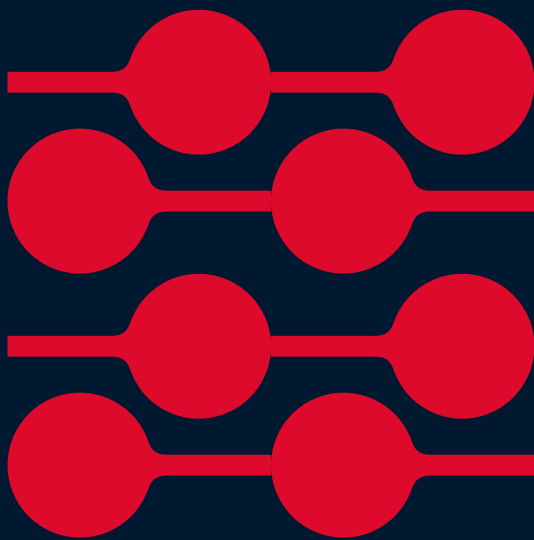




Te Aroturukitanga o
te Mahere ā-Wae ki
Tāmaki Makaurau

**Auckland
Unitary Plan
Resource
Management Act
(1991) Section 35
Monitoring:
B10.2 Natural
Hazards and
Climate Change**



December 2022





Auckland Unitary Plan Resource Management Act (1991) Section 35 Monitoring:

B10.2 Natural hazards and climate change

December 2022

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Plans and Places Department, Auckland Council

Auckland Council
Technical Report

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Executive summary

The Auckland Unitary Plan (AUP) became operative in part in November 2016. This report considers how effective and efficient the objectives, policies, rules and other methods of the AUP have been in meeting the outcomes intended by the Regional Policy Statement (RPS) – Chapter B10.2 Natural hazards and climate change.

This monitoring work will contribute to our knowledge base – what is working in the plan and where there may be challenges. This knowledge will help to inform future plan changes and contribute to the policy cycle. Additionally, this report will address the Section 35(2)(b) plan monitoring requirements of the Resource Management Act 1991 (RMA).

It is recommended that this report is read in conjunction with its companion technical topic reports, and the summary report.

It is noted that in February 2021, the New Zealand Government announced that it would repeal the RMA 1991, replacing it with the Natural and Built Environments Act, the Strategic Planning Act, and the Climate Change Adaptation Act. Given the timeframes, the findings and recommendations from this s35 report may be best applied to the analysis of the new legislation and plan requirements for managing natural hazards and climate change rather than pursuing plan changes to the AUP. However, this would be dependent on the timing and scope of the new legislation.

Background

Managing the effects of natural hazards and climate change in providing for subdivision, use and development is one of the most significant challenges facing Auckland. The extent of use and development adjoining Auckland's coastal edge, Auckland's geology and the location of historic development mean that a substantial number of public and private assets are in areas increasingly at risk of being affected by a range of natural hazards. Auckland's rapid population growth and need to provide for significant levels of new urban development result in pressure to locate development in areas that may be at risk from natural hazards. In addition, climate change has the potential to exacerbate these risks, as well as pose its own risks to people, property, and the environment.

There is reliance on the AUP provisions to be effective in managing risk, particularly in providing for new subdivision, use and development in the face of increasing risk to existing development. This challenge is recognised in Chapter B10.2, and the objectives of B10.2.1 seek that activities are managed so that:

- communities are more resilient to natural hazards and the effects of climate change
- natural hazard risks are not increased in existing developed areas and new risks are not created because of new subdivision, use and development
- the effects of climate change on natural hazards are recognised and provided for
- the functions of natural systems, including floodplains and overland flow paths are protected and maintained.

This report examines whether the AUP is effective and efficient at achieving the outcomes sought under Chapter B10.2, as measured against the objectives of B10.2.1. Pursuant to the Resource Management Act 1991, the AUP provisions manage the risk of natural hazards in providing for the subdivision, use and development of land. The assessment of the AUP provisions is based on the legal requirements that applied and information available at the time the AUP was developed and adopted in 2016.

The assessment in this report has primarily relied on discussions with council staff who implement the relevant AUP provisions and a review of a sample of resource consents that processed under the AUP provisions relating to natural hazards. Other sources of information include documents that support the implementation and/or provide background to the provisions, including practice and guidance notes, codes of practice, technical reports, and guidance from Ministry for the Environment and Local Government New Zealand. Information, data and reports up until November 2021 have been used to inform this analysis.

The key findings and recommendations are summarised below. Given the complexity and wide scope of this topic, this report only provides a broad canvas of the key observations, trends and feedback drawn from the various data sources. In many cases, further investigation will be required to understand the extent of highlighted issues. In addition, it is concluded that some of the gaps identified stem from the current RMA legislative framework and may be addressed by upcoming legislative changes.

Key findings and recommendations

Scope of the AUP provisions

The objectives and policies in Chapter B10.2 refer to all natural hazards in general, however not all natural hazard risks are managed under the AUP. The AUP provisions only apply to coastal erosion, coastal storm inundation, flooding, land instability and wildfire. The risk from other hazards like earthquakes, tsunamis and volcanic activity are currently managed through other methods such as identified tsunami evacuation areas and emergency management procedures. In addition, the AUP provisions focus on climate change effects only in relation to the exacerbation of these natural hazards and do not recognise that climate change itself that can pose hazard risks. This is reflective of the effects of climate changes being a s7 RMA matter and the understanding of climate change risk at the time the provisions were adopted.

These gaps can limit the effectiveness of the AUP in achieving the outcomes sought under the RPS. It is recommended to evaluate whether it is appropriate for the AUP to include provisions that address risk from other natural hazards beyond those currently covered. This also aligns with Policy E36.2(2), which directs investigation of whether other natural hazards should be managed through the Plan or otherwise.

Responsiveness to change under the AUP

Given the dynamic nature of natural hazards and the effects of climate change, the understanding and extent of risks that the AUP seeks to manage are constantly changing. As the AUP provisions are statutory provisions, it cannot be readily or quickly amended to incorporate updated technical information. It is important for the AUP to have robust provisions and mechanisms in place to ensure risk assessments are based on the latest information. While this is somewhat provided for by keeping the natural hazard mapping layers outside of the AUP maps so they can be continually updated without the need for a plan change, parts of the AUP text can become out of date. An example of this is the reference in policies to a 1m sea level rise over the 100-year timeframe, which is no longer reflective of latest guidance.

The effectiveness of the AUP in managing the changing hazard risk and understanding is limited by the need to undertake a statutory plan change process to incorporate updated information. It is recommended that investigation is undertaken into the possible mechanisms, in addition to mapping sitting outside of the AUP, that may be used to ensure that the AUP is as responsive as possible to these changes.

Approaches and directives for managing risk

The concept of risk treatment is complex as there are often multiple factors that can influence the risk equation. The AUP provisions do not fully reflect this complexity and instead refer to risk in a generic

sense. This has the potential to lead to outcomes that may not fully align with what the RPS objectives seek to achieve, particularly as it also makes it difficult to determine whether risk is being created or being increased in a particular scenario. This is not assisted by a lack of clear policy direction on when an ‘avoid’ and when a ‘mitigate’ approach should be applied, leading to different interpretations of what these approaches mean. This issue is further compounded by the fact that almost all subdivision, use and development activities on land are provided for as a permitted or restricted discretionary activity in the AUP, which does not clearly indicate when an ‘avoid’ approach is warranted.

These gaps are likely to limit the effectiveness and efficiency of the AUP in achieving the RPS objectives. It is recommended that further investigation is undertaken to incorporate the complexities of risk management into the AUP provisions and to provide clearer policy direction on how risk should be managed, and whether there is a preferred option for managing risk. The activity status for activities in areas subject to natural hazard risk should also be reviewed.

Zoning of land within natural hazard areas

The zone that applies to land indicates, through a statutory process, what is considered as the appropriate use and development for land. Although the zones are also subject to any Auckland-wide provisions, including Chapter E36, the zone inevitably establishes a development expectation for a site. As such, there is inevitably a contest between the presumed development potential provided for by the zone against any loss in potential required through the implementation of Auckland-wide provisions to avoid or mitigate a hazard risk. The issue identified is that by having the natural hazard provisions in the AUP sit independently of the zone does not ensure, or apply, a potential reduction in the anticipated development right yield set by the overarching zone, even when this may be warranted given the level of information already available on likely hazard risk.

The disconnect between the underlying zone and the relevant Auckland-wide provisions can limit the effectiveness of the AUP provisions in achieving the outcomes sought under the RPS and contributes to an issue identified relating to the perceived development potential of sites. It is recommended that further consideration be given to whether it is appropriate to better utilise zoning and/or other development control measures to manage this conflict.

Structure plans

Structure plans provide a critical opportunity to assess the risks to land from natural hazards as part of determining the appropriate form of urban development and establish the framework for subsequent plan changes to rezone land accordingly. The wording in Appendix 1 of the AUP does not appear to provide an appropriately strong directive to consider all the relevant information when assessing natural hazard risk and the effects of climate change and does not provide clear policy direction on when an ‘avoid’ approach is warranted. In addition, a weakness of the structure plan process is the lack of an AUP requirement that subsequent plan changes must be in accordance with an adopted structure plan. There is the potential for private plan changes to propose different land uses and negate the comprehensive analysis that has gone into a structure plan, including assessing hazard risk and the effects of urban development on risk.

Structure planning is an important tool in providing a blueprint for future urban development and improvements that will add to their effectiveness in achieving the RPS objectives should be investigated.

Lack of an AUP zone to apply to land that functions as ‘green infrastructure’

The zones in the AUP do not include a zone that can be applied to land which is intended to function as green infrastructure (i.e. land that remains undeveloped and unobstructed to provide space for overflows

of stormwater, flood waters and streams in storm events and/or for coastal erosion and coastal processes). In the absence of a 'green infrastructure' zone, one of the AUP Open Space zones is usually considered as the most appropriate zone to apply to land intended to function as green infrastructure. However, this creates a tension with the purpose, management and costs associated with an Open Space zone.

The lack of a AUP zone that can be applied to land intended 'green infrastructure' is considered a gap in and may limit the effectiveness of the AUP in achieving the RPS objectives. Further evaluation is recommended to determine whether a 'green infrastructure zone' is appropriate to be included in the AUP.

Identifying and managing activities within natural hazard areas

The provisions under the AUP generally require resource consent to be obtained when certain specified activities occur on land or within an area that is identified to be potentially subject to natural hazards. However, not all sites where a hazard risk assessment is warranted is identified due to limitations associated with the use of mapping and definitions as the identifiers. There are also differing interpretations on how the AUP provisions that relate to these identified areas are applied. For example, in some cases, the rules are deemed to apply only when the activity occurs within the identified area, and other cases the rules are deemed to apply if any part of the site that the activity is located on is within the identified area. In addition, it is noted that sometimes there may be risk to people even when the building or structure itself is not located in an identified natural hazard area.

These gaps mean that not all risks that should be assessed are being assessed through the current management framework. It is recommended to undertake further investigation into how natural hazard areas currently managed by the AUP have been identified and whether the AUP provisions should be broadened to enable risk assessments to be undertaken where required. It is also recommended to provide additional guidance to ensure that the relevant rules in the AUP are being applied consistently.

Consistency of assessments and quality of information

Under E36.9, the council requires applicants to provide appropriate technical assessments to support an application for an activity or development that may be subject to or exacerbate natural hazard risk. Council specialists largely rely on these technical assessments to undertake their review. An issue identified is that sometimes the information provided can be misleading or not entirely accurate, which then affects the ability for the AUP provisions to manage natural hazard risk as intended. Furthermore, not all matters that can and should be considered as part of the assessment have been addressed as part of a resource consent application, and there is always an argument that can be made by applicants to support their proposal given the various objectives and policies that are available to choose from.

It is recommended to continue to provide additional guidance on or strengthen the special information requirements under E36.9 and investigate the clarity and directiveness of the relevant rules, objectives and policies to focus on the most relevant and important considerations.

Impact of existing development on hazard risk management

Existing development, particularly where established prior to the AUP, can add complexity to how risk from natural hazards is managed. There is a lack of clear policy direction for scenarios where it involves existing development that no longer avoids or mitigates hazard risk to the extent required by the AUP. As a result, there are varied outcomes in the assessments undertaken for these scenarios.

Further investigation is recommended to understand the accepted risk level associated with existing development, and redevelopment, and what policy direction should be adopted for in these situations.

Differentiation in risk tolerance

The AUP uses the terms ‘habitable room’, ‘non-habitable room’, ‘more vulnerable’ and ‘less vulnerable’ as a method to manage risk. Although these enable focus on activities that are inherently more sensitive to risk from natural hazards, it is noted that there is no such differentiation in Chapter B10.2, where any risk, regardless of type of land use activity, should be avoided or not increased depending on the situation. As such, the Chapter E36 framework of having less onerous provisions applying to less sensitive activities may not actually achieve the overall outcomes sought under the objectives under B10.2. In addition, there is confusion as to how use and development that involves both types of activities should be assessed.

Further evaluation into the use of this approach is recommended to determine whether it aligns with the RPS outcomes. Additional guidance or policy direction should also be provided for situations where both ‘vulnerable’ and ‘less vulnerable’ activities are involved.

Implementing a precautionary approach

The term ‘precautionary approach’ is used in Policy B10.2.2(6) but is not referenced in Chapter E36. There is also no definition of what this term means, nor is it clear, based on the current policy and zoning framework, how the AUP supports this policy. It is recommended that this term be clarified, and further evaluation is undertaken on how the AUP achieves Policy B10.2.2(6), including how this could be reflected in the policy framework, rule/activity status and zoning.

Risk from multiple hazards

The AUP lacks direction on the management of risk from cascading and coincidental hazards. There does not appear to be a clear directive to consider risk associated with multiple hazard events occurring at the same time. This is particularly relevant as the impact of climate change on the magnitude, frequency and intensity of natural hazard events are not very well understood.

It is recommended to undertake further investigation into how risk from multiple hazards is managed and whether the AUP provisions should indicate that a precautionary approach should apply in these scenarios.

Duration and timeframes for consents

While duration of consent is a matter that can be considered under Policy E36.3(3), there is no policy guidance on when this would be applicable. Limiting duration is particularly important as an assessment of risk is done at the time consent is sought but risk may change over time. There is also a lack of policy direction in the AUP to clarify when a review condition is warranted and should be imposed.

This lack of policy guidance is likely to limit the full potential of the AUP provisions in achieving the RPS objectives. The provision of further policy direction is recommended on the appropriateness of limiting the duration of consents and the imposition of review conditions as a mechanism to manage risk.

Permitted activities

There are several activities in identified natural hazard areas that are provided for as permitted activities under Chapter E36. The issue identified is that there is limited scope to consider all relevant matters that may need to be considered as a permitted activity. There is no ability to take an ‘avoid’ approach where it may be warranted, but instead suggests an automatic mitigate or remediation approach.

