NAPIER CITY COUNCIL
Te Kaunihera o Ahuriri

MANA AHURIRI INCORPORATED

HASTINGS DISTRICT COUNCIL

MAUNGAHARURU TANGITŪ

HAWKE'S BAY REGIONAL COUNCIL

HE TOA TAKITINI

Clifton to Tangoio Coastal Hazards Strategy 2120

Version 2: August 2016

www.hbcoast.co.nz

Glossary of Terms

Resilience:

Our community's ability to cope with adversity or change.

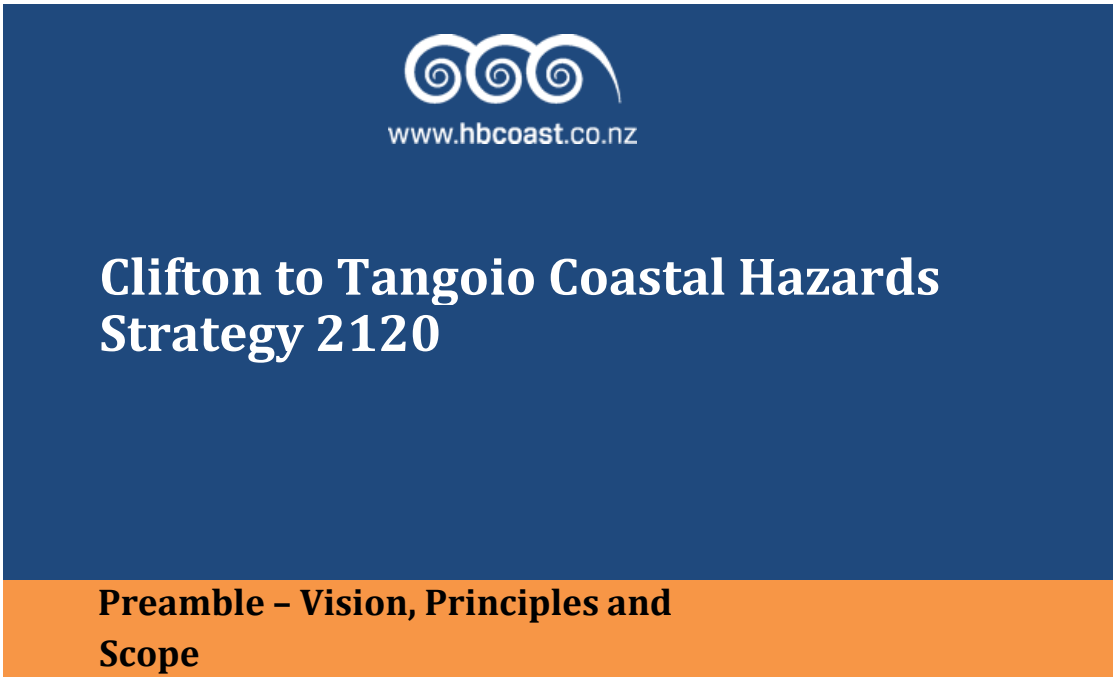
The essential characteristics of resilience are being able to:

- *resist, absorb or adapt to hazards and*
- *maintain or restore social, cultural and ecological structure and functions in a timely and efficient manner.*

Adaptation:

The process of adjustment to actual or expected climate and its effects.

Project Website



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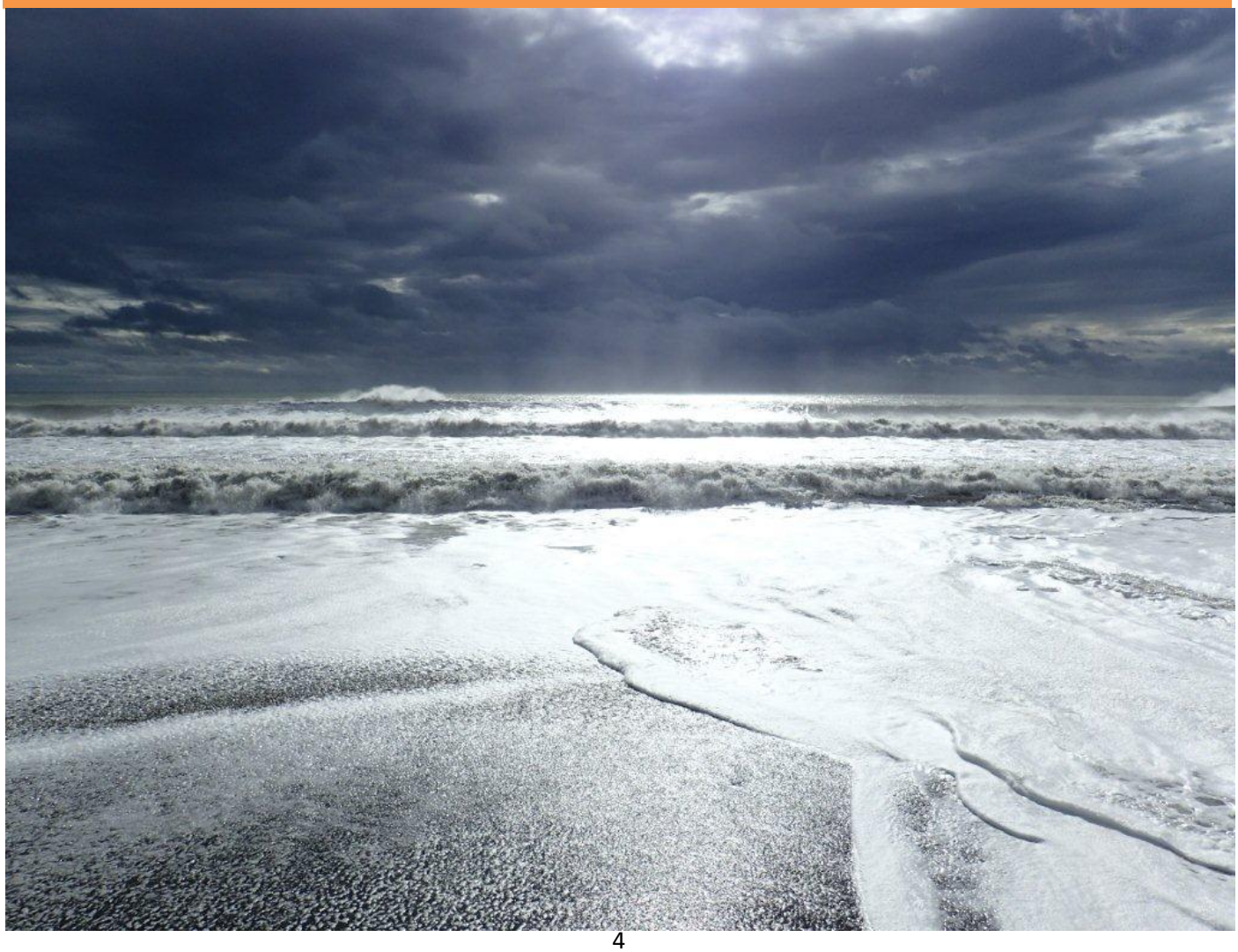
Clifton to Tangoio Coastal Hazards Strategy 2120

Preamble – Vision, Principles and Scope



Introduction

The New Zealand Coastal Policy Statement requires Local Authorities to consider and plan for coastal hazards risks. Under Policy 24 (1), Local Authorities are required to:

> *"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…"*

Storms, wave direction and energy, beach and cliff profiles and geomorphology, and the presence of manmade structures all contribute to a changing coastline which can present a variety of hazards for those that live, work and play in the coastal environment.

Overriding these processes, climate change is driving the pace of change and presenting new challenges to coastal communities through sea level rise and the increased frequency and severity of storm events.

