

PLANNING OPTIONS FOR COASTAL COMMUNITIES

Hurunui District Council

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Contents

1	Introduction	4
1.1	Purpose	4
1.2	Background	4
2	Legislative Framework	6
2.1	Existing Legislative Framework	6
2.1.1	Resource Management Act 1991.....	6
2.1.2	Climate Change Response Act 2002.....	6
2.1.3	Building Act 2004	7
2.1.4	Local Government Act 2002.....	7
2.1.5	Reserves Act 1977	7
2.1.6	Marine and Coastal Area (Takutai Moana) Act 2011.....	7
2.2	National Policy Statements.....	8
2.2.1	New Zealand Coastal Policy Statement 2010	8
2.2.2	National Policy Statement for Freshwater Management	10
2.3	Proposed legislation.....	10
2.3.1	Resource Management reforms	10
2.3.2	Natural Hazards Insurance Bill	10
2.3.3	National Adaptation Plan.....	11
2.4	Regional Policy Statements and Plans	11
2.4.1	Canterbury Regional Policy Statement	11
2.4.2	Regional Coastal Environment Plan (RCEP)	13
2.5	Hurunui District Plan.....	13
2.6	Iwi Management Plans.....	14
2.6.1	Te Poha o Tohu Raumati – Te Rūnanga o Kaikōura Environmental Management Plan 14	
2.6.2	Mahaanui Iwi Management Plan	16
3	The hazard risk.....	17
4	The challenges of existing use rights	17
5	Possible planning options and approaches.....	18
5.1	Option 1 – raised floor heights	18
5.2	Option 2 – Relocatable dwellings	19
5.3	Option 3 – Amphibious dwellings	21
5.4	Option 4 – Waterproofing buildings	22

5.5	Option 5 – Avoid development.....	22
5.6	Option 6 – Time limited land use consents.....	24
5.7	Option 7 – Managed retreat	24
6	Planning options for Amberley Beach.....	26
6.1	Matrix of options	26
6.2	Reason and discussion	26
7	Planning options for Leithfield Beach	27
7.1	Matrix of options	28
7.2	Reason and discussion	28
8	Planning options for Gore Bay	29
8.1	Matrix of options	29
8.2	Reason and discussion	30
9	Planning options for Motunau Beach	30
9.1	Matrix of options	30
9.2	Reason and discussion	30
10	Planning options for Conway Flat and Claverley	31
11	Conclusion.....	31
12	References	32

1 Introduction

In 2020 the Hurunui District Council commenced a project to identify the current coastal hazards that impact Hurunui's coastal communities and to understand how these hazards will change over the next 100 years. This project is known as "Coastal Conversations." The project seeks to establish a long-term approach for managing the risk of coastal hazards at Amberley Beach, Leithfield Beach, Motunau Beach, Gore Bay and Conway Flat/Claverley in partnership with the local communities.

The long-term approach will follow a dynamic adaptative planning pathway approach based on the process set out in the Ministry for the Environment's *Coastal Hazards and Climate Change Guidance for Local Government*.¹

1.1 Purpose

This report has two roles. Firstly, it sets out the legislative and policy framework that decisions are to be made under and, secondly, it identifies a range of planning options that may be used to support a dynamic adaptive planning pathway process.

1.2 Background

Council has adopted the adaption approach detailed in the Ministry for the Environment's *Coastal Hazards and Climate Change Guidance for Local Government* to plan for future uncertainty. The dynamic adaptative planning pathways approach (DAPP) is a risk-based approach built on the notion that decisions in a dynamic environment cannot be predetermined and must remain flexible to account for uncertainty. DAPP establishes a series of actions over time (pathways) that achieve the projects objectives and sets signals and triggers that indicate when a pathway is no longer achieving the set objective and a review is needed.² DAPP also recognises that pathways are not linear and that multiple options can be utilised at the same time to achieve the best outcome. The DAPP process is illustrated in Figure 1 below.

The guidance sets out a 10-step decision cycle which has been modified to suit the Hurunui District. The Coastal Conversations project plan includes five distinct phases:

Phase 1 What is happening?

To build a shared understanding with coastal communities on the potential risk to their individual community.

Phase 2 What matters most?

Determining what is important to whom and developing community objectives that guide the decision-making process.

Phase 3 What can we do about it?

Identifying the possible range of adaptation options and developing pathways that meet the agreed objectives.

Phase 4 How can we implement the strategy?

Preparing an implementation plan, recording the agreed approach and documenting the actions required to achieve this.

¹ (Bell, Lawrence, Allan, Blackett, & Stephens, 2017)

² (Bell, Lawrence, Allan, Blackett, & Stephens, 2017)

Phase 5 How is it working?

To prepare a review programme to ensure the approach is adapted as required.

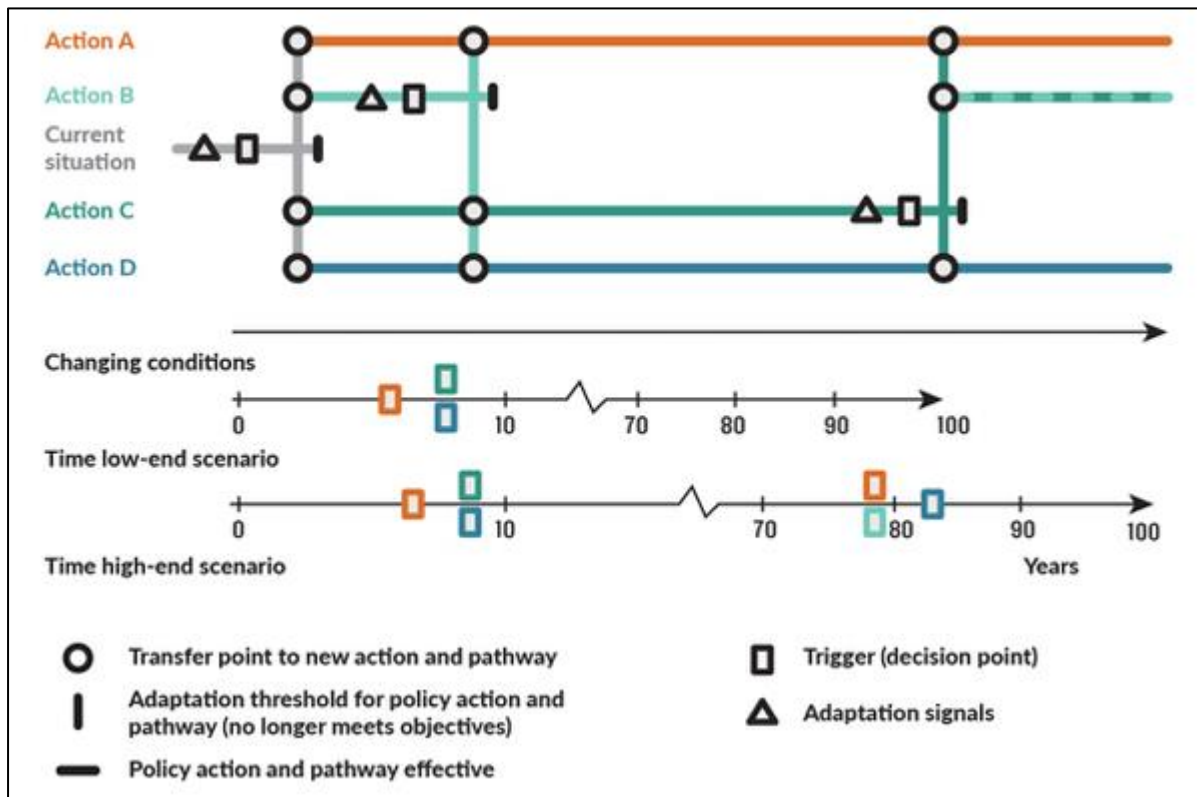


Figure 1: Adaptive Pathway Map (Source: MfE)³

Under Phase 1 Council commissioned Jacobs to prepare the *Hurunui District Coastline Hazard and Risk Assessment*⁴ looking at how coastal hazards would change with projected climate change scenarios over the next 30, 50 and 100 years. This information was used to inform the project and aid community engagement. For Leithfield Beach and Amberley Beach, Jacobs prepared a further coastal inundation modelling report to assess how flooding from fluvial and pluvial sources may compound with coastal inundation and change with predicted climate change scenarios.⁵

Under Phase 2 Council engaged with the relevant communities to establish what the communities placed greatest value in. This information was used to create unique objectives that would inform future adaptation options and measure their suitability. The project is now progressing into Phase 3. So far Jacobs have prepared a long list of potential adaptation options and short listed these for each community. One of the long-listed options is policy and planning mechanisms. Section 5 of this report sets out some of these options.

