to recognise the effects of natural hazards within the zone regarding liquefaction and inundation.

- Industrial 2A Zone Policy 16 seeks to protect areas less than 3 m ASL and also directs that the potential impacts of sea-level rise are taken into account when locating buildings less than 5 m ASL.

Rules

The resource consent requirements for the following activities direct that natural hazards are addressed/considered:

- Utilities Rule 5 – utilities require consent for a non-complying activity in the national grid yard on land identified as being subject to a natural hazard.
- Utilities Rule 10 – electricity lines not complying with other rules/standards require consent for a restricted discretionary activity on land identified as being subject to a natural hazard.
- Utilities Rule 12, 17, 19 and 24 – electricity lines greater than 110 kV, electricity substations, communications lines and communication facilities not provided for elsewhere in the Invercargill DP require resource consent for a discretionary activity on land identified as being subject to a natural hazard.
- Ecosystem and Indigenous Biodiversity Rule 14 requires the consideration of the role affected land plays in natural hazard mitigation regarding consent applications for specific activities in areas of significant indigenous biodiversity.
- Subdivision Rule 4 identifies natural hazard issues as a matter that the Council will take into account when considering a subdivision application under Subdivision Rule 3 as a discretionary activity.
- Subdivision Rule 7 addresses subdivision of land in an area identified on the District Planning Maps as being subject to Level 2, 2A or 3 inundation.

4.1.4 Alignment with Best-Practice Indicators

An assessment of the provisions of the Invercargill DP against the current best-practice measures set out in Section 2 is provided in Table 4.3 below.

Table 4.3 Measure of the Invercargill DP against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).

Best-Practice Indicator	Comment
General risk management or all-hazard objectives and policies alongside hazard-specific methods and rules.	The Invercargill DP contains two all-hazard objectives, which is in line with the best-practice indicators. However, it contains both all-hazard and hazard-specific policies; all-hazard and activity-specific methods; and hazard-specific, activity-specific and zone-specific rules, which are out of line with the best-practice indicators.
Clear links (lists) between policies and rules.	The Invercargill DP does not provide a clear link/list correlating policies to rules.
The use of directive language (e.g. 'avoid', 'shall', 'limit'), and direction on when to avoid and when to mitigate rather than utilising the two terms in the same policy without guidance on which to apply.	The Invercargill DP contains a mixture of directive language and more vague language. Policies seek to raise, reduce, identify, discourage, avoid, protect, adopt, take and seek, which are all examples of directive language; however, the policies also utilise 'limit' and 'recognise', which are more open to interpretation.
Methods that clearly show how policies are to be implemented, including links to maps.	The methods do not clearly link to the policies; however, they do make requirements of the maps and rules. For example, Method NH-M1 identifies the Delineation of areas subject to risk from natural hazard on the District Hazard Information Maps and Method NH-M2 identifies rules limiting subdivision and certain activities.

Best-Practice Indicator	Comment
A structure where all natural hazard provisions are contained in one chapter. ¹⁰	The Invercargill DP splits issues, objectives, policies and methods into one part and rules into another part. Other chapters of the Invercargill DP also address natural hazard matters as outlined in Table 4.2. The Invercargill DP therefore requires significant restructuring to achieve the National Planning Standard structure.
The use of three or more activity statuses provide a more meaningful range of control than just two.	In some cases, three tiers of activity status are used, while in others two tiers are used, as set out below: • NH-R1.1: Residence extensions and riverine inundation (Level 2 or 2A risk) utilises permitted, restricted discretionary and non-complying activity statuses depending on extension size and date. • NH-R1.2: The same as NH-R1 but, in Level 3 risk areas, utilises restricted discretionary and non-complying activity statuses, noting that it would be inappropriate to have a permitted activity given the Level 3 risk. • NH-R2: Development and coastal hazards utilises permitted and restricted discretionary activity statuses. • NH-R3 and NH-R4 address earthworks and utilise non-complying and permitted activity statuses, respectively. • NH-R5 addresses the Industrial 2A zone and utilises permitted and restricted discretionary statuses.
Rules that match the level of detail in maps.	The Invercargill DP maps include four levels (1, 2, 2A and 3) regarding riverine inundation that, as set out in NH-P6, correlate to the following risk levels: • Low • High (where future flood levels can be predicted) • High (flood greater than the design limits of the flood protection system) • High (unprotected). The natural hazard rules regarding riverine inundation match with these risk levels. The other natural hazards are not managed in this level of detail.
Prohibited activity status utilised to implement 'avoid' policies.	Policy NH-P8 seeks to avoid subdivision in hazard-prone areas where this would lead to intensification of development that would exacerbate the consequence of a hazard event. There is no prohibited activity status rule implementing this policy.

¹⁰ Recognising the National Planning Standards.

Best-Practice Indicator	Comment
A record of why a particular hazard is not addressed aids clarity and transparency.	The overview section of the Natural Hazards chapter outlines that the district is subject to flooding, sea-level rise, storm surge, seismic activity, liquefaction and tsunami. Of these natural hazards, the Invercargill DP does not address tsunami. No explanation is included for tsunami's absence in the Invercargill DP.
Hazard maps that incorporate potential consequences.	While the Invercargill DP describes riverine inundation with levels of risk within Policy NH-P6, the potential consequences at each level are not contemplated. An example of this being incorporated within the Thames-Coromandel District Plan is: <i>“‘High flood hazard area’ The combined depth and speed of floodwaters is likely to significantly impede the manoeuvrability or stability of the average person. Damage to property is likely to be widespread and structural, including instances where buildings have been raised about the ‘flood level’”.</i>¹¹ The rules only address residential development.
Mapping acknowledges uncertainty where appropriate, e.g. fault lines.	The Invercargill DP maps do not acknowledge uncertainty. However, it is noted that the liquefaction and seismic amplification susceptibility maps provided alongside the Invercargill DP for information contain uncertainty buffer zones. These maps do not have regulatory implications.
Clear identification of matters to be monitored, information to be gathered, information sources and the frequency of reviews.	The Invercargill DP policies seek to identify areas at risk of liquefaction, riverine inundation and MMI 8 shaking; areas below than 3 m ASL in relation to sea-level rise; and identify Environment Southland and government agencies as sources of information. Reviews are not considered.
Record of roles and responsibilities.	The Invercargill DP does not address the Council's roles and responsibilities regarding natural hazards.
Reference to CDEM Plan.	The Invercargill DP does not reference the Southland CDEM Plan
Include information requirements of applicants.	Restricted discretionary natural hazard rules include matters that the Council shall restrict their discretion to, which should be approached by applicants as information requirements. SUB-R7 also addresses subdivision on land identified as being subject to Level 2, 2A or 3 inundation and requires subdivision plans to show a building platform and, where applicable, effluent disposal area and reserve area that are hazard-free. Appendix 1 to the Invercargill DP sets out information to accompany applications and includes natural hazard considerations for land-use and subdivision applications.

¹¹ From the Thames-Coromandel District Plan.

Best-Practice Indicator		Comment	
Hazard information on LIMs. ¹²		NH-M6 addresses the dissemination of information, which includes issuing hazard information as part of the LIM and PIM process.	
Policy and methods on information management for hazard information.		The Invercargill DP does not contain provisions regarding information management for hazard information (such as a directive for a database). However, it does seek to identify a number of natural hazards and collaborate with other authorities, which would inherently lead to similar outcomes.	
A directive to apply a precautionary approach that allows uncertainty to be addressed.		NH-P11 directs that a precautionary approach be taken when managing the effects of natural hazards.	
Mapping and associated rules that address coastal hazards cumulatively.		The Invercargill DP maps address sea-level rise and storm surge cumulatively and coastal erosion separately. Tsunami is not addressed.	
A policy direction requiring the consideration of cumulative and cascading hazards.		Issue 1, Policy 4 and Policy 10 address cumulative hazards. Cascading hazards are not addressed.	
Improved linkages between policies' directives and land-use planning rules to achieve a specific level of risk rather than just seeking to maintain or not increase risk.		NH-P2 seeks to reduce exposure to natural hazards; however, due to not taking a risk-based approach, the achievement of a specific level of risk is not contemplated.	
Incorporation of definition of risk.		As the Invercargill DP does not take a risk-based approach, it does not seek to define risk. Regarding riverine inundation, it does specify what the various levels of risk are represented/triggered by; however, this could not be simply translated to other natural hazards.	
Key			
Implemented in full	Implemented in part	Not implemented	Not applicable

¹² Land Information Memorandum in accordance with Section 44A of the Local Government Official Information and Meetings Act 1987.

5.0 SOUTHLAND DISTRICT COUNCIL

5.1 Southland District Plan

5.1.1 Overview

The Southland DP became operative on 22 January 2018 following a five-year process from proposed district plan notification to being made operative.

The Southland DP is structured into six parts:

1. Introduction
2. District-wide Objectives, Policies, Methods and Rules
3. Zone Objectives, Policies, Rules and Methods
4. Definitions
5. Schedules
6. Schedule: Information for Resource Consents.

One set of statutory maps is provided with the Southland DP.

5.1.2 Natural Hazards Chapters

Chapter 2.7 (Natural Hazards) of the Southland DP contains one objective, six policies and two methods. It notes that the rules relating to natural hazards are contained within the Urban Zone, Rural Zone, Industrial Zone, Infrastructure and Subdivision chapters of the Southland DP.

The coastal environment chapter contains objectives and policies regarding coastal hazards, and rules relating to the coastal environment are contained within the Fiordland Rakiura Zone, Rural Zone and Subdivision chapters of the Southland DP.

Table 5.1 contains a summary of the issues, objectives, policies and rules in the natural hazards chapter of the Southland DP.

Table 5.1 A summary of the natural hazard chapter provisions in the Southland DP.

Objective
Reduce the risk of natural hazards to people, communities, businesses and infrastructure.
Policies
- Avoid inappropriate subdivision, land use and development, and avoid (wherever practicable) regionally significant infrastructure in areas at significant risk¹³ from natural hazards. - Mitigate adverse effects of natural hazards by controlling subdivision, land use and development in natural hazard areas other than those at significant risk from natural hazards. - Recognise the benefits of and allow for the undertaking and establishment of physical protection works to reduce the risk of natural hazards.

¹³ The Southland DP's definition of significant risk is based on an interpretation of that provided within the Southland RPS.

• Recognise the benefits of the protection, re-creation and enhancement of natural features and landforms that mitigate the risk of natural hazards. • Subdivision, land use, development and physical protection works shall not exacerbate the risk of natural hazards. • Adopt a precautionary approach in managing the effects of climate change and sea-level rise and any associated changes in the scale and frequency of natural hazards in order to ensure potential adverse effects are avoided or mitigated.
Methods
• With other relevant agencies and the community, develop and maintain a record of existing or potential natural hazards and develop approaches for managing natural hazards. • Make maps available that identify the location of known natural hazard risks.

5.1.3 Other Chapters

Further to the Natural Hazard chapter, the Coastal Environment, Subdivision, Rural, Infrastructure and Urban chapters contain provisions that address climate change and natural hazards. The outcomes sought by these provisions are set out in Table 5.2.

Table 5.2 Overview of natural hazard provisions in other chapters of the Southland DP.