It is recommended that further investigation be undertaken into whether a permitted activity status is appropriate for managing risk from natural hazards given the changing nature of risk and the outcomes sought under the objectives and policies both under the RPS and under Chapter E36.

Hazard-specific AUP provisions

Coastal storm inundation

- The AUP planning maps includes a mapping layer for 'Coastal storm inundation 1 per cent AEP plus 1m sea level rise control'. As a statutory layer that cannot be easily updated, it is no longer accurate and does not reflect the mapping found in GeoMaps, which has since been updated to reflect latest modelling. It is recommended that this statutory mapping layer is removed to avoid confusion.
- Based on the consents reviewed, the management of risk for coastal storm inundation is primarily focused on ensuring developments achieve adequate finished floor levels, and/or using engineering solutions to reduce the impact of a coastal storm event. There has been a lack of clear guidance on freeboard allowances for coastal flooding above the modelled water levels to accommodate other factors that should be considered such as wave-run up and wave overtopping. Additional guidance has been in the process of being prepared and implemented, which will improve the efficiency and effectiveness of the relevant AUP provisions. However, consent applications that have been assessed up until this point would have potentially been granted without this guidance information available and therefore may not have been sufficiently designed to mitigate potential risk.
- Guidance on design criteria is provided through supporting documentation. These sit outside of the AUP and the AUP provisions do not reflect the need for these documents to be considered. Consideration should be given to whether it would be appropriate to specify clearer provisions and design requirements to address coastal inundation risk through the provisions in the AUP.

Coastal erosion

- There is no mapping of land affected by coastal erosion and the determination on whether the rules apply rely on the definition of '*coastal erosion hazard area*'. Several issues were identified with relying on this definition to implement the rules including how the definition does not capture all land that may be at risk and how it is unclear if the definition applies to land that lies between MHWS and a cliff top. This hinders on the effectiveness of the AUP in addressing this risk. It is recommended that the definition is revisited but it is noted that a future plan change that links the AUP provisions with the latest coastal erosion and instability mapping is likely to resolve this issue.
- Reliance only on the definition without any mapping means that consent requirements relating to subdivision, use and development within the coastal erosion hazard area are not always identified and appropriately assessed. This has significant impacts on the ability for the AUP in achieving the outcomes sought under the RPS. It is recommended to improve plan users' awareness of what coastal erosion is, what matters should be considered, and how it should be assessed appropriately. This again may be partly resolved by the future plan change.
- Based on the consents reviewed where potential coastal erosion risk has been correctly identified, management of risk for coastal erosion appears to be primarily dependent on ensuring developments are appropriately avoid the risk or ensuring that that the features proposed are relocatable if the land does recede. It has also been observed that reliance on existing hard protection structures is also a common response.

Flooding

- There are some issues with the flooding related definitions in Chapter J of the AUP. These include the abbreviation of 'ARI', the definition of 'annual exceedance probability' and the note attached to the 'floodplain' definition. It is recommended that these errors are corrected.

- The mapping layers in GeoMaps for floodplains and overland flow paths are indicative only. This can be an issue in certain scenarios where an assessment of flood risk may not be picked up in some instances as the exact extent of the floodplain or overland flow path is not immediately clear, particularly as the overland flow paths are shown as lines in the mapping and does not signal the width of the affected catchment along different sections of the flow path. In addition, changes to floodplains and overland flow paths resulting from land modification during the development process is not always reflected in the GIS mapping, especially immediately following new subdivision. Further review should be undertaken to improve mapping accuracy where possible and to ensure that the relevant AUP provisions accommodate known mapping limitations.
- Based on the consents reviewed, the risk from flooding is commonly managed by ensuring development is outside of the floodplain or using engineering solutions that include minimum floor levels for buildings and ensuring that floodplains and overland flow paths are not obstructed. Engineering solutions can be an acceptable to maintain the functioning of floodplains and overland flow paths, provided a suitably robust assessment has been undertaken. However, locating outside of a floodplain or overland flow path is the preferred approach. Potential gaps identified as affecting the effectiveness of the AUP include the lack of a standard minimum freeboard requirement in the AUP, the lack of awareness and understanding of the purpose of the different flooding-related provisions, the lack of rules that apply to 'flood prone areas' and 'flood sensitive areas', and the potential impact of permitted activities on flood risk. It is recommended to improve awareness of the relevant flooding-related provisions and undertake further investigation into these gaps to identify the extent of each issue and possible solutions.

Land instability

- There is no consistent mapping of land that falls within the definition of 'land which may be subject to land instability' and as a result, the determination on whether the rules apply mainly rely on this definition. Several issues were identified with the definition including the fact that it does not capture all the sites that may be subject to land instability, that it does not include reference to other mapping or information available that may indicate a site's susceptibility to land instability, and that it does not clarify how slope gradient is measured. This then results in an inconsistent approach of how sites that may be subject to this risk have been identified. It is recommended that these gaps are addressed, and that further investigation is undertaken to improve how land which may be subject to this risk can be identified, including the creation of a specific mapping layer.
- Relevant rules in Chapter E36 relating to land instability are not being applied consistently as activities can be considered both a permitted and a restricted discretionary activity. While both enable an appropriate assessment of risk to be undertaken, this does have implications on how the AUP can be monitored and is an impediment for evaluating the effectiveness and efficiency of the AUP. Additional guidance should be provided to ensure consistent application of these provisions.
- An identified trend is for a focus on engineering structures as solutions to address the risk from land instability. However, issues identified include whether all the relevant matters that should be considered have been considered, how these structures are maintained over their intended lifespan, and the lifespan for which these structures are designed. These hinder the ability for the AUP provisions to effectively manage land instability risk. It is recommended to investigate these issues further and to ensure that more robust assessments are undertaken on what should be considered and how engineering structures should be designed and maintained.

Wildfire

- There is no definition or AUP maps that identify land that may be a risk from wildfires. There are also no rules that directly relate to avoiding or mitigating the risk from wildfires. The only relevant rules relate to vegetation alteration and removal or water supply for firefighting purposes. While there are policies that relate to addressing wildfire risk, there appears to be a lack of opportunity for this to be considered. There is also a lack of direction on how wildfire risk should be assessed. Given the increasing drought conditions anticipated with climate change, this gap limits the effectiveness of the AUP in achieving the RPS objectives. Further investigation should be undertaken on the need for the AUP to take a more risk management rather than risk mitigation approach to wildfire risk.

Other AUP provisions

Subdivision in natural hazard areas

- Chapters E38 and E39 are complex and contain several different rules, some which overlap. This can cause confusion for plan users, who may not be aware of all the natural hazard related rules that may apply. In addition, the rules themselves are being applied inconsistently. These impact on the ability of the AUP to operate as intended and cause complications with monitoring the effectiveness and efficiency of these provisions. It is recommended to provide additional awareness and guidance to assist with their implementation and interpretation.
- The consequences and impact of subdivision of land that is within one or more natural hazard areas do not appear to be fully appreciated, with consent data review indicating that emphasis appears to focus more on the land use component for joint land use subdivision consent applications. A similar trend was observed in relation to vacant lot subdivision where the assessment of risk is largely deferred until a future land use consent. This outcome may be influenced by the current AUP assessment framework, the lack of a direct mechanism to ensure that future development following subdivision avoids the natural hazard area where possible, and the need for a stronger directive to consider future risk generated by the development opportunities created by the establishment of a new site in a natural hazard area. Further analysis should be undertaken with regards to the relevant subdivision standards and assessment criteria and whether any amendments are required to better achieve the outcomes sought under the RPS.
- A method to manage natural hazard risk is to impose conditions and consent notices to ensure that only the development that has been assessed as part of the resource consent can be established on newly created sites. However, this method may no longer be utilised, which then compromises the risk assessment framework. It is recommended that this matter is investigated further.

Esplanade reserves and strips

- Esplanade reserves and strips play an important role in mitigating the risk from hazards, however, this role does not appear to always be considered when assessing applications for applications for esplanade reserves or for reductions and waivers. This is likely due to the wording of the relevant policies, matters of discretion and assessment criteria. It is recommended to strengthen the AUP provisions to ensure that this role is appropriately considered.
- Development that precedes subdivision can limit the ability for a 20-metre-wide esplanade reserve or strip to be provided at subdivision stage as the current riparian and coastal yard requirements at land use stage are usually a lesser width. Further investigation should be undertaken to understand the extent of this issue and how this disconnect can be resolved.

Hard protection structures

- The assessment of applications relating to hard protection structures appears to be inconsistent as not all matters that should be assessed are considered. Furthermore, an identified issue is that there appears to be a lack of consideration for these structures, particularly those located on land, to be maintained properly or for the integrity of these structures to be reviewed regularly during their lifespan. This compromises their ability to manage risk as they may not be as effective as intended as time goes by. It is recommended that additional guidance is provided on what should be assessed for hard protection structures and how conditions should be utilised to ensure that these structures are maintained and reviewed regularly.
- The review of resource consents suggests that there may be a gap with regards to retrospective applications for hard protection structures. The focus in assessments appear to be on the fact that structure already being in place to manage the risk, and that it is not practical to consider alternatives or replace the structure with a more natural mitigation method. This can undermine the intent of the objectives and policies of the RPS to rely less on hard protection structures where possible. The scale of this issue should be canvassed through additional investigation.

Coastal protection yards and riparian yards

- The role of coastal protection yards and riparian yards in natural hazard risk management is outlined in the purpose statement for these standards. However, there is a lack of objectives and policies that directly recognise this role. There is also no link between these provisions and Chapter E36. It is recommended to amend the AUP to include objectives and/or policies that provide a clearer policy cascade for these provisions.

Vegetation alteration or removal

- The rules under Chapter E15 primarily rely on a feature to identify land where vegetation removal or alteration may have an impact on natural hazard mitigation or exacerbation of natural hazard risk. However, not all vegetation that plays a role in natural hazard risk management may be covered by these provisions. Additional investigation should be undertaken to determine whether additional areas or criteria should be identified in the AUP.
- There is a disconnect between the objectives and policies in Chapter E15 as it relates to the role of vegetation in natural hazard risk management. There is also currently no link between Chapters E15 and E36. It is recommended to consider amending the AUP to establish a clearer and linked policy framework.

Natural hazards and the Building Act 2004

- There are potentially gaps resulting from the differences between the requirements under the Building Act and the AUP, particularly in relation to the different timeframes involved and the hazard parameters that apply. These differences may reduce the overall effectiveness and efficiency in the AUP provisions in achieving the RPS outcomes. It is recommended that further investigation is undertaken on this matter and identify how the different timeframes that apply under the Building Act (or Code) is aligned with or is contradictory to the AUP and RMA requirements.

Summary

Where is the plan performing well?

- The reliance on mapping layers that sit outside of the AUP maps to identify natural hazard risk. These maps can be regularly updated to reflect the most up to date modelled scenarios for risk without the need for a plan change that would be required if they were statutory AUP planning maps. This provides plan users with the most up to date information on risk that the council has.
- The requirement for a site-specific analysis to confirm the actual extent of risk on an individual property. All the natural hazard mapping layers are indicative only, and the site-specific assessment allows a better focussed understanding of the level of risk present and how risk associated with development on the site should be avoided, remedied or mitigated.
- Despite some gaps in the understanding of the requirements, the existing assessment framework in the AUP broadly provides sufficient scope that all the matters that should be considered at risk assessment stage can be considered.

Where is the plan underperforming?

- Some of the issues identified relate to the implementation of the provisions in the AUP. Although there is scope for assessment, this is not always understood or utilised appropriately by plan users.
- The static nature of the AUP means that a plan change is required to make any adjustments to the text of the Plan. As such, parts of the Plan can become out-of-date. This does not work well given the dynamic nature of natural hazard risk management and climate change predictions.
- There are some gaps with the mechanics of the Plan, such as a lack of clear guidance on design criteria, a lack of a suitable zone for green infrastructure purposes, and unclear links between different chapters. Some of these gaps are filled via alternative methods, such as codes of practices and guidance notes. While these have their own benefits, they do not have statutory weight.

What are the most significant matters limiting the effectiveness of the AUP?

- The provisions in the AUP do not fully reflect the complexity of risk management. This has the potential to lead to outcomes that may not fully align with what the RPS seeks to achieve, particularly as it also makes it difficult to determine whether risk is being created or being increased in a particular scenario.
- There is a lack of a clear framework that identifies the circumstances where a precautionary approach of avoidance, as opposed to just mitigation, would be the most appropriate management method. Most activities in natural hazard areas are provided for as permitted or restricted discretionary activities despite the varying extent of risk or cumulative risk, particularly as a result from coincidental or cascading hazards. The relevant Auckland-wide provisions also sit independently of the underlying zones and results in an inherent tension between the two sets of provisions. A clearer policy, zoning and rule framework based on the understanding of hazard risk and effects of climate change would help strengthen the effectiveness of the AUP in avoiding increasing risk, or creating new risk, in areas subject to the greatest natural hazard risk.
- There are gaps in how the AUP manages activities in areas subject to natural hazard risk. For example, there are currently no provisions that address 'flood prone areas' or areas that may be subject to wildfire risk, and some of the definitions and criteria currently used to enable a risk assessment do not encompass all areas that should warrant an assessment.

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Abbreviations in this report include:

Abbreviation	Meaning
AUP	Auckland Unitary Plan Operative in Part
the council	Auckland Council
RMA	Resource Management Act 1991
RPS	Regional Policy Statement
resource consents database	Plans and Places resource consent decision tracking database
compliance database	Resource consent compliance and monitoring database
building consents database	Building consent decisions database
AT	Auckland Transport
Watercare	Watercare Services Limited
CCO	council-controlled organisation
ACP	Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan
NZCPS	New Zealand Coastal Policy Statement 2010
AEP	Annual Exceedance Probability
MHWS	Mean high water springs
MfE	Ministry for the Environment
LGNZ	Local Government New Zealand

1.0 Introduction

This report considers how effective and efficient the objectives, policies, rules and other methods of the AUP have been in meeting the outcomes intended by the Regional Policy Statement – Chapter B10.2 Natural hazards and climate change. The monitoring is in accordance with 35(2)(b) of the RMA.

Section 35(2)(b) specifies that monitoring results are published every five years. The AUP became operative in part in November 2016 and will have been operative in part for five years in November 2021.

The findings seek to tell a story of what the AUP is achieving and where challenges may be. With monitoring being a key link in the policy development lifecycle, the data can also provide the evidence base for taking appropriate action where necessary.

The terms ‘effectiveness’ and ‘efficiency’ are not explicitly defined in the RMA. For the purposes of this monitoring report the terms are generally interpreted as¹:

Effectiveness is the contribution that the provisions make towards achieving the objective, and how successful they are likely to be in solving the problem they were designed to address when compared with alternatives. The difficulty when assessing effectiveness is to be able to answer the question ‘how do we know that implementing the policy, rule or method led or contributed to the outcome?’