This report relies on the abovementioned technical reports provided by Jacobs and outlines some of the possible planning options which could be used to help achieve the community's objectives. These reports will be used to develop pathways, set triggers and create a coastal adaptation plan.

³ (Bell, Lawrence, Allan, Blackett, & Stephens, 2017) Adapted from Haaxnoot et al (2013; Hermans et al (2017)

⁴ (Jacobs, 2020)

⁵ (Jacobs, 2022)

2 Legislative Framework

This section sets out the legislative and planning framework relating to natural hazard risk management and preparing for climate change. Adaptation decisions need to be made under this framework.

2.1 Existing Legislative Framework

2.1.1 Resource Management Act 1991

The Resource Management Act 1991 (RMA) is the primary legislative document guiding national and regional policy planning in New Zealand. Planning documents are required to give effect to the RMA.

The purpose of the RMA is to promote the sustainable management of natural and physical resources (s5). In achieving that purpose councils must recognise and provide for a number of *matters of national importance* including:

- The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development (s6(a)).
- The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers (s6(d)).
- The management of significant risks from natural hazards (s6(h)).

Council is also required to have particular regard to the effects of climate change (s7(i)).

Section 10 Existing Use Rights

The RMA provides protection of certain existing uses under section 10.

- (1) *Land may be used in a manner that contravenes a rule in a district plan or proposed district plan if*
-
- (a) *either –*
- (i) *the use was lawfully established before the rule became operative or the proposed plan was notified; and*
- (ii) *the effects of the use are the same or similar in character, intensity, and scale to those which existed before the rule became operative or the proposed plan was notified.*
- (b) *[...]*

These rights do not apply if the reconstruction of the building increases the degree to which the building fails to comply with any rule in a district plan or proposed district plan.

In planning for coastal hazards under the RMA, Council is required to control the effects of land use and development in a way that avoids or mitigates the effects of hazards on people and property (s31). This is in part achieved through provisions in the Hurunui District Plan.

2.1.2 Climate Change Response Act 2002

The Climate Change Response Act (CCRA) puts in place a legal framework to enable New Zealand to meet its international obligations under the United Nations Framework Convention on Climate Change, the Kyoto Protocol and the Paris Agreement.

Part 1C was introduced in 2019 and addresses climate change adaptation. Specifically, it requires a national climate change risk assessment to be prepared by the Minister every six years. In response to the national climate change risk assessment the Minister must prepare a national adaptation plan.

The plan must set out the Government's objectives for adapting to the effects of climate change, the Government's strategies, policies, and proposals for meeting the objective and set timeframes for implementation.

2.1.3 Building Act 2004

The Building Act sets out the rules for the construction, alteration, demolition and maintenance of new and existing buildings in New Zealand. The Act states that a consent authority *“must refuse to grant a building consent for construction of a building, or major alterations to a building, if –*

- (a) the land on which the building work is to be carried out is subject or is likely to be subject to 1 or more natural hazards; or*
- (b) the building work is likely to accelerate, worsen, or result in a natural hazard on that land or any other property (s71).”*

An exception can be made if council is satisfied that the works will not accelerate, worsen, or result in a natural hazard on the land on which the building work is to be carried out or any other property (s72).

2.1.4 Local Government Act 2002

The Local Government Act 2002 (LGA) sets out the purpose of local government and *“provides for local authorities to play a broad role in promoting the social, economic, environmental, and cultural well-being of their communities, taking a sustainable development approach (s3).”*

When making a decision the LGA requires councils to *“take account of – the diversity of the community, and the community’s interests, within its district or region; and the interests of future as well as current communities; and the likely impact of any decision on each aspect of well-being referred to in section 10. (s14(c))”.*

The LGA requires Councils to develop a long term plan every three years which sets out community objectives and allocates resources, including funding, for a 10-year period.

2.1.5 Reserves Act 1977

The Reserves Act 1977 is the current legislation for administering public reserves. Reserves are gazetted by the Minister of Conservation with a specific purpose to ensure they are controlled, managed, developed, used, maintained and preserved in line with their intended purpose. The Act sets out the process to change the purpose of a reserve or to revoke the reserve classification of a reserve (s23-24A).

2.1.6 Marine and Coastal Area (Takutai Moana) Act 2011

The Marine and Coastal Area (Takutai Moana) Act 2011 *“acknowledges the importance of the marine and coastal area to all New Zealanders and the customary interests of iwi, hapū and whānau in that area.”*

If an activity requiring a resource consent is located within the area of a customary marine title application, the resource consent applicant is required to notify and seek the views of any group that has applied for recognition of a customary marine title in that area (s62).

2.2 National Policy Statements

The purpose of national policy statements is to state objectives and policies in order to achieve the overarching purpose of the RMA in relation to matters of national significance. The most significant of these for coastal adaptation is the New Zealand Coastal Policy Statement 2010.

2.2.1 New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement (NZCPS) states objectives and policies to achieve the overarching purpose of the RMA in relation to the coastal environment. All regional and district plans must give effect to the NZCPS. The NZCPS is important as it guides the policy framework for all planning documents relating to the coastal environment throughout New Zealand.

The key provisions for managing coastal hazard risk are provided below. Objective 5 requires that new development is located away from areas prone to coastal hazard risk and that responses including managed retreat are considered for areas of existing development. Policies 24-27 support this objective. There is particular focus on assessing risk over a 100-year period and avoiding activities that would increase the risk or increase exposure to the risk. The use of natural defences against coastal hazards is encouraged while the use of hard protection is discouraged. There is also the requirement to consider the environmental and social costs of permitting hard protection structures to protect private property. Such structures *“should not be located on public land if there is no significant public or environmental benefit in doing so.”*

Objective 5

To ensure that coastal hazard risks taking account of climate change, are managed by:

- *Locating new development away from areas prone to such risks;*
- *Considering responses, including managed retreat, for existing development in this situation; and*
- *Protecting or restoring natural defences to coastal hazards.*

Policy 24: Identification of coastal hazards

(1) Identify areas in the coastal environment that are potentially affected by coastal hazards (including tsunami), giving priority to the identification of areas at high risk of being affected. Hazard risks, over at least 100 years, are to be assessed having regard to:

- (a) physical drivers and processes that cause coastal change including sea level rise;*
- (b) short-term and long-term natural dynamic fluctuations or erosion and accretion;*
- (c) geomorphological character;*
- (d) the potential for inundation of the coastal environment, taking into account potential sources, inundation pathways and overland extent;*
- (e) cumulative effects of sea level rise, storm surge and wave height under storm conditions;*
- (f) influences that humans have had or are having on the coast;*
- (g) the extent and permanence of built development; and*
- (h) the effects of climate change on:*
 - (i) matters (a) to (g) above;*
 - (ii) storm frequency, intensity and surges; and*
 - (iii) coastal sediment dynamics;*

taking into account national guidance and the best available information on the likely effects of climate change on the region or district.

Policy 25: Subdivision, use, and development in areas of coastal hazard risk

In areas potentially affected by coastal hazards over at least the next 100 years:

- (a) avoid increasing the risk of social, environmental and economic harm from coastal hazards;*
- (b) avoid redevelopment, or change in land use, that would increase the risk of adverse effects from coastal hazards;*
- (c) encourage redevelopment, or change in land use, where that would reduce the risk of adverse effects from coastal hazards, including managed retreat by relocation or removal of existing structures or their abandonment in extreme circumstances, and designing for relocatability or recoverability from hazard events;*
- (d) encourage the location of infrastructure away from areas of hazard risk where practicable;*
- (e) discourage hard protection structures and promote the use of alternatives to them, including natural defences, and*
- (f) consider the potential effects of tsunami and how to avoid or mitigate them.*

Policy 26: Natural defences against coastal hazards

- (1) Provide where appropriate for the protection, restoration or enhancement of natural defences that protect coastal land uses, or sites of significant biodiversity, cultural or historical heritage or geological value, from coastal hazards.*
- (2) Recognise that such natural defences include beaches, estuaries, wetlands, intertidal areas, coastal vegetation, dunes and barrier islands.*

Policy 27: Strategies for protecting significant existing development from coastal hazard risk