Objective
• Objective CE.1(7) seeks that the coastal environment is managed in an integrated and sustainable way that takes into account coastal hazard risks.
Policies
• Policy CE.2 and CE.3 respectively seek the avoidance of subdivision, land use and development in areas at significant risk from coastal hazards and mitigation of adverse effects of coastal hazards by controlling subdivision, land use and development in areas other than those at significant risk. • Policy CE.4 seeks recognition of the benefits of coastal protection works, including natural defences to coastal hazards. • Policy SUB.2 directs that regard be given to risks associated with natural hazards through the subdivision process, where relevant. • Policy SUB.5 seeks to recognise that rural-residential subdivision may be appropriate where sites are not subject to significant risk from natural hazards. • Policy SUB.13 directs that a precautionary approach be adopted where subdivision is proposed in areas at significant risk of natural hazards. • Policy SUB.14 seeks to avoid or mitigate the potential adverse effects of natural hazards on new allotments. • Policy SUB.15 seeks to recognise that subdivision in areas of significant natural hazard risk should not create a density of development that exacerbates the risk of hazards to people and property. • Policy RURAL.5 seeks to recognise that rural-residential activities may be appropriate in a location where sites are not subject to significant risk from natural hazards. • Policy INF.4 directs that infrastructure and, in particular, regionally significant infrastructure, should be located so that the effects of climate change and natural hazards are avoided or mitigated.

Rules
• Rule SUB.1 provides for certification of allotments on an existing Survey Plan as a permitted activity, provided the property is not located within the Flooding Inundation Natural Hazard Overlay. • Rule SUB.2(4) provides for subdivision within the Urban Zone as a controlled activity, provided no allotment is identified as being subject to natural hazards in the Hazard Overlay. Subdivision within the Urban Zone and within an area identified as being subject to natural hazard is provided for as a discretionary activity. • Rules RURAL.1(2)(1) and RURAL.1(2)(2) provide for dwellings outside and inside (respectively) Rural Settlement Areas as permitted activities, provided (among other standards) the building site and access are not identified as being seaward of the Coastal Hazard Line. • Rule RURAL.3(1) provides for activities not meeting the permitted activity standards as a restricted discretionary activity. One of the matters of discretion is the risk of natural hazards in the broad context, without stating what sort of risk in particular. • Rule URB.5 sets out the general urban standards, which all activities within the Urban Zone are required to comply with. Regarding earthworks, these include that earthworks may not be undertaken within 20 m of any natural hazard protection work or in a manner that exacerbates any natural hazards. Earthworks not meeting the standard require resource consent for a discretionary activity in accordance with Rule URB.3.

5.1.4 Alignment with Best-Practice Indicators

An assessment of the provisions of the Southland DP against the current best-practice measures set out in Section 2 is provided in Table 5.3 below.

Table 5.3 Measure of the Southland DP against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).

Best-Practice Indicator	Comment
General risk management or all-hazard objectives and policies alongside hazard-specific methods and rules.	The Southland DP Natural Hazards chapter contains a single all-hazard objective, six all-hazard policies and two all-hazard methods. Rules relating to natural hazards are contained in the zone chapters of the Southland DP. The Subdivision chapter contains three all-hazard policies, two policies that address all-hazards as a consideration and two rules requiring the consideration of mapped flooding and all mapped natural hazards. The Infrastructure chapter contains a single all-hazards policy. Natural hazards are a consideration in the Urban Zone earthworks standards. The Rural Zone chapter contains one policy that addresses all hazards in relation to rural-residential activities and has restricted its discretion to include the risk of natural hazards for restricted discretionary activities in the Rural Zone.
Clear links (lists) between policies and rules.	The policies and rules are contained in separate chapters and there is no clear link between these.
The use of directive language (e.g. 'avoid', 'shall', 'limit'), and direction on when to avoid and when to mitigate rather than utilising the two terms in the same policy without guidance on which to apply.	Policies NHZ.1 and NHZ.2 direct when it is expected that subdivision, land use and development is to be avoided due to significant risk from natural hazards and when the adverse effects of natural hazards should be mitigated.

Best-Practice Indicator	Comment
	Policy NHZ.5 directs that subdivision, land use, development and physical protection works shall not exacerbate the risk of natural hazards. Policy NHZ.6 directs the adoption of a precautionary approach with regard to climate change and sea-level rise to ensure the potential effects are avoided or mitigated but does not provide direction on when to avoid and when to mitigate.
Methods that clearly show how policies are to be implemented, including links to maps.	The Southland DP contains two methods, which include directives to develop and maintain a record of natural hazards, to develop approaches for managing natural hazards and to make maps available. It is not clear how these methods implement the six policies.
A structure where all natural hazard provisions are contained in one chapter. ¹⁴	The natural hazard objectives, policies and methods are contained in the Natural Hazards chapter, and the rules are contained in the Urban Zone, Rural Zone, Industrial Zone and Subdivision chapters. Objectives and policies regarding coastal hazard are contained in the Coastal Environment chapter.
The use of three or more activity statuses provide a more meaningful range of control than just two.	The Southland DP does not seek to manage natural hazards with a rule structure of escalating activity statuses. Rules that address natural hazards do so by including them in standards and matters of discretion.
Rules that match the level of detail in maps.	The Southland DP maps include a coastal hazard line and a flood area. Their mapping is absolute, with land either inside or outside of these hazard areas. Rules that address these areas are similarly absolute in nature.
Prohibited activity status utilised to implement 'avoid' policies.	The single 'avoid' policy in the Natural Hazards chapter of the Southland DP seeks to avoid subdivision, land use and development in areas at significant risk from natural hazards. This policy is not reinforced by a prohibited activity rule.
A record of why a particular hazard is not addressed aids clarity and transparency.	The Southland DP addresses flooding and coastal hazards but does not address natural hazards such as active faults, liquefaction, landslides or ground shaking or include an explanation as to why they are not included.
Hazard maps that incorporate potential consequences.	The Southland DP maps do not include potential consequences.
Mapping acknowledges uncertainty where appropriate, e.g. fault lines.	Uncertainty is not acknowledged in mapping.
Clear identification of matters to be monitored, information to be gathered, information sources and the frequency of reviews.	The Natural Hazard methods identify that SDC will develop and maintain a record of natural hazards in collaboration with other relevant agencies but does not consider matters to be monitored or the frequency of reviews of this information.

¹⁴ Recognising the National Planning Standards.

Best-Practice Indicator		Comment	
Record of roles and responsibilities.		The Southland DP does not consider roles and responsibilities.	
Reference to CDEM Plan.		The Southland DP does not reference the Southland CDEM Plan.	
Include information requirements of applicants.		The Southland DP identifies natural hazards as a standard or matter for discretion, which should prompt applicants to consider natural hazards within their application. However, this is not a formal information requirement. Schedule 6 contains Information for Resource Consents and Schedule 6.1.2 identifies information for land-use details, including: - an assessment of the likely risk of natural hazards; and - where natural hazards are identified and the proposed methods to avoid, remedy or mitigate the hazard. Schedule 6.1.3 identifies information requirements for subdivisions, including the presence of and type of natural hazards.	
Hazard information on LIMs.		The Southland DP does not direct that hazard information shall be placed on LIMs. It is recognised that there is no statutory requirement for this to occur, but it is good practice to do so.	
Policy and methods on information management for hazard information.		Method NHZ.1 directs that a record of natural hazards be developed and maintained with other relevant agencies; however, it is not clear what form this record will take.	
A directive to apply a precautionary approach that allows uncertainty to be addressed.		Policy NHZ.6 seeks that a precautionary approach be adopted in managing the effects of climate change and sea-level rise.	
Mapping and associated rules that address coastal hazards cumulatively.		Coastal hazards are addressed as a single overlay on the Southland DP maps, and the rules reference this overlay.	
A policy direction requiring the consideration of cumulative and cascading hazards.		Cumulative and cascading natural hazards are not addressed in the Southland DP.	
Improved linkages between policies' direction and land-use planning rules to achieve a specific level of risk rather than just seeking to maintain or not increase risk.		The policies and rules of the Southland DP do not seek to achieve a specific level of risk, instead seeking to reduce risk or not exacerbate it.	
Incorporation of definition of risk.		Section 4 contains the definitions but does not include a definition of risk; however, an outline of significant risk is provided as a guidance note in Chapter 2.7. The Southland DP borrows from the Southland RPS definition and as such comprises an outline of areas potentially at significant risk from natural hazards.	
Key			
Implemented in full	Implemented in part	Not implemented	Not applicable

6.0 GORE DISTRICT COUNCIL

6.1 Gore District Plan

The Gore DP became operative in 2006 and is currently at the beginning of a review process. Chapter 4A of the Gore DP addresses natural hazards and identifies that inundation/flooding is the natural hazard that poses the greatest risk to the district. In particular, the Mataura River has flooded in 1896, 1913, 1957, 1978, 1987, 1999 and, most recently, in 2020.

6.1.1 Natural Hazards Chapter

The Gore DP Natural Hazards chapter contains two issues, two objectives, four policies and five methods. Table 6.1 contains a summary of these.

Table 6.1 A summary of the natural hazard provisions in the Gore DP.

Issues
• The public do not have a high level of awareness of natural hazards. • Inundation can jeopardise public safety and create risks to structures and materials within floodplains.
Objectives
• Ensure the public is aware of the likelihood and consequences of natural and man-made hazards. • Minimise the risk to people and property from inundation.
Policies
• Promote public awareness of natural and man-made hazards. • On sites subject to actual or potential flooding, promote elevated ground for potentially affected activities, and elevated floor levels for buildings. • Control activities and development to avoid adverse effects of natural and man-made hazards. • In areas identified as being subject to actual or potential flooding: - Refer applications to Environment Southland for comment. - In Gore, encourage the adoption of flood-proofing techniques or other measures to avoid the adverse effects of flooding on the activity and other property. - In Mataura, require buildings accommodating people to have floor levels at least 300 mm above the 1978 flood level. - In other areas, require buildings accommodating people to have building floor levels at least 600 m above the level of past flooding or ground level.
Methods
• A rule to protect floodways from inappropriate development. • Education and public awareness of land owners and occupiers of measure to avoid the adverse effects of flooding and other natural hazards. • Use the provisions of the Building Act 2004 to determine the suitability of erecting structures and record the presence of hazards on sites where new buildings are erected. • Consult with Environment Southland. • Provide information held by the Council to the public.

Rules

- Rule 4A.9.1 provides for structures, hazardous substance storage, farm quarries and earthworks, subdivision, forestry and shelter belts, storage of floatables, and permanent fences within areas identified as 'Mataura River Floodway' and not classified as riverbed, as a restricted discretionary activity. The matters of discretion are the adverse effects of natural hazards on or by the proposed activity.
- Rule 4A.9.1 lists the information requirements for an application under Rule 4A.9.1, which include the reasons for the activity and alternative sites; the nature of the proposed activity; any effects it will have on inundation of the land and that inundation of the land will have on the activity; a record of consultation undertaken with Environment Southland; and a description of the measures proposed in order to avoid, remedy or mitigate any adverse effects.

6.1.2 Other Chapters

Chapter 8 of the Gore DP addresses subdivision and contains provisions and directive relating to subdivision and natural hazards as follows:

- Policy 8.4(8) directs that, within areas subject to actual or potential inundation, the District Council refer all applications to Environment Southland for comment; for rural subdivision, to encourage the inclusion of high ground in each lot for stock to be moved to in the event of a flood; and that buildings for the accommodation of people are suitably located.
- Rule 8.10(2)(c)(v) provides for new boundaries that pass through land contained within a floodway or that is subject to actual and potential flooding.
- Chapter 8.12 makes information requirements of subdivision consent applications, which include an assessment of any hazards such as instability and erosion, contamination and inundation; and, for land identified as 'Mataura River Floodway' or "land subject to actual or potential inundation", a record of consultation undertaken with Environment Southland.