Efficiency is an assessment of whether the provisions will be likely to achieve the objectives at the lowest total cost to all, or achieves the highest net benefit relative to cost to all.

The steps undertaken in this monitoring work are briefly summarised in Figure 1.

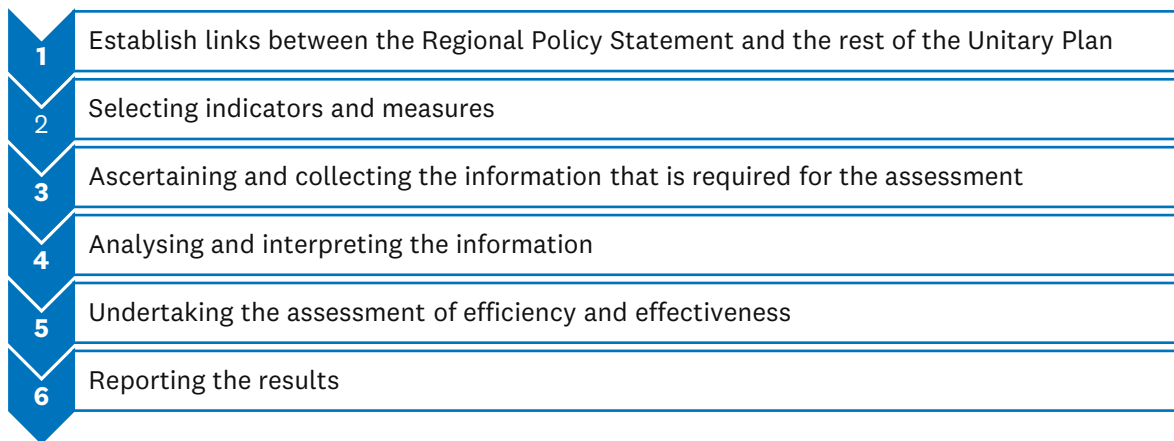


Figure 1 Steps in the monitoring process

¹ Auckland Unitary Plan Monitoring Strategy (2018).

2.0 Background

2.1 Legislation and policy documents that applies to natural hazard management

In assessing the efficiency and effectiveness of the AUP provisions for the purposes of s35(2)(b), it is necessary to understand the different legislation that applies to managing the risks from natural hazards and their relationship with the matters controlled under Resource Management Act 1991 (RMA) through the AUP.

A summary of the relevant legislation and policy documents, and their role in managing the risks from natural hazards is provided below. It is noted that in some cases there is a degree of overlap between different legislation and policy documents in managing hazard risk. These overlaps are discussed in the analysis section of the report.

2.1.1 Resource Management Act 1991 (RMA)

Definition of natural hazards

Section 2(1) RMA defines a natural hazard as:

natural hazard means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment

Functions of council under RMA sections 30 and 31

The AUP provisions are based on the RMA requirement to control of the use of land for the purpose of avoidance or mitigation of natural hazards as a function of both a regional council under s30, and a district council under s31, as outlined below.

A function of regional councils, as stated in s30(1)(iv), is to:

control the use of land for the purpose of the avoidance or mitigation of natural hazards

For any coastal marine area, s30(d)(v) states regional councils, in conjunction with the Minister of Conservation, have the function to control:

any actual or potential effects of the use, development, or protection of land, including the avoidance or mitigation of natural hazards

In relation to any bed of a water body, under s30(g)(iv) 'control'... for the purpose of:

The avoidance or mitigation of natural hazards

A function of district councils under s31(1)(b)(i) is:

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

Consideration of climate change

Pursuant to s7(i) of the RMA the AUP provisions are required to ‘have particular regard to’ the effects of climate change, along with a number of other matters:

7 Other matters

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to -

a) kaitiakitanga:

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources:

(ba) the efficiency of the end use of energy:

(c) the maintenance and enhancement of amenity values:

(d) intrinsic values of ecosystems:

(e)[Repealed]

(f) maintenance and enhancement of the quality of the environment:

(g) any finite characteristics of natural and physical resources:

(h) the protection of the habitat of trout and salmon:

(i) the effects of climate change:

(j) the benefits to be derived from the use and development of renewable energy.

Esplanade Reserves

s229-s237H of the RMA cover the legislative requirements relating to the creation and vesting of esplanade reserves. As outlined in s229, esplanade reserves have a role in mitigating natural hazards, along with a number of other purposes:

229 Purposes of esplanade reserves and esplanade strips

An esplanade reserve or an esplanade strip has 1 or more of the following purposes:

(a) to contribute to the protection of conservation values by, in particular,—

(i) maintaining or enhancing the natural functioning of the adjacent sea, river, or lake; or

(ii) maintaining or enhancing water quality; or

(iii) maintaining or enhancing aquatic habitats; or

*(iv) protecting the natural values associated with the esplanade reserve or esplanade strip
or*

(v) mitigating natural hazards; or

(b) to enable public access to or along any sea, river, or lake; or

(c) to enable public recreational use of the esplanade reserve or esplanade strip and adjacent sea, river, or lake, where the use is compatible with conservation values.

These provisions are discussed in more detail in [Section 4.4.2 Esplanade reserves and strips](#) of this report.

Amendments to RMA after the AUP became operative

The following changes to the RMA, that are relevant to the management of the risk from natural hazards, were introduced after the AUP became operative in part in November 2016.

Amendment to section 6: matters of national importance

The RMA was amended in April 2017 to include as a matter of national importance in section 6:

(h) the management of significant risks from natural hazards.

This change elevated the control of land to manage the significant risks from natural hazards to a matter of national importance that all persons exercising functions and powers shall ‘recognise and provide for’.

Amendment to section 106: subdivision

Under s106 of the RMA, the council is responsible for managing the significant risk from natural hazards when providing for the subdivision of land. An assessment against s106 is required for all subdivision consents. Section 106(1) was amended in October 2017.

Section 106 was amended to state that:

(1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that –

(a) there is a significant risk from natural hazards; or

(b) (repealed)

(c) sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision.

Section 106 (1A) (a) to (c) was inserted and contains the matters that need to be considered for the purposes of s106 (1)(a), namely:

(1A) For the purpose of subsection (1)(a), an assessment of the risk from natural hazards requires a combined assessment of:

(a) the likelihood of natural hazards occurring (whether individually or in combination); and

(b) the material damage to land in respect of which the consent is sought, other land, or structures that would result from natural hazards; and

(c) any likely subsequent use of the land in respect of which the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in paragraph (b)

There were no changes to the AUP text as a result of the above amendments.

Resource management reform

In February 2021, the New Zealand Government announced that it would repeal the Resource Management Act 1991 (RMA), replacing it with three new Acts:

- Natural and Built Environments Act
- Strategic Planning Act

- Climate Change Adaptation Act

The replacement of the RMA with these three Acts is anticipated to elevate the consideration of climate change in planning documents from the status of a s7 RMA matter and provide further direction in terms of natural hazard and climate change risk management.

2.1.2 New Zealand Coastal Policy Statement 2010 (NZCPS)

Regional policy statements, regional plans and district plans must give effect to the NZCPS (Sections 62(3), 67(3)(b), 75(3)(b) of the RMA). Resource consent processes must have regard to the NZCPS.

The NZCPS objectives and policies apply to land that lies within the coastal environment, which includes land both above and below mean high water springs (MHWS). The NZCPS includes an objective and a number of directive policies for managing the risk from coastal hazards, as outlined below.

Objective 5 applies to the management of the risk from coastal hazards:

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*

This objective is supported by a number of policies². Those that are particularly relevant to coastal hazards include:

- Policy 3 Precautionary approach
- Policy 4(c)(iii) Integration
- Policy 7 Strategic planning
- Policy 24 Identification of coastal hazards
- Policy 25 Subdivision, use and development in areas of coastal hazard risk
- Policy 26 Natural defences against coastal hazards
- Policy 27 Strategies for protection significant existing development from coastal hazard risk.

A summary of the key directives of the NZCPS that apply in managing the risk from coastal hazards are:

Identifying areas potentially affected by coastal hazards, particularly those at high risk, and to avoid subdivision, use and development where it will increase risk

- That areas at risk be identified, particularly those at high risk, and that new development be located away from areas at risk. (Objective 5, Policy 24 and Policy 25)
- That hazard risk be identified for over at least 100 years, taking into account, amongst a number of matters, the cumulative effects of sea level rise, storm surge and wave height under storm conditions and the effects of climate change (Policy 24)

² The New Zealand Coastal Policy Statement 2010 can be found in full in the following link:

<https://www.doc.govt.nz/globalassets/documents/conservation/marine-and-coastal/coastal-management/nz-coastal-policy-statement-2010.pdf>

Identifying areas where subdivision, use and development is inappropriate

- That plans identify areas where particular activities or subdivision, use and development are inappropriate, or may be appropriate through an assessment of effects through a resource consent. (Policy 4(c)(iii) and 7)

Avoid increasing risk of effects from coastal hazards

- That redevelopment or change in land use that increases risk be avoided, and to encourage risk reduction through managed retreat, designing for buildings and structures to be relocatable and discouraging hard protection structures. (Objective 5 and Policy 25)

Strategies for protecting existing development from coastal hazards

- That a range of risk reduction options be assessed that support the use of natural defences and focus on reducing the need for hard protection structures and engineering interventions. If hard protection structures are considered necessary to protect private assets they should not be located on public land unless there is a significant public or environmental benefit. (Policies 26 and 27)

Precautionary approach

- That a precautionary approach be taken to effects from climate change to avoid loss and harm to communities and to maintain natural character, public access and other coastal values. (Policy 3)
- The NZCPS requires that national guidance and the best available information on the likely effects of climate change be used to assess coastal hazard risk. (Policy 24)

2.1.3 Auckland Plan

Auckland Plan 2012

Section 79 of the Local Government (Auckland Council) Act 2009 required council to prepare a spatial plan to provide a 20-to-30-year strategy for Auckland. The Auckland Plan was prepared and adopted in 2012 as Auckland's spatial plan. The AUP implemented the strategic direction of the Auckland Plan 2012.

The strategic guidance of the Auckland Plan for managing the risk from natural hazards and climate change that informed the development of AUP provisions included:

Priority 4 Build Resilience to natural hazards

Directive 7.14: Take account of environmental constraints as identified on Map 7.6 and Figure 7.1 when considering the location and nature of any future development

Directive 7.15: Avoid placing communities and critical infrastructure and lifeline utilities in locations at risk from natural hazards, unless the risks are manageable and acceptable.

Directive 8.2: Protect, enhance and increase Auckland's green infrastructure networks

Directive 8.5: Identify the opportunities and risks associated with climate change. Increase the resilience of Auckland's communities, natural resources and built environments and their ability to adapt to the impacts of climate change. Take a cautious, risk-based approach where there is uncertainty on the effects of climate change and monitor and adapt to environmental change over time.

Auckland Plan 2050

The Auckland Plan was reviewed in response to the rapid population growth and urban pressures facing Auckland. The Auckland Plan 2050 was adopted in 2018. The Auckland Plan 2050 recognises that Auckland is exposed to a range of climate change impacts, and that global and local records for rainfall and temperature are already being surpassed on a regular basis. While there is strong focus to reduce emissions, it recognises the increasing hazard risk associated with climate change and that this requires flexibility and adaptability in decisions.

The AUP was not amended in response to the Auckland Plan 2050.

2.1.4 Building Act 2004

Sections 71 to 73 of the Building Act apply to the construction of buildings and structures located on land subject to natural hazards. The performance requirements of the Building Code aim to ensure buildings and structures are designed to protect against certain hazards (ground shaking and flooding).

Section 71 (3) of the Building Act includes a different definition of natural hazard to the RMA and in relation to building on land subject to natural hazards, defines natural hazard as:

- (a) erosion (including coastal erosion, bank erosion, and sheet erosion)*
- (b) falling debris (including soil, rock, snow and ice)*
- (c) subsidence*
- (d) inundation (including flooding overland flow, storm surge, tidal effects and ponding)*
- (e) slippage.*

Section 71 applies to buildings on land subject to natural hazards:

- (1) A building 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*
- (2) Subsection (1) does not apply if the building consent authority is satisfied that adequate provision has been or will be made to—*
 - (a) protect the land, building work, or other property referred to in that subsection from the natural hazard or hazards; or*
 - (b) restore any damage to that land or other property as a result of the building work.*

Section 72 provides for building on land subject to natural hazards and states the following:

Despite section 71, a building consent authority that is a territorial authority must grant a building consent if the building consent authority considers that—

- (a) the building work to which an application for a building consent relates 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; and*

(b) the land is subject or is likely to be subject to 1 or more natural hazards; and

(c) it is reasonable to grant a waiver or modification of the building code in respect of the natural hazard concerned.

Sections 73 and 74 provide for a notice to be registered on a property title where a building consent has been granted identifying the natural hazard concerned.

Refer to [Section 4: Natural hazards and the Building Act 2004](#) for further discussion on the Building Act 2004 in Auckland.

Changes to the Building Code – liquefaction effects

Liquefaction is described in the Ministry of Business, Innovation & Employment Building Code compliance document³ as:

Liquefaction is a natural process where earthquake shaking increases the water pressure in the ground in some types of soil resulting in temporary loss of soil strength. Liquefaction can cause significant damage to land, buildings, infrastructure and the environment, as well as economic and social disruption. The three key factors (Figure 1) which influence whether liquefaction occurs and how severe the resulting ground damage are soil condition (material type and density), groundwater table depth and earthquake shaking (duration and intensity).

Liquefaction occurring beneath buildings and other structures can cause major damage during earthquakes. Although Auckland is a low-risk area for ground shaking relative to most of New Zealand, this hazard does exist in some areas.

In response to lessons from the Canterbury earthquakes, in November 2019, the Ministry of Business, Innovation and Employment (MBIE) advised all New Zealand councils to undertake hazard mapping to identify liquefaction-prone areas. MBIE advised that these regional hazard maps should be prepared in advance of changes to B1/AS1 (a Building Code compliance pathway) coming into effect on 29 November 2021.

To meet this requirement, maps have been developed that identify liquefaction vulnerability categories for Auckland. These are now available on GeoMaps under the ‘Development Restrictions’ and ‘Geology & Geotechnical’ layer. The maps provide a high-level identification of land assessed as being at liquefaction risk and where landowners can undertake further geotechnical investigation to determine the actual risk and the required building foundations.

Information related to liquefaction risk will be added to Land Information Memorandums (refer to the discussion below on LIMs). The mapping may also be used by external parties, such as insurance companies or potential buyers of properties, to assess hazard risk of properties.

2.1.5 Local Government Act 2002

Under Section 3 of the Local Government Act 2002, council has a broad role of managing natural hazard risk in promoting the social, economic, environmental, and cultural well-being of communities.