In her 2014 report, the Parliamentary Commissioner for the Environment (PCE) stated that over the past century, the average global sea level has risen by about 20 cm. The Intergovernmental Panel on Climate Change (IPCC) expects sea level to rise up to a metre by the end of the century, whilst identifying that about 70% of the coastlines worldwide are projected to experience sea level change within ±20% of the global mean; and it is very likely that there will be a significant increase in the occurrence of future sea level extremes in some regions by 2100.

The Clifton to Tangoio Coastal Hazard Management Strategy 2120 (Strategy) represents a cross-Council approach to identifying and responding to these hazards. It provides a platform from which decisions to determine the most appropriate coastal hazard responses will be made.

Vision

That coastal communities, businesses and critical infrastructure from Tangoio to Clifton are resilient to the effects of coastal hazards

Principles

The Clifton to Tangoio Coastal Hazards Strategy is founded on the following principles:

- to take a long term approach to coastal hazards impact management in order to develop resilient communities out to 2120;

- that the best long term Strategy will be the choice or series of choices that provide the most cost effective outcome for the Hawkes Bay community, while addressing economic, environmental, cultural and social issues;
- to ensure cultural concerns are considered prior to options being progressed;
- to take a consistent, coordinated and shared approach between Hastings District Council, Napier City Council and Hawke's Bay Regional Council;
- to take an informed, consultative and coordinated approach with stakeholders and interest groups;
- to make decisions that align with national-level directions and policies, including the New Zealand Coastal Policy Statement and findings of the PCE;
- to ensure that coastal hazards responses are developed in an integrated way that considers risk, cost, impacts and indirect effects;
- to ensure that coastal hazard responses are assessed on the basis of adaptability and the site-specific nature of the particular coastal hazard; and not preclude or unnecessarily constrain choices to adopt different options into the medium and longer term horizons;
- an understanding that any activities undertaken that impact on the natural coastal processes will result in impacts on other parts of the coast;
- make evidence-based decisions founded on best practice coastal science and good data;
- to make decisions on a level of community resilience to coastal hazards that is consistent with the likelihood of the risk, the magnitude of the consequences, and the community's appetite for risk acceptance;
- To ensure the timely provision of information on hazards, risks and uncertainties to private land-owners and the wider community in order to encourage prudence in decision-making relating to private property;
- To avoid creating perverse incentives for private land-owners to undertake actions that increase costs and risks to the wider community;
- To minimise public costs arising from decisions made by private landowners, which incur unnecessary risks despite available information.

Scope

1. Assesses coastal hazards risks between Clifton and Tangoio associated with the following processes occurring over the period 2016 to 2120:
    - Coastal erosion (storm cut, trends, effects of sea level rise);
    - Storm surge inundation (wave set-up, run-up, overtopping and sea level rise);
    - Tsunami;
2. Provide a decision making framework to identify, evaluate, consult on and select practicable adaptation options that respond to the identified coastal hazards risks;
3. Implement the selected adaptation option(s) in a coordinated and planned manner that will provide the best overall outcome for the Hawkes Bay community.

Process of Development

The Strategy was initiated in 2014 with the establishment of a Technical Advisory Group ("TAG") formed by senior Council staff and advisors, and the Joint Committee formed by elected

representatives from the participating Councils, along with representatives from Maungaharuru-Tangitu Trust, Mana Ahuriri Incorporated and He Toa Takitini.

The Strategy is being developed in four key stages:

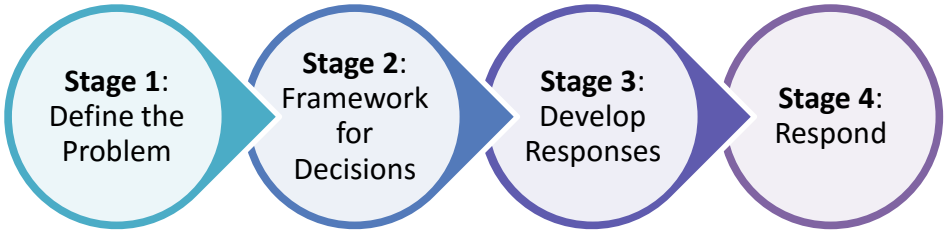


***Figure 1**: Clifton to Tangoio Coastal Hazard Strategy – Process of Development*

Stage 1 commenced in 2014 with strategy initiation and was completed in May 2016. Fundamental to Stage 1 is the identification of hazards and the risks these present. This was undertaken as a technical study by Tonkin & Taylor with oversight by TAG and the Joint Committee. The outcomes of Stage 1 are described in Part 1 of this Strategy.

Stage 2 will establish a decision making process for turning what we now know about coastal hazards risks (as identified in Stage 1) into actionable responses. Stage 2 will also develop a funding mode to support the decision making process. The funding model will guide how responses to coastal hazards risks will be paid for, and will take into account public / private benefit, the share of costs between Councils, and mechanisms for securing funds. Stage 2 will be completed by the end of 2016.

Stage 3 will implement the decision making process developed in Stage 2. It will result in a series of confirmed responses to coastal hazards risks. Stage 3 will commence late in 2016 and will conclude in mid-2017.

Stage 4 will begin with the development of an implementation plan for the coastal hazards responses confirmed in Stage 3, and continue with the roll out of those responses. Given that the Strategy is responding to coastal hazards over a long timeframe, Stage 4 will be ongoing for a number of years with sequencing of works to be programmed in accordance with priority.

As each stage of the Strategy is completed, this document will be updated to reflect the outcomes reached. In this way, this document will be "live" until the completion of the implementation plan in Stage 4. At that time, it will be completed as the first iteration of the Strategy, to be reviewed in its entirety in accordance with the review process outlined in Section 15

Strategy Oversight

Joint Committee

The Clifton to Tangoio Coastal Hazards Strategy Joint Committee (Joint Committee) was formed with Terms of Reference approved in March 2015 (refer **Appendix 1**).

Under the delegated authority within the Terms of Reference, the role of the JC is described as:

- Considering and recommending a draft Strategy to each of the Partner Councils for public notification;
- Considering comments and submissions on scenarios and the draft Strategy and making appropriate recommendations to the Partner Councils;
- Considering and recommending a final Strategy to each of the Partner Councils for approval.

The Joint Committee will continue to provide an oversight and governance role for the Strategy as it progresses through each stage of development. This may necessitate updates or changes to the Terms of Reference in later stages of the Strategy.

Technical Advisory Group (TAG)

The Joint Committee is supported by a Technical Advisory Group (TAG) which is comprised of senior staff representatives from each of the participating Councils. The TAG provides project management and advisory support to the Joint Committee, and management of external expertise where this is engaged to assist at various stages of the Strategy. The TAG is supported by a Project Manager.

The Project Manager and appropriate members of the TAG work with stakeholders, who are also able to present or discuss issues directly with the Joint Committee. Functions of the TAG include:

- Providing technical oversight for the study;
- Coordinating agency inputs particularly in the context of the forward work programmes of the respective Councils;
- Ensuring Council inputs are integrated.

Consultation Strategy

Throughout all stages, a comprehensive and consistent stakeholder engagement process is undertaken. It is vital to the foundation of the Strategy that a fully transparent, consultative approach is undertaken that conveys a consistent message to coastal groups and the wider community. A “live” stakeholder engagement plan is in place, which will be reviewed and updated as the intensity and approach to consultation shifts through the various stages of Strategy development. The current version of the Stakeholder Engagement Plan is available through the project website at www.hbcoast.co.nz.