6.1.3 Alignment with Best-Practice Indicators

An assessment of the provisions of the Gore DP against the current best-practice measures set out in Section 2 is provided in Table 6.2 below.

Table 6.2 Measure of the Gore DP against best-practice indicators and identified opportunities for improvement in best practice, based on Grace and Saunders (2016).

Best-Practice Indicator	Comment
General risk management or all-hazard objectives and policies alongside hazard-specific methods and rules.	The Gore DP's natural hazard provisions, from issues through to rules, focus on awareness of natural hazards and inundation.
Clear links (lists) between policies and rules.	Due to the Gore DP's focus on awareness (to which there are no related rules) and inundation, the link between the inundation policies and rule is clear without the need for a list.
The use of directive language (e.g. 'avoid', 'shall', 'limit'), and direction on when to avoid and when to mitigate rather than utilising the two terms in the same policy without guidance on which to apply.	Policy 3 seeks to avoid adverse effects, which is an example of directive language. Other policies contain less directive language, such as 'promote' (Policies 1 and 2) and 'encourage' (Policy 4(b)). Policy 4(b) encourages avoidance and adoption of measures in relation to flooding and is implemented by Method 1 and Rule 4A.9.1, the combination of which provides clarity.

Best-Practice Indicator	Comment
Methods that clearly show how policies are to be implemented, including links to maps.	Chapter 4A.5 sets out the methods of implementation, which do not reference the Gore DP maps. The themes within the methods align with policies.
A structure where all natural hazard provisions are contained in one chapter. ¹⁵	The Subdivision chapter of the Gore DP also contains provisions relating to natural hazards as they apply to subdivision. These provisions are largely repetitive of those contained within the Natural Hazards chapter.
The use of three or more activity statuses provide a more meaningful range of control than just two.	The Natural Hazards chapter contains one rule, Rule 4A.9.1, which provides for certain activities within the Matura River Floodway as a restricted discretionary activity.
Rules that match the level of detail in maps.	Areas are either inside or outside an "area subject to actual or potential flooding" or 'Matura River Floodway' overlays. The rules address the Matura River Floodway; however, there is no rule for other areas located within an "area subject to actual or potential flooding" and a policy directive applies instead.
Prohibited activity status utilised to implement 'avoid' policies.	The Natural Hazards chapter does not contain a prohibited activity status with respect to the 'avoid adverse effects' directive of Policy 3. It is noted that a prohibited activity in this regard would be inappropriate.
A record of why a particular hazard is not addressed aids clarity and transparency.	There are no records of why hazards other than inundation are not addressed within the Gore DP.
Hazard maps that incorporate potential consequences.	The Gore DP maps do not incorporate potential consequences.
Mapping acknowledges uncertainty where appropriate, e.g. fault lines.	The Gore DP maps do not acknowledge uncertainty, noting that "areas subject to actual or potential flooding" are grouped under one overlay.
Clear identification of matters to be monitored, information to be gathered, information sources and the frequency of reviews.	Chapter 4A.8 addresses monitoring for natural hazards and sets out that this comprises the nature, type and location of natural hazards that may be identified from time to time. This is ambiguous and lacks purpose, particularly when reviewed alongside the chapter's other provisions.
Record of roles and responsibilities.	The Gore DP does not address roles and responsibilities regarding natural hazards.
Reference to CDEM Plan.	The Gore DP Natural Hazards chapter does not reference the Southland CDEM Plan.
Include information requirements of applicants.	Rule 4A.9.2 and Chapter 8.12 contain information requirements of applicants with regard to natural hazards and subdivision.
Hazard information on LIMs.	The Gore DP does not contemplate placing hazard information on LIMs.

¹⁵ Recognising the National Planning Standards.

Best-Practice Indicator		Comment	
Policy and methods on information management for hazard information.		The Gore DP does not contain policies or methods on information management for hazard information; however, it does contain a method relating to the distribution of hazard information to the public.	
A directive to apply a precautionary approach that allows uncertainty to be addressed.		The Gore DP does not contemplate a precautionary approach.	
Mapping and associated rules that address coastal hazards cumulatively.		The Gore district is land-locked.	
A policy direction requiring the consideration of cumulative and cascading hazards.		The Gore DP does not contemplate cumulative or cascading hazards.	
Improved linkages between policies' directive and land-use planning rules to achieve a specific level of risk rather than just seeking to maintain or not increase risk.		The Gore DP does not seek to achieve a specific level of risk through its policies and planning rules.	
Incorporation of definition of risk.		The Gore DP does not include a definition of risk.	
Key			
Implemented	Implemented in part	Not implemented	Not applicable

7.0 EXISTING ANALYSIS OF PLAN PROVISIONS

7.1 Regional Natural Hazards Management Gap Analysis and Action Plan

7.1.1 Overview

In 2016, Environment Southland and Emergency Management Southland prepared a Regional Natural Hazards Management Gap Analysis and Action Plan ('Gap Analysis and Action Plan'). This document was provided to the authors of this report in draft format and reviewed.

The purpose of the Gap Analysis and Action Plan "... is to identify gaps and potential actions in natural hazards management for discussion with stakeholders."

The Gap Analysis and Action Plan outlines a preliminary list of key actions identified from the gap analysis. Relevant to this review are the following actions:

- Programme and undertake the required research.
- Identify and address deficiencies in district plans.
- Incorporate lifelines assessments into district plans.

The gaps and actions relevant to this natural hazard provision review are identified below.

7.1.2 Relevant Gaps and Actions

The Gap Analysis and Action Plan identifies that Environment Southland's Long-Term Plan 2015–2025 contains risks and natural hazards as one of five focus areas, and that the proposed Southland Regional Policy Statement (pRPS) (now operative) and Southland CDEM Group Plan 2012–2017 (now 2017–2022) form the basis for regional roles and responsibility for identifying and managing natural hazards in Southland.

The key piece of analysis and planning takes the pRPS methods from the Natural Hazards chapter, reviews Environment Southland's current approach regarding a method, ranks its appropriateness, identifies gaps to fulfilling the method and identifies the required action to fulfil the method. The methods and actions set out in Table 7.1 relate to this report.

Table 7.1 Southland Regional Policy Statement natural hazard methods and identified actions.

Method	Action
Method NH.1 – Regional plans and bylaws	Review Regional Coastal Plan and implement plan change. It is noted that an independent consultancy has reviewed the Regional Coastal Plan, and this review was reviewed as part of the preparation for this report.
Method NH.2 – Research and investigation	Review existing hazard information and identify gaps, prioritise level of risk in gaps, programme and undertake research.
Method NH.5 – District plans	Encourage appropriate plan changes to district plans.
Method NH.7 – District plans and resource consents Method NH.8 – Promote Method NH.10 – Resource consents	Identify and address deficiencies in district plans.
Method NH.9 – Risk assessments Method NH.11 – Critical infrastructure	Incorporate lifelines assessments into district plans.

To manage the actions identified, the Gap Analysis and Action Plan established a Reduction Working Group, which will consider and make recommendations on risk reduction priorities and programmes. The Reduction Working Group comprises the planning managers from Southland's territorial authorities and Environment Southland's Hazard Mitigation Planner and involves other parties (e.g. lifelines personnel) when appropriate.

7.1.3 Southland Hazard Information

Appendix 1 to the Gap Analysis and Action Plan sets out the hazard information that is readily and publicly available. Determining whether this information is of sufficient detail and scientific certainty to be able to be utilised as part of any plan change process is beyond the scope of this report, as that would require an expert peer review of each document.

7.2 Southland Regional Coastal Plan – Effectiveness and Efficiency Assessment

In June 2019, an independent planning consultancy undertook an assessment of the effectiveness and efficiency of the Southland Regional Coastal Plan (RCP). The assessment analyses whether the outcomes specified have been achieved and identifies whether the objectives and policies enable the outcomes to be achieved. Regarding the natural hazards, the assessment identified the following matters:

- Consideration should be given to the options to manage coastal natural hazards more directly, noting that currently there are a number of policies but no rules relating to natural hazards.
- Environment Southland is regularly identified as an affected party in relation to resource consent applications where sites are subject to natural hazards and provide advice to applicants and territorial authorities in this regard or make submissions on matters in this regard, resulting in involvement at hearings.
- Outcome 12.1.1 directs that the adverse effects on coastal processes, including global sea-level rise on coastal land use and development, is avoided, remedied or mitigated. However, erosion issues around the region are ongoing: storm surge has resulted in flooding, and the transportation of debris and the exposure to risk from tsunami is ever-present. These effects and potential consequences indicate that Outcome 12.1.1 is not being achieved.¹⁶

In addition to that analysis undertaken in the Effectiveness and Efficiency Assessment, it is considered that the following is relevant to natural hazards, effects and the RCP. Objective 4.7.1 and Policy 4.7.1 state:

Objective 4.7.1 – Avoid, remedy or mitigate cumulative adverse effects

To avoid, remedy or mitigate cumulative adverse effects

Policy 4.7.1 – Avoid, remedy or mitigate adverse cumulative effects

To avoid, remedy or mitigate adverse cumulative effects of activities in the coastal marine area.

¹⁶ It is further noted that seeking to mitigate a natural process may be an unachievable outcome. Avoidance and remediation are more achievable outcomes in this regard.

The outcome expected from the adoption of the policies is that “cumulative adverse effects are avoided, remedied or mitigated”.

The repetitive nature of the drafting of these provisions and the outcome sought does not provide any direction to plan users and is generally impractical. While the outcome and objective can be intrinsically linked, multiple policies are required to reflect when to avoid, when to remedy and when to mitigate cumulative adverse effects, and how these outcomes are achieved.

More specifically in relation to coastal hazards, Chapter 12 addresses coastal processes and protection works, and the relevant provisions state:

Objective 12.1.1 – Avoid, remedy or mitigate the adverse effects of coastal processes

To avoid, remedy or mitigate the adverse effects of coastal processes on coastal use and development.

Policy 12.1.1 – Sea level rise

The design of structures and reclamations is to take into account the effects of a possible sea level rise of 35 centimetres prior to 2050 AD, until such time as there is evidence that the rate of this is higher or lower.

Policy 12.1.3 – Avoid the need for coastal protection works

Use and development of the coastal marine area should be located, designed and undertaken, so that the need for coastal protection works is avoided.

Policy 12.1.4 – Identification of coastal hazard zones

Encourage and assist territorial authorities to identify coastal hazard zones in the coastal environment especially areas subject to erosion (wind/water) or inundation.

Policy 12.1.6 – Effect of natural hazards on activities

Take into account the frequency, magnitude, extent and duration of natural hazards in providing for any activity or development in the coastal marine area.

The outcome expected from the adoption of these provisions is that “the adverse effects of coastal processes including global sea level rise on coastal use and development is avoided, remedied or mitigated.”

Objective 12.1.1 follows the same theme as Objective 4.7.1; however, the policies are more directive of the considerations required to achieve Objective 12.1.1 but stop short of directing when to avoid, when to remedy and when to mitigate, or how the policy considerations relate to the objective.

Good practice for drafting objectives and policies includes:

- Objectives stating *what* is to be achieved, *where*, and *when*.
- Policies that address effects and state *what* the course of action is to meet the objective.

In this regard, it is noted that mitigation may not be an achievable objective due to the natural process component. Regarding the policies, these generally consider the effects and the course of action for meeting the objective in accordance with good practice. Improvements would address what policies are seeking to avoid effects and what policies are seeking to remediate effects.