³ Ministry of Business, Innovation & Employment (2021). Building Code compliance: Geotechnical education: Ensuring new buildings can withstand liquefaction effects

2.1.6 Civil Defence Emergency Management Act 2002 (CDEM)

The risks from natural hazards are also managed under the Civil Defence Emergency Management Act 2002. The meaning of CDEM is set out in s4 of the CDEM Act as:

civil defence emergency management—

(a) means the application of knowledge, measures, and practices that—

(i) are necessary or desirable for the safety of the public or property; and

(ii) are designed to guard against, prevent, reduce, recover from, or overcome any hazard or harm or loss that may be associated with any emergency; and

(b) includes, without limitation, the planning, organisation, co-ordination, and implementation of those measures, knowledge, and practices

The purpose of the CDEM Act (in section 3 of the CDEM Act) describes how risk is to be managed:

(b) encourage and enable communities to achieve acceptable levels of risk (as that term is defined in this Act), including, without limitation,—

(i) identifying, assessing, and managing risks; and

(ii) consulting and communicating about risks; and

(iii) identifying and implementing cost-effective risk reduction; and

(iv) monitoring and reviewing the process; and

(c) provide for planning and preparation for emergencies and for response and recovery in the event of an emergency; and

(d) require local authorities to co-ordinate, through regional groups, planning, programmes, and activities related to civil defence emergency management across the areas of reduction, readiness, response, and recovery, and encourage co-operation and joint action within those regional groups; and

(e) provide a basis for the integration of national and local civil defence emergency management planning and activity through the alignment of local planning with a national strategy and national plan; and

(f) encourage the co-ordination of emergency management, planning, and activities related to civil defence emergency management across the wide range of agencies and organisations preventing or managing emergencies under this Act and the Acts listed in section 17(3).

It is noted that this legislation is also proposed to be undergo reform as in late 2020, the National Emergency Management Agency established a CDEM Act amendment project to undertake policy development and manage the process to develop a CDEM Amendment Bill. Refer to [Section 4.6.2 Non-regulatory plans and strategies](#) for further discussion on CDEM activities in Auckland.

2.2 Auckland Unitary Plan

2.2.1 Regional Policy Statement (RPS): Chapter B10.2 Natural hazards and climate change

Objectives

This s35(2)(b) assessment analyses the efficiency and effectiveness of achieving outcomes in the RPS objectives in B10.2.1:

B10.2.1 Objectives

- (1) Communities are more resilient to natural hazards and the effects of climate change*
- (2) The risks to people, property, infrastructure and the environment from natural hazards are not increased in existing developed areas*
- (3) New subdivision, use and development avoid the creation of new risks to people, property and infrastructure*
- (4) The effects of climate change on natural hazards, including effects on sea level rise and on the frequency and severity of storm events, is recognised and provided for*
- (5) The functions of natural systems, including floodplains, are protected from inappropriate subdivision, use and development*
- (6) The conveyance function of overland flow paths is maintained*

The intent of the objectives is that communities are made more resilient to natural hazards, through a range of both regulatory and non-regulatory methods, and that subdivision, use and development is controlled so that the risks to people and property are:

- not increased in existing developed areas, interpreted as ‘existing urban areas’ for this analysis (B10.2.1(2))
- avoided in providing for new subdivision, use and development (B10.2.1(3)).

In assessing natural hazard risks:

- the effects of climate change on natural hazards must be recognised and provided for (B10.2.1(4))
- the functions of natural systems, including floodplains, and overland flow paths are maintained and protected (B10.2.1(5) & (6))

Policies

Policies B10.2.2(1) to (13)⁴ provide direction on how these RPS objectives are to be achieved. These policies apply to all natural hazards, aside from policy B10.2.2(13) which applies specifically to coastal hazards. The policies are grouped under the following headings where more detailed policy guidance is provided:

⁴ Chapter B10.2 of the AUP can be found in full in the following link:

<https://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland%20Unitary%20Plan%20Operative/Chapter%20B%20RPS/B10%20Environmental%20risk.pdf>

Identification and risk assessment – Policies (1) to (6):

- That areas potentially affected by hazards be identified, particularly in the coastal environment
- That hazard risk assessments are part of structure planning and that the effects of climate change are taken into account in assessing risk
- That the best information available be used to assess risk over a 100-year timeframe for flooding and coastal hazards
- To manage subdivision, use and development taking into account the severity and combination of risk, the vulnerability of the activity and the cumulative effects of locating activities in areas at risk.
- The adoption of a precautionary approach where the effects and extent of climate change effects are uncertain but may be significant and the level of information on probability and effects is limited.

Management approaches – Policies (7) to (10):

- Avoiding or mitigating the effects of activities such as earthworks, changes to drainage or vegetation removal so the risk of natural hazards is not increased.
- That the location and scale of activities does not increase risks to people and property.
- Encouraging activities that reduce risk including by protection natural landform and through managed retreat, relocatable structures and providing for low density activities that are less vulnerable to effects.
- Encouraging redevelopment to reduce risks and ensure no new risks are created.

Role of natural systems – Policy (11)

- To strengthen natural systems such as floodplains, riparian and coastal margins in preference to using hard protection structures to mitigate risk.

Coastal hazards – Policy (13)

For areas potentially affected by coastal hazards over the next 100 years:

- Avoid changes in land use that will increase risk and do not increase the intensity of activities vulnerable to effects beyond what is provided for in the plan
- Minimise the risk to any redevelopment through the location and design.

2.2.2 AUP regional and district plan provisions

Several district plan chapters of the AUP contain objectives, policies and rules that manage subdivision, use and development to achieve the outcomes stated in the objectives of B10.2.1. Some of the regional coastal plan chapters of the AUP also apply.

A summary of the provisions of the chapters that relate to managing the risk from natural hazards and climate change is provided below.

Chapter E36 Natural hazards and flooding

Chapter E36⁵ contains most of the AUP provisions that manage land use and development to address the risk from natural hazards and climate change. These provisions play a key role in the effectiveness of the AUP in achieving the objectives in B10.2.1 and are the primary focus of this analysis. Chapter E36 specifies that the provisions in the AUP are focussed on the following hazards:

- flooding
- coastal storm inundation
- coastal erosion
- land instability
- wildfires

In summary, the objectives in E36.2 reflect a flexible risk-based approach to risk through controlling subdivision, use and development so that:

- subdivision, use and development outside urban areas is assessed, and significant adverse effects are avoided, taking into account the likely long-term effects of climate change (Objective 1)
- subdivision, use and development, including redevelopment in urban areas, does not increase risk overall, and where practicable risk is reduced taking into account the likely long-term effects of climate change. (Objective 2)
- subdivision, use and development on rural land for rural uses ensures risks from natural hazards are not increased, and where practicable are reduced. (Objective 3)
- where infrastructure has a functional or operational need to locate in a natural hazard area, significant adverse effects are sought to be first avoided or mitigated to the extent practicable if avoidance is not able to be totally achieved (Objective 4)
- subdivision, use and development are managed to safely maintain the conveyance function of floodplains and overland flowpaths (Objective 5)
- where appropriate, natural features and buffers are used in preference to hard protection structures to manage natural hazards. (Objective 6)

The policies in E36.3 outline the methods by which these objectives are to be achieved and the rules determine the activity status and assessment required for use and development in natural hazard areas.

The provisions that manage subdivision in natural hazard areas are included in Chapters E38 Subdivision – Urban and E39 Subdivision – Rural.

Chapter E12 Land disturbance

Chapter E12 includes general standards for site disturbance activities that have the potential to impact on natural hazard risk. These standards cover earthworks occurring in riparian and coastal protection yards and in overland flow paths and floodplains. They also cover risk of land instability on properties beyond the boundaries of the site where land disturbance occurs.

⁵ Chapter E36 of the AUP can be found in full in the following link:

<https://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland%20Unitary%20Plan%20Operative/Chapter%20E%20Auckland-wide/5.%20Environmental%20Risk/E36%20Natural%20hazards%20and%20flooding.pdf>

These general standards apply to site disturbance activities provided for as permitted, controlled, or restricted discretionary activities in this chapter.

Chapter E15 Vegetation management and biodiversity

Vegetation can contribute towards the mitigation of natural hazards through reducing the rate of erosion, enhancing stability, and slowing the rate and speed at which stormwater is discharged into waterbodies (where it can cause stream bank erosion and instability, and affect the speed and velocity of floodwaters).

Vegetation management can also play a role in mitigating wildfire risk.

The rules in Chapter E15 control vegetation alteration and removal within defined distances within the coastal and riparian environment for this purpose.

Chapter E26 Infrastructure

Chapter E26 outlines the specific provisions that apply to infrastructure. With respect to the management of natural hazard risk, the relevant provisions relate to land disturbance within floodplains and overland flow paths, and vegetation alteration or removal.

Chapter E38 Subdivision – Urban and Chapter E39 Subdivision – Rural

The provisions in these chapters manage natural hazard risk from subdivision within the urban and rural zones respectively. Both chapters have similar objectives.

For urban zones, objective E38.2(10)(a) and (c) and policy E38.3(2) state:

B38.2 Objectives

(10) Subdivision:

(a) within urban and serviced areas, does not increase the risks of adverse effects to people, property, infrastructure and the environment from natural hazards

(b) ...

(c) maintains the function of flood plains and overland flow paths to safely convey flood waters, while taking into account the likely long-term effects of climate change

B38.3 Policies

(2) Require subdivision to manage the risk of adverse effects resulting from natural hazards in accordance with the objectives and policies in E36 Natural hazards and flooding, and to provide safe and stable building platforms and vehicle access

For rural zones, objective E39.2(17)(a) and (c) and policy E39.3(2) state:

B39.2 Objectives

(17) Subdivision:

(a) outside of urban and serviced areas, does not increase the risks of adverse effects to people, property, infrastructure and the environment from natural hazards

(b) ...

(c) maintains the function of flood plains and overland flow paths to safely convey flood waters, while taking into account the likely long-term effects of climate change

B39.3 Policies

(2) Require subdivision to manage the risk of adverse effects resulting from natural hazards in accordance with the objectives and policies in E36 Natural hazards and flooding, and to provide safe and stable building platforms and vehicle access

These chapters include rules that relate to subdivision of land within natural hazard areas. They also contain rules relating to esplanade reserves and strips for subdivision of land adjoining the mark of mean high water springs, rivers or lakes.

Chapter F2 Coastal – General Coastal Marine Area zone

Chapter F2 manages the use and development in the coastal marine area. It contains provisions for hard protection structures located within the coastal marine area for the purpose of remedying or mitigating coastal hazards. This includes policies requiring evidence on:

- the degree of risk
- alternative options, including managed retreat or relocation of structures
- an integrated land-sea management approach, including stormwater discharges

This chapter also contains rules relating to deposition and disposal of material as well as mangrove removal in the coastal marine area. Deposition of material can assist in managing erosion, while mangroves can reduce coastal erosion by reducing wave and storm impacts on the coast.

Chapter H Zones: maximum impervious areas, coastal protection yards, and riparian yards

The coastal protection and riparian yards aim to set back buildings from the edge of streams and the coast, and to mitigate the risk from natural hazards. Standards limiting maximum impervious areas also manage the volume of stormwater being generated, and link to the management of flood risk.

2.3 Mapping

2.3.1 AUP Maps

The AUP planning maps form part of the AUP and have the same statutory effect as the other AUP provisions.

The AUP mapping maps identify, for any location or land parcel:

- the AUP zone or zones
- any relevant overlays or controls
- whether the site or location is part of a precinct
- whether land is subject to a designation

Figure 2 below illustrates an example of the AUP planning maps with the zone and all the different management layers enabled.

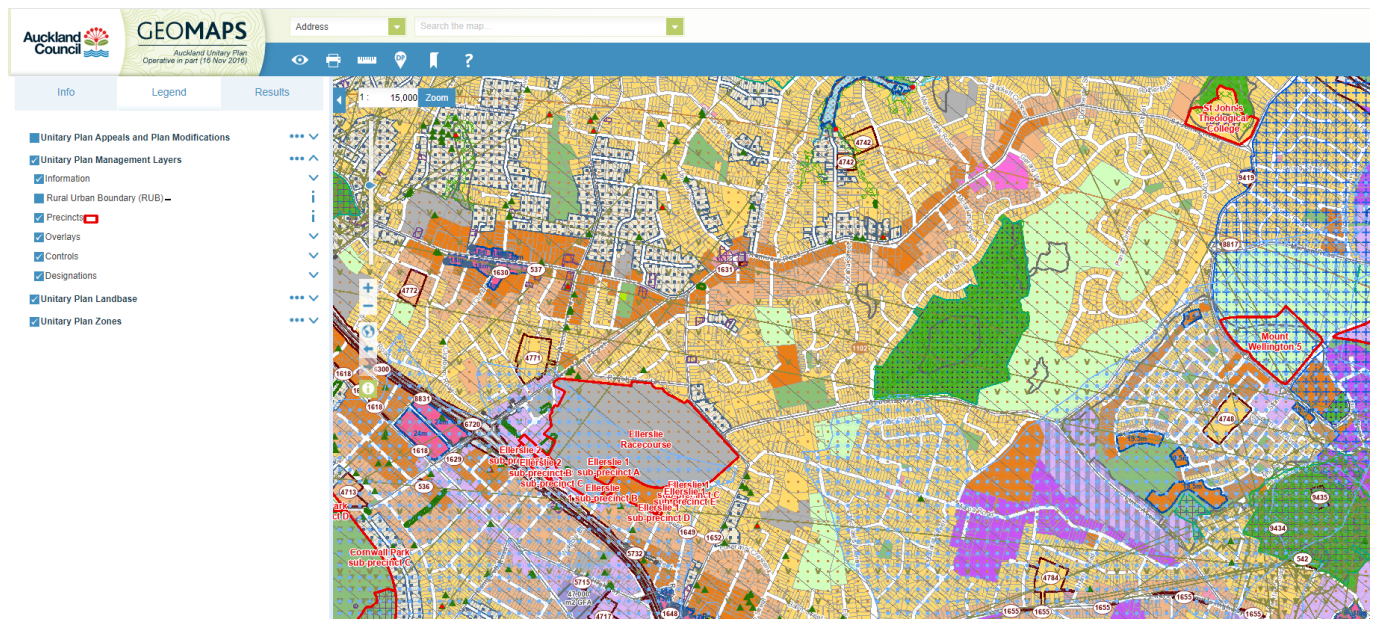


Figure 2: Auckland Council AUP planning maps

2.3.2 GeoMaps

The council's GIS viewer (GeoMaps) contains spatial and non-spatial data from across Auckland. The mapping information on GeoMaps is non-statutory. Although the GeoMaps spatial data can be added and viewed in the AUP planning maps portal, they do not form part of the AUP and do not have the status of statutory AUP planning maps.

GeoMaps includes geospatial mapping layers that show information relating to natural hazards in the region, including the hazards to which the rules in Chapter E36 apply.