- (1) In areas of significant existing development likely to be affected by coastal hazards, the range of options for reducing coastal hazard risk that should be assessed includes:*
 - (a) promoting and identifying long-term sustainable risk reduction approaches including the relocation or removal of existing development or structures at risk;*
 - (b) identifying the consequences of potential strategic options relative to the option of 'do-nothing';*
 - (c) recognising that hard protection structures may be the only practical means to protect existing infrastructure of national or regional importance, to sustain the potential of built physical resources to meet the reasonably foreseeable needs of future generations;*
 - (d) recognising and considering the environmental and social costs of permitting hard protection structures to protect private property; and*
 - (e) identifying and planning for transition mechanisms and timeframes for moving to more sustainable approaches.*
- (2) In evaluating options under (1):*
 - (a) focus on approaches to risk management that reduce the need for hard protection structures and similar engineering interventions;*
 - (b) take into account the nature of the coastal hazard risk and how it might change over at least a 100-year timeframe, including the expected effects of climate change; and*

- (c) *evaluate the likely costs and benefits of any proposed coastal hazard risk reduction options.*
- (3) *Where hard protection structures are considered to be necessary, ensure that the form and location of any structures are designed to minimise adverse effects on the coastal environment.*
- (4) *Hard protection structures, where considered necessary to protect private assets, should not be located on public land if there is no significant public or environmental benefit in doing so.*

Additional to the specific coastal hazards policies, the NZCPS provides direction around the coastal environment. This includes the need to:

- recognise the significant relationship tangata whenua have with the land and their need to be able to exercise their kaitiaki; (Policy 2)
- adopt a precautionary approach to use and management of coastal resources; (Policy 3)
- protect indigenous biodiversity, preserve natural character and protect natural features and landscapes (Policies 11, 13 and 15).

2.2.2 National Policy Statement for Freshwater Management

The National Policy Statement for Freshwater Management sets a hierarchy of obligations that prioritises the health and well-being of water bodies and freshwater ecosystems. Of particular relevance to coastal adaptation is Policy 6. This requires that there is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted. This is implemented through the National Environmental Standards for Freshwater which places significant restrictions on what can be achieved in and near to wetlands.

2.3 Proposed legislation

The Government is currently undertaking a significant programme of legislation reform. The most relevant of these documents are explained briefly below.

2.3.1 Resource Management reforms

The Government is proposing a reform of the planning system, including replacement of the Resource Management Act. One of the five objectives of the reform is to “better prepare for adapting to climate change and risks from natural hazards, and better mitigate emissions contributing to climate change.” It is proposed that the RMA will be replaced with three new pieces of legislation: Natural and Built Environments Act (NBA); Strategic Planning Act (SPA); and Climate Adaptation Act (CAA).

The proposed changes are designed to ensure that the resource management system is fit for purpose and ensure communities are resilient and able to adapt to future challenges. Each of these three pieces of legislation will have a critical role in coastal hazard risk management however in particular the CAA is expected to provide direction around managed retreat.

2.3.2 Natural Hazards Insurance Bill

This Bill will replace the Earthquake Commission Act 1993 and aims to reduce the impact of natural hazards on people, property, and the community. The Bill determines under what circumstances properties are eligible for natural hazards cover.

2.3.3 National Adaptation Plan

A National Adaptation Plan is required under the Climate Change Response Act. A Draft National Adaptation Plan was notified in May 2022. The draft National Adaptation Plan responds to the risks identified in the National Climate Change Risk assessment completed in 2020 by establishing a framework for long-term adaptation to the risks of climate change across all of government and society.

2.4 Regional Policy Statements and Plans

Both the Hurunui District Council and Environment Canterbury are responsible for managing the risks of natural hazards and work together in an integrated way to manage land use activities and development. This integration is achieved, in part, through the Regional Policy Statement and Canterbury Regional Coastal Environment Plan, which contain policies and rules relating to the wider coastal environment.

2.4.1 Canterbury Regional Policy Statement

The Canterbury Regional Policy Statement (CRPS) gives an overview of the significant resource management issues facing the region. As the CRPS is required to give effect to Part 2 of the RMA and the NZCPS, its objectives contain similar themes to this higher order document.

Objectives 8.2.1, 8.2.4 and 8.2.5 relate to the coastal environment and focus on improving knowledge of the coastal environment, the preservation, protection and enhancement of the coastal environment and the provision of access to the coastal environment. Policies 8.3.1, 8.3.4 and 8.3.5 give effect to the above objectives.

Objective 11.2.1 directs that in Canterbury any new subdivision, use and development that increases the risk to people, property and infrastructure is avoided, or where avoidance is not possible, mitigation measures minimise such risks. This is implemented through Policies 11.3.1 and 11.3.2 which place limitations on development in areas of high hazard risk or subject to inundation.

Objective 11.2.3 directs that the effects of climate change are to be recognised and provided for. This is given effect to by Policy 11.3.8.

Objective 11.2.1 Avoid new subdivision, use and development of land that increases risks associated with natural hazards

New subdivision, use and development of land which increases the risk of natural hazards to people, property and infrastructure is avoided or, where avoidance is not possible, mitigation measures minimise such risks.

Objective 11.2.3 Climate change and natural hazards

The effects of climate change, and its influence on sea levels and the frequency and severity of natural hazards, are recognised and provided for.

Policy 11.3.1 Avoidance of inappropriate development in high hazard areas

To avoid new subdivision, use and development (except as provided for in Policy 11.3.4) of land in high hazard areas, unless the subdivision, use or development:

- 1. Is not likely to result in loss of life or serious injuries in the event of a natural hazard occurrence; and*
- 2. Is not likely to suffer significant damage or loss in the event of a natural hazard occurrence; and*
- 3. Is not likely to require new or upgraded hazard mitigation works to mitigate or avoid the natural hazard; and*

4. *Is not likely to exacerbate the effects of the natural hazard; or*
5. *Outside of greater Christchurch, is proposed to be located in an area zoned or identified in a district plan for urban residential, industrial or commercial use, at the date of notification of the CRPS, in which case the effects of the natural hazard must be mitigated.*

11.3.2 Avoid development in areas subject to inundation

In areas not subject to Policy 11.3.1 that are subject to inundation by a 0.5% AEP flood event; any new subdivision, use and development (excluding critical infrastructure) shall be avoided unless there is no increased risk to life, and the subdivision, use or development:

1. *is of a type that is not likely to suffer material damage in an inundation event; or*
2. *is ancillary or incidental to the main development; or*
3. *meets all of the following criteria:*
 - a. *new buildings have an appropriate floor level above the 0.5% AEP design flood level; and*
 - b. *hazardous substances will not be inundated during a 0.5% AEP flood event; provided that a higher standard of management of inundation hazard events may be adopted where local catchment conditions warrant (as determined by a cost/benefit assessment). When determining areas subject to inundation, climate change projections including sea level rise are to be taken into account.*

11.3.5 General risk management approach

For natural hazards and/or areas not addressed by policies 11.3.1, 11.3.2, and 11.3.3, subdivision, use or development of land shall be avoided if the risk from natural hazards is unacceptable. When determining whether risk is unacceptable, the following matters will be considered:

1. *the likelihood of the natural hazard event; and*
2. *the potential consequence of the natural hazard event for: people and communities, property and infrastructure and the environment, and the emergency response organisations.*

Where there is uncertainty in the likelihood or consequences of a natural hazard event, the local authority shall adopt a precautionary approach. Formal risk management techniques should be used, such as the Risk Management Standard (AS/NZS ISO 31000:2009) or the Structural Design Action Standard (AS/NZS 1170.0:2002).

11.3.6 Role of natural features

The role of natural topographic (or geographic) and vegetation features which assist in avoiding or mitigating natural hazards should be recognised and the features maintained, protected and restored, where appropriate.

11.3.8 Climate change

When considering natural hazards, and in determining if new subdivision, use or development is appropriate and sustainable in relation to the potential risks from natural hazard events, local authorities shall have particular regard to the effects of climate change.

High hazard areas are defined in the CRPS as:

1. *flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1, or where depths are greater than 1 metre, in a 0.2% AEP flood event.*
2. *land outside of greater Christchurch subject to coastal erosion over the next 100 years;*

3. [...]
4. *land subject to sea water inundation (excluding tsunami) over the next 100 years. This includes (but is not limited to) the land located within the sea water inundation zone boundary shown on Maps in Appendix 5 of this Regional Policy Statement.*

When determining high hazard areas, projections on the effects of climate change will be taken into account.