7.3 Southland District Plan Effectiveness Report

SDC provided a draft copy of their 2016–2018 District Plan Effectiveness Report for review. While the Southland DP became operative in January 2018, the Effectiveness Report identifies that the majority has been treated as operative since December 2014.

Regarding natural hazard risk management, the Effectiveness Report contains monitoring results on the Coastal Environment and Natural Hazard chapters of the Southland DP.

The review of the Natural Hazards chapter identifies the following key points in relation to this review:

- Within the 2016–2018 monitoring period and within the natural hazards overlay, 26 subdivision and 50 land-use consents were granted.
- It is recommended that priority is given to completing data gathering from SDC's own information sources, continued commitment and resources allocated to regional collaborative projects and consideration given to developing a review partnership with Environment Southland.
- Due to the time that has passed since the Southland DP approach to natural hazard planning was developed, it is timely to consider whether the approach is still best practice.
- SDC previously made a deliberate decision to not require resource consent for dwellings within coastal and flood hazard overlays (except for sites within the Rural zone); this approach is likely to be realigned to be more proactive in protecting development from increased exposure to hazards.

This report goes someway to addressing the above matters. In particular, Section 5.1.4 provides an analysis of the Southland DP natural hazard provisions against current best practice and identifies a number of areas where the Southland DP requires updating to incorporate best practice.

That a resource consent is not required for a dwelling within the coastal or flood hazard overlay may create a perverse outcome, particularly in the view of an applicant who could be granted resource consent for their dwelling or is granted a Certificate of Compliance for a permitted activity, but not gain building consent for their dwelling due to exposure to risk which should be more carefully considered and is required to be managed at the resource consent stage. Further, dependent on the risk level, this approach may be inconsistent with Policy NH.4 of the Southland RPS. A realignment of the rule framework to be more proactive in protecting development and managing natural hazard risk through the planning framework would be aligned with current best practice.

8.0 SUPPORTING DOCUMENTS

8.1 Southland Civil Defence Emergency Management Group Plan 2017–2022

The Southland Civil Defence Emergency Management Group Plan 2017–2022 commenced on 1 May 2017 and is a comprehensive plan agreed to by all Southland councils, which sets out how Emergency Management Southland works and the work they will be completing for the next five years.

The Group Plan comprises an overarching vision and four goals, as follows:

Vision

Safer, strong communities understanding and managing their hazards.

Goals

1. *Building safer, strong communities through coordinated hazard management.*
2. *Increasing community engagement in preparing for an emergency.*
3. *Communities are empowered to respond to emergencies.*
4. *Communities recover from adversity stronger than before.*

Regarding this review, the overall vision and Goal 1 are of particular relevance.

The Group Plan recognises the linkage to the Resource Management Act 1991, Regional Policy Statement and Plans, and City and District Plans, and that these are tools/mechanisms available to address hazard risk.

The Group Plan recognises the following natural hazards:

- Climate change
- Sea-level rise
- Liquefaction
- Flooding
- Seismic activity.

The Group Plan seeks to manage risk through a risk treatment process. The treatment options include avoiding the risk, reducing the risk, removing the source of the risk, modifying the consequence, changing the probabilities, sharing the risk, retaining the risk and increasing the risk to pursue an opportunity. It recognises that “residual risk is the threat that remains after all effort to identify and eliminate risk have been made”. Further regarding risk:

“Southland CDEM Group has made a commitment to work in partnership with its key stakeholders and the community to identify an acceptable level of risk across each hazard.”

The Southland CDEM Plan sets out hazards that may be of national significance. A landslide-generated tsunami in Fiordland has been identified as a hazard of national significance. Other natural hazard events are identified under ‘extreme’, ‘very high’ and ‘other’ categories. Natural hazards identified under these categories are set out in Table 8.1.

Table 8.1 Southland CDEM Plan Risk Assessment Summary.

Extreme
• Tsunami – the lack of accurate ground height data makes it difficult to define evacuation areas. • Earthquake – a major earthquake resulting in major damage across the whole South Island.
Very High
• Tsunami: - Predicted tsunami at high threat level (>3 m) causing marine warning and Level 3 evacuation. - Unexpected local source tsunami requiring evacuation with limited information within a short timeframe (e.g. Puysegur-Trench- or Fiordland-generated tsunami). • Earthquake: - Ground shaking resulting in extensive areas of liquefaction. - Ground shaking resulting in major lifelines infrastructure damage. • Climate change: - Climate change causing sea-level rise impacting coastal communities. - Climate change causing more severe and frequent weather events. - Climate change predictions understate the risk of extreme weather events, resulting in failure to adequately plan. • Weather events: - Storm surges / coastal inundation causing flooding in coastal areas (infrastructure damage).
Other
• Weather events. • Urban or rural fires.

8.2 Southland Climate Change Impact Assessment

In 2018, Environment Southland in collaboration with ICC, SDC and GDC, commissioned NIWA to produce a regional assessment of the impacts of climate change for Southland. This report considered the impacts on infrastructure, agriculture, fishing and aquaculture, forestry and tourism.

With regard to land-use planning for natural hazards, the key findings of the impact assessment are:

- Annual rainfall is anticipated to increase by up to 5% by mid-century, and by up to 20% around the end of the century (with a larger increase in the northern part of the region).
- The number of 'heavy rain days' (>50 mm) is projected to increase throughout the region, except for in one localised area.
- By mid-century, annual maximum five-day rainfall is projected to decrease (up to 15 mm) in central Southland and increase across the rest of the region. By the end of the century, almost all of the region is projected to experience a 15–30 mm increase in annual maximum five-day rainfall.
- Sea level is projected to increase by 0.2–0.3 m by 2040 and by 0.4–0.9 m by 2090, resulting in the current 1% coastal AEP occurring more frequently and, on average, annually when sea level increases by 0.45 m.

- Identified impacts relevant to this review include that:
 - Flood events are expected to become larger across the region with climate change.
 - Nuisance and damaging coastal flooding events will increase in frequency.
 - Saltwater intrusion of lowland rivers and groundwater aquifers will increase, and groundwater levels in coastal aquifers will raise.
 - Exacerbated coastal erosion will occur.
 - Gradual inundation of low-lying marshland and adjoining drylands will occur.

The findings of the Climate Change Impact Assessment require consideration in future land-use planning policy changes, particularly regarding flooding and coastal hazards. The Impact Assessment effectively sets a baseline of the impact that climate change could have on the Southland region. Therefore, future hazard/risk assessments should use the Impact Assessment's outputs as a starting point for their assessment. For example, what effect does a 20% increase in rainfall have on flood levels, or what effect does 0.9 m of sea-level rise have on coastal erosion, storm surge, inundation and tsunami run ups? To further develop the assessment and assist understanding of the potential impacts, future assessments should include a consequence function, for example, quantifying the increased hazard in the affected area and/or the number of dwellings or identifying newly inaccessible areas.

9.0 SEMI-STRUCTURED INTERVIEWS

On 14 and 15 November 2019, semi-structured in-person interviews were undertaken with Environment Southland, GDC, SDC, ICC and Emergency Management Southland staff. The interviews focused on the natural hazard planning provisions, issues faced regarding natural hazards and land-use planning, guidance sought in this regard, the development of recently operative plans and approaches to land-use planning and natural hazards. The key matters can be sorted into themes, which are set out and discussed below.

9.1 Technical Information

A key theme emerging from the discussions with the territorial authorities and Environment Southland surrounded technical natural hazard information. There was acknowledgement that Environment Southland hold the majority of information and expertise in this regard, that the robust information needed to form a comprehensive planning framework around natural hazards is not available and that the information that is available is generally not peer-reviewed or scientifically robust.

Environment Southland identified that a large amount of the information they hold is not suitable for use in a RMA planning document, is generally uncaptured or requires digitising. One territorial authority considered that the information held by Environment Southland is limited in nature and has not been peer-reviewed. Given the advancement of scientific understanding of natural hazards in the past two decades, and the predominance of digitised information in the past decade, the robustness of technical information that requires digitising should come into question and whether it is fit for purpose. It is likely that this would require a rigorous peer-review to identify what purposes it is suitable for and its limits.

Across the region, it was found that new natural hazard information is predominantly incorporated into the RMA planning process on a case-by-case basis, typically at the resource consent stage. This would be guided by the planning framework and whether natural hazards were identified as a matter for consideration, whether the consenting planner saw reason to raise natural hazards as a matter or whether the applicant provided information in this regard. If natural hazards were being considered as part of an application, it is understood that Environment Southland would become involved in the resource consenting process as necessary. This results in any sharing of information being on a site-specific basis, which is of little use to developing capacity for understanding natural hazards across the territorial authorities. One methodology to improve this would be for a workshop to be held with staff to consider the information being produced on a regular basis, review lessons from the resource consenting process around natural hazards and consider what policy changes would assist.

9.2 Development Direction

Territorial authorities are generally associated with the development of settlements, towns and cities. As such, the discussions with them typically gravitated towards development and the potential effects of natural hazards and the constraints they inherently impose on development.

Across the region, the territorial authorities are experiencing pressure from communities to enable development – in particular, residential development. SDC identified Winton as an area where pressure is being put on the Council for development to occur but recognised that further analysis is required to ascertain the motivations for seeking additional development, what this would entail from a planning and policy perspective and whether this would be possible. Meanwhile, ICC noted that development (intensification, infill and redevelopment)

is being sought in areas at risk from natural hazards (flooding). They considered this to be a consequence of recent memory bias, given that Invercargill has not experienced a significant flooding event since 1984, and resultant community complacency regarding natural hazard risk. Lastly, GDC identified an area to the north-west of the town as being a likely area of future residential development. Their key considerations regarding natural hazards were whether the area could be developed while also providing for access/egress during a natural hazard event (flooding in particular) and required guidance/certainty regarding flood paths and appropriate finished floor levels.

Environment Southland identified the development of an area in Invercargill known to be a floodplain. This area was zoned for light industrial development, but has crept into mixed-use development, which they considered to be an imperfect outcome. Emergency Management Southland also identified that development across the region is not occurring in consideration of natural hazard risks and identified that key learnings should be taken from the 2017 Edgecumbe Floods. They noted that evacuation was becoming the predominant response for these areas, which they considered to be a less than appropriate outcome. This raises the question of whether the development is sustainable and resilient.

Regarding development, ICC raised the key issue of insurance. As was experienced in Christchurch following the Canterbury Earthquake Sequence, insurance companies may not provide insurance when the risk of loss is deemed to be too high. Alternatively, as is being experienced in Wellington due to natural hazard risk, the price of insurance may become too great for communities to afford. Following the Edgecumbe floods, one resident's insurance premium more than tripled¹⁷, with a flood and landslide excess of \$10,000 also imposed.

The territorial authorities are seeking guidance from Environment Southland regarding a regional development direction and what is considered appropriate in the face of natural hazard risk. The issue of future insurability, particularly following a natural hazard event, is one matter that requires consideration in this regard.

9.3 Regional Leadership and Guidance Sought

Due to the structure of the RMA planning system, the mandated responsibilities of regional councils and territorial authorities, the mandated contents of planning documents under the RMA and the location of natural hazards expertise within the region, regional leadership is inherently sought from Environment Southland regarding natural hazards. While this was covered in part in Section 9.2, this section goes beyond development within the region to cover other matters where leadership is sought from Environment Southland.