The mapping of hazards on GeoMaps assists to inform the public about the spatial extent of potential natural hazards risk. This information is also used to provide information of hazard risk on Land Information Memorandums (LIMs) for property. There is an increasing need to record identified hazard risk for property as it can have implications for property insurance cover and premiums and on bank lending. Although these mapping layers are non-statutory, some do have a direct relationship with the AUP provisions, and this is discussed in more detail throughout this report.

There are two versions of GeoMaps available. GeoMaps (public) is readily accessible by the public, whereas GeoMaps (internal) shows additional information accessible only to council staff.

2.4 Auckland's risks from natural hazards and climate change

2.4.1 Auckland context

Auckland's coastal environment, topography, and location of historic development mean that a substantial number of public and private assets are in areas at risk of being affected by natural hazards. Impacts of natural hazards to Auckland include property and content damage, injuries or fatalities, disruption to local and regional infrastructure, damage to the natural environment and natural features, as well as short-term

and long-term economic loss and isolation of communities, particularly those in the outlying parts of the region. Climate change is increasing these risks.

Auckland is susceptible to a range of natural hazards. The natural hazards that are most likely to impact Auckland, and the level of risk that they each pose, is illustrated in Figure 3 below:

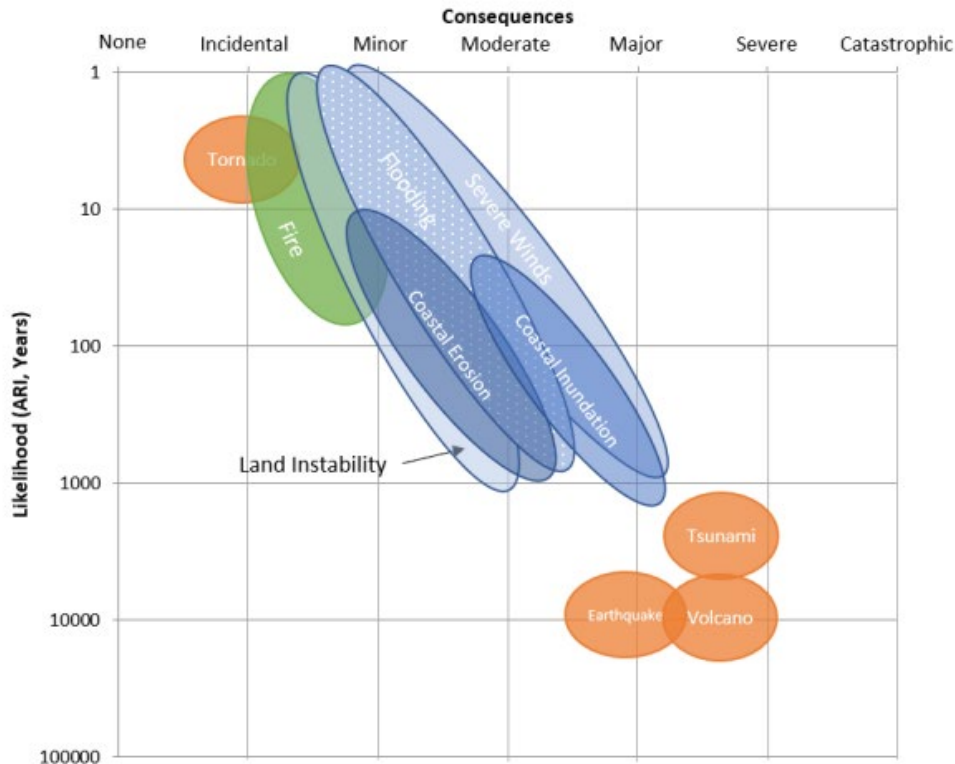


Figure 3: The likelihood and potential consequences of the 10 natural hazards most likely to impact Auckland. (Source: Howe, T, Roberts, R., Fung, J., Sinclair, S, Carpenter, N, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg. 8)

Auckland’s rapid population growth and demand for urban development has added pressure to develop in areas that are likely to be exposed to natural hazards. Managing urban growth without creating new risks, or increasing the existing risk, of adverse effects from natural hazards and climate change is a significant resource management issue for Auckland. The significance of this risk and the challenge it presents is recognised in the AUP Regional Policy Statement (B10.1 Issues):

Auckland’s growth will increase pressure to develop areas more susceptible to natural hazards. There may be conflict between where people want to live and where they can live safely, particularly in some coastal areas. Some existing development, including infrastructure, is already located on land that may be subject to natural hazards. This needs managing to ensure that the risk is not increased.

Climate is changing, in both the short and long term. This creates significant risks, (including exacerbating natural hazards), uncertainties and challenges for Auckland. How the region manages land use in response to climate change will determine the resilience of Auckland’s economy, environment, and communities in the future.

2.4.2 Flooding

Flooding occurs when there is an overflow of water that submerges land that is usually dry. Flooding may result from the overflow from waterbodies such as rivers and lakes, from stormwater runoff exceeding the capacity of stormwater drainage systems, or rainwater directly running across land.

Auckland Council's Natural Hazards Risk Management Action Plan describes Auckland's flooding risk:

Flooding is a relatively common occurrence in Auckland because of its location and topography. The consequences of flooding increase with the magnitude of the rainfall event and a 1:100-year (1 per cent AEP) event can affect people and damage property throughout the Auckland region, in vulnerable areas. More frequent and less severe flooding events can still result in potentially significant economic consequences, usually as the result of property damage, business closures and the temporary loss of infrastructure services, including loss of power⁶.

Auckland's topography mean that many areas are vulnerable to flooding. In low-lying coastal areas, flooding risk could be exacerbated if a flood event coincides with a high tide, particularly a 'spring tide'. Figure 4 (from GeoMaps) shows an example of the extent of floodplains in the southern portion of Auckland:

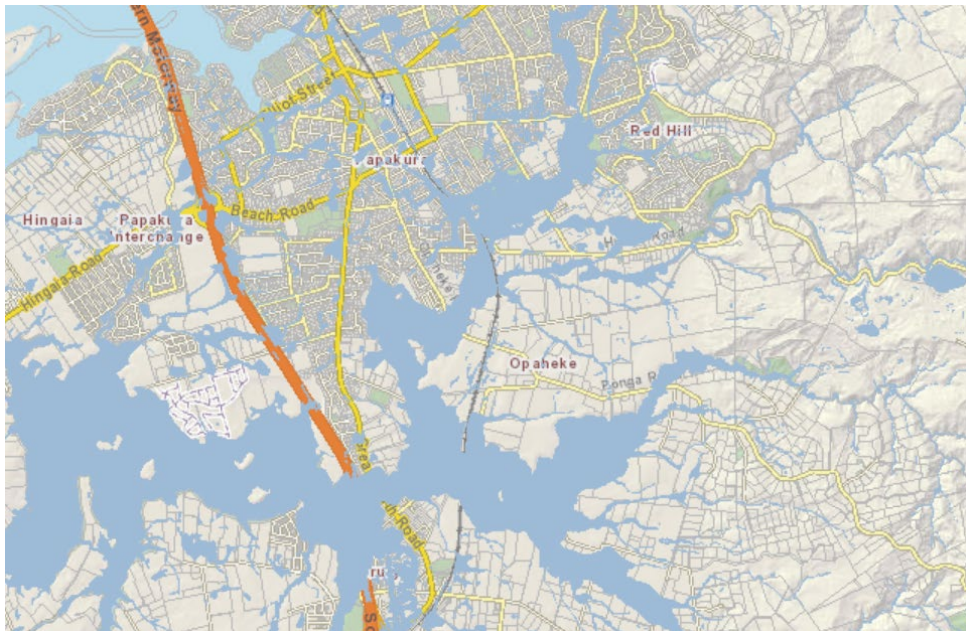


Figure 4: Auckland Council GeoMaps (public) – Floodplains – 1% AEP (blue)

It is estimated that almost one quarter (23 per cent) of Auckland's buildings are exposed to flood risk and that 16,000 are at risk of floor flooding in a 1 in 100-year (1 per cent AEP) rainfall event⁷. Climate change results in warmer temperatures, leading to more extreme storm events and increased rainfall depth and duration for rainfall events, and therefore increased flood risk.

⁶ Carpenter, N, Howe, T, Roberts, R, Fung, J, Sinclair, S, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg.11

⁷ Auckland Council. (2019). Climate Change Risks in Auckland (TR 2019/019), pg.33

2.4.3 Severe wind

Severe winds are caused by the movement of air from high pressure areas to low pressure areas and are a common occurrence in Auckland as the region is in the path of South Pacific's tropical cyclones⁸. While in most cases cyclones have lost most of their destructive power by the time they reach Auckland, cyclones at near full strength have affected the region in the past.

2.4.4 Volcanic activity

Auckland may be affected by both local volcanic activity as well as volcanic activity occurring in other parts of the country. Auckland's urban area is directly built on the Auckland Volcanic Field which means that any eruption may have significant impacts on the population.

Auckland Council's Natural Hazards Risk Management Action Plan describes Auckland's volcanic activity risk⁹:

It cannot be predicted when Auckland's volcanic field will become noticeably active again. Although New Zealand is a geologically active country, such events generally occur on a geological timescale, which far exceeds an average human lifespan. The field has a complex episodic eruption history with large variations in the eruption volumes and changes in the rate of eruptions over time, meaning that assessing eruption frequency is challenging. Gaps between eruptions have varied between 50 years and 10,000 years. The rate of volcanism in the Auckland Volcanic Field has increased since 60,000 years, suggesting that the field is still in its infancy and could accelerate further... However, a volcanic eruption in the Auckland field is likely to have significant consequences, regardless of when or how often it occurs. Because large-scale impacts are likely for any volcanic eruption, the potential rarity of such an event cannot reduce the overall risk.

2.4.5 Tsunami

A tsunami is a series of waves that are typically created by sudden movement of the ocean floor and can grow in size as it moves from deep water to shallow water. The waves do not only have considerable force but can also travel significant distances over land. Tsunamis can be generated from different locations and events, and can cause significant damage to Auckland, particularly those in the low-lying areas on the coast. Climate-change induced sea level rise increases tsunami risk.

2.4.6 Coastal hazards

Auckland is highly vulnerable to the impacts of both coastal erosion and coastal storm inundation and sea level rise. Auckland Council's Predicting Auckland's Exposure to Coastal Instability and Erosion technical report describes Auckland's risk from coastal hazards:

The Auckland region has over 3,200 km of coastline including three major harbours and a range of sandy beaches and dunes, rocky shores and cliffs, estuaries and offshore islands. As well as a long and diverse coastline, Auckland has the largest population density to coastline ratio in New Zealand, and as a result, we have a high exposure to coastal hazards. These hazards can present a

⁸ Carpenter, N, Howe, T, Roberts, R, Fung, J, Sinclair, S, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg.13

⁹ Carpenter, N, Howe, T, Roberts, R, Fung, J, Sinclair, S, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg.14

safety risk, adversely affect property and infrastructure, and damage or destroy cultural and environmental sites¹⁰.

Coastal storm inundation

Coastal storm inundation occurs when the sea floods low-lying coastal land as a result of a number of processes, including those that occur in combination, namely:

- high astronomical (during full and new moon) tides
- storm surge (low atmospheric pressure)
- wave height (wind direction and strength)
- ongoing sea-level rise



Figure 5: Overtopping between Mission Bay and Kohimarama Beach during Cyclone Ita in 2014 (Source: Auckland Transport, as referenced in Tonkin & Taylor Ltd (2019). Tamaki Drive Wave Overtopping Study, pg. 1)

Auckland Council's Natural Hazards Risk Management Action Plan describes Auckland's risk from coastal inundation:

Low-lying coastal areas are most at risk of coastal inundation. As Auckland has a very long coastline to land mass ratio, with much of it developed for commercial and residential use, there are many places that are at risk¹¹.

The risk of coastal inundation is increasing over time because of climate change induced sea-level rise arising from glacial and ice sheet melt and rising water temperatures. The risk is also exacerbated by increasing development in low-lying coastal areas¹². Research undertaken by council's Research and Evaluation Unit (RIMU) in 2019 in contribution to the Auckland Climate Action Plan concluded that

¹⁰ Roberts, R., N Carpenter and P Klinac. (2020). Predicting Auckland's exposure to coastal instability and erosion (Auckland Council technical report, TR2020/021), Auckland Council, pg.1

¹¹ Carpenter, N, Howe, T, Roberts, R, Fung, J, Sinclair, S, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg.19

¹² Roberts, R., N Carpenter and P Klinac. (2020). Auckland's exposure to coastal inundation by storm-tides and waves (Auckland Council technical report, TR2020/24), Auckland Council, pg.1

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approximately 1.5 per cent to 4.5 per cent of Auckland's land area could be exposed to coastal inundation, ranging from 0.25 to 3 metre rise in sea level¹³.



Figure 6: Coastal inundation from storm event in early 2018 at Hudsons Beach along Awhitu Peninsula (Source: Auckland Council, provided by local community)

The map below (from GeoMaps) shows an example of the modelled coastal storm inundation for 1 per cent AEP with 1 metre and 2 metre sea level rise scenarios in the Mission Bay area:

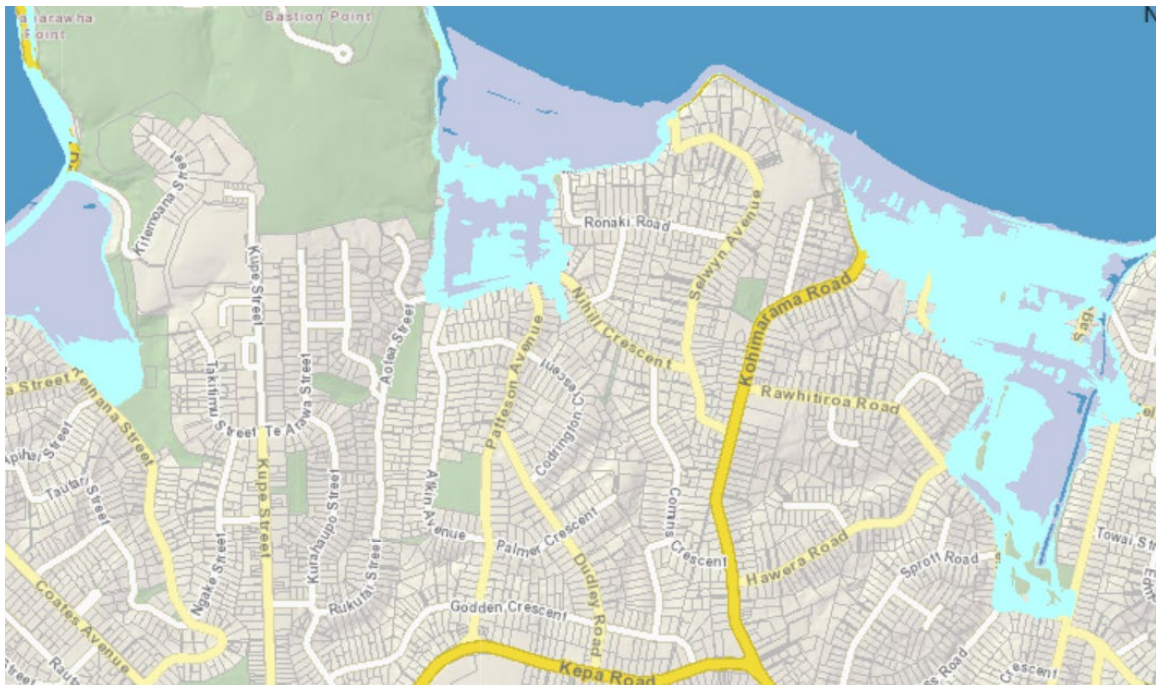


Figure 7: Auckland Council GeoMaps – ‘Coastal storm inundation 1% AEP + 1m sea level rise’ (grey blue) and ‘1% AEP + 2m sea level rise’ (light blue)

¹³ Golubiewski, N. E., K. Balderston, C. Hu and J. Boyle. (2019). Auckland's exposure to sea level rise: part 1 – regional inventory (Auckland Council technical report, TR2019/017), Auckland Council, pg. 7

Coastal erosion

Coastal erosion can potentially occur anywhere along Auckland’s coastal margin. While the erosion process is ongoing, significant erosion events are usually triggered by other natural hazard events, such as a severe storm.