Interim Hazard Management Solutions

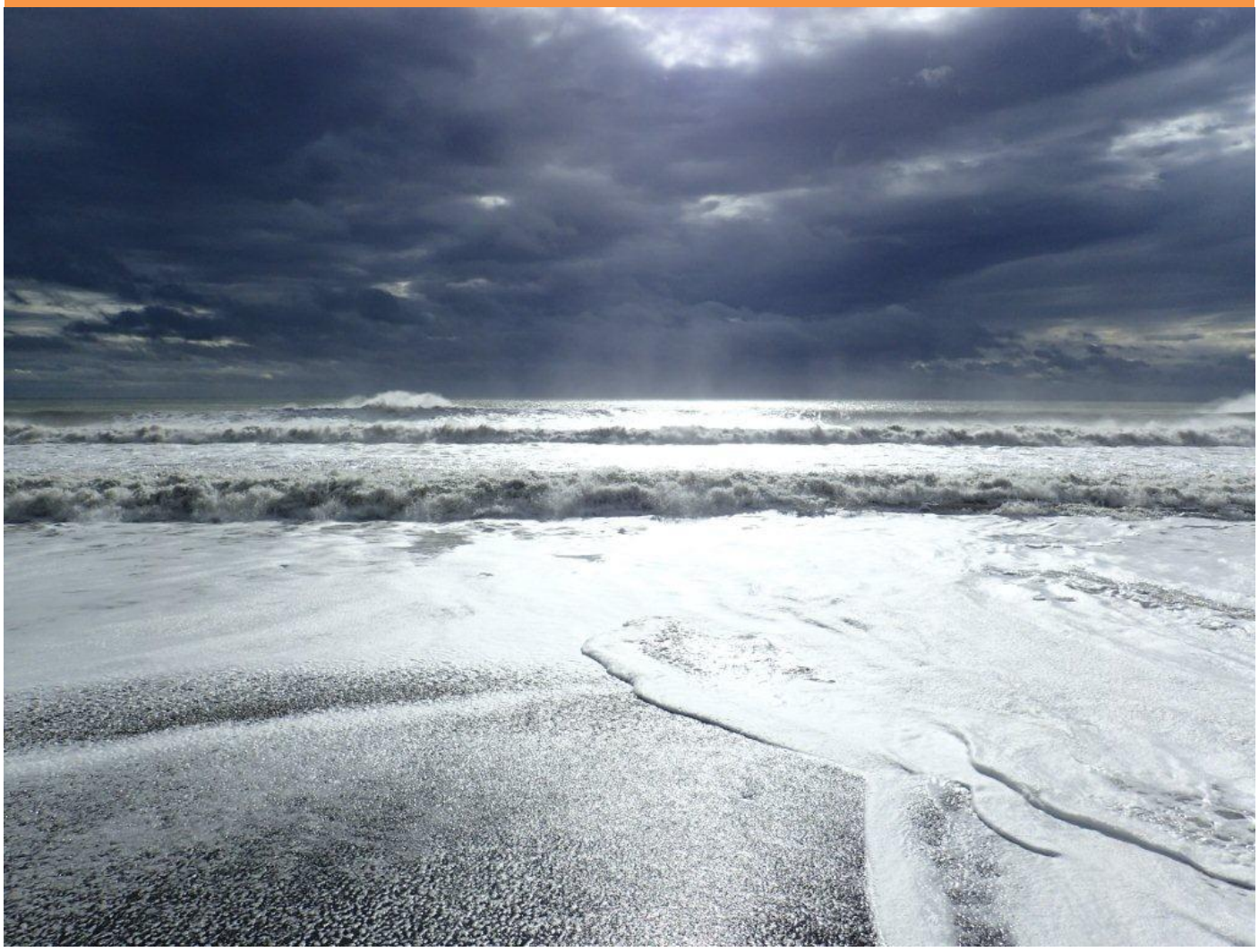
The coast is a dynamic environment and there are a number of current and proposed responses to coastal hazards within the Strategy area, including beach nourishment and protection works at Westshore, and cessation of gravel extraction on Marine Parade.

It is not the intention of the partner Councils engaged in this Strategy that a moratorium on coastal works be imposed while the outcomes of the Strategy are being developed. However, the Councils

wish to note that a coordinated effort to respond to coastal hazards is preferred, and as such any proposed activities are encouraged to be advanced within the framework of this Strategy.

Clifton to Tangoio Coastal Hazards Strategy 2120

Stage One: Define the Problem



Defining the Problem

In 1999 the Hawke's Bay Regional Council implemented the Hawke's Bay Regional Coastal Environment Plan (RCEP). The RCEP rules are based on hazard risk zones defined in the 2004 Hawke's Bay Regional Coastal Hazard Assessment and subsequent reports by Tonkin & Taylor. The coastal hazard zones (CHZ) are divided into two groups with tighter controls applied to areas adjacent to beaches, and less strict controls further landward. Regional rules within the RCEP, which became operative in 2014, also control coastal protection structures.

The RCEP is the primary existing regulatory tool for the management of coastal hazards risks for all parts of the coast within the Strategy area, with the exception of the stretch of coast between Westshore and the Esk River mouth which is regulated under the Napier District Plan.

Since the RCEP was developed, additional reports, information and data has become available to support a refinement of hazard information. This includes additional data from shoreline monitoring, updated climate change projections from the Intergovernmental Panel on Climate Change (IPCC) which includes greater levels of sea level rise, tsunami modelling and other information. In addition, the methodology for assessment of coastal hazards has improved.

Through TAG, Tonkin & Taylor were engaged to provide the technical analysis required Stage 1 of the Strategy (Define the Problem). This work resulted in two reports being produced: Coastal Hazards Assessment and Coastal Risk Assessment. The coastal hazard assessment work was independently peer reviewed by Professor Paul Kench of Auckland University.

The reports were formally adopted by the Joint Committee at their meeting held on 2 May 2016, marking the conclusion of Stage 1.

The full text of the reports produced by Tonkin & Taylor are available for download from the project website at www.hbcoast.co.nz under the 'Resources' tab. The key findings of the reports are summarised in the following sections.

Coastal Hazard Assessment

The following is a reproduction of the executive summary from the Tonkin and Taylor report "*Clifton to Tangoio Coastal Hazards Strategy 2120: Coastal Hazard Assessment. Tonkin & Taylor, May 2016*", which available for download from www.hbcoast.co.nz.

Purpose

Hawke's Bay Regional Council (HBRC), Hastings District Council (HDC) and Napier City Council (NCC) are working together to develop a strategy for managing, or mitigating, coastal hazard risks along the Hawke Bay shoreline from Tangoio to Clifton to make a more resilient community. This report provides the results of a regional scale coastal hazard risk assessment using the results of a coastal hazard assessment (reported separately). The hazards considered for this assessment are:

- Coastal inundation (overtopping and sea level rise) with 10%, 1% and 0.5% Annual Exceedance Probability (AEP) scenarios for the present day, 2065 and 2120. This corresponds to a 10 year, 100 year and 200 year return period event.

- Tsunami (modelled by HBRC) for 3 m, 5 m and 10 m which, based on the GNS most recent tsunami modelling represents 0.5%, 0.13% and .025% Annual Exceedence Probability (AEP) for the present day coinciding with Mean High Water Springs (MHWS). This corresponds to a 200 year, 750 year and 4000 year return period event.
- Coastal erosion (storm cut, trends, and effects of sea level rise) for 66%, 33%, 5% and 1% likelihoods for the present day, 2065 and 2120.

Mapping units and elements at risk

The coastal area has been divided into 16 units (Refer Figure 3-1) to enable a relative comparison of risk and vulnerability. Elements at risk considered in this assessment include the resident population and economic, social, cultural and environmental/ecological assets. These elements at risk have been obtained from Council databases. It is noted that there is very limited information within the Council's data base on Māori sites of significance, but it is recognised that it is highly likely that there will be sites of significance along the coastline.