The community is acknowledged as being a key part of land-use planning for natural hazards, and, in particular, defining levels of risk. This can only be achieved through a participatory process with the potentially affected community and infrastructure providers, for example, in deciding responses for coastal hazards for coastal communities. ICC identified a desire for stronger regional-level messaging to communities regarding natural hazards, while Emergency Management Southland acknowledged that, through the development of community plans, they likely have the relationships to enable this to occur.

¹⁷ Subsequent negotiation resulted in an increased general excess (\$250 to \$1,000) and the premium being limited to double the pre-flood premium.

Emergency Management Southland sought Environment Southland leadership with regard to roles and responsibilities for the collection of key natural hazard information. The example provided centred on tsunami inundation, which would enable updates to be made to the planning framework and evacuation route planning to be completed. While it was recognised that the LiDAR data to be collected in 2020–2022 had a key role to play, planning for the outputs of the LiDAR data and identifying the parties responsible for their coordination should occur prior to the LiDAR data becoming available in order to ensure timely impact of the dataset. Outputs possible with the addition of LiDAR data include tsunami / coastal inundation modelling, active fault identification, flood modelling and landslide susceptibility.

The territorial authorities identified a need for more prescriptive guidance regarding land-use planning for natural hazards, particularly around matters such as ‘significant risk’ in the absence of national guidance on this (recognising the need for national guidance in this regard). While it is noted that the Southland RPS contains an explanation of areas potentially at significant risk, which has been adopted in the Southland DP, this description is out of line with current best practice regarding natural hazard risk as the description does not contemplate likelihood or consequence, instead focusing on the occurrence of natural hazards and their magnitude.

ICC broadly expressed that guidance with regard to natural hazards was in a relatively strong position, particularly when compared with climate change, which they are uncertain how to respond to. This would be an opportunity for regional leadership and guidance, which could take the form of a Southland Climate Action Plan or the appointment of a climate change specialist to champion a response and action to climate change impacts and effects across the region.

GDC also identified the misalignment between the timeframe of their district plan and the Southland RPS, noting that it is likely that, by the time a new Gore DP becomes operative, a new Southland RPS will likely be in preparation. Collaboration and partnership between Environment Southland and GDC in the preparation of a new Gore DP has the potential to reduce the misalignment between issues being identified and the future Southland regional direction, while ultimately planning for an alignment between the documents is desirable in the long-term.

The territorial authorities considered the current Southland RPS to be unclear in its implementation plan and that the method-heavy structure was not helpful, nor the vague drafting of its provisions. Within the Natural Hazards chapter (Chapter 8), the structure comprises four issues, one objective, eight policies and 16 methods. With regard to territorial authorities and Method NH.5, which sets out what provisions in the district plans must do, the following matters could be clarified:

- When management is appropriate and when avoidance is required regarding subdivision, land use and development of land subject to natural hazard risk, and what management measures are available (Method NH.5(b)). An example of management measures is included in Appendix M of the Bay of Plenty Regional Policy Statement.
- What a natural hazard risk assessment should comprise, and what is a commensurate assessment depending on scale and significance (Method NH.5(c)).
- What is sought through the management of off-site flood risk (i.e. avoidance) (Method NH.5(d)).

- What matters should be considered when avoiding, to the extent possible, new critical infrastructure in areas subject to significant natural hazard risk, and at what point, and using what measure, determine when avoidance is not possible (Method NH.5(e)).
- What infrastructure activities have a functional, operational and technical need to be developed in areas at risk from natural hazards, and how does 'at risk' differ from 'significant risk' (Method NH.5(f)).
- What activities should be excluded from areas known to be at significant risk from natural hazards, what the desired mechanism for this to occur is (i.e. prohibited activity status) and what information is available to support such a restrictive framework (Method NH.5(i)).

It is recommended that a collaborative approach be taken to implementing the current direction of the Southland RPS, with the territorial authorities and Emergency Management Southland being key partners in this regard. This collaborative approach should then be carried into the next RPS, or a change to the RPS, to enable resolution of the issues identified above.

9.4 Perception of Natural Hazards

A key question asked of each of the territorial authorities during the discussions was 'What are the top three natural hazards in this district?'. In this regard, the Southland Civil Defence Emergency Management Group Plan 2017–2022 provides a useful comparison.

The Southland Civil Defence Emergency Management Group Plan 2017–2022 is required to undertake a risk assessment in accordance with the CDEM Act. This risk assessment is summarised in Table 8.1, Section 8.1. The key natural hazards identified are tsunami, earthquake (and associated cascading natural hazards), climate change (i.e. sea-level rise and increased severity in weather events) and weather events (storm surge and coastal flooding). The Group Plan also identifies a landslide tsunami within Fiordland as a natural hazard of national significance.

The three territorial authorities consistently identified flooding, earthquake, wildfire and land instability as being within their top three hazards, while one noted that this needs to be put in the context of the scale at which it is being considered. For example, weighing up a localised flooding event in a city or town versus an Alpine Fault earthquake, or Puysegur Trench or Fiordland tsunami. It is within this context that differences in the perceptions of Emergency Management Southland and the territorial authorities emerge, and the Emergency Management Southland position that 'big' natural hazards (Alpine Fault, Puysegur Trench or Fiordland tsunami) remain unaddressed in RMA planning can be understood.

One territorial authority representative expressed the view that natural hazards such as flooding, storm surge and erosion can be controlled, while 'big' natural hazards (citing earthquakes) cannot be controlled. An active example of this is stop banks seeking to control flood pathways to protect development. However, as the 2017 Edgecumbe flood event demonstrated, stop banks can only cope to their design level, and the consequences of a stop bank breach can be catastrophic when the residual risk is realised.

Recent memory bias has already been noted, and this would also apply to the 'big' natural hazards, with an event not having occurred in Southland's living memory, and as such these go unaddressed in RMA planning.

9.5 What Is an Ideal District Plan?

GDC and Environment Southland were asked what their ideal district plan chapter for natural hazards would look like, covering matters such as what it would address, what data would underpin it, what outcomes would be sought and what controls or restrictions would be put in place. The difference between GDC and Environment Southland's responses were clear, and the responses are explored below.

GDC are in the process of reviewing their District Plan and are currently producing their Issues and Options Report, which will identify natural hazards as a key issue. The District Plan will have a strong objectives and outcomes focus to guide development and consideration of applications, while acknowledging that natural hazards planning is currently a responsive exercise. Natural hazards to be addressed will be flooding and wildfire, and the District Plan will seek to provide for access and egress from sites during events, with safety being the key consideration within the chapter. This will be reflected by controlling the location of development and placing stringent controls on that development to ensure objectives and outcomes are achieved. The approach taken in this regard will be nearing a risk-based approach, expressed in the form of identifying the hazard and its likelihood, and consideration of the consequences. This recommended approach would provide for a risk-based approach that ensures the management of significant risk is achieved. Proactivity should be at the forefront of the approach, particularly where there is available information or where information is within the planned pipeline (for example, LiDAR and the analysis set to utilise this).

Environment Southland's response took an understandably regional focus, with flooding emphasised. They sought that district plans contain modelling outputs for 1-in-100-year events, with a provision framework developed around this. In light of recent events around New Zealand, and the potential for climate change to exacerbate flooding, a longer timeframe should be considered. The provision framework should control and manage development in 'less than ideal' locations and specify an appropriate minimum floor level within floodplains. Lastly, Environment Southland sought consistency across the region regarding what is enabled and what is regulated, the point at which Environment Southland becomes involved with district council planning processes regarding natural hazards and the approach to coastal hazards (and presumably flooding and other natural hazards, too).

10.0 RECOMMENDATIONS

The following recommendations are grouped into four themes: scientific information and investigations, guidelines, policy change and collaboration. Following these themed recommendations is guidance on how these could be prioritised.

10.1 Scientific Information and Investigations

Environment Southland has been identified as holding the majority of Southland's natural hazard information, which is reflected in the district councils often consulting with Environment Southland when a resource consent application requires natural hazards to be considered, and Environment Southland managing the Beacon GIS system. To improve capacity and understanding of natural hazards information across the region, Environment Southland and the Regional Planning Working Group may wish to consider a workshop for staff to consider the information being produced on a regular basis, review lessons from the resource consenting process around natural hazards and consider what policy changes would assist this process.

Upon reviewing a number of responses by Environment Southland to requests for natural hazard information, it was found that a number of statements were made that should be informed by peer-reviewed material. Furthermore, it was identified that a lot of the information held by Environment Southland requires digitising. Given the likely age of this information, a rigorous peer review to identify what purposes it is suitable for and its limits is recommended if it is proposed for use in a public forum.

Notwithstanding the above, to inform future policy changes it is recommended that the following scientific investigations are completed:

- Flooding:
 - Flooding was regularly identified as the natural hazard with the greatest potential for impact across the region; however, the last flooding event that significantly impacted the region was in 1984. This status is reflected in planning documents across the region, with the most well-developed policy framework around flooding. However, the data underpinning this is out of date and reliant on previous flooding events (1-in-20-, 50–60- or 80-year events depending on the location), as opposed to the 1-in-100-year event typically found in planning documents. Given recent flooding events around New Zealand, namely the 2017 Edgecumbe and 2020 Southland events, consideration should be given as to whether the 1-in-100-year event is adequate or whether a longer return interval event is more appropriate.
- Coastal hazards (erosion, storm surge, sea-level rise¹⁸, tsunami):
 - Current best practice includes that coastal hazards are mapped and managed in land-use planning documents as a collective layer. It is understood that current coastal hazard overlays in Southland are not underpinned by a robust dataset or modelling.

¹⁸ Including potential saltwater intrusion of groundwater sources and noting that localised ground deformation should also be factored in.

- Active faults:
 - Utilising the soon to be complete regional LiDAR dataset, it is recommended that an active faults study be completed to determine the risk associated with fault lines in the Southland Region. In particular, recurrence intervals, the degree of single event displacement and the levels of deformation possible.
- Ground shaking and liquefaction:
 - Building on Glassey and Heron (2012), developing it at a region-wide scale and utilising the findings from the active fault study recommended above, it is recommended that a ground shaking and liquefaction study be undertaken to understand the level of risk currently adopted across the region and to guide future development strategies.
- Landslide and land instability:
 - Also utilising the regional LiDAR dataset and other relevant datasets, analysis to identify those areas potentially prone to landslide events can be mapped with appropriate planning provisions developed.

10.2 Guidelines

The completion of the above scientific investigations would enable the following guidelines to be implemented:

- Ministry for Business, Innovation and Employment – Planning and engineering guidance for potentially liquefaction-prone land: Resource Management Act and Building Act aspects (Ministry of Business Innovation and Employment 2017).
- GNS Science – Guidelines for Assessing Planning Policy and Consent Requirements for Landslide Prone Land (Saunders and Glassey 2007).
- Ministry for the Environment – Coastal Hazards and Climate Change (Bell et al. 2017).
- GNS Science – New Zealand's Next Top Model: Integrating tsunami inundation modelling into land-use planning (Saunders et al. 2011).
- Ministry for the Environment – Planning for development of land on or close to active faults (Kerr et al. 2003).
- Ministry for the Environment – Preparing for future flooding: A guide for local government in New Zealand (Ministry for the Environment 2010).

These guidelines should also inform the development of the scientific investigations to ensure that they are appropriate and fit for purpose in the RMA planning space.

10.3 Policy Change

The analysis of the Southland RPS and the territorial authorities' district plans in Sections 3.1.3, 4.1.4, 5.1.4 and 6.1.3 identifies that each document requires significant changes to align with best practice for natural hazards land-use planning. The best-practice measures that require addressing include:

- The adoption of a risk-based approach (likelihood and consequences).
- Improved directiveness of provisions.