Coastal erosion results from cliff and beach material being removed from the coastal edge and are a function of a range of factors including:

- the underlying geology
- the exposure to coastal processes, such as sediment supply, wave and storm surge
- rainfall events (including intensity of storm events as a result of climate change)
- sea-level rise (which also affects wave and storm surge).

Coastal erosion occurs on soft shores (beaches and dunes) and hard shores (including cliffs), where different factors will dominate the erosion process.



Figure 8: A typical Auckland East Coast cliff showing a recent repair to reinstate a footpath damaged by cliff instability (Source: Roberts, R., N Carpenter and P Klinac. (2020). Predicting Auckland’s exposure to coastal instability and erosion (Auckland Council technical report, TR2020/021), Auckland Council, pg. 6)

Climate change is predicted to increase the current rates of erosion around the coast, mainly as a result of sea-level rise and changes in the intensity and frequency of rainfall and storm events.



Figure 9: Coastal erosion at Stanmore Bay, Whangaparāoa following January 2018 storm events. The event lowered beach levels, exposing legacy buried rock and eroding the reserve edge (Source: Auckland Council)

2.4.7 Land instability

Most of Auckland is at moderate to high risk of land instability, depending on the slope and geotechnical properties of the underlying rocks and soils¹⁴. Land instability refers to land that is susceptible to landslides, subsidence or riverbank erosion. Slope (topography) and geology (underlying rock and soil) are the main factors that determine the risk of instability. More extreme weather, both from drought and storms, will increase the risk of land instability. Landslides can be triggered by a number of ways:

In Auckland, land instability is often prevalent in the soft soils and weak rock that are common across the region. Landslides can be triggered by heavy rainfall, earthquakes and human activity such as removal of trees and vegetation, steep roadside cuttings, leaking water pipes or a combination of these¹⁵.

Changes in groundwater levels as a result of sea level rise can result in the groundwater table rising and changing soil conditions, resulting in increased risk to land instability.

¹⁴ Carpenter, N, Howe, T, Roberts, R, Fung, J, Sinclair, S, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg.23

¹⁵ Ibid, pg.3



Figure 10: The Rawene Road landslide in Birkenhead, following a storm in 2017 (Source: Auckland Council)

2.4.8 Tornado

Tornadoes are violently rotating columns of air that make contact with the ground. They can occur anywhere and could last from a few minutes to a few hours. Tornadoes have occurred in various parts across the Auckland region in the past and have varied in the degree of damage they have caused. As such, it is not possible to determine any areas that are particularly vulnerable to this risk.

2.4.9 Wildfires

Uncontrolled wildfires can result in extensive loss or damage to people, property, agricultural resources, the environment, and infrastructure. Their spread and the damage they cause are influenced by a range of factors such as fire environment conditions, topography variations and vegetation types. The risk is increasing in the future, primarily because of the drought conditions and changes to rainfall patterns resulting from climate change producing dangerous fire weather situations. Auckland Civil Defence and Emergency Management Group Plan 2016-2021 identifies that wildfire risk, particularly rural wildfire risk, is a high priority risk for the Auckland region¹⁶.

¹⁶ Auckland Council. (2016). Auckland Civil Defence and Emergency Management Group Plan 2016 – 2021, pg. 59

A 2020 report commissioned by NIWA titled ‘Auckland Regional climate change projections and impacts’ concluded that¹⁷:

Key messages

- Fire risk is projected to increase in Auckland in the future due to increasing temperatures, lower rainfall and more drought
- A 10-30% increase in Seasonal Severity Rating is projected for Auckland in the mid and late 21st centuries compared to the historical period.
- An increase in the number of Very High and Extreme forest fire danger days is projected, with a 50-100% increase projected north of the Auckland isthmus and a 40-50% increase projected south of the isthmus by the end of the 21st century.
- Afforestation with exotic pine species may increase fire risk in Auckland.

2.4.10 Earthquakes

Earthquakes occur when there is an abrupt release of accumulated stress along a fault in the Earth’s crust. The likelihood of a severe earthquake occurring in Auckland is low because it is located approximately 300km from the nearest zone of high activity¹⁸. However, there are minor faults in the rural parts of the Auckland region.

2.4.11 Climate change

Effects of climate change

As outlined in the sections above, climate change has the potential to increase natural hazard risk. Examples of this include:

- increasing temperatures resulting in a warmer atmosphere that holds more water
- rainfall changes, including more extreme storm events and intense rainfall
- sea level rise determined by the effect of greenhouse gas emissions and rising temperatures on glacial and ice sheet melt.

The effects of climate change are already increasingly evident with the occurrence of more extreme heat, rainfall, and storm events. It is noted that climate change itself can also pose direct risks to people, property, and the environment. For example, extreme heat events can result in drought and heatwaves, while sea level rise can impact on groundwater tables and coastal areas.

There are a number of council, government, research, and international body (i.e. IPCC) reports that provide in-depth analysis on climate change and the likely consequences. There is also a level of uncertainty on the rate of change and the effects as climate change effects relate to emission reductions.

¹⁷ Pearce, P., Bell, R., Bostock, H., Carey-Smith, T., Collins, D., Fedaeff, N., Kachhara, A., Macara, G., Mullan, B., Paulik, R., Somervell, E., Sood, A., Tait, A., Wadhwa, S., Woolley, J.-M. (2020). Auckland Region climate change projections and impacts (Auckland Council Technical Report, TR2017/030-3). Revised September 2020. Prepared by the National Institute of Water and Atmospheric Research, NIWA, for Auckland Council, pg. 300

¹⁸ Carpenter, N, Howe, T, Roberts, R, Fung, J, Sinclair, S, Doherty, A, and Brown, N. (2021). Natural Hazards Risk Management Action Plan – Part 1, Auckland Council, pg.30

Climate change in the 2016 and AUP context

The provisions in the AUP relating to natural hazards and climate change were developed based on the best information and advice available at the time. This included a prediction of a 1m sea level rise over the 100-year timeframe based on available MfE and NIWA guidance.

Climate change in the post-2016 and post-AUP context

Information and studies regarding climate change have been constantly evolving since the adoption of the AUP in 2016.

In December 2017, the MfE released a guidance document for local government in relation to coastal hazards and climate change. This report outlined four scenarios of New Zealand-wide regional sea-level rise projections based on different greenhouse gas emission scenarios for sea level rise. Figure 11 shows the projected sea-level rise based on these four scenarios:

Figure 27: Four scenarios of New Zealand-wide regional sea-level rise projections for use with this guidance, with extensions to 2150 based on Kopp et al (2014)

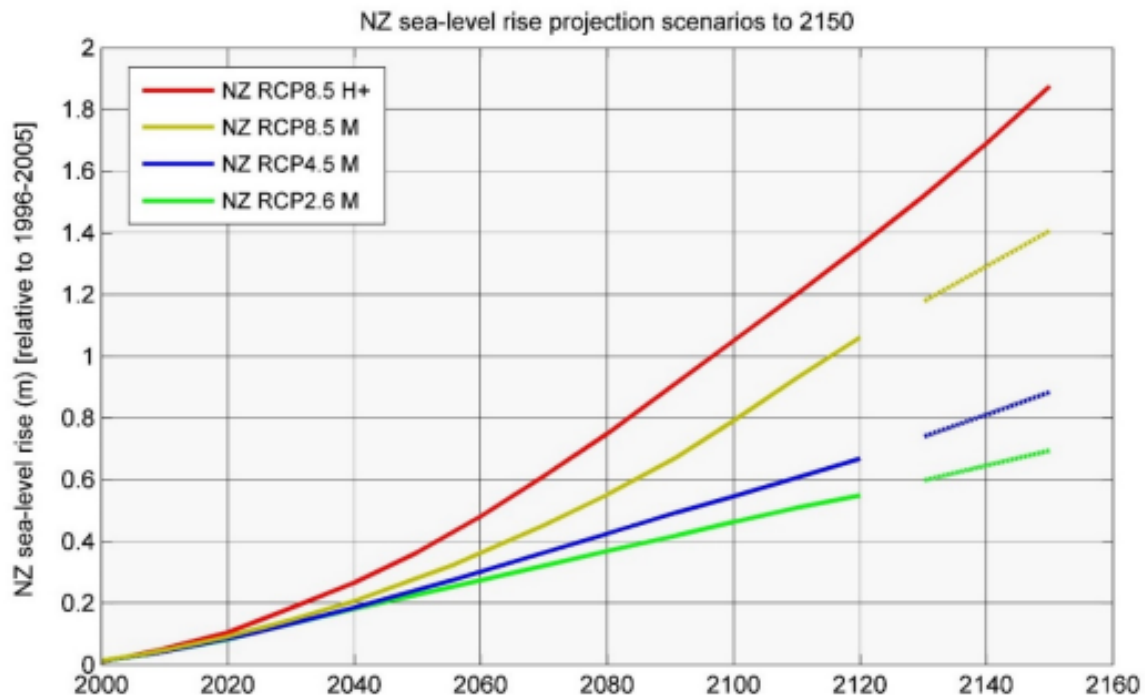


Figure 11: Four scenarios of New Zealand-wide regional sea-level rise projections (Source: Ministry for the Environment. (2017). Coastal Hazards and Climate Change: Guidance for Local Government, pg. 105)

In 2018 council commissioned NIWA to assess the projected climate changes for Auckland. While there is uncertainty in the climate change projections, as this is dependent on the management of greenhouse gases, four scenarios of change were modelled. The report concluded that:

Future changes to the Auckland Region's climate are likely to be significant. A large increase in hot days, larger extreme rainfall events, and increases in drought potential are some of the main

impacts. Sea-level rise will have an impact on much of the region, especially where urban areas and infrastructure are very close to the coast¹⁹

In response to these assessments' council declared a climate emergency in 2019 and Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan was adopted in 2020. A number of reports and strategies have been prepared on the risk of climate change for Auckland and to guide council's response, both in achieving emission reductions and planning for adaptation. These are discussed in [Section 4.6: Other methods](#).



Figure 12: Flooding in north and north-west Auckland in September 2021 (Source: Our Auckland)



Figure 13: Storm damage to Rakino Community Hall (Source: Auckland Council)

¹⁹ Pearce, P., Bell, R., Bostock, H., Carey-Smith, T., Collins, D., Fedaeff, N., Kachhara, A., Macara, G., Mullan, B., Paulik, R., Somervell, E., Sood, A., Tait, A., Wadhwa, S., Woolley, J.-M. (2020). Auckland Region climate change projections and impacts (Auckland Council Technical Report, TR2017/030-3). Revised September 2020. Prepared by the National Institute of Water and Atmospheric Research, NIWA, for Auckland Council, pg. 317

2.0 Indicators

2.1 Identification of indicators

Given the wide scope of the RPS objectives and the data limitations (as discussed in more detail in the [Section 3: Data and information](#) below), this s35 analysis has used the achievement of the RPS B10.2.1 Objectives for natural hazards and climate change as the indicators to measure the effectiveness of the AUP provisions. From an analysis of the trends and outcomes resulting from the implementation of the AUP since 2016, the gaps and aspects in the AUP and its implementation that may impact on its efficiency and effectiveness in achieving the RPS Objectives B10.2.1 are identified.

2.2 Chapter B11 Monitoring and environmental results anticipated

Chapter B11 in the AUP sets out the monitoring and environmental results anticipated (ERA) of a regional policy statement. B11 is not exhaustive, an ERA is not listed for every objective. Chapter B11 explains:

Environmental results anticipated identify the outcomes expected as a result of implementing the policies and methods in the regional policy statement and provide the basis for monitoring the efficiency and effectiveness of those policies and methods as required by section 35 of the Resource Management Act 1991

Environmental results anticipated are not additional objectives, policies or rules - they are indicators to be used when assessing progress towards achieving the objectives in the regional policy statement. These indicators should be used:

- to assess the condition of the environment;
- to identify changes to that condition;
- to diagnose the causes of environmental problems; and
- to guide future changes to objectives, policies and methods

Table B11.9 contains three environmental results anticipated for the objectives in RPS B10.2.1, namely:

Note: the reference to Indicators in B11.9 equates to the environmental results anticipated

Reference	Objective	Indicators
B10.2.1(2)	The risks to people, property, infrastructure and the environment from natural hazards are not increased in existing developed areas.	Personal injuries and property damage in developed areas resulting from natural hazards and the effects of climate change do not increase over time
B10.2.1(3)	New subdivision, use and development avoid the creation of new risks to people, property and infrastructure.	Structure planning and plan changes make explicit provision for natural hazards and the effects of climate change.

B10.2.1(6)	The conveyance function of overland flow paths is maintained	Areas of surface flooding in developed areas do not increase over time
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The indicators in Table B11.9 were analysed to determine their suitability as indicators for the purposes of monitoring the efficiency and effectiveness of the AUP:

- **Objective B10.2.1(2)** and indicator/ERA: *Personal injuries and property damage in developed areas resulting from natural hazards and the effects of climate change do not increase over time*

This indicator is written as if this outcome can be solely, or predominantly, attributed to being a result of the implementation of the AUP provisions. Personal injury and property damage might result from causes unrelated to the implementation of, or outside the scope of, the AUP, such as the location of historic development, infrastructure constraints, changing climate or individual behaviour.

A broader assessment of the achievement of the RPS Objectives B10.2 than the measures in this indicator have been used for the purposes of this analysis.

- **Objective B10.2.1(3)** and indicator/ERA: *Structure planning and plan changes make explicit provision for natural hazards and the effects of climate change.*

This indicator/ERA has been used as a measure, rather than an indicator. There are also a number of other measures/methods to achieve this objective that are not mentioned, including the AUP zones and provisions.