2.4.2 Regional Coastal Environment Plan (RCEP)

The purpose of the RCEP is to promote the sustainable management of the natural and physical resources of the Coastal Marine Area and the coastal environment and to promote the integrated management of that environment. It sets out issues relating to, the protection and enhancement of the coast, water quality, controls on activities and structures, and coastal hazards. The RCEP pre-dates the NZCPS and the RPS and is less restrictive.

The RCEP identifies coastal erosion hazard zones along the region's coastline. These erosion hazard zones determine where high hazard rules apply in accordance with the RPS definition of high hazard areas. The following two zones are defined:

Hazard Zone 1: This is a zone delimited by a line approximately parallel with the shoreline, set inland from mean high water springs, which contains the current active beach system and land that is at risk from coastal erosion within 50 years of this Plan being produced.

Hazard Zone 2: This is inland from Hazard Zone 1, and marks land that is at risk from coastal erosion in the period 50 to 100 years of this Plan being produced.

As the RCEP does not give effect to the higher documents, namely the NZCPS and the RPS, the policy framework in all three documents must be considered.

2.5 Hurunui District Plan

The Hurunui District Plan includes several objectives and policies relevant to coastal hazards and replicates the language of higher order documents.

Policy 15.1 To avoid new subdivision, use and development of land in areas identified as subject to natural hazards:

1. *If the risk from the natural hazard is unacceptable, having taken into account the likelihood of the natural hazard event and the potential consequences for people, property, infrastructure and the environment, including the level of uncertainty about the likelihood or consequences; and*
2. *For high hazard areas, if the matters in Policy 11.3.1 of the Canterbury Regional Policy Statement 2013 are not met.*

Policy 15.2 To avoid development, excluding critical infrastructure, within areas at risk from flooding or ponding during a 0.5% AEP (Annual Exceedance Probability) storm event, unless:

1. *an assessment is undertaken by a suitably qualified person which shows that the land is not subject to flooding or ponding during a 0.5% AEP storm event an assessment is undertaken; or*
2. *appropriate mitigation measures are undertaken to mitigate the risk of flooding on life or property; and*
3. *the site is outside of a high hazard area; and*
4. *the development will not increase the risk to life and is of a type that is not likely to suffer material damage in an inundation event.*

Policy 15.6 Mitigation works to minimise the effects of natural hazards shall be undertaken in a way which avoids, remedies or mitigates adverse effects on cultural, social and environmental values and the health and safety of communities.

Policy 15.7 To avoid the subdivision, use or development of land within the seaward side of the Coastal Hazard Line unless the proposed development is the repair or upgrade of existing infrastructure; and mitigation is undertaken to ensure that there is no increased risk to life or built infrastructure or a consent has been sought and granted for the proposed development under the Regional Coastal Plan.

Policy 15.8 To recognise that climate change could alter the frequency and duration of some natural hazard events. Any mitigation works should take into consideration the need to be precautionary given the uncertainties as to the magnitude of effects from climate change. New subdivision, use and development should consider the consequences of a mean sea-level rise of at least 0.8m relative to the 1980-1999 average.

2.6 Iwi Management Plans

There are two relevant Iwi Management Plans that cover the Hurunui District coastline. Te Poha o Tohu Raumati states the values of Ngāti Kuri to the north of the Hurunui River and the Mahaanui Iwi Management Plan to the south of the Hurunui River stating the values of Ngāi Tūāhuriri.

2.6.1 Te Poha o Tohu Raumati – Te Rūnanga o Kaikōura Environmental Management Plan

Te Poha o Tohu Raumati is the Iwi Management Plan stating Ngāti Kuri values and polices regarding natural resources and environmental management in the Te Rūnanga o Kaikōura takiwā. Ngāti Kuri are the tangata whenua who have manawhenua and manamoana over the area north of the Hurunui River.

Of particular relevance is Section 3.6 Te Tai o Marokura Tama Nui Ki Te Rangī. This section the coastal area including coastal land use and development, coastal protection works, coastal dune environments and access. However, it is noted that the coast cannot be considered in isolation. Ki uta ki tai refers to the concept of mountains to sea and encapsulates the need to recognise and manage the interconnectedness of the whole environment.

There are nine general policies that inform the section. The most relevant are:

General Policy Objectives for Te Tai o Marokura

- 1. That Ngāi Tahu Whānui, current and future generations, are able to exercise their customary rights and responsibilities associated with coastal and marine environments, as guaranteed by the Treaty of Waitangi.*
- 2. That coastal and marine biodiversity is protected and enhanced.*
- 3. That those coastal and marine areas that are most important to us are enhanced and restored.*
- 4. To ensure that the realm of Tangaroa is flourishing and the mahinga kai of Tangaroa is readily available to tangata whenua and their local communities.*
- 5. That the relationship between terrestrial and aquatic ecosystems is recognised and provided for in all decision making relating to coastal environment.*
- 6. That the adverse impacts of human activities on coastal and marine environments are avoided, remedied, or mitigated at all times.*
- 7. That research and monitoring of coastal and marine areas is supported and encouraged, to provide baseline information upon which to make sound decisions.*

This are supported by specific activity policies. The following policies are considered relevant.

3.6.1 Coastal land use and development

3. *To avoid compromising the natural, cultural and ecological values of the coastal environment as result of inappropriate land use and development.*
9. *To protect, enhance, and restore riparian margins in coastal areas, as transition zones between the coast and the sea.*
10. *To encourage the protection of coastal ecological and cultural values through the use of mechanisms such as voluntary agreements, esplanade strips, access strips, buffer zones and covenants.*
13. *To support and encourage the use of indigenous species plantings to offset and mitigate negative impacts of coastal development activities.*

3.6.4 Coastal protection works

1. *To adopt a precautionary approach in considering any proposal for coastal protection works.*
2. *Any coastal protection works deemed necessary in an area of high cultural or archaeological importance is subject to those guidelines outlined in the Te Rūnanga o Kaikōura Management Guidelines for Wāhi Tapu and Wāhi Taonga, as per Section 3.7. This includes provisions for site visits, cultural impact assessments and pre-resource consent archaeological assessments.*
4. *To avoid adverse effects on mahinga kai and other areas of high cultural significance as a result of coastal protection works.*
6. *To avoid the dumping of rocks or rubble, or the placing of structures along the foreshore, as part of any unauthorised coastal protection works.*

3.6.5 Access

1. *All Ngāi Tahu Whānui, current and future generations, must have the capacity to access, use and protect coastal regions, and the history and traditions that are part of such landscapes.*
2. *All Ngāi Tahu Whānui, current and future generations, must have the capacity to exercise their customary rights associated with coastal and marine environments, as guaranteed by the Treaty of Waitangi.*
3. *To ensure that coastal regions are sustained and protected, in perpetuity, for all to enjoy.*
6. *To prohibit the use of recreational vehicles in coastal beach areas where the environment is vulnerable: including areas where dunes may be damaged, coastal plants such as pingao may be threatened, or wildlife areas (e.g. bird nesting sites) may be impacted.*

3.6.16 Coastal dune environments

1. *All activities in coastal beach and dune environments must recognise and provide for the strong association between these areas and the cultural heritage of Ngāti Kuri.*
2. *To avoid adverse impacts on vulnerable coastal dune environments as a result of subdivision, residential development, forestry, farming, mineral extraction, tourism, or general public access.*
3. *Due to the potential for unearthing of archaeological material or wāhi tapu cultural materials in coastal dune environments, activities in these environments are subject to those guidelines outlined in the Te Rūnanga o Kaikōura Management Guidelines for Wāhi Tapu and Wāhi Taonga, as per Section 3.7.*
5. *To encourage and support projects for the re-establishment and restoration of indigenous plants in coastal dune environments, particularly in terms of protection against coastal erosion.*

2.6.2 Mahaanui Iwi Management Plan

Mahaanui Iwi Management Plan is the iwi management plan that states the values and policies regarding natural resources and environmental management for the Ngāi Tūāhuriri takiwā. Ngāi Tūāhuriri are the tangata whenua who have manawhenua and manamoana over the area south of the Hurunui River.

Section 5.6 Tangaroa is relevant to coastal environment. The following objectives are considered relevant.