- Identification of clear linkages between policies and rules at a district level, policies and outcomes sought at a regional level and improvement to the internal structure of the documents.
- Prohibited activity status to implement 'avoidance' provisions (recognising that a robust level of information is required to impose a prohibited activity status rule).
- Maps that consider the potential consequences.
- Improved linkages to the Emergency Management Southland Group Plan.
- Identification of why certain natural hazards are not managed through land-use planning.
- Where appropriate, the use of three or more activity statuses to provide differing levels of control and restrictiveness over activities in response to levels of risk.
- Consideration of roles and responsibility to provide clarity across the region.
- Identification and consideration of cumulative and cascading hazards.
- Acknowledgement of uncertainty and the adoption of a precautionary approach in the face of uncertainty.

To address ambiguity and provide clarity and consistency across the region, it is considered that one of two, or a combination of two, approaches could be taken.

1. Environment Southland, in partnership with the territorial authorities and Emergency Management Southland, produce regional natural hazard land-use planning guidance for district planning. The guidance will need to be prescriptive in nature to ensure clarity and address the identified issues.
2. A region-wide district plan natural hazard chapter is prepared in partnership with the territorial authorities, which can be incorporated into each of the territorial authorities' district plans. While there would be complications needing resolution regarding how the common chapter interacted with the separate district plans, the recently produced National Planning Standards require a level of alignment in planning documents that would aid the integration of such a chapter across three district plans. The current internal structure of the district plans will be a more difficult issue to resolve (i.e. the location of natural hazard rules within the plans¹⁹).

An option available to Environment Southland and the territorial authorities, which takes into account uncertainty and the implications of placing a natural hazard overlay across a property, is a mechanism within plans where applicants can challenge this line by providing a site-specific assessment based on a specific methodology set out by the authority.

An example of this being implemented is the Christchurch District Plan in relation to rockfall and cliff collapse. The assessments utilised to develop the risk-matrix for rockfall and cliff collapse involve a number of underlying assumptions.²⁰ Given this, and the area-wide scale of the assessments, there is uncertainty in the calculated value, which can mean there may be a higher or lower level of actual risk. In response to this uncertainty, Policy 5.2.2.4.2

¹⁹ The Southland District Plan natural hazard rules are located within the zone chapters, rather than within the Natural Hazard chapter. This was the recommendation of the Section 32 report.

²⁰ Including the percentage of time that an individual is on-site or in a residential unit, the level of seismicity (taking into account that the Canterbury earthquakes are expected to decrease over time) and whether or not people would be evacuated following a major seismic event.

provides for site-specific assessment of risk from rockfall and cliff collapse in certain areas. Christchurch City Council then issue a certificate (valid for two years), which specifies the site's level of risk. Site-specific assessments must utilise the methodology prescribed within the Christchurch District Plan, which is the same as that which underpins the risk-matrix within the plan.

Lastly, it must be recognised that a 'best practice' natural hazards land-use planning framework relies upon robust and peer-reviewed scientific information that is aligned across investigations to produce a planning framework that is consistent and aligned in the outcomes it seeks, management measures in place, and levels of control across different hazards, with potentially different risk profiles. This is where a risk-based approach is able to provide a consistent approach across multiple natural hazards in a manner than can be tailored for the region. Until the required scientific information (identified in Section 10.1) is obtained, changes to the planning framework should be limited and would ideally be implemented at the same time as changes for the National Planning Standards. However, this is not to dismiss pre-planning for these changes by identifying the outcomes sought with regard to the management of natural hazards through land-use planning, some of which has been captured within this report.

10.4 Collaboration

As identified in Section 10.3, each of the territorial authorities' district plan natural hazard chapters and the Southland RPS chapter require updating to align them with best practice. In order to implement a regionally consistent approach to land-use planning for natural hazards, a collaborative approach is recommended. The Regional Planning Working Group provides a strong basis for this to occur.

Discussions with Environment Southland identified that, in the case of flooding, different departments are responsible for the management of various aspects of the inputs that require consideration when assessing flooding risk – for example, flood modelling and the stop bank network are managed by separate departments. Therefore, the collaborative approach should extend internally within the councils as appropriate.

The discussions with council staff also identified that each council experiences significant staffing and capacity issues within their planning and policy departments. A collaborative approach in conjunction with regional level leadership and guidance, including the implementation of one or both of the approaches identified in Section 10.3, would assist in alleviating this.

Another collaborative opportunity identified, albeit with regional leadership and guidance, would be in the development of a Southland Climate Action Plan or the appointment of a climate change specialist to champion a response and action to climate change impacts and effects across the region.

10.5 Prioritising Recommendations

On 22 January 2020, a workshop session was held with the Southland Regional Planning Working Group to socialise the findings and concepts of a draft copy of this report. A key request from the Working Group was the prioritisation of the recommendations and the identification of any 'catastrophic' recommendations, i.e. the recommendations that should be implemented immediately, as not doing so could result in catastrophic outcomes. These are each discussed below.

Several recommendations are required to be actioned before others, while the remaining recommendations could be actioned at any time. A prioritisation exercise would likely produce different results depending upon a person's or group's perspective. To assist with a prioritisation process, identified below are a series of considerations that should be taken into account when prioritising the recommendations.

The recommendations that follow an obvious consecutive order are for scientific investigations to precede the implementation of GNS Science; Ministry for Business, Innovation and Employment; and Ministry for the Environment guidance and policy change. The order in which to undertake scientific investigations would be subject to the considerations below. The remaining recommendations include regional natural hazard planning guidance for district planning or that a region-wide district plan natural hazard chapter is prepared in partnership with the territorial authorities and a natural hazard information workshop held with council staff. These recommendations do not follow a consecutive order and could be undertaken at any time.

Matters that should be considered in prioritising or undertaking recommendations include:

- The consequences of implementing / not implementing each recommendation.
- Dependencies of each recommendation – for example, meaningful policy change may require further scientific information.
- Societal exposure/impacts – for example, the number of people / residential portfolio and the infrastructure potentially exposed to flooding versus landslides versus ground rupture.
- The timeframes for an RPS or District Plan change, and what is achievable within that timeframe.
- Personnel availability to lead, availability of funding, and the timeframe driving completion (e.g. RPS, District Plan, CDEM, LTP).
- Buy-in from stakeholders and partners (e.g. is there already buy-in, or will more time be required if starting from the beginning of the process?).
- Impact and feasibility of implementing the recommendation.
- Whether the recommendation can result in a 'quick win' and be implemented with minimal cost.

For some of these considerations, existing evaluation processes may be useful. For example, Appendix C of MCDEM (2018) provides a risk matrix and template-based process for risk analysis, which could be utilised, in part, to prioritise scientific investigations. The MCDEM (2018) evaluation process aligns well with the key concepts of Saunders et al. (2013), and a combination of the two could be utilised to programme scientific investigations through to implementing policy change.

This review has not identified any recommendations that could be classified as catastrophic; however, the councils may adopt their own metrics to determine if the consequences of not actioning a recommendation would be catastrophic to their own context. The implementation of the recommendations contained within this report is required to improve the region's management of natural hazard risk within the RMA framework and improve the robustness of its communication of information within the natural hazard's space.

11.0 CONCLUSION

The purpose of this review was to determine whether the natural hazard plan provisions in the Southland RPS and district plans are relevant, appropriate, complete and consistent with best practice; to assess the degree of change needed to better plan for natural-hazard-related challenges; and to enable better planning for the risk of natural hazards, including scientific investigations needed to inform changes.

To achieve the purpose of this report, a review of key documents was undertaken and the Southland RPS and district plans were analysed against best-practice measures for land-use planning for natural hazards (Grace and Saunders 2016). This analysis took the form of a simple traffic light analysis, which identifies whether the RPS or plan is implementing the measure in full, in part or not at all.

Following the analysis, in-person one-on-one and group semi-structured interviews were held with Environment Southland, GDC, ICC, SDC and Emergency Management Southland to gain further insight into their approaches, perceptions, challenges, outcomes and goals regarding land-use planning for natural hazards. Analysis of the discussions pulled out five themes: technical information, development direction, regional leadership and guidance, perception of natural hazards and the ideal district plan. These interviews provided key information that is undocumented and only attainable through experience, but which is highly important when considering changes to the planning framework.

Recommendations stemming from this report address the scientific investigations required to underpin a robust land-use planning framework for natural hazards and include, in order of priority: flood modelling, coastal hazards, active faults, ground shaking and liquefaction and landslide and land instability. To implement the scientific investigation in a planning framework, the relevant guidelines from the Ministry for the Environment, GNS Science and the Ministry for Business, Innovation and Employment are identified and referenced. The degree of change needed for each of the planning documents is considered, but change cannot occur without robust information to underpin it. Change could still be scoped ahead of gaining this information to ensure that it is entirely fit for purpose, and councils are able to implement the changes required to address the issues being experienced at present. To implement these changes a regional collaborative approach will be needed across Environment Southland, ICC, SDC, GDC and Emergency Management Southland. The Regional Planning Working Group provides a strong basis for this to occur.

12.0 ACKNOWLEDGEMENTS

The authors would like to thank Lara Clarke and Maureen Coomer of GNS Science for their review of the draft report. They also greatly acknowledge the time of Environment Southland, Gore District Council, Southland District Council, Invercargill District Council and Emergency Management Southland staff for their contributions to this review.

13.0 REFERENCES

- Beban JG, Saunders WSA. 2013. Planning for risk: incorporating risk-based land use planning into a district plan. Lower Hutt (NZ): GNS Science. 52 p. (GNS Science miscellaneous series; 63).
- Bell RG, Lawrence JH, Allan S, Blackett P, Stephens S. 2017. Coastal hazards and climate change: guidance for local government. Wellington (NZ): Ministry for the Environment; [accessed 2020 Feb]. <http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/coastal-hazards-guide-final.pdf>
- Berke P, Smith G, Lyles W. 2012. Planning for resiliency: evaluation of state hazard mitigation plans under the Disaster Mitigation Act. *Natural Hazards Review*. 13(2):139–149. doi:10.1061/(ASCE)NH.1527-6996.0000063.
- Ericksen NJ. 2003. Planning for sustainability: New Zealand under the RMA. Hamilton (NZ): International Global Change Institute. 350 p.
- Glassey PJ. 2006. Geological hazards: Southland District Council Lifelines study. Dunedin (NZ): GNS Science. 1 v. + CD. Consultancy Report 2006/100. Prepared for Southland District Council.
- Glassey PJ, Heron DW. 2012. Amplified ground shaking and liquefaction susceptibility, Invercargill City. Dunedin (NZ): GNS Science. 10 p. Consultancy Report 2012/014. Prepared for Invercargill City Council.
- Grace ES, Saunders WSA. 2016. Good practice case studies of regional policy statements, district plans, and proposal plans. Lower Hutt (NZ): GNS Science. 82 p. (GNS Science report; 2015/03).
- Kerr J, Nathan S, Van Dissen RJ, Webb P, Brunsdon D, King AB. 2003. Planning for development of land on or close to active faults: a guideline to assist resource management planners in New Zealand. Lower Hutt (NZ): Institute of Geological & Nuclear Sciences. 71 p. Client Report 2002/124. Prepared for Ministry for the Environment.
- [MCDEM] Ministry of Civil Defence and Emergency Management. 2018. CDEM group planning. Wellington (NZ): Ministry of Civil Defence and Emergency Management. 81 p. (Director's guideline for Civil Defence Emergency Management Groups; DGL 09/18).
- Ministry for the Environment. 2010. Preparing for future flooding: a guide for local government in New Zealand. Wellington (NZ): Ministry for the Environment. 34 p.
- Ministry of Business Innovation and Employment. 2017. Planning and engineering guidance for potentially liquefaction-prone land: Resource Management Act and Building Act aspects. Rev 0.1. ed. Wellington (NZ): MBIE; [accessed 2019 Jun 3]. <https://www.building.govt.nz/assets/Uploads/building-code-compliance/b-stability/b1-structure/planning-engineering-liquefaction.pdf>
- [NIWA] National Institute of Water and Atmospheric Research. 2015. Coastal erosion at Colac Bay, Southland. Hamilton (NZ): National Institute of Water and Atmospheric Research.