A broader assessment of the achievement of the RPS Objectives B10.2 than the measures in this indicator have been used for the purposes of this analysis. An analysis of the effectiveness of structure planning is included in Section 4.2.4 Zoning of land within natural hazard areas.

- **Objective B10.2.1(6)** and indicator/ERA: *Areas of surface flooding in developed areas do not increase over time*

This indicator is written as if this is an outcome solely, or predominantly attributed to being a result of the implementation of the AUP provisions. Surface flooding in developed areas might result from causes unrelated to the implementation of the AUP, such as the location of historic development and infrastructure constraints, and because of the increased effects of climate change.

A broader assessment of the achievement of the RPS Objectives B10.2 in managing the risk of flooding is used for the purposes of this analysis.

- **B10.2 Objectives with no indicators/ERAs**

Table B11.9 Environmental risks does not make reference or include ERA/indicators for the following B10.2 Objectives:

- Objective B10.2.1 (1): Communities are more resilient to natural hazards and the effects of climate change.
- Objective B10.2.1 (4): The effects of climate change on natural hazards, including effects on sea level rise and on the frequency and severity of storm events, is recognised and provided for.
- Objective B10.2.1 (5) The functions of natural systems, including floodplains, are protected from inappropriate subdivision, use and development

The assumption is that these objectives are considered to be encompassed in achieving the indicators for the objectives discussed above. However, it is considered that a closer examination of the AUP provisions in achieving these objectives is needed to assess the effectiveness of the AUP provisions.

Taking the above matters into account, for the purposes of this assessment the RPS Objectives in B10.2 Natural hazards and climate change have been used as the ‘indicators’ to assess the efficiency and effectiveness of the AUP provisions.

3.0 Data and information

3.1 Scope of this report

- This report focuses on natural hazards and the effects of climate change in relation to subdivision, use and development on land only. Where use and development in the coastal marine area is discussed, it is in the context of its impact on subdivision, use and development on land e.g., hard protection structures in the coastal marine area in the context of their role in protecting development on land. Other activities within the coastal marine area will be reported as part of the monitoring reports for Chapter B8.
- With regards to the effects of climate change, the focus is directed at how this will exacerbate natural hazard risk. This reflects the way climate change has been integrated into Chapter B10.2 of the RPS.
- Due to limited timeframes and resources, and the complexity of this topic, this report only provides a broad canvas of the key observations, trends and feedback drawn from the various data sources available and from interviews with council staff and specialists involved in the management and assessment of hazard risk. Further investigations will be required to verify this information and to understand the extent of any highlighted issues. Precincts and overlays were also not reviewed for the purposes of this report.
- This analysis does not include an assessment of the efficiency and effectiveness of the AUP provisions relating to managing the risk of natural hazards and climate change for:
 - (i) Infrastructure. The management of risks to infrastructure will be reported as part of the monitoring reports for Chapter B3.2 Infrastructure and B3.3. Transport.
 - (ii) On-site septic tanks, stormwater management devices, and implementation of provisions such as maximum impervious area controls. These matters are in-part addressed in the monitoring report for Chapter B7.3 Freshwater systems and B7.4 Coastal water, freshwater, and geothermal water.

3.2 Data limitations

The limitations and provisos that apply to the findings and conclusions made include:

- The natural hazard provisions in the AUP were developed based on the best information available, and under the RMA legislative requirements that applied at the time the provisions were adopted in 2016. Modelling and data on hazard risk and the effects of climate change are constantly being

updated. As a result, the AUP provisions do not always reflect the most up-to-date information on natural hazard risk or climate change. The conclusions that have been drawn on the efficiency and effectiveness of the AUP provisions are based on the best information available and used to develop the AUP provisions, rather than an assessment against updated information or data that has become available since the AUP provisions came into effect. This is discussed more specifically in the sections below, but for example, this means that the analysis of the effectiveness of the coastal erosion hazard area provisions is based on the implementation of the AUP provision that used the information available in 2016 and does not evaluate the effectiveness in managing risk in relation to the extent of areas susceptible to coastal erosion as identified in the 2021 maps.

- An assessment of the efficiency and effectiveness of the AUP provisions is being made on their implementation over a five-year period when the natural hazard and climate change provisions are based on managing hazard for events that might only have a 1 per cent probability of occurring or being exceeded in any one year. In this context the conclusions drawn relate to issues identified through implementation of the AUP provisions, rather than assessing their effectiveness in terms of the outcome from a 1-in-a-100-year event.
- The efficiency and effectiveness of the provisions includes managing risk for climate change effects, which are uncertain, but are increasingly evident even from when the AUP provisions were adopted over six years ago. The provisions are written in the context of the effects of climate change being provided for under s7 RMA as an ‘other matter’ to have particular regard to.
- Consent data, along with interviews with staff across council teams (discussed further in [Section 3.4 Additional data and information](#)), has been used as a primary source for information to inform the findings and conclusions drawn in this analysis. However, given the number of relevant consents and the limited time and resources available for this analysis, only a small sample of consents were investigated. As such, the findings and conclusions based on this data source only provide a snapshot of the overall picture and should be regarded as observations or trends rather than as providing definitive conclusions of fact. More detailed limitations on consent data are outlined in [Section 3.3 Resource consent database methodology and limitations](#) and further detailed in the separate overarching monitoring summary report.
- Information, data and reports up until November 2021 have been used to inform this analysis.

3.3 Resource consent database methodology and limitations

The overarching monitoring summary report covers the general limitations that apply to the resource consents database which is utilised across most monitoring topics. The methodology, limitations and provisos that apply specifically to the use of the resource consents database for this analysis include:

- The consent data reviewed consists of consents that were granted or declined between November 2016 (when the provisions came into effect) and April 2021.
- Permitted activities that meet the required standards do not require a resource consent. Without a record of these activities, it is difficult to obtain data to understand the effectiveness of the PA provisions and this has not been investigated given the timeframes and the resources available. As such, there is a notable gap and potential bias in this analysis as there is a lack of consideration and

analysis of subdivision, use and development that is outside of hazard areas, or do not trigger a relevant AUP provision, and are consistent with the outcomes sought under the RPS objectives.

- The resource consent database was filtered to identify consents that required a reason for consent for one or more identified rules or standards that were relevant to the management of natural hazard risk. The rules and standards that were identified are outlined in the various topic sections of this report. Not every rule or standard relating to natural hazards were identified and used as a filter to obtain consent data for the purposes of this analysis. In addition, not every consent that required a reason for consent under one or more identified rules or standards was able to be filtered out given the limitations with the overall consent data.
- A total of 8,072 consents were extracted based on the identified rules or standards. This number includes bundled consents, which may be split into multiple singular consents, and consents that featured more than one identified rule or standard. Given this large quantity, only a sample of consents were investigated. A total of 466 consents were investigated, representing an approximate sample size of 5.77 per cent. In most cases, only key rules and standards have been investigated as part of the sampling. Key rules and standards were identified based on their relevance, and importance in relation to their assessment against the RPS objectives and policies.
- There are some rules and standards that have been included as part of the consent data extraction and therefore contribute to the overall consent numbers but have not been directly discussed or referenced in this report. These are outlined in Table 1 below. These rules and standards were ultimately not investigated due to their limited relevance to the scope of this report.

Table 1: Rules and standards included as part of the consent data extraction but have not been directly discussed or referenced in this report

Rule or standard	Number of consents with this rule was identified as a reason for consent
E36.4.1 (A16) Beach nourishment which does not comply with Standard E36.6.1.2	0
E36.4.1 (A17) Dune stabilisation which does not comply with Standard E36.6.1.3	0
E36.4.1 (A18) Modification, alteration or removal of sand dunes and vegetation on sand dunes within 40m of mean high water springs not otherwise provided for	1

- Random sampling was undertaken in a way to ensure that all the key rules and standards were represented. The extracted consent data was filtered based on each key rule or standard, and then an approximate sample size was determined based on how many consents there were that required a consent under each key rule or standard, and the relevance of the rule or standard. The consents from each key rule or standard were then investigated at random until the approximate sample size was reached. Those consents that were investigated that required consent for one or more key rules or standards are included as part of the sample size for each of these key rules or standards.
- The approximate sample size for each key rule and standard was dependent on the corresponding number of consents that had been extracted from the resource consents database. Given the limited time and resourcing, the initial aim was to investigate all the consents for the key rules and standards where numbers were manageable, or sample at least 50 consents or proportionate amount using a 95 per cent confidence level (whichever is higher) for each of the key rules and

standards with larger consent numbers. However, due to changes in staff resourcing, this level of consent analysis was not able to be achieved.

- No data is readily available on the number of pre-application meetings that resulted in relevant proposals not proceeding, or that were amended to achieve better outcomes in terms of managing natural hazard risk. There is also no data readily available on the number of relevant consents that were lodged but did not reach the decision stage due to unresolved issues, including those associated with natural hazard risk. As such, the number and ratio of consents that have been approved and declined is not fully representative of what the actual outcomes are of the resource consent process.
- Given the limited timeframe and resources available, the investigation undertaken for the sampling focused on obtaining readily accessible information. This included:
 - reviewing the council planner's and/or decision maker's assessments provided in the notification and decision reports
 - reviewing specialist reports and memos
 - reviewing the relevant conditions imposed
 - determining reasons for consent that may not have been identified as part of the consent where possible.

In-depth investigation was not able to be undertaken with regards to more detailed matters, such as a full review of any further information requests to the applicant and responses, or correspondence. As such, it may be the case that certain effects or matters have been considered during the consenting process but that they were not documented in the information sourced for this review.

- The number of consents from the consent data review that demonstrated a matter raised in the analysis and findings have been provided. These are intended to illustrate the likely scale of a particular point or issue. It is noted that due to time and resource constraints, not all consents related to a particular issue were able to be identified, including for example in a 'bundled consent' where consent is sought under multiple rules, including rules triggered in chapters investigated. This means there are likely to be more instances of consents being applied for than the numbers provided.
- Findings and conclusions drawn are based on the consent decision and conditions that have been imposed. No information was readily available on the proportion of consents that were given effect to (i.e., implemented on the ground). Information on consent compliance and monitoring has also not been analysed.

3.4 Additional data and information

Other data and information sources

A number of the key matters investigated through resource consent data, and that are the focus of analysis, were identified by council officers from departments that play a key role in implementing the AUP provisions.

Other data and information that have informed this analysis were obtained from:

- Interviews and discussions with staff from:
 - Regulatory Services, including planners, technical specialists, subdivision advisors, and regulatory engineers
 - Infrastructure & Environmental Services, including coastal and geotechnical specialists
 - Healthy Waters
 - Auckland Emergency Management
- Review of practice and guidance notes issued by Regulatory Services for resource consenting.
- Review of council and other reports on natural hazards and climate change.
- Review of evidence and supporting information during the Auckland Unitary Plan Independent Hearings Panel review process.
- Analysis of relevant legislation and policy documents, such as the NZCPS and the Building Act 2004.
- Review of relevant Ministry of the Environment and Local Government New Zealand guidance.
- Review of Land Information Memorandums (LIMs) and information relating to other methods.

Claims data from Earthquake Commission (EQC)

In addition to the above, data was obtained from the Earthquake Commission (EQC). EQC is a New Zealand Crown entity that undertakes natural disaster research and education as well as providing natural disaster insurance to property owners. EQC provided data on the properties where claims were made for land instability and flooding damage since January 2016. There were 1,739 claim entries between January 2016 to March 2021.

The intention was to match the EQC claims data with council consent data to help ‘ground truth’ the effectiveness of the AUP provisions. However, the EQC claim data did not directly correlate with the activities provided for in the AUP and it was not possible to match consents granted under AUP since 2016 against the EQC claims and to undertake any direct analysis of this data.

However, with the approval of EQC, a heat map (Figure 14) was produced from the claims data. This map shows the number and location of EQC claims for flooding, storm and landslip damage from January 2016 to March 2021. This indicates the areas in Auckland that have been most adversely affected by natural hazards and where compensation for damage has been sought since 2016.

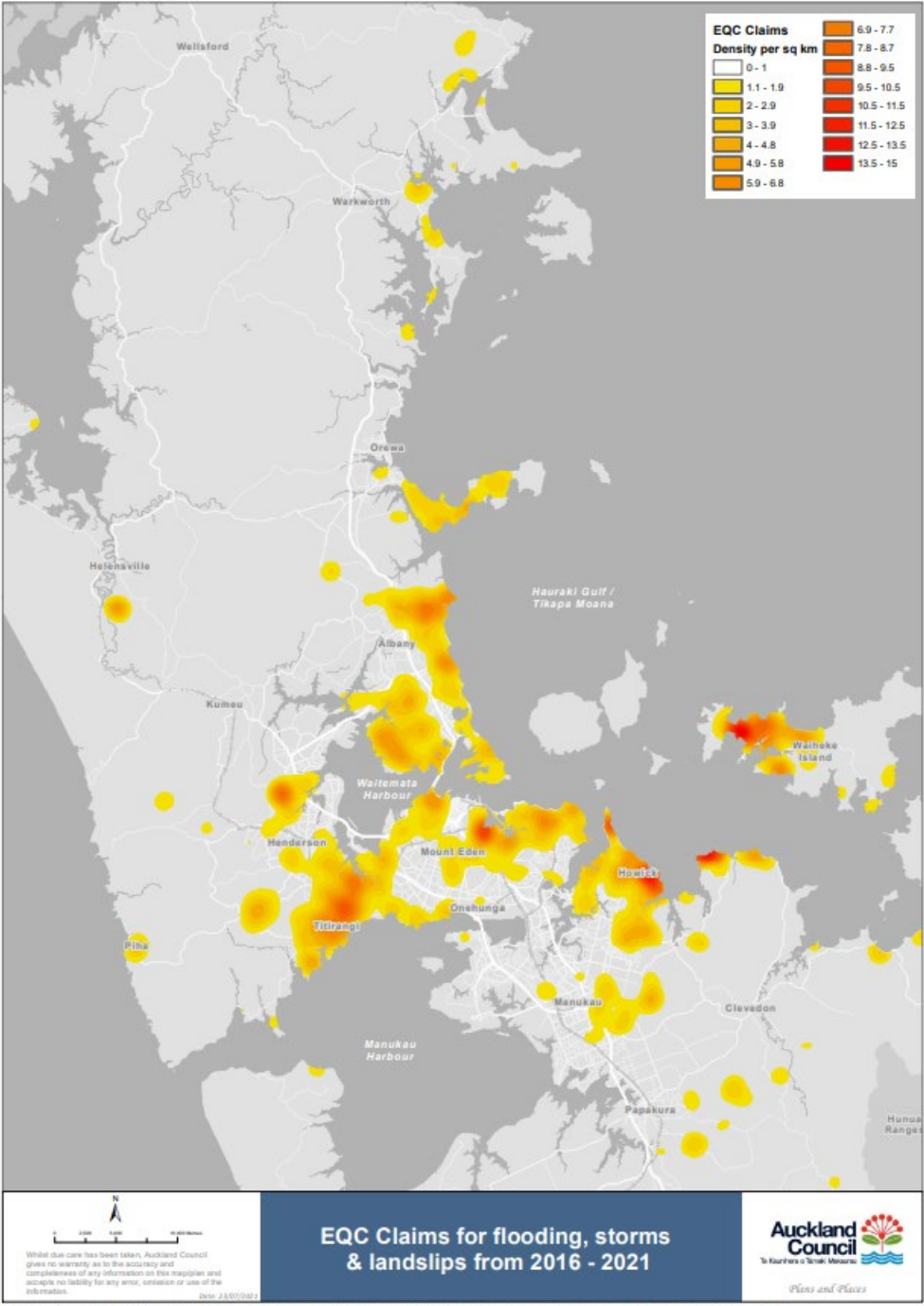


Figure 14: Heat map of all EQC claims for flooding, storms and landslips in the Auckland region from 2016 to March 2021

4.0 Findings and analysis

This section reports on the data findings, and considers how effective and efficient the objectives, policies, rules and other methods of the AUP have been in meeting the outcomes intended by the Regional Policy Statement. Where appropriate, recommendations are also provided.