- (1) *There is a diversity and abundance of mahinga kai in coastal areas, the resources are fit for cultural use, and tāngata whenua have unhindered access to them.*
- (2) *The role of tāngata whenua as kaitiaki of the coastal environment and sea is recognised and provided for in coastal and marine management.*
- (4) *Traditional and contemporary mahinga kai sites and species within the coastal environment, and access to those sites and species, are protected and enhanced.*
- (5) *Mahinga kai have unhindered access between rivers, coastal wetlands, hāpua and the sea.*
- (6) *The wāhi taonga status of coastal wetlands, hāpua and estuaries is recognised and provided for.*
- (8) *Coastal cultural landscapes and seascapes are protected from inappropriate use and development.*

These objectives are supported by the following relevant policies:

Coastal wetlands, estuaries and hāpua

Issue TAN3: Protecting the ecological and cultural values of coastal wetlands, estuaries and hāpua.

TAN3.1 To require that coastal wetlands, estuaries and hāpua are recognised and protected as an integral part of the coastal environment, and for their wāhi taonga value as mahinga kai, or food baskets, of Ngāi Tahu.

Access to coastal environments

Issue TAN8: Ngāi Tahu access to the coastal marine area and customary resources has been reduced and degraded over time.

TAN8.1 Customary access to the coastal environment is a customary right, not a privilege, and must be recognised and provided for independently from general public access.

TAN8.2 To require that access restrictions designed to protect the coastal environment, including restrictions to vehicle access, do not unnecessarily or unfairly restrict tāngata whenua access to mahinga kai sites and resources, or other sites of cultural significance.

TAN8.3 To require that general public access does not compromise Ngāi Tahu values associated with the coastal environment.

TAN8.4 To oppose coastal land use and development that results in the further loss of customary access to the coastal marine area, including any activity that will result in the private ownership of the foreshore.

Sections 6.1 and 6.2 address the Hurunui River catchment and Waipara and Kōwai River catchments. It is noted that the Hurunui River catchment has a number of outstanding characteristics that need protecting. Policy H2.1 states: *To require that the whole of the Hurunui catchment is recognised as possessing the following outstanding cultural characteristics and values, and that these key characteristics are protected as a first order of priority:*

- (a) *Mahinga kai;*
- (b) *Natural character;*

- (c) *Wāhi tapu and wāhi taonga;*
- (d) *Hoka Kura;*
- (e) *River mouth environment; and*
- (f) *Ara tawhito ki pounamu.*

Policies WK6.1 and WK7.1 address the issues of gravel extraction and the presence of willows in the Waipara and Kōwai Rivers. The over extraction of gravel and willows can have a detrimental effect on the build up of sediments on beaches. This is a good example of how interconnected the systems are and why a whole of system approach is required.

There is an underlying message throughout the plan that if we protect the environment the environment will provide for us.

3 The Hazard Risk

The Jacobs report describes in detail the various coastal hazards each of the coastal settlements face. The risk for each settlement is briefly summarised at the start sections 6-9 of this report.

4 The Challenges of Existing Use Rights

Given the Hurunui settlements are already developed, one of the challenges is section 10 of the RMA. This enables land to be used in a manner that contravenes a District Plan if it was lawfully established before the plan was notified and the effects of the use are the same or similar in character, intensity, and scale to those which existed before the rule became operative. The District Plan can promote the use of adaptative planning options but in many cases, it cannot enforce them.

Even if existing use rights are strictly applied the best a District Council can do is maintain the existing level of exposure, noting the risk is already increasing in most situations with climate change.

Regional councils do not face the same restrictions under section 10. One method of implementing these planning options is through a regional planning rule that requires land use consent for development within a particular area in which a mitigating factor could be that the dwelling is relocatable or adaptable. This power could be delegated to the District Council.

Alternatively, the regional council could develop a rule that extinguishes existing use rights which would enable greater controls to be placed on future development. This was tested in the Environment Court in 2020.

In May 2005 a storm triggered a debris flow of approximately 300,000m³ in the catchment of the Awatarariki Stream at the western end of the settlement at Matatā. This storm was initially thought to have a return period of around 200-500 years but was recalculated as being 40-80 years. Whakatane District Council lodged a plan change with the regional council to extinguish existing use rights based on the significant risk. This plan change made the use of 18 parcels of land a prohibited activity from 31 March 2021. This status had the effect of terminating existing use rights after that date. The decision of the Hearing Panel was appealed but the appeal was resolved before the hearing commenced.⁶

⁶ (Awatarariki Residents Incorporated v Bay of Plenty Regional Council & Whakatane District Council , 2020)

5 Possible Planning Options and Approaches

Prior to shortlisting options, an assessment was undertaken of planning approaches taken elsewhere in New Zealand and internationally. These approaches are discussed below. Prior to introducing a new planning provision into a district or regional plan a detailed assessment needs to be undertaken in accordance with section 32 of the RMA. This report does not intend to provide that level of detail.

5.1 Option 1 – Raised floor heights

Minimum floor heights can be set for new dwellings and extensions. This can work in one of three ways.

- a. The first option is to set a minimum floor height in the District Plan that everyone must comply with. This floor height is the same for all properties regardless of the depth of anticipated flooding unless separate flood zones are created. It is most likely that this required floor level remains the same for the life of the District Plan and is reviewed again with the review of the District Plan.
- b. The second option is to require flood assessments for new dwellings and extensions. This allows the most recent science to be considered with each assessment and allows for property specific analysis.
- c. Alternatively, the ground levels under the dwellings can be raised. This achieves the same purpose as options a and b above but may help make the dwelling more accessible by providing a gentler gradient.

Amberley Beach and Leithfield Beach are already included within a Flood Assessment Area in the Hurunui District Plan. Within these settlements Flood Assessments are required prior to development. New development or extensions of more than 10% are permitted only where they meet the minimum floor heights set out in the Flood Assessment which must be at least 400 mm above the 0.5% annual exceedance probability flood event.⁷ This rule only applies to principal or habitable buildings. There is a consenting pathway if no flood assessment is provided.



Figure 2a and b: Raised dwelling to cater for flood waters⁸

⁷ Rule 15.4.3.2(a) (Hurunui District Council, 2016)

⁸ (Dornob, n.d.)

Positives	Limitations
<ul style="list-style-type: none"> • Provisions already exist within the District Plan. • Ensures dwellings are constructed at a height to significantly reduce the risk of flooding entering buildings. • Flood mitigation is site specific and therefore addresses any low-lying parts of a settlement. 	<ul style="list-style-type: none"> • Only applies to the construction of new dwellings. To enforce this for rebuilds a regional planning rule would be required. • Prevents the dwelling from flooding but does not guarantee access to the property during flood events. • If dwellings are required to be raised significantly then the new dwelling can impede on the existing dwellings outlook and privacy. • Can create a visually irregular settlement as some dwellings remain low while others are raised. • Does not address coastal erosion. • Does not provide a whole of settlement approach. Only individual properties are protected from the flood risk. • Raised land levels may redirect flood water runoff to other areas, increasing risk to other properties. • The material used to raise land levels is important, for example using landfill materials for raised land levels can lead to soil compaction and land subsidence.⁹ • Access to the dwelling can be challenging for residents with mobility limitations.

5.2 Option 2 – Relocatable dwellings

Relocatable dwellings are an option for new builds whereby a large portion of the equity invested can be retained if retreat is required in the future. This option also signals that development in this area is temporary. It could be used in conjunction with time limited land use consents, either as a requirement or a mitigating factor.

Christchurch City Council offers limited duration consents based on flood modelling and LIDAR site level information in areas identified in their High Flood Hazard Management Area.¹⁰ For example, a new house could be built on the site but would need to be removed from the site when the risk reaches a certain point.

⁹ (Climate Adapt, 2016)

¹⁰ Page 78 (Christchurch City Council, 2021)

The Whakatane District Plan includes provisions requiring buildings within coastal hazard risk zones to be practically movable to an alternative building site. This is enforced via a certificate from a Chartered Professional Engineer or house removal company shall be submitted detailing the means by which the proposed works can be practicably relocated.¹¹



Figure 3: House being moved near Taihape. (Photo courtesy Brittons Housemovers Ltd.)¹²

Positives	Limitations
<ul style="list-style-type: none"> • Adaptable. • Ensures equity is retained if dwelling needs to be removed in future. • Enables floor heights to be raised at existing site if required in future. • Progressively improves the resilience of dwellings. • Where new builds are occurring the cost to make them relocatable is modest given the benefit of relocating the dwelling in future. 	<ul style="list-style-type: none"> • Only applies to the construction of new dwellings. • Prevents the dwelling from flooding but does not guarantee access to the property during flood events. • Could apply to redevelopment but would require a regional planning rule. • Restricts use of certain building materials and foundation types

¹¹ Rule 18.2.7.4 (Whakatane District Council, 2017)

¹² (Pringle, 2011)

5.3 Option 3 – Amphibious dwellings

Amphibious buildings rest on the ground but in periods of flooding can float on the floodwater while remaining anchored to the building foundations. As flooding subsides the building returns to ground level. This makes amphibious dwellings highly adaptable to seasonal changes in weather patterns and long-term sea level rise.