Exposure

Exposure to the hazard is measured solely by the extent of the hazard, so does not measure severity or scale of the hazard. However, this approach provides a total proportion of elements affected by each particular hazard and information on exposure has been presented in terms of human, economic, social, cultural and environmental/ecological assets to each particular hazard for present day, 2065 and 2120.

Exposure has been classified from low (0 to 30% exposure) to high (70% to 100% exposure). In terms of relative scale the tsunami hazard has a significantly greater exposure than erosion and coastal inundation. Coastal inundation has the next greatest exposure.

For Coastal Inundation exposure is generally low in the present day apart from the Ahuriri Lagoon (Area M) and the southern Hawke Bay (Areas J, K and L) where exposure is moderate. The exposure in most areas increases in 2065 and there are a greater number of moderate to high exposures at 2120. In terms of land use type, regional park land has high exposure, recreational land exposure is moderate and the remaining land use types have low exposure. Social and cultural items also have low exposures, but as noted above, it is likely that cultural items of significance, particularly to Māori, are under-represented.

For tsunami hazard, exposure is generally low for a 3 m tsunami for most of the areas apart from Westshore, Ahuriri and the Port of Napier (Areas D, E and F) where exposure is moderate to high. All mapping unit areas exposure is high for a 10 meter tsunami height apart from Whirinaki (Area B) and Tukituki (Area P) where exposure is moderate. This trend is observed for all elements at risk.

For coastal erosion exposure is generally low as it affects only the coastal margin. However, the exposure increases progressively with sea level rise, particularly at the northern and southern ends of the study area. The main land areas affected are recreation and rural residential land, although there is an increasing exposure to all elements at risk with increased sea level rise.

Risk assessment approach

The overall risk assessment examines “hazard x vulnerability” where vulnerability represents damages and losses. The risk assessment presents information in terms of losses and likelihood for each hazard. Risk has been categorized in human, economic, social/cultural and environmental losses for each hazard.

Risk assessment results

The summary of risk classification for tsunami (3 m, 5 m, 10 m), the 1%AEP coastal inundation at present day, 2065 and 2120 and P1% coastal erosion for the same time periods as the coastal inundation assessment are set out in Table 7-6. The results are shown in terms of effects on humans (fatalities and injuries), economic, social and cultural and environmental/ecological for 15 mapping areas (excluding the Port of Napier) using value bands ranging from negligible/none to very high.

The tsunami hazard risk within the Hawke Bay region for the events modelled is significantly greater than the coastal inundation and coastal erosion hazard in terms of all key elements – human, economic, social/cultural and environmental/ecological. Losses for coastal inundation are generally greater than for coastal erosion, but the range of values are of a similar order of magnitude for these two hazards.

Human losses

Due to the short warning time for a near field tsunami and the magnitude of the events predicted, the tsunami hazard poses the greatest risk to human loss of life and injury, with all tsunami events modelled potentially able to cause both loss of life and injury. A 10 m tsunami height will have greatest impact in the Napier City area due to the high population density and low lying land. Potential fatalities of up to 5,400 and injuries of up to 4,600 are estimated for the 10 m tsunami. Loss of life is anticipated to be very low for coastal inundation and erosion as it is expected that a combination of better forecasting, early warning systems and approaches to manage future sea level rise will be more effective for these hazards.

Economic losses

The risks are generally negligible-to-low for the 3 m tsunami, with only Westshore, Ahuriri and Haumoana/Te Awanga (Areas D, E and K) being at very low to low risk. Ahuriri, Marine Parade and Napier (Areas E, H and N) represent very high risk for the 10 m tsunami hazard, while the urban and residential areas along the shoreline have moderate risk during this event. Ahuriri (Area E) and at Haumoana/Te Awanga (Area K) there is a gradual increase in losses from the 3 m to 10 m tsunami event due to the low-lying nature of these areas. Along Marine Parade (Area H) and Napier (Area N) there is a slow increase in losses from the 3 m to 5 m tsunami but a significant increase in losses from the 5 m and 10 m tsunami as existing defences are inundated by the tsunami.

In the present day coastal inundation losses are low. The losses increase significantly for coastal inundation from 2065 (up to moderate) and 2120 (up to very high risk). The greatest increase in loss occurs along Ahuriri (Area E), Awatoto (Area I), East Clive (Area J) and Haumoana/Te Awanga (Area K). The East Clive and Haumoana/Te Awanga area includes small residential settlements and the Hastings water treatment plant and is flood prone. Losses increase significantly from 1% AEP to 0.5% AEP events. The land area classification indicates the rural and urban residential risk is more prominent in 2065 and 2120 for all scenarios.

In the present day the coastal erosion hazard risk is generally very low to low, with Pacific Beach (Area G)) and Haumoana/Te Awanga (Area K) being the most at risk. Westshore, East Clive and Haumoana/Te Awanga (Areas D, J and K) are increasingly vulnerable for future scenarios for erosion reaching very high economic losses in 2120 in areas D, J and high losses in Area K and B (Whirinaki). Urban and rural residence are highly at high risk for erosion hazard, with roading risk influencing area B.

Social and cultural losses

It is recognised that there are likely to be items of value that are not mapped or identified, so this information provides an indication of the values affected, but cannot be considered a comprehensive assessment of actual loss, but more as a proxy of loss. It is recommended that a process to identify social and cultural values be carried out to improve understanding of risk.

Based on the information available, churches, schools, archaeological and heritage items are highly vulnerable for tsunami hazard. They are also highly vulnerable for coastal inundation hazard, although with the exception of Clifton (Area L) the other areas are of low to moderate risk.

Westshore, Ahuriri and Pacific Beach (Areas D, E, and G) shows low to moderate losses for erosion, while Clifton (Area L) shows moderate to high losses.

Environmental Losses

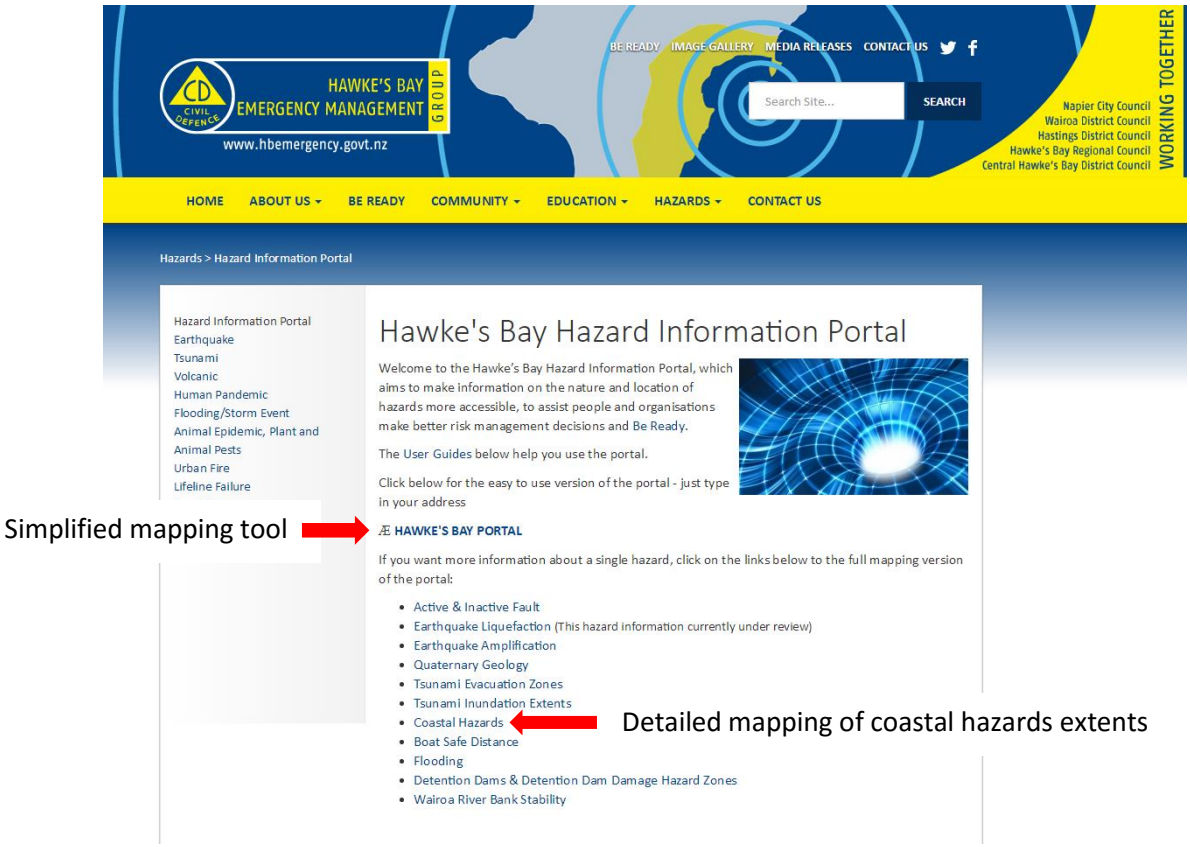
The environmental impact for both tsunami and coastal inundation has moderate to very high losses in the land areas. There are no significant losses resulting from coastal erosion.