- Quality Planning. 2013. Treating risks: RMA tools for managing natural hazards. Wellington (NZ): Ministry for the Environment; [accessed 2020 Feb]. <https://qualityplanning.org.nz/index.php/node/811>
- Quality Planning. 2017. Writing issues, objectives and policies. Wellington (N): Ministry for the Environment; [accessed 2020 Feb]. <https://qualityplanning.org.nz/node/610>
- Saunders WSA, Beban JG, Coomer MA. 2014a. Analysis of natural hazard provisions in regional policy statements, territorial authority plans, and CDEM Group Plans. Lower Hutt (NZ): GNS Science. 72 p. (GNS Science report; 2014/28).
- Saunders WSA, Beban JG, Coomer MA. 2014b. Assessment of council capability and capacity for managing natural hazards through land use planning. Lower Hutt (NZ): GNS Science. 25, 34 p. (GNS Science report; 2014/50).
- Saunders WSA, Beban JG, Kilvington M. 2013. Risk-based land use planning for natural hazard risk reduction. Lower Hutt (NZ): GNS Science. 97 p. (GNS Science miscellaneous series; 67).
- Saunders WSA, Glassey PJ. 2007. Guidelines for assessing planning policy and consent requirements for landslide prone land. Lower Hutt (NZ): GNS Science. 71 p. (GNS Science miscellaneous series; 7).
- Saunders WSA, Grace ES, Beban JG. 2014c. Overview of the state of land use planning for natural hazards in New Zealand. Lower Hutt 9NZ): GNS Science. 30 p. (GNS Science report; 2014/63).
- Saunders WSA, Prasetya G, Leonard GS. 2011. New Zealand's next top model: integrating tsunami inundation modelling into land use planning. Lower Hutt (NZ): GNS Science. 37 p. (GNS Science miscellaneous series; 34).

This page left intentionally blank.

APPENDICES

This page left intentionally blank.

APPENDIX 1 COMPARISON OF ALIGNMENT WITH BEST-PRACTICE INDICATORS AND GUIDANCE TO INCREASE ALIGNMENT

Best-Practice Indicator	Invercargill DP Comment	Southland DP Comment	Gore DP Comment	Guidance to Increase Alignment with Best-Practice Indicator
General risk management or all-hazard objectives and policies alongside hazard-specific methods and rules.	The Invercargill DP contains two all-hazard objectives, which is in line with the best-practice indicators. However, it contains both all-hazard and hazard-specific policies; all-hazard and activity-specific methods; and hazard-specific, activity-specific and zone-specific rules, which make it difficult to navigate the linkages between policies and their implementation through rules.	The Southland DP Natural Hazards chapter contains a single all-hazard objective, six all-hazard policies and two all-hazard methods. Rules relating to natural hazards are contained in the zone chapters of the Southland DP. The Subdivision chapter contains three all-hazard policies, two policies that address all-hazards as a consideration, and two rules requiring the consideration of mapped flooding and all mapped natural hazards. The Infrastructure chapter contains a single all-hazards policy. Natural hazards are a consideration in the Urban Zone earthworks standards. The Rural Zone chapter contains one policy that addresses all hazards in relation to rural-residential activities and has restricted its discretion to include the risk of natural hazards for restricted discretionary activities in the Rural Zone.	The Gore DP's natural hazard provisions, from issues through to rules, focus on awareness of natural hazards and inundation.	The National Planning Standards provide the overall plan architecture. Quality Planning provides guidance regarding the structure of objectives, policies, rules and methods. ²¹
Clear links (lists) between policies and rules.	The Invercargill DP does not provide a clear link/list correlating policies to rules.	The policies and rules are contained in separate chapters and there is no clear link between these.	Due to the Gore DP's focus on awareness (to which there are no related rules) and inundation, the link between the inundation policies and rule is clear without the need for a list.	Table 8 of the Southland RPS provides a good example of clear links/lists between objectives, policies and methods, which could be used as an example for district plans to show links between objectives, policies and rules.
The use of directive language (e.g. 'avoid', 'shall', 'limit'), and direction on when to avoid and when to mitigate rather than utilising the two terms in the same policy without guidance on which to apply.	The Invercargill DP contains a mixture of directive language and more vague language. Policies seek to raise, reduce, identify, discourage, avoid, protect, adopt, take and seek, which are all examples of directive language; however, the policies also utilise 'limit' and 'recognise', which are more open to interpretation.	Policies NHZ.1 and NHZ.2 direct when it is expected that subdivision, land use and development is to be avoided due to significant risk from natural hazards and when the adverse effects of natural hazards should be mitigated. Policy NHZ.5 directs that subdivision, land use, development and physical protection works shall not exacerbate the risk of natural hazards. Policy NHZ.6 directs the adoption of a precautionary approach with regard to climate change and sea-level rise to ensure the potential effects are avoided or mitigated but does not provide direction on when to avoid and when to mitigate.	Policy 3 seeks to avoid adverse effects, which is an example of directive language. Other policies contain less directive language, such as 'promote' (Policies 1 and 2), and 'encourage' (Policy 4(b)). Policy 4(b) encourages avoidance and adoption of measures in relation to flooding and is implemented by Method 1 and Rule 4A.9.1, the combination of which provides clarity.	The use of directive and vague language is mixed across the District Plans. The use of language (such as 'limit', 'recognise' and 'encourage') is open to interpretation and requires rules, methods or sub-order policies to provide clarity. Further development of a risk-based approach (considering types of activities and their exposure to hazards) may enable more specific policy direction to be developed and as such more direct terminology may be used to support the outcomes sought.

²¹ <https://www.qualityplanning.org.nz/node/610>, <https://www.qualityplanning.org.nz/node/611>, <https://www.qualityplanning.org.nz/node/613>

Best-Practice Indicator	Invercargill DP Comment	Southland DP Comment	Gore DP Comment	Guidance to Increase Alignment with Best-Practice Indicator
Methods that clearly show how policies are to be implemented, including links to maps.	The methods do not clearly link to the policies; however, they do make requirements of the maps and rules. For example, Method NH-M1 identifies the Delineation of areas subject to risk from natural hazard on the District Hazard Information Maps and Method NH-M2 identifies rules limiting subdivision and certain activities.	The Southland DP contains two methods, which include directives to develop and maintain a record of natural hazards, to develop approaches for managing natural hazards and to make maps available. It is not clear how these methods implement the six policies.	Chapter 4A.5 sets out the methods of implementation, which do not reference the Gore DP maps. The themes within the methods align with policies.	Recognising that methods are optional (s75(2)(b) of the RMA), in order to align with this best-practice indicator a table such as that exemplified by Table 8 of the RPS could be utilised.
A structure where all natural hazard provisions are contained in one chapter. ²²	The Invercargill DP splits issues, objectives, policies and methods into one part, and rules into another part. Other chapters of the Invercargill DP also address natural hazard matters as outlined in Table 4.2. The Invercargill DP therefore requires significant restructuring to achieve the National Planning Standard structure.	The natural hazard objectives, policies and methods are contained in the Natural Hazards chapter, and the rules are contained in the Urban Zone, Rural Zone, Industrial Zone and Subdivision chapters. Objectives and policies regarding coastal hazard are contained in the Coastal Environment chapter.	The subdivision chapter of the Gore DP also contains provisions relating to natural hazards as they apply to subdivision. These provisions are largely repetitive of those contained within the Natural Hazards chapter.	Refer to the National Planning Standards in relation to plan structure.
The use of three or more activity statuses provide a more meaningful range of control than just two.	In some cases, three tiers of activity status are used, while in others two tiers are used, as set out below: - NH-R1.1: Residence extensions and riverine inundation (Level 2 or 2A risk) utilises permitted, restricted discretionary and non-complying activity statuses depending on extension size and date. - NH-R1.2: The same as NH-R1 but, in Level 3 risk areas, utilises restricted discretionary and non-complying activity statuses, noting that it would be inappropriate to have a permitted activity given the Level 3 risk. - NH-R2: Development and coastal hazards utilises permitted and restricted discretionary activity statuses. - NH-R3 and NH-R4 address earthworks and utilise non-complying and permitted activity statuses, respectively. - NH-R5 addresses the Industrial 2A zone and utilises permitted and restricted discretionary statuses.	The Southland DP does not seek to manage natural hazards with a rule structure of escalating activity statuses. Rules that address natural hazards do so by including them in standards and matters of discretion.	The Natural Hazards chapter contains one rule, Rule 4A.9.1, which provides for certain activities within the Maitai River Floodway as a restricted discretionary activity.	The use of activity status should aim to reflect the levels of risk (including the acceptance or significance of that risk) associated with the activity in relation to the natural hazard and ensure that the planning framework efficiently and effectively achieves the plan objectives. Within the plan, this is best reflected in a clear cascading rule framework that is supported by policy directives.

²² Recognising the National Planning Standards.

Best-Practice Indicator	Invercargill DP Comment	Southland DP Comment	Gore DP Comment	Guidance to Increase Alignment with Best-Practice Indicator
Rules that match the level of detail in maps.	The Invercargill DP maps include four levels (1, 2, 2A and 3) regarding riverine inundation that, as set out in NH-P6, correlate to the following risk levels: • Low • High (where future flood levels can be predicted) • High (flood greater than the design limits of the flood protection system) • High (unprotected). The natural hazard rules regarding riverine inundation match with these risk levels. The other natural hazards are not managed in this level of detail.	The Southland DP maps include a coastal hazard line and a flood area. Their mapping is absolute, with land either inside or outside of these hazard areas. Rules that address these areas are similarly absolute in nature.	Areas are either inside or outside an “area subject to actual or potential flooding” or ‘Matura River Floodway’ overlays. The rules address the Matura River Floodway; however, there is no rule for other areas located within an “area subject to actual or potential flooding” and a policy directive applies instead.	The Invercargill DP and Southland DP maps and rule frameworks provide examples of best practice in this regard. Key to the approach is that when risk levels are utilised, as exemplified in the Invercargill DP, activities are escalated up the activity statuses in correlation with the level of risk.
Prohibited activity status utilised to implement ‘avoid’ policies.	Policy NH-P8 seeks to avoid subdivision in hazard-prone areas where this would lead to intensification of development that would exacerbate the consequence of a hazard event. There is no prohibited activity status rule implementing this policy.	The single ‘avoid’ policy in the Natural Hazards chapter of the Southland DP seeks to avoid subdivision, land use and development in areas at significant risk from natural hazards. This policy is not reinforced by a prohibited activity rule.	The Natural Hazards chapter does not contain a prohibited activity status with respect to the ‘avoid adverse effects’ directive of Policy 3. It is noted that a prohibited activity in this regard would be inappropriate.	A strong level of evidence is required to prohibit land-use activities in response to a natural hazard presenting a significant (or unacceptable) level of risk. Identifying the use of a prohibited activity status for specific activities in specific areas should be undertaken in partnership with stakeholders and may require community consultation regarding risk acceptance.
A record of why a particular hazard is not addressed aids clarity and transparency.	The overview section of the Natural Hazards chapter outlines that the district is subject to flooding, sea-level rise, storm surge, seismic activity, liquefaction and tsunami. Of these natural hazards, the Invercargill DP does not address tsunami. No explanation is included for tsunami’s absence in the Invercargill DP.	The Southland DP addresses flooding and coastal hazards but does not address natural hazards such as active faults, liquefaction, landslides or ground shaking or include an explanation as to why they are not included.	There are no records of why hazards other than inundation are not addressed within the Gore DP.	Each of the districts have the potential to be subject to natural hazards additional to those addressed in the district plans. Additional text in the introductory sections of the Natural Hazard chapters providing an explanation as to which natural hazards are addressed generally and more specifically, and why, is preferable to explaining why a particular natural hazard is not addressed (for example, in relation to flooding, an explanation that it has historically impacted the district and has the potential to impact the district regularly versus a lack of mapped information to support the understanding of a particular hazard or application of specific rules). Policies and methods can be utilised to set out information collection priorities and responsibilities to address information gaps. It may also be appropriate to include scope within the chapter to consider low-probability high-magnitude hazard events where significant land-use change is anticipated, such as a plan change process.