There are several difficulties with this sort of design including ensuring the building is well secured to the site, ensuring no objects get lodged between the building and the ground and the connection to services.

There are international examples of such dwellings. Maasbommel in the Netherlands has 46 floating or semi-floating homes,¹³ and there are about 1400 floating homes in the Portland metropolitan area.¹⁴ There is one local example in Kaiapoi, New Zealand; however, this is not a common building design possibly due to the significant cost.¹⁵

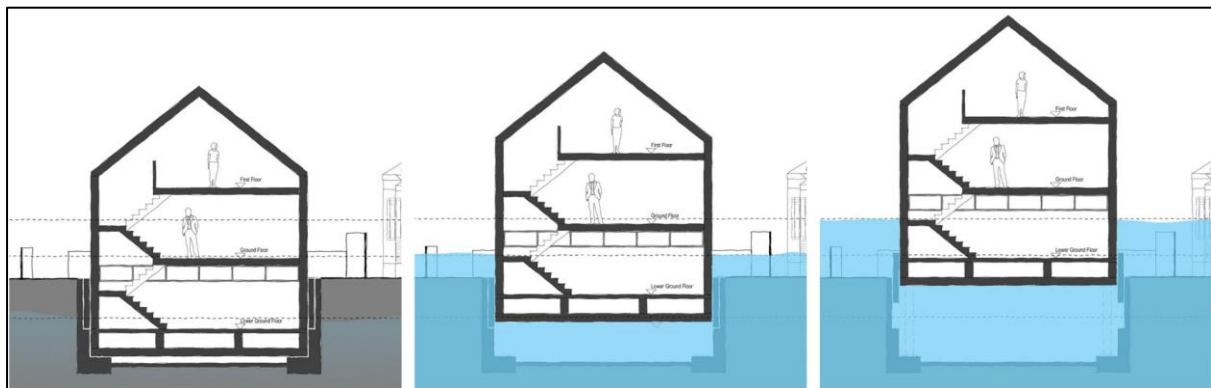


Figure 4: An amphibious dwelling rises with the flood waters¹⁶

Positives	Limitations
<ul style="list-style-type: none">• Would ensure dwellings are not subject to inundation.• Adaptable to seasonal changes in weather and longer-term climate trends.	<ul style="list-style-type: none">• Only applies to the construction of new dwellings.• Prevents the dwelling from flooding but does not guarantee access to the property during flood events.• Does not address coastal erosion.• Likely to be costly to develop.

¹³ (Urban Green-Blue Grids, n.d.)

¹⁴ (Hayden Island, 2015)

¹⁵ (Williscroft, 2018)

¹⁶ (Baca Architects, n.d.)

5.4 Option 4 – Waterproofing buildings

Waterproofing buildings can occur in one of two ways. Firstly, an impervious barrier can be placed over the foundations and lower walls to prevent water penetration. This makes the building water-resistant or waterproof depending on what is used. Alternatively, protection works can be tailored to individual properties. This could be achieved through localised bunds, swales or other modifications to the site to control water flow.

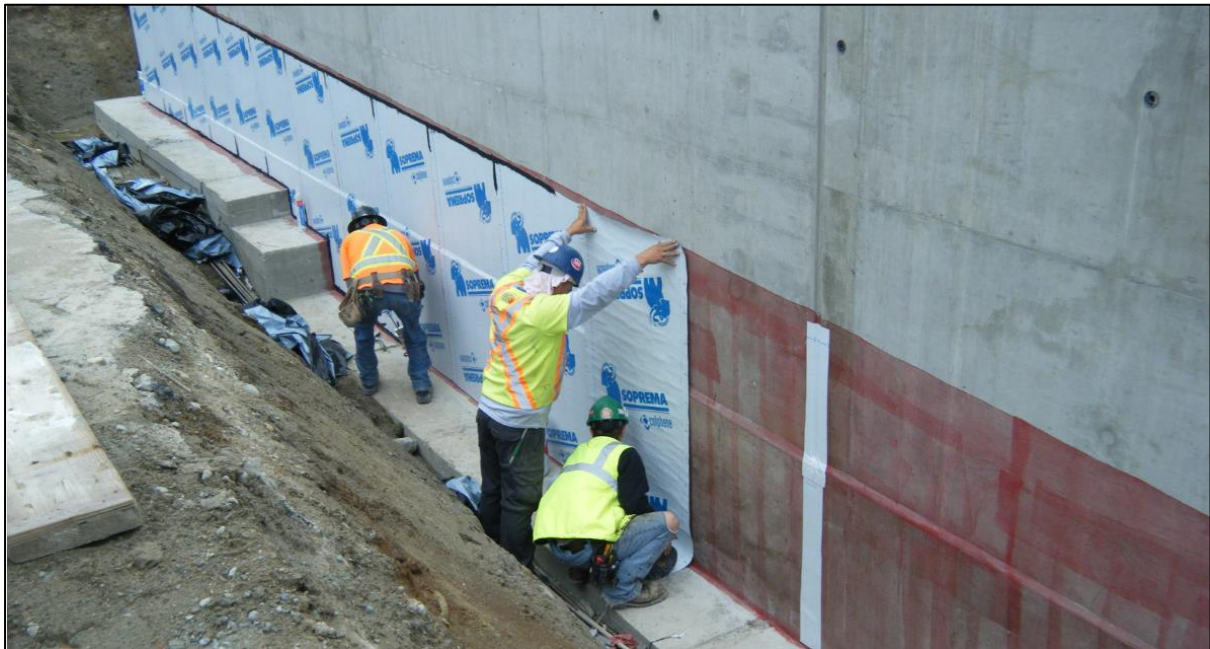


Figure 5: Waterproof membrane¹⁷

Positives	Limitations
<ul style="list-style-type: none">• Can help address the inundation risk.	<ul style="list-style-type: none">• Can limit the damage to the dwelling from flooding but does not guarantee access to the property during flood events.• Does not address coastal erosion.• Does not address the risk of groundwater damage.

5.5 Option 5 – Avoid development

Avoiding development in areas of natural hazard risk is the most effective option. There are several ways this can be implemented.

- a. Prevent new subdivision in areas at risk of inundation or erosion

¹⁷ (Kryton Smart Concrete, 2020)

It is possible to prevent further development of areas at risk of inundation or erosion. Where land is yet to be subdivided it is possible to prevent or provide significant restrictions of future subdivision and development in the affected area. The Hurunui District Plan already has controls around subdivision of land subject to identified natural hazards. This ensures that further expansion of settlements occurs in areas of lower risk. Where natural hazards are yet to be identified no controls are currently in place.

Spatial planning is a tool that can identify the most suitable locations for future development. It works by overlaying different values and constraints, including coastal hazards, to establish the most suitable available land.

b. Require buildings to be set back

Building setbacks are effective where the risk is greater on one part of the site. These can be used to require that a building is located a certain distance from the risk, such as the edge of a cliff which is subject to instability. Prevent the development of land in areas already subdivided

Where land has already been subdivided it is possible, albeit more challenging, to prevent further development. Generally, there is an expectation that a residential dwelling can be built on a residential site. The District Plan could put provisions in place to prevent new development entirely or prevent new development without mitigating factors. A thorough assessment would need to be undertaken to ensure such restriction was required and reasonable.

c. Prevent further development of already developed sites

Where dwellings already exist avoiding further development becomes more difficult. Section 10 of the RMA enables land to be used in a manner that contravenes a District Plan if it was lawfully established before the plan was notified and the effects of the use are the same or similar in character, intensity, and scale to those which existed before the rule became operative. This means that if a dwelling is to be destroyed and need replacing the dwelling can be replaced like for like as a right. This is discussed in more detail in Section 4 above.

Extensions to dwellings are similarly complicated as the extension likely increases the overall exposure to risk and increases private equity within a high-risk area. This must be weighed up against the benefits to the extension.

Positives	Limitations
<ul style="list-style-type: none"> • Removes all risk and residual risk where development does not occur. • Setback provisions can significantly reduce the risk to a dwelling. 	<ul style="list-style-type: none"> • Difficult to implement in situations with existing development. • In areas of existing development would require a regional planning rule to implement. • Plans require strong objectives and policies in support of natural hazard avoidance to enable consent authorities to decline resource consent applications. • Setback provisions can create expectations of safety.