Mapping Tool

A mapping tool has been developed to show land owners and the community what this work means for our coastal environment. Visit the Hawke's Bay Hazard Information Portal at: http://www.hbemergency.govt.nz/hazards/portal

Two versions of the tool are available – a simplified version which works based on an address search function; users enter an address of interest and all relevant hazards information applicable to that

property is shown. A more detailed mapping tool is also available through the portal, which allows users to bring up different layers of information.



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Purpose

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This report provides the results of a regional scale coastal hazard assessment that will be used as a basis for a coastal hazard risk assessment (reported separately). This coastal hazard erosion report builds on previous hazard studies and ongoing research and investigations in the coastal processes of this area. The report quantifies the possible extent of the following hazards:

- Coastal erosion (storm cut, trends, effects of sea level rise)
- Coastal inundation (storm surge, set-up, run-up, overtopping and sea level rise)
- Tsunami.

The report briefly describes the coastal processes and summarises key information required for the coastal hazard assessment based on the latest available information. However, the report does not seek to replicate information already contained in previous reports, particularly Komar and Harris (2014) and T+T (2012) and these should be read for more detailed descriptions of the physical processes affecting this area.

Coastal erosion hazard

The coastal erosion hazard assessment uses a probabilistic approach in determining the potential future shoreline position at 2065 and 2120 taking into account the following parameters: historic erosion trends, storm effects and backshore slope stability as well as the possible effects of sea level rise. The range of values for each of these parameters was determine from a range of sources, including LiDAR survey, aerial photographs, field investigations, beach profile data, numerical modelling and expert engineering judgement. A triangular probability distribution was assumed for each parameter and a Monte Carlo technique was used to assess the likelihood of the combined influence of each parameter. This approach differs from the previous erosion hazard assessment that was based on a deterministic approach of adding together the effects each parameter.

The approach used in this report is consistent with the Government's Envirolink "guide to good practice[1]" that recommends moving from deterministic predictions to probabilistic projections. The probabilistic approach recognises there will always be inherent uncertainties associated with projections and provides a more transparent way of capturing and presenting such uncertainty. This method results in a range of potential hazard zone extents, ranging from virtually certain to exceptionally unlikely.

Minimum set back values are developed to take into account limitations and uncertainties in our current understanding of processes that drive erosion hazard and in the data and modelling techniques. Utilising minimum values provides a targeted precautionary approach as advocated in the NZCPS without applying overly conservative factors of safety for sites with sufficient hazard zone widths.

Mapping of the erosion hazard extent was based on setbacks determined at each beach profile measured from present day vegetation lines or beach scarps. Due to the consideration of accretion trends as well as erosion trends the future erosion hazard extents can be less than the current erosion hazard zone. This is particularly evident between HB8 and HB12 where the maximum CEHZ is between -15 and -16 m, while for CEHZ21020 at these locations the hazard extent varies from -20 m to +23 m (i.e. at some locations the hazard zone is more seaward in the future than it is at the present day). Therefore, it is not recommended to select a particular line at a point in time to inform future planning, but a set of lines and likelihoods. For example it may be prudent to select the particular likelihood for present day CEHZ as well as a future likelihood event, so there is still a set-back distance to consider even in areas where, over time, accretion may reduce the hazard.

Coastal inundation hazard

[1] http: //www.envirolink.govt.nz/Envirolink-tools/

The coastal inundation hazard extent was determined for both permanent and extreme inundation along the open coast for present day and for the years 2065 and 2120 for a 10%AEP, 1% AEP and 0.5%AEP event (i.e. a 10 year, 100 year and 200 year return period). Permanent inundation extents were based on the predicted rise in sea level added to present day tidal levels. Extreme inundation is caused by extreme events during which waves contribute to super-elevate water levels (astronomic tide + storm surge) through wave setup, wave run-up and wave overtopping. The combined effect of storm surge levels with the effect of onshore storms based was modelled at each beach profile using the X-Beach Gravel model. This provided information on both the extreme water level on the seaward side of the beach crest and the volume of seawater that can overtop the beach crest during storm events.

Mapping was based on the manual integration of the extreme water levels along the coast produced by X-Beach with the inundation extent resulting from overtopping from the catchment flood models of HBRC using engineering judgement to refine the inundation maps.

Tsunami inundation hazard

Tsunami hazard mapping was based on the work carried out by HBRC (http://www.hbemergency.govt.nz/hazards/portal) that included the potential effect of a 3 m, 5 m and 10 m amplitude tsunami. The tsunami amplitude was applied in deep water some 20 km from the Port of Napier and modelled to coincide with the high tide at Mean High Water Springs water level (Goodier, 2011). Based on the recent GNS report on tsunami (GNS, 2013), the 3, 5 and 10 m tsunami have been determined to conservatively represent approximately a 0.5%, 0.13% and a 0.025% AEP event (i.e. 200 year, 750 year and 4000 year return period).

Mapping information

Hazard maps have been prepared for erosion, sea inundation and tsunami. These maps have been provided to Council and are the basis for the baseline risk assessment reported separately.