Best-Practice Indicator	Invercargill DP Comment	Southland DP Comment	Gore DP Comment	Guidance to Increase Alignment with Best-Practice Indicator
Hazard maps that incorporate potential consequences.	While the Invercargill DP describes riverine inundation with levels of risk within Policy NH-P6, the potential consequences at each level are not contemplated. An example of this being incorporated within the Thames-Coromandel District Plan is: <i>“‘High flood hazard area’ The combined depth and speed of floodwaters is likely to significantly impede the manoeuvrability or stability of the average person. Damage to property is likely to be widespread and structural, including instanced where buildings have been raised about the ‘flood level’”.</i> ²³ The rules only address residential development.	The Southland DP maps do not include potential consequences.	The Gore DP maps do not incorporate potential consequences.	The acknowledgement of potential consequences can assist plan users’ understanding of escalating levels of risk and associated activity statuses. This can be included as simply as including the potential consequences within definitions for the natural hazard overlays.
Mapping acknowledges uncertainty where appropriate, e.g. fault lines.	The Invercargill DP maps do not acknowledge uncertainty. However, it is noted that the liquefaction and seismic amplification susceptibility maps provided alongside the Invercargill DP for information contain uncertainty buffer zones. These maps do not have regulatory implications.	Uncertainty is not acknowledged in mapping.	The Gore DP maps do not acknowledge uncertainty, noting that “areas subject to actual or potential flooding” are grouped under one overlay.	Uncertainty is somewhat inherent in natural hazard science, particularly with regard to reoccurrence intervals and, in some instances, the extent of the affected area. This can be particularly innate when studies are carried out over larger areas within a confined timeframe. One method of addressing this within a district plan is to acknowledge the uncertainty by providing a mechanism for applicants to ‘challenge the line’ at a site level, with a site-specific study undertaken in accordance with a predetermined and consistently applied methodology.
Clear identification of matters to be monitored, information to be gathered, information sources and the frequency of reviews.	The Invercargill DP policies seek to identify areas at risk of liquefaction, riverine inundation and MMI 8 shaking; areas below 3 m ASL in relation to sea-level rise; and identify Environment Southland and government agencies as sources of information. Reviews are not considered.	The Natural Hazard methods identify that SDC will develop and maintain a record of natural hazards in collaboration with other relevant agencies but does not consider matters to be monitored or the frequency of reviews of this information.	Chapter 4A.8 addresses monitoring for natural hazards and sets out that this comprises the nature, type and location of natural hazards that may be identified from time to time. This is ambiguous and lacks purpose, particularly when reviewed alongside the chapter’s other provisions.	Identification of the matters to be monitored, information to be gathered, information sources and the frequency of reviews is most appropriately located within the methods of the Natural Hazard chapter. These streams of work, and as such the methods, need to be developed in partnership with all relevant stakeholders to ensure priorities are met and to avoid duplication and gaps. A region-wide approach is therefore most appropriate.
Record of roles and responsibilities.	The Invercargill DP does to address the Council’s roles and responsibilities regarding natural hazards.	The Southland DP does not consider roles and responsibilities.	The Gore DP does not address roles and responsibilities regarding natural hazards.	As for the above matter.

²³ From the Thames-Coromandel District Plan.

Best-Practice Indicator	Invercargill DP Comment	Southland DP Comment	Gore DP Comment	Guidance to Increase Alignment with Best-Practice Indicator
Reference to CDEM Plan.	The Invercargill DP does not reference the Southland CDEM Plan.	The Southland DP does not reference the Southland CDEM Plan.	The Gore DP natural hazards chapter does not reference to the Southland CDEM Plan.	Among other functions, CDEM Plans identify and prioritise natural hazards within a region. Where appropriate, RMA planning documents can be utilised to reduce the risk of some natural hazard events. While it is acknowledged that the RPS is the most appropriate place for alignment to occur, the district plans have a role to play in implementing the RPS. Alignment of priorities, collaboration of resources and identification of responsibilities should be considered across planning/policy and CDEM.
Include information requirements of applicants.	Restricted discretionary natural hazard rules include matters that the Council shall restrict their discretion to, which should be approached by applicants as information requirements. SUB-R7 also addresses subdivision on land identified as being subject to Level 2, 2A or 3 inundation and requires subdivision plans to show a building platform and, where applicable, effluent disposal area and reserve area that are hazard-free. Appendix 1 to the Invercargill DP sets out information to accompany applications and include natural hazard considerations for land-use and subdivision applications.	The Southland DP identifies natural hazards as a standard or matter for discretion, which should prompt applicants to consider natural hazards within their application. However, this is not a formal information requirement. Schedule 6 contains Information for Resource Consents and Schedule 6.1.2 identifies information for land-use details, including: - an assessment of the likely risk of natural hazards; and - where natural hazards are identified and the proposed methods to avoid, remedy or mitigate the hazard. Schedule 6.1.3 identifies information requirements for subdivisions, including the presence of and type of natural hazards.	Rule 4A.9.2 and Chapter 8.12 contain information requirements of applicants with regard to natural hazards and subdivision.	Information requirements provide clarity to applicants and improve the consistency of applications for similar activities. Where a natural hazard within an area is well known, information requirements can be relatively prescriptive. To improve the clarity for applicants, a regionally consistent framework for assessment of natural hazard risk should be considered.
Hazard information on LIMs. ²⁴	NH-M6 addresses the dissemination of information, which includes issuing hazard information as part of the LIM and PIM process.	The Southland DP does not direct that hazard information shall be placed on LIMs. It is recognised that there is no statutory requirement for this to occur, but it is good practice to do so.	The Gore DP does not contemplate placing hazard information on LIMs.	Natural hazard information is not required to be included on LIMs if it is included in the District Plan; however, it is good practice to include it. Achievement of this indicator would be through the information's inclusion on LIMs, which could be reflected within a district plan's methods.
Policy and methods on information management for hazard information.	The Invercargill DP does not contain provisions regarding information management for hazard information (such as a directive for a database). However, it does seek to identify a number of natural hazards and collaborate with other authorities, which would inherently lead to similar outcomes.	Method NHZ.1 directs that a record of natural hazards be developed and maintained with other relevant agencies; however, it is not clear what form this record will take.	The Gore DP does not contain policies or methods on information management for hazard information; however, it does contain a method relating to the distribution of hazard information to the public.	Identification of Environment Southland's Beacon portal may be the most appropriate way to acknowledge information management. If this is the case, a regionally consistent approach should be considered.

²⁴ Land Information Memorandum in accordance with Section 44A of the Local Government Official Information and Meetings Act 1987.

Best-Practice Indicator	Invercargill DP Comment	Southland DP Comment	Gore DP Comment	Guidance to Increase Alignment with Best-Practice Indicator
A directive to apply a precautionary approach that allows uncertainty to be addressed.	NH-P11 directs that a precautionary approach be taken when managing the effects of natural hazards.	Policy NHZ.6 seeks that a precautionary approach be adopted in managing the effects of climate change and sea-level rise.	The Gore DP does not contemplate a precautionary approach.	The direction to adopt a precautionary approach, whether in relation to a particular natural hazard or natural hazards as a whole, at the policy level allows councils to take a conservative approach in their consideration of information.
Mapping and associated rules that address coastal hazards cumulatively.	The Invercargill DP maps address sea-level rise and storm surge cumulatively, and coastal erosion separately. Tsunami is not addressed.	Coastal hazards are addressed as a single overlay on the Southland DP maps, and the rules reference this overlay.	The Gore district is land-locked.	Adoption of this approach provides simplicity within the planning framework and is considered appropriate due to the overlapping extent of coastal hazards.
A policy direction requiring the consideration of cumulative and cascading hazards.	Issue 1, Policy 4 and Policy 10 address cumulative hazards. Cascading hazards are not addressed.	Cumulative and cascading natural hazards are not addressed in the Southland DP.	The Gore DP does not contemplate cumulative or cascading hazards.	Cumulative (unrelated) and cascading (related) hazards occur where multiple natural hazards result in impacts within the same timeframe. While it is difficult for a plan to contemplate all possible scenarios, they potentially represent a 'worst case' scenario, and their consideration at a policy level should be identified and enabled.
Improved linkages between policies directive and land-use planning rules to achieve a specific level of risk rather than just seeking to maintain or not increase risk.	NH-P2 seeks to reduce exposure to natural hazards; however, due to not taking a risk-based approach, the achievement of a specific level of risk is not contemplated.	The policies and rules of the Southland DP do not seek to achieve a specific level of risk, instead seeking to reduce risk or not exacerbate it.	The Gore DP does not seek to achieve a specific level of risk through its policies and planning rules.	Linking into a definition of risk (below), implementing such an approach with community involvement allows the community to decide the level of risk they consider to be tolerable.
Incorporation of definition of risk.	As the Invercargill DP does not take a risk-based approach, it does not seek to define risk. Regarding riverine inundation, it does specify what the various level of risk are represented/triggered by; however, this could not be simply translated to other natural hazards.	Section 4 contains the definitions but does not include a definition of risk; however, an outline of significant risk is provided as a guidance note in Chapter 2.7. The Southland DP borrows from the Southland RPS definition and as such comprises an outline of areas potentially at significant risk from natural hazards.	The Gore DP does not include a definition of risk.	Recognising that national direction is required in this regard. The development of a regionally consistent definition of risk (likely to involve likelihood and consequences), developed in partnership with the community and with different levels to enable correlation with activity statuses, should be considered by the Regional Planning Working Group.



www.gns.cri.nz

Principal Location

1 Fairway Drive, Avalon
Lower Hutt 5010
PO Box 30368
Lower Hutt 5040
New Zealand
T +64-4-570 1444
F +64-4-570 4600

Other Locations

Dunedin Research Centre
764 Cumberland Street
Private Bag 1930
Dunedin 9054
New Zealand
T +64-3-477 4050
F +64-3-477 5232

Wairakei Research Centre
114 Karetoto Road
Private Bag 2000
Taupo 3352
New Zealand
T +64-7-374 8211
F +64-7-374 8199

National Isotope Centre
30 Gracefield Road
PO Box 30368
Lower Hutt 5040
New Zealand
T +64-4-570 1444
F +64-4-570 4657