5.6 Option 6 – Time limited land use consents

Land use consents are generally granted in perpetuity acknowledging that the building is not going to be readily removed. There is the option to include a time limit on resource consents and/or include trigger conditions for when an assessment of risk or relocation is required.¹⁸ The use of triggers accounts for future uncertainties and helps to give effect to an adaptive plan.

For example, Christchurch City Council granted an eight-lot subdivision consent which not only specified that the dwellings were to have a minimum floor height but also required that the dwellings were relocatable and that all buildings, fences and structures were to be removed from the sections (at the owner’s expense) within 12 months of sea level rise reaching a specified point.¹⁹

Positives	Limitations
<ul style="list-style-type: none"> • Allow development to continue at the location for as long as practicable. • Properties owners know the terms of building including what the trigger for moving the dwelling is upfront. • Property owners are responsible for restoring the site so no long-term costs on the Council. • Provides security to landowners and insurance companies that the risk to property is being managed. 	<ul style="list-style-type: none"> • Only relevant for new builds. • Creates an expectation of safety, or perceived reduction in risk. • Requires ongoing monitoring of trigger points. • Imposition of these conditions must be supported by strong policy framework to avoid the conditions being considered ultra vires.

5.7 Option 7 – Managed retreat

Managed retreat is a coastal management strategy that allows the shoreline to move inland, instead of attempting to hold the line with structural engineering.²⁰ Managed retreat usually involves moving human activity out of areas at high risk of coastal hazards. This could involve relocation within the same property, relocation within the same settlement or relocation outside the settlement.

Due to the complexities of managed retreat a separate Issues and Options paper is being prepared to consider how managed retreat could work in the Hurunui District. The below intends to give a high-level summary of some of the strategies to implement retreat.

Existing settlements are able to develop a plan to proactively retreat prior to the risk becoming unbearable. This plan could be implemented at a given trigger point proactively or could be implemented if significant damage occurred from a natural hazards event. Managed retreat could involve relocating a few at risk properties at a time or relocating an entire settlement. There are several ways that this can occur, some of which are set out below. These options can be used individually or as a combination of options.

Managed retreat is not strictly a planning approach rather the planning options set out in the sections above could be used to deliver a policy of managed retreat. Managed retreat in New Zealand has

¹⁸ (Lawrence, Allen, & Clarke, 2021)

¹⁹ (Christchurch City Council, 2021)

²⁰ (Pennsylvania State University, n.d.)

primarily happened retrospectively. The one notable example is Project Twin Streams in Waitākere. The city purchased 81 dwellings located within the 100-year flood plain in a bid to restore 56 kilometres of the Waitākere Stream.²¹

Managed retreat was also used in both Matatā and the Christchurch Red Zone. As the Christchurch Red Zone was reactive retreat it is not discussed further here. In 2005 a destructive debris flow destroyed 27 homes and caused over \$20 million in damage in Matatā. As a result, 34 properties in private ownership have been retreated. The Whakatane District Council lodged a Plan Change with the Bay of Plenty Regional Council to extinguish existing rights on this land. Property owners were offered current market rate for their property and a contribution towards legal fees, relocation costs and mortgage break fees.²²

a. Buyouts

This involves the government acquiring at risk land to reduce the exposure to risk. There are limited examples from within New Zealand with Matata and the Christchurch Red Zone being the two notable examples. These were both reactive buyouts and the result of a natural disaster having already occurred. Buyouts are expensive for governments, and it is unlikely the government will compensate all coastal retreat in New Zealand.

There is also the possibility to designate land for future acquisition. This might mean that the land does not need to be acquired immediately but prevents the land being sold to any other party.

b. Land swaps

Land swaps involve property owners of high-risk land being offered the opportunity to swap their title for a similar parcel of lower risk land. The original sections are then used as reserve land or in some situations are able to provide space for coastal renourishment works to protect the remaining development. Land swaps can enable communities to relocate to a lower risk area together.

c. Leasebacks

Leasebacks involve the acquisition of at-risk land with provision for this to be leased back to the original owner or a third party. The former owner then pays rent to use the land but no longer owns it. This enables continued use until such a time that retreat is necessary. The revenue generated from the leases can then be used to pay for maintenance costs, alternative land, or disestablishment costs.

Positives	Limitations
<ul style="list-style-type: none"> • Moves people from a high-risk location to a lower risk location. • Creates a new public reserve. • The settlement land may be valuable for recreation use or for gravel extraction. 	<ul style="list-style-type: none"> • Expensive. • Moves people away from an area in which they have a connection with. • Needs to be implemented carefully to avoid a checkerboard effect to remaining development. • Can result in loss of equity.

²¹ (Project Twin Streams, 2022)

²² (Whakatane District Council, 2020)

6 Planning Options for Amberley Beach

Amberley Beach has historically faced issues with fluvial flooding and coastal inundation. In 1993 a bund was constructed. This was then extended in 2003 and continues to be renourished periodically. The bund has been successful in protecting the settlement from coastal inundation and has additionally provided some protection from coastal erosion.

The Jacobs report indicates that the shoreline in front of the Amberley Beach settlement is projected to erode:

- 30 to 43 metres landward of its current position over the next 30 years;
- 45 to 68 metres landward of its current position over the next 50 years; and
- 89 to 135 metres of its current position over the next 100 years.

Currently, a 1% Annual Exceedance Probability (AEP) event is insufficient to overtop the bund but can overtop the lowered beach ridge at the outlets of the lagoons to the north and the south of the settlement. The Multi Hazards Assessment shows that the low-lying land to the west of the settlement is the key flood path and flooding across Amberley Beach Road can be expected in flood events of 2% AEP or greater. Flooding is expected in both extreme storm tide events with coastal water entering the Mimimoto or Northern Lagoons or alternatively from fluvial/pluvial flows from breakouts of the Kowai and Waipara Rivers.

6.1 Matrix of options

Not all of the planning options are applicable for all settlements. The table below indicates where an option might be worth pursuing. Options are rated between 1 and 5:

	Feasible	Adaptable	Affordable	Effective	Score
Raised floor heights	5	3	3	4	15
Relocatable dwellings	5	5	3	5	18
Amphibious dwellings	3	2	1	4	9
Waterproof dwellings	4	2	3	3	11
Avoid development	5	5	5	5	20
Time limited land use consents	5	5	5	5	20

6.2 Reason and discussion

The planning provisions set out above can be used to reduce the risk of inundation but will not prevent inundation within the settlement boundaries alone. Which provisions are of most use depends on the long term preferred adaptation pathway. For example, if a sea wall is to be constructed raised floor heights may help to reduce the residual risk. If the long-term approach is managed retreat, then the focus of the planning provisions should be on protecting the equity held in the dwellings. This may be achieved by building a relocatable dwelling. The DAPP process is intended to be an adaptive decision-making tool allowing for the preferred pathway to change based on new science, new technologies or a new legislation. Planning provisions can be used to maximise the options available in the future.

Options one to four relate to dwelling design and may be effective at protecting individual dwellings from inundation, however these do not reduce the inundation risk across the whole settlement or maintain access. These provisions are only applicable to new dwellings and most sites within the settlement contain existing dwellings that would not be subject to these requirements. The feasibility of renovating existing dwellings to include inundation resilient or relocatable designs may be limited by the age and design of dwellings as well as existing use rights.

These types of options may be effective at protecting individual dwellings from inundation however they do not ensure that access to those properties is maintained. This is particularly relevant to Amberley Beach where the main access route is likely to be flooded during major weather events. These options also do not reduce risk of coastal erosion.

Maintaining District Plan provisions for raised floor heights is a feasible option. The current Hurunui District Plan provision allows site specific analysis of inundation risk using the most recent scientific data. This requirement is also reasonably affordable for new developments and can be incorporated into the architectural design. As the required minimum floor height increases so do the challenges in meeting the residential zone provisions which seek to control residential amenity including outlook and privacy.

The District Plan prevents development of land in areas subject to natural hazards and given the risks of inundation through the low-lying land to the west, and the lagoons to the north and south, expansion of Amberley Beach settlement is unlikely. Infill development within the existing settlement boundary is also unlikely given the small lot sizes within the settlement and the existing development.

Given the age of some of the dwellings at Amberley Beach, additions, alterations or rebuilds can be expected. These activities could be controlled through the resource consent process to both improve resilience and protect equity.