Recommendations

The coastal hazard information is to be used for a baseline risk assessment. There are no recommendations on the preferred hazard information to use for any possible update of coastal hazard zones in regional or district plans. The selection of appropriate hazard maps should be based on the outcomes of the risk assessment and discussions on acceptable risk

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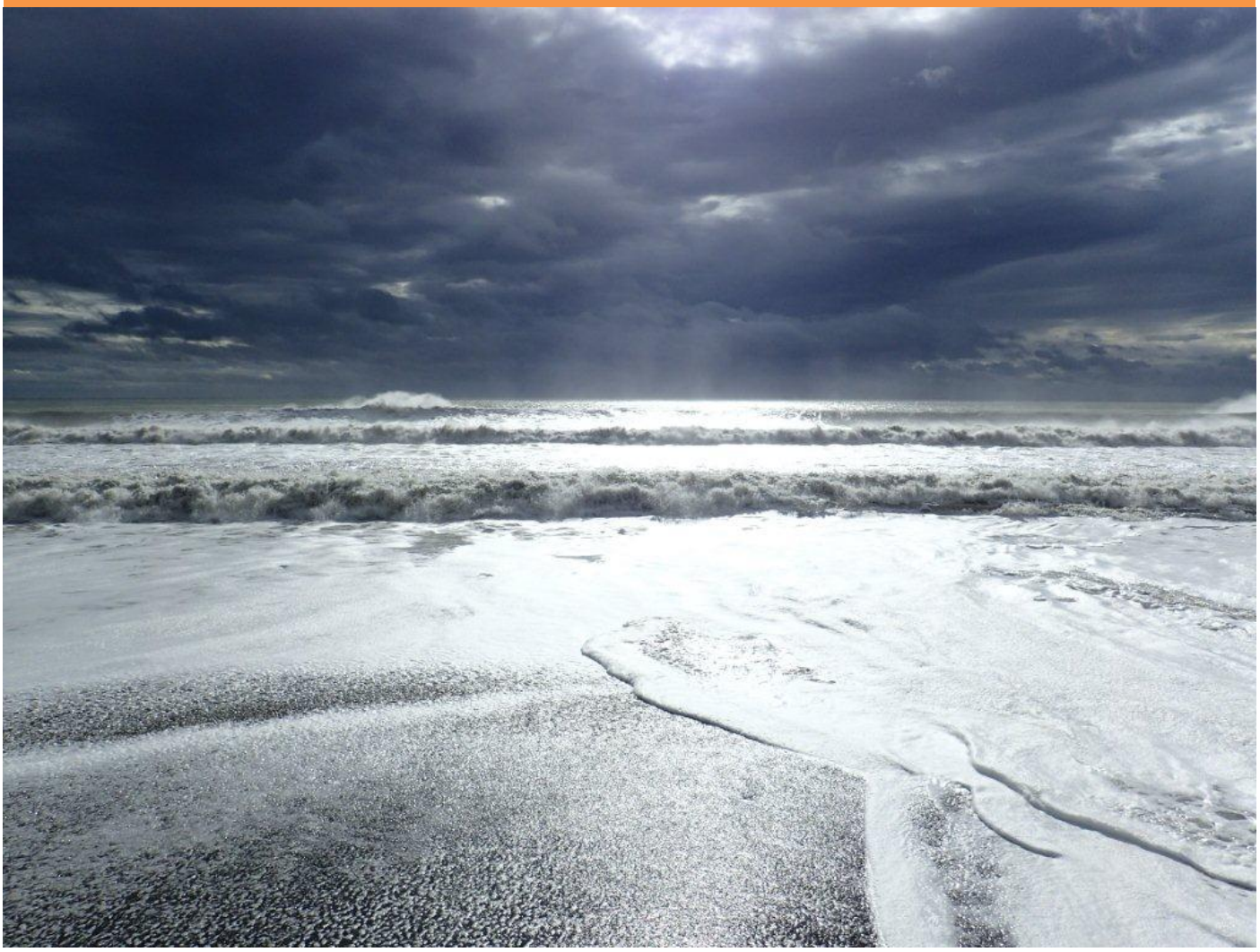
Stage Two – Framework for Decisions



Decision Making Framework and Funding Guidelines

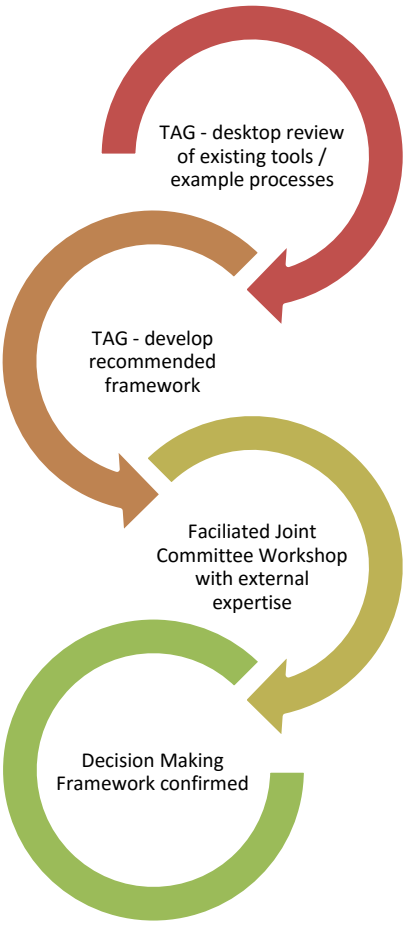
Having defined the risk of coastal hazards between Clifton and Tangoio, a process for deciding on how to respond to those risks is required.

This overarching process must provide for coordinated and consistent decision making that appropriately provides for community and stakeholder participation, whist ensuring that decisions are robust, reached efficiently, and ultimately implemented.

In support of this process, funding guidelines are required to provide in principle, agreement between the participating Councils on how the responses to coastal hazards, once confirmed, will be funded.

The decision making framework and funding guidelines will be developed in 2016. The process to develop each outcome is outlined in the following diagram.

Developing a Decision Making Framework



Developing Funding Guidelines

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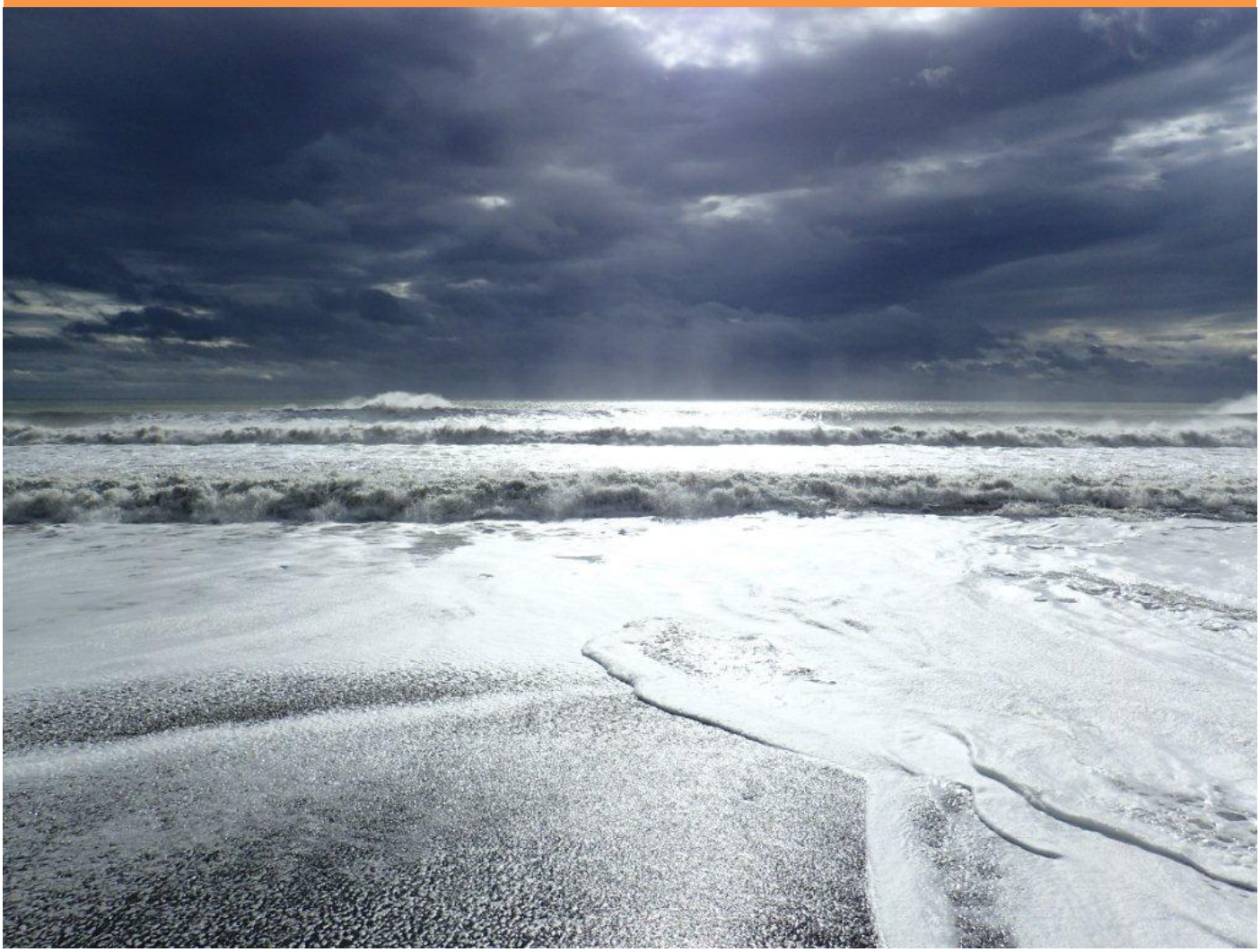
Stage 3 – Develop Response