7 Planning Options for Leithfield Beach

Leithfield Beach has also been subject to fluvial flooding and coastal inundation during significant weather events. Significant heavy rainfall in 2008 caused widespread inundation across the settlement.

The Multi Hazards assessment showed Leithfield Beach is susceptible to inundation in storm tide and high river flow events of 2% AEP or greater. The primary sources of flooding are overflow from the Kowai River as well storm tide inundation through the Ashley River mouth, Ashworths Ponds, Leithfield Beach Drain, Leithfield Beach Lagoon and Kowai River mouth. The modelling demonstrated flooding from these sources is likely to enter from the north and south of the settlement with some temporary localised flooding caused by wave overtopping of the beach frontage.

Risk of ground water breakthrough and surface ponding is low within the settlement, although high ground water levels during large flood events could reduce infiltration and increase stormwater runoff within the settlement.

The Jacobs report provided projected future shoreline positions which illustrated coastal erosion is not predicted to impede on the Leithfield Beach settlement until 2120. This is largely attributed to the existing double ridged dune system which provides some protection from coastal erosion.

7.1 Matrix of options

Not all of the planning options are applicable for all settlements. The table below indicates where an option might be worth pursuing. Options are rated between 1 and 5:

	Feasible	Adaptable	Affordable	Effective	Score
Raised floor heights	5	3	3	4	15
Relocatable dwellings	5	5	3	5	18
Amphibious dwellings	3	2	1	4	10
Waterproof dwellings	4	2	3	3	12
Avoid development	5	5	5	5	20
Time limited land use consents	5	5	5	5	20

7.2 Reason and discussion

The planning provisions set out above can be used to reduce the risk of inundation but will not prevent inundation within the settlement boundaries alone. Which provisions are of most use depends on the long term preferred adaptation pathway. For example, if a sea wall is to be constructed raised floor heights may help to reduce the residual risk. If the long-term approach is managed retreat, then the focus of the planning provisions should be on protecting the equity held in the dwellings. This may be achieved by building a relocatable dwelling. The DAPP process is intended to be an adaptive decision-making tool allowing for the preferred pathway to change based on new science, new technologies or a new legislation. Planning provisions can be used to maximise the options available in the future.

Leithfield Beach is similar to Amberley Beach in settlement size and characteristics as well as topography and exposure to inundation hazard. Many of the options that are relevant or effective at Amberley Beach may also be effective at Leithfield Beach.

Options one to four relate to dwelling design and may be effective at protecting individual dwellings from inundation, however these do not reduce the inundation risk across the whole settlement or maintain access. These provisions are only applicable to new dwellings and most sites within the settlement contain existing dwellings that would not be subject to these requirements. The feasibility of renovating existing dwellings to include inundation resilient or relocatable designs may be limited by the age and design of dwellings as well as existing use rights.

Maintaining District Plan provisions for raised floor heights is a feasible option. The current Hurunui District Plan provision allows site specific analysis of inundation risk using the most recent scientific data. This requirement is also reasonably affordable for new developments and can be incorporated into the architectural design. As the required minimum floor height increases so do the challenges in meeting the residential zone provisions which seek to control residential amenity including outlook and privacy.

Given the age of some of the dwellings at Leithfield Beach, additions, alterations or rebuilds can be expected. These activities could be controlled through the resource consent process to both improve resilience and protect equity.

Most sites at Leithfield Beach contain existing residential dwellings. There are a few existing undeveloped residential sites. Avoiding development of these sites may be difficult given the expectation to build on residential sites. There are however opportunities to build resilience into these houses through the options above.

Expansion of the settlement is limited by topography as the area directly inland of the existing settlement boundary is low lying marshland. This area isn't suitable for residential development without substantial remediation or specifically engineered dwelling foundations. Any expansion within this area would be subject to the controls of the Hurunui District Plan with specific consideration given to liquefaction potential and coastal hazards.

8 Planning Options for Gore Bay

Gore Bay has experienced periods of accretion and erosion over the last 60 years with an overall long term accretion rate of 0.05 to 0.15 metres/year. The Jacobs report indicates that the shoreline may erode:

- 22 to 35 metres landward of its current position over the next 30 years;
- 32 to 55 metres landward of its current position over the next 50 years; and
- 77 to 120 metres of its current position over the next 100 years.

This rate of erosion makes the access routes north and south of the settlement vulnerable.

At current sea level, the 1% AEP static water level could enter the northern part of the settlement footprint by over topping the low beach ridge in front of the combined mouths of the Buxton Creek and the Jed River. The northern part of the settlement along Gore Bay Rd and the Buxton Campground is susceptible to inundation. This includes the roading network which provides access into and out of Gore Bay. The Jacob's report indicates that while the static water level may only impact on a handful of properties the additional inundation from runup could impact a much greater area of the settlement.

8.1 Matrix of options

Not all of the planning options are applicable for all settlements. The table below indicates where an option might be worth pursuing. Options are rated between 1 and 5:

	Feasible	Adaptable	Affordable	Effective	Score
Raised floor heights	5	3	3	2	13
Relocatable dwellings	5	5	3	5	18
Amphibious dwellings	4	1	1	2	8
Waterproof dwellings	5	1	3	2	11
Avoid development	5	5	5	5	20
Time limited land use consents	5	5	5	5	20

8.2 Reason and discussion

One of the primary issues Gore Bay faces is the vulnerability of the access roads at either end of the settlement. None of the planning options considered in this report address protecting infrastructure.

Options one to four relate to dwelling design and may be effective at protecting individual dwellings from inundation, however these do not reduce the inundation risk across the whole settlement. These provisions are only applicable to new dwellings and most sites within the settlement contain existing dwellings that would not be subject to these requirements. The feasibility of renovating existing dwellings to include inundation resilient or relocatable designs may be limited.

With the exception of relocatable dwellings and time limited land use consents the majority of the options do not address the risk of coastal erosion to the settlement.

9 Planning Options for Motunau Beach

The Motunau cliff face has undergone periods of rapid erosion resulting in house removals and the installation of gabion baskets at the base of the cliffs in the late 1980s.

The Jacobs report indicates that the cliff face is projected to erode:

- 22 to 40 metres landward of its current position over the next 30 years;
- 34 to 60 metres landward of its current position over the next 50 years; and
- 66 to 124 metres landward of its current position over the next 100 years.

These predictions vary depending on which part of the cliff face is being considered.

Coastal inundation risk is limited to the properties located on the lower terrace adjacent to the Motunau River Mouth.

9.1 Matrix of options

Not all of the planning options are applicable for all settlements. The table below indicates where an option might be worth pursuing. Options are rated between 1 and 5:

	Feasible	Adaptable	Affordable	Effective	Score
Raised floor heights	5	2	5	1	15
Relocatable dwellings	4	5	3	4	16
Amphibious dwellings	2	3	2	3	10
Waterproof dwellings	4	2	3	3	12
Avoid development	4	2	3	4	12
Time limited land use consents	3	3	4	5	15

9.2 Reason and discussion

As Motunau Beach has two distinct and discrete issues the planning options need to be specific to these issues.

Inundation on the lower terrace

Sites on the lower terrace are already developed. Any redevelopment of these sites should look to build resilience into the design through options one to four. However, it is noted that the feasibility of renovating existing dwellings to include inundation resilient or relocatable designs may be limited by the age and the design of the existing dwellings.

These types of options may be effective at protecting individual dwellings from inundation however they do not ensure that access to those properties is maintained.

Erosion risk to the Motunau cliff face

Properties at the top of the cliff are subject to cliff collapse. The risk varies depending on where on the cliff the property is located. This risk is currently identified through the Coastal Hazard Line in the RPS. This has required new dwellings to be set back a distance from the edge of the cliff. Building setbacks, relocatable dwellings and time limited land use consents could have a role in enabling continued development of cliff top sections.

Planning options to address existing development on the cliff top are limited to additions, alterations and redevelopment.

10 Planning Options for Conway Flat and Claverley

Conway Flat and Claverley are unique in that only the roading network is at risk of coastal inundation and erosion. Subsequently no planning options are considered necessary.

11 Conclusion

As discussed above the planning options are generally better suited to new development. In most instances planning options alone may not be enough to eliminate the risk but they can be used in conjunction to support managed retreat or an engineered solution. They can also be successfully used to extend the lifetime of a settlement.

Adaptive planning is a reasonably new field of planning in New Zealand and is rapidly evolving along with the legislation supporting it. Councils throughout New Zealand are currently experimenting with how coastal engineering and planning can work together in an uncertain environment to deliver the best outcomes.

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