Hazard Risk Response

Applying the decision making framework developed in Stage 2, coastal hazard plans will be developed for coastal areas (cells) to respond to the identified risks.

Adaptation options (or a combination of options) will be considered to address coastal hazards and mitigate against damaging effects using defend, retreat or maintain approaches. Social tolerance for the proposed options and levels of risk will be explored, which will assist in directing resources and funding toward preferred options.

Options will be explored covering:

- community willingness to buy-in should there be options to continue coastal hazard mitigation efforts through hard engineering solutions;
- residents willingness to adapt to change or pay to reduce risk;
- community support for hard engineering solutions;
- central government assistance.

The number and extent of cell plans has yet to be determined; this will be developed in Stage 2 and refined as part of Stage 3. However, in defining the extent of cells, the following matters require consideration:

- Community and cultural areas of common interest
- Natural features
- Man-made structures
- Coastal processes
- Jurisdictional boundaries
- Ecological areas

A logical starting point informed by coastal processes would be to define a Northern Cell and a Southern Cell, divided by the Port of Napier. Further refinement of 'sub cells' within these two larger areas will be the subject of further refinement and engagement.

It is important to note that each cell has differences in both exposure to hazards and community preferences in terms of risk tolerance and options to respond to those risks. As such, it is expected that the timeline to complete cell plans could vary significantly between cells. Where some cell plans may be able to progress fairly quickly from development to implementation (Stage 3 to Stage 4), others are likely to take longer.

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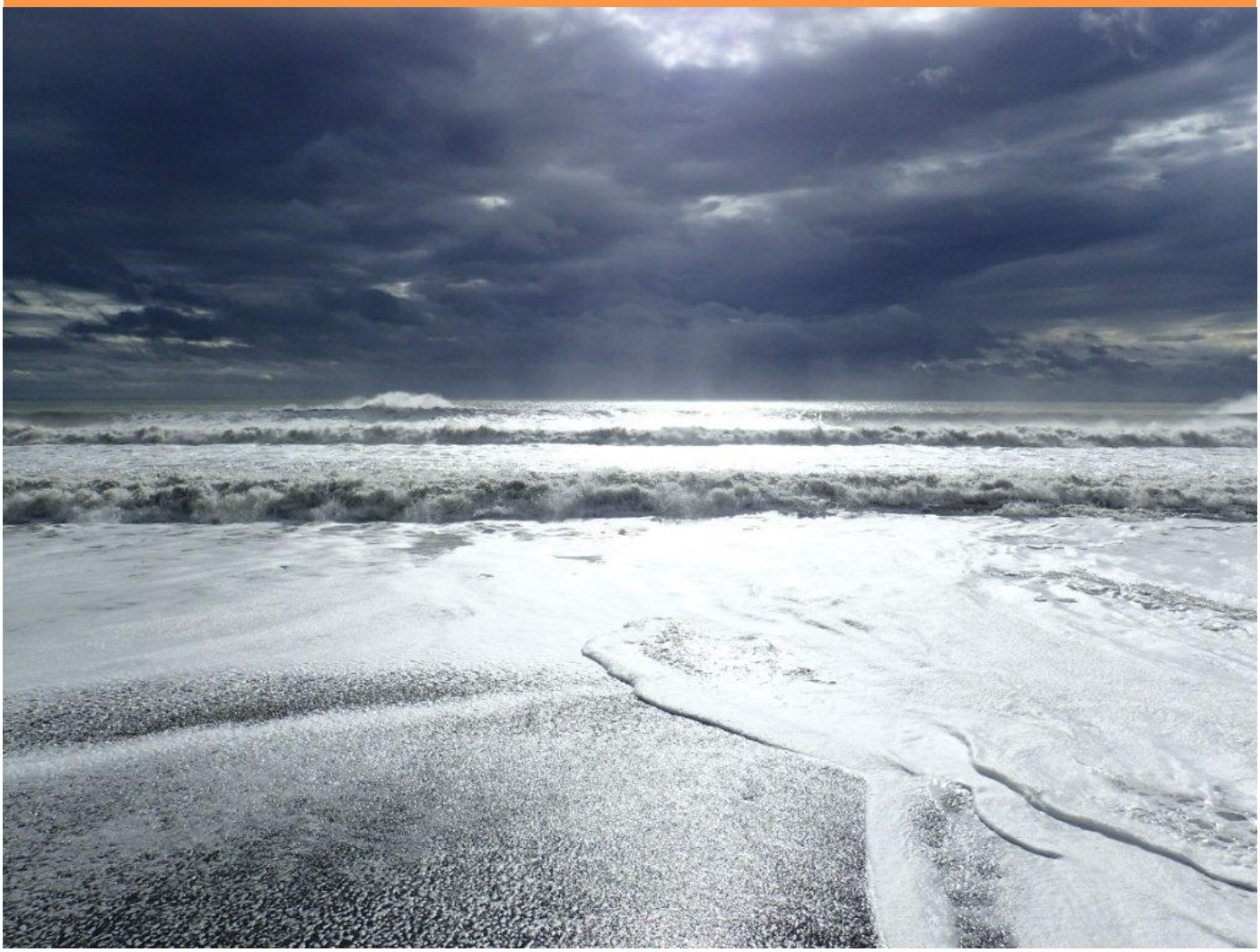
Stage Four - Respond



Implementation

Once completed and adopted, cell plan implementation will commence. This is expected to occur from 2017. Given the long horizons (100 years) of the strategy, implementation will occur over a number of decades in response to priority and the necessary timing of each response.

Depending on the types of actions that have been identified, the following activities may be required:

- Council Long Term Plan amendments or updates to allocate resources;
- Securing resource consents and the associated assessments of environmental effects;
- District Plan changes / reviews;
- Regional Coastal Environment Plan changes / reviews.

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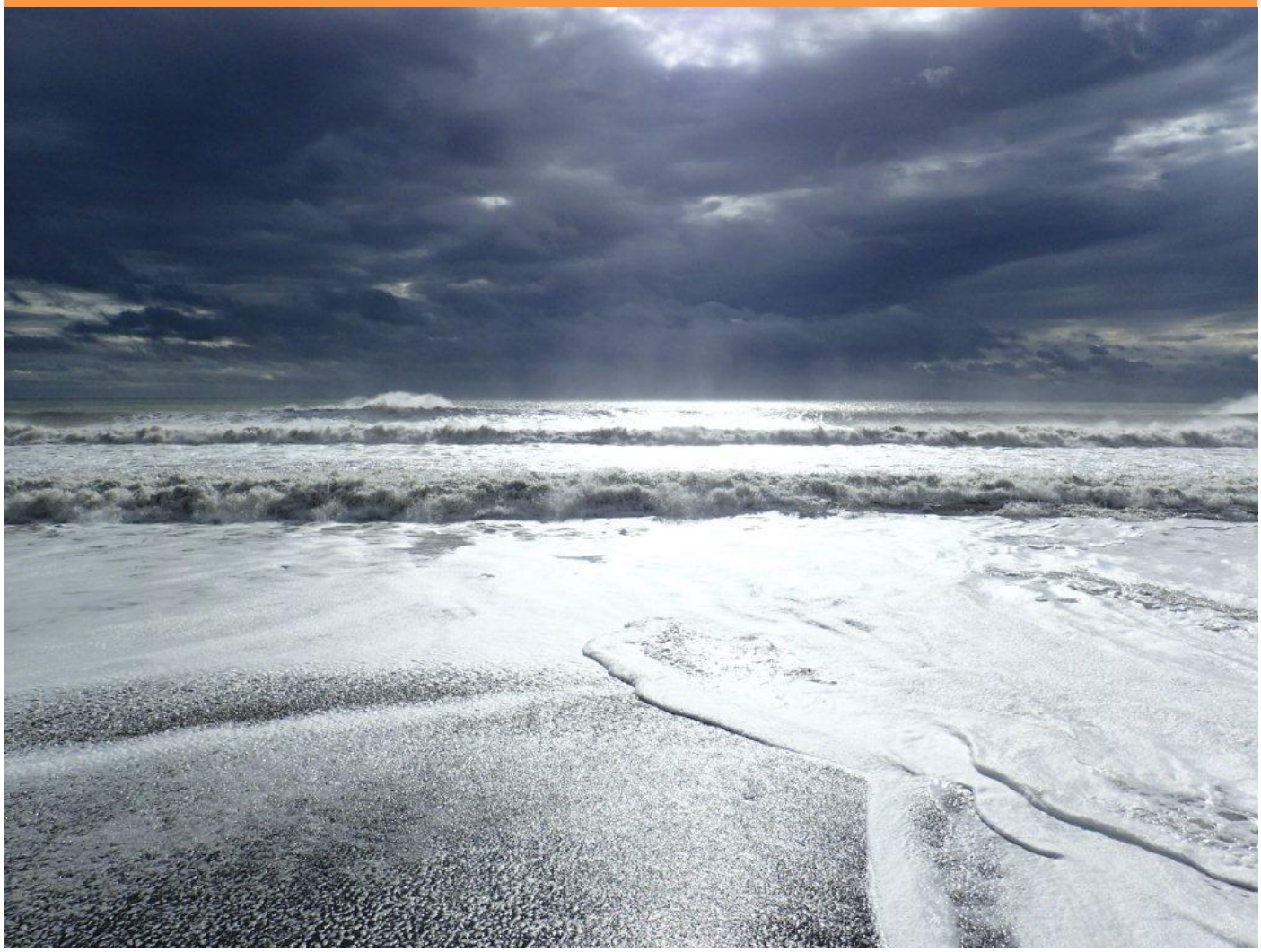
Strategy Review



Strategy Review Process

The Strategy aims to set in place an approach to for the management of coastal hazards risks over the next 100 years. This is a very long horizon for any strategic planning process, and regular reviews will be essential to success. The Strategy will need to effectively respond to:

- Revised and updated science from local data sources and reviews;
- Revised and updated projections and models around sea level rise and climate change;
- New information on other hazards risks which may usefully be integrated into hazard scope;
- Changing patterns of settlement and growth along the coast;
- Any new direction or guidance from central government on long term hazards responses;
- Others factors which may influence the direction set by the Strategy.

A full Strategy review process will be developed as the final stage of development, to confirm:

1. Who undertakes the review;
2. The timing / frequency of reviews;
3. The scope of future reviews; and
4. The governance and reporting structures required to give effect to the review.

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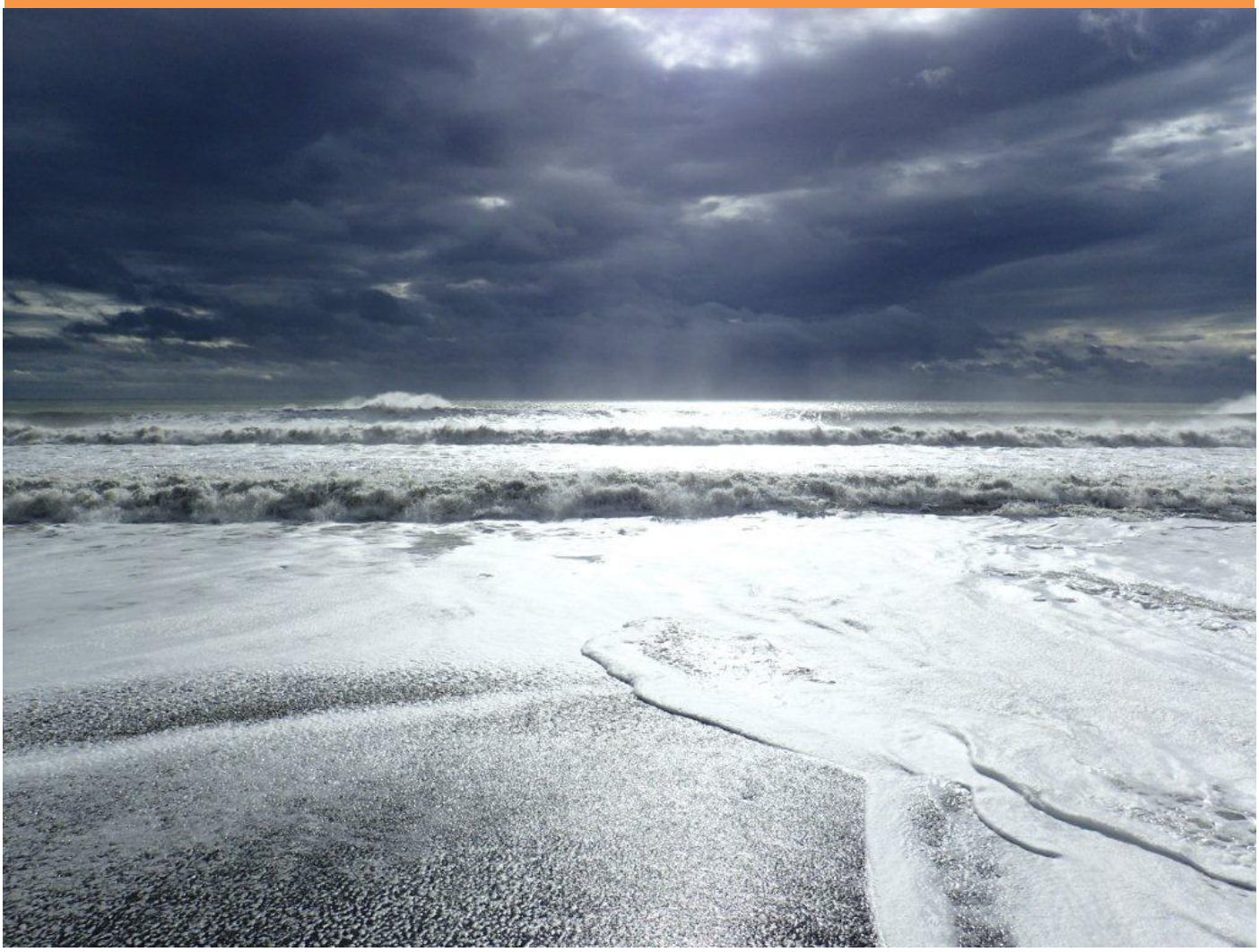
Appendices



Appendix 1 - Joint Committee Terms of Reference