4.1 Structure and Content

The AUP provisions that apply to the management of a natural hazard and climate change risks are contained in several different chapters of the AUP and can overlap. The relevant objectives and policies also often apply to more than one hazard or aspect of addressing natural hazards and climate change.

For the purposes of this report, the analysis of the efficiency and effectiveness of the AUP provisions in managing the risks of natural hazards and the effects of climate change has been separated into three sections:

- the first section provides an analysis of the overall approach and issues associated with the management of natural hazard and climate change risk
- the second section provides an analysis of the effectiveness and implementation of the hazard-specific provisions of the AUP
- the third section provides an analysis of the effectiveness and implementation of other relevant provisions of the AUP

There is also a section on the Building Act 2004 and the other methods that contribute to achieving the objectives of Chapter B10.2.

The structure of the findings and analysis section is set out below in Table 2 below.

Table 2: Structure of findings and analysis section

Structure of Findings and Analysis Section	
Section 4.2 Overarching matters	
4.2.1	Scope of the AUP provisions
4.2.2	Responsiveness to change under the AUP
4.2.3	Approaches and directives for managing risk
4.2.4	Zoning of land within natural hazard areas
4.2.5	Identifying and managing activities within natural hazard areas
4.2.6	Consistency of assessments and quality of information provided
4.2.7	Impact of existing development on hazard risk management
4.2.8	Differentiation of risk tolerance
4.2.9	Implementing a precautionary approach
4.2.10	Risk from multiple hazards
4.2.11	Duration and timeframes for consents
4.2.12	Permitted activities

Section 4.3 Hazard-specific AUP provisions	
4.3.1	Coastal storm inundation
4.3.2	Coastal erosion
4.3.3	Flooding
4.3.4	Land instability
4.3.5	Wildfire
Section 4.4 Other AUP provisions that manage risk from natural hazards and climate change	
4.4.1	Subdivision in natural hazard areas
4.4.2	Esplanade reserves and strips
4.4.3	Hard protection structures
4.4.4	Coastal protection yards and riparian yards
4.4.5	Vegetation alteration or removal
Section 4.5 Natural hazards and the Building Act 2004	
Section 4.6 Other methods	
4.6.1	Background
4.6.2	Non-regulatory plans and strategies
4.6.3	Monitoring and information gathering
4.6.4	Land Information Memorandum ('LIMs')
4.6.5	Council activities to mitigate risk

4.2 Overarching matters

4.2.1 Scope of the AUP provisions

Context

- As mentioned in [Section 2.1.1 Resource Management Act 1991 \(RMA\)](#), the RMA defines natural hazard as:
any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment
- The AUP does not include a definition of “natural hazard”. Chapter E36 describes the range of natural hazards that may affect Auckland:
Auckland is affected by natural hazards including:
 - those that occur frequently such as flooding, coastal erosion (including the effects of sea level rise), freshwater erosion and land instability; and*
 - those that occur less frequently such as wildfires, volcanic activity, tsunami, earthquakes and meteorological hazards such as cyclones, tornados and drought.*

- As outlined in [Section 2.2.2 AUP regional and district plan provisions](#), Chapter E36 then specifies that the provisions of the Plan only apply to some of these hazards as some hazards cannot be addressed through land use planning and are better addressed through other methods (eg. through tsunami and seismic monitoring and warning systems and emergency management responses).

Analysis and Findings

- The objectives and policies in B10.2 refer to all natural hazards (e.g. those outlined in the RMA), not just the natural hazards that the AUP provisions apply to. As such, there is an inherent gap between what the risk from hazards the AUP provisions manage and the ability to achieve the wider hazard outcomes that the RPS seeks to achieve.
- While it may not be appropriate to address every natural hazard risk through land use planning, this does raise the question of whether the AUP should include provisions to manage the risk from a greater range of natural hazards. This consideration is reflected under Policy E36.3(2), which refers to the investigation of “other natural hazards to assess whether risks to people, property or the environment should be managed through the Plan or otherwise”.
- Due to the effects of climate changes being a s7 RMA matter and the understanding of climate change risk at the time the provisions were adopted, the AUP provisions under E36 largely focus on climate change effects only in relation to the exacerbation of natural hazards. This reflects the outcomes sought under Objective B10.2.1(4). However, there are hazards that derive from climate change itself that can pose risks independent of any other natural hazard e.g., prolonged heat, or the impacts of sea level rise on groundwater. Objective B10.2.1(1) refers to “the effects of climate change” in a broader sense, while Objectives B10.2.1(2) and (3) refer to all natural hazards in general. As such, this gap may limit the ability for the AUP to achieve the outcomes sought under these objectives as natural hazards caused by climate change are not directly managed by the Plan.
- These inherent gaps also impact on structure planning in terms of what risks should be assessed at the structure planning stage. This is discussed further in [Section 4.2.4 Zoning of land within natural hazard areas](#).

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to²⁰:

- Consider whether the AUP should include provisions that address risk from other natural hazards, including climate change related hazards, in addition to those currently forcovered.

²⁰ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.2.2 Responsiveness to change under the AUP

Context

- Given the dynamic nature of natural hazards and the effects of climate change, the understanding and extent of risks that the AUP seeks to avoid and manage are constantly changing. This is reflected in the various studies, technical reports and guidance documents that have been published since the AUP has come into effect. The AUP is limited in its ability to be responsive to these changes due to the RMA framework. Any changes to the plan provisions or maps requires a RMA Schedule 1 plan change, which can be a costly and lengthy process.
- As land subject to risk changes, any mapping of land affected needs to sit outside (but linked) to the AUP provisions, so that they can be updated to reflect the most recent modelling without requiring a plan change process.

Analysis and Findings

Adaptability of AUP to reflect changing hazard risk

- As the AUP provisions cannot be readily or quickly amended to respond to updated technical information, it is important for the AUP to have robust provisions and mechanisms in place to ensure risk assessments are based on the latest climate change predictions. In some cases, flexibility to take into account the latest modelling and mapping of hazards and climate change risk is accommodated. For example, having the mapping layers for some of the hazards sitting outside of the AUP maps means that the maps that have been updated to show the latest risk information can be used in applying the relevant AUP provisions.
- Information in the AUP can become out of date. For example, at the time the AUP was adopted, a one metre sea level rise had been modelled to manage risks from coastal storm inundation over the 100-year timeframe. This extent of sea level rise is referred to in Policies E36.3(2) and E36.3(9) and is shown on the AUP maps. However, the latest studies show that sea level rise may be more than 1m over this timeframe and is likely to keep changing in response to climate change. A plan change would be required to update the plan to reflect anticipated sea level rise based on the new modelling. It is inefficient and costly to update the plan provisions each time an updated sea level rise model is available.
- As such, the current provisions in the AUP may already not be effective or sufficient in managing the changing risk from climate change over a 100-year timeframe as directed under Policy B10.2.2(4). Updated assessments and guidance on natural hazards and climate change are being provided through MfE which suggest that this may be the case. However, the RMA framework makes it difficult to readily make plan changes to incorporate updated management approaches

Accommodating uncertainty

- As discussed in [Section 2.4.11 Climate change](#), technical predictions on the rate of sea level rise and the effects of climate change are based on different greenhouse gas emission scenarios. Different technical sources may also have different predictions to one another. There is currently no policy framework in the AUP that provides clarification on which source of information to rely on and which scenario should be utilised for the considering the impacts of climate change. This also relates to the issue of precautionary approach, which is discussed further in [Section 4.2.9 Implementing a precautionary approach](#).

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to²¹:

- Investigate the possible mechanisms available to ensure that the AUP is as responsive as possible to the everchanging impacts of natural hazards and climate change.

4.2.3 Approaches and directives for managing risk

Context

- From the analysis of the AUP and discussion with specialists, it has been identified that there are different interpretations of the AUP direction from planners and specialists on how the risk from natural hazards and climate change can be managed. This is likely to be partly a result of interpreting the varying references to managing hazard risk in the AUP, NZCPS, and RMA.
- Sections 30 and 31 of the RMA require council to ‘avoid or mitigate’ the risk from natural hazards. Section 6 makes the management of ‘significant risks’ a matter of national importance, but no definition or criteria is provided against to determine what ‘significant risk’ is (i.e. to life, property, multiple risks, or specified timeframes). National guidance on ‘significant risks’ would assist in applying a consistent management hierarchy that clarifies where and when to ‘avoid’ and/or ‘mitigate’ hazard risk.
- The NZCPS includes directive provisions for the management of the risk from coastal hazards and climate change for subdivision, use and development in the coastal environment. The NZCPS Objective 5 supports an interpretation that coastal hazard risk, particularly for new development, should be avoided by locating new development away from areas prone to risk. For areas of existing development, the approach is to avoid redevelopment, or change in land use, that would increase the risk, and there is encouragement for risk reduction, such as managed retreat or relocation.
- There is no other national policy statement to provide national guidance on the approach to managing ‘significant risks’ from other hazards such as flooding, land instability or wildfire to which the AUP provisions apply.
- The varying references to ‘avoid’, ‘avoid or mitigate’, ‘manage’ risk, ‘significant natural hazard risk’ and ‘areas prone to risk’ does not help to provide clarity on the approach that should apply in a given situation. A comparison of the varying references made to managing risk in the AUP and NZCPS objectives and the RMA is provided below in Table 3.

²¹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Table 3: Comparison of the references to managing risk (emphasis added)

Auckland Unitary Plan RPS Objectives and Policies	Auckland Unitary Plan E36.2 Objectives and Policies	New Zealand Coastal Policy Statement Objectives and Policies
B2.2 Urban growth and form B2.2.1 (2) <i>Ensure the location or any relocation of the Rural Urban Boundary identifies land suitable for urbanisation in locations that:</i> (l) <u>avoid(ing) areas with significant natural hazard risks and where practicable avoiding areas prone to natural hazards including coastal hazards and flooding;</u> Appendix 1 Structure plan guidelines 1.4. Matters to identify, investigate and address (4) Measures to <u>manage natural hazards and contamination.</u> B10.2 Natural hazards and climate change B10.2.1 Objectives (2) The risks to people, property, infrastructure and the environment from natural hazards are <u>not increased in existing developed areas.</u> (3) New subdivision, use and development <u>avoid the creation of new risks</u> to people, property and infrastructure. Example supporting policies: B10.2.2. Policies <i>Management approaches</i> (7) <u>Avoid or mitigate</u> the effects of activities in areas subject to natural hazards, such as earthworks, changes to natural and built drainage systems, vegetation clearance and new or modified structures, so that the risks of natural hazards are not increased. <i>Coastal hazards</i> (13) Require areas potentially affected by coastal hazards over the next 100 years to do all of the following:	(1) Subdivision, use and development outside urban areas does not occur unless the risk of adverse effects to people, property, infrastructure and the environment from natural hazards has been assessed and <u>significant adverse effects are avoided</u>, taking into account the likely long-term effects of climate change. (2) Subdivision, use and development, including redevelopment in urban areas, only occurs where the <u>risks of adverse effects from natural hazards to people, buildings, infrastructure and the environment are not increased overall and where practicable are reduced</u>, taking into account the likely long term effects of climate change. (3) Subdivision, use and development on rural land for rural uses is managed to ensure that the risks of <u>adverse effects from natural hazards are not increased and where practicable are reduced.</u> Example supporting policies: (5) Ensure that subdivision, use and development on rural land for rural uses and in existing urban areas subject to coastal hazards <u>avoids or mitigates adverse effects</u> resulting from coastal storm inundation, coastal erosion and sea level rise of 1m through location, design and management. (16) In rural areas, <u>avoid where practicable</u> locating buildings accommodating more vulnerable activities in the 1 per cent annual exceedance probability (AEP) floodplain and manage other buildings and structures so that flood hazards are not exacerbated.	Objective 5 To ensure that coastal hazard risks taking account of climate change, are managed by: • <u>locating new development away from areas prone to such risks;</u> • considering responses, including <u>managed retreat, for existing development</u> in this situation; and • protecting or restoring natural defences to coastal hazards Example of supporting policies: 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) <u>avoid increasing the risk</u> of social, environmental and economic harm from coastal hazards; (b) <u>avoid redevelopment</u>, or change in land use, that would <u>increase the risk</u> of adverse effects from coastal hazards; (c) encourage redevelopment, or change in land use, where that would <u>reduce the risk</u> 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;

(a) <u>avoid changes in land use that would increase the risk of adverse effects from coastal hazards;</u>		
Resource Management Act 1991		
s6 Matters of national importance [2017 amendment]		
In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:		
(h) the <u>management of significant risks</u> from natural hazards.		
S30 Functions of regional councils		
(1) Every regional council shall have the following functions		
(c) the control of the use of land for the purpose of		
(iv) the <u>avoidance or mitigation</u> of natural hazards		
S31 Functions of territorial authorities		
(1) Every territorial authority shall have the following functions		
(b) the control of any actual or potential effects of the use, development, or protection of land, including for the purpose of— <u>the avoidance or mitigation</u> of natural hazards;		
S106 Consent authority may refuse subdivision consent in certain circumstances [2017 amendment]		
(1) A consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent subject to conditions, if it considers that—		
(a) there is a <u>significant risk</u> from natural hazards; or...		

Analysis and Findings

Understanding risk

- Objectives B10.2.1(2) and (3) take an ‘avoid’ creating risk approach for new development and a ‘not increase or risk reduction’ approach within areas of existing development. In Objective E36.2(1), this is translated to the ‘avoidance of the significant adverse effects of risk outside urban areas’. Within urban areas, Objective E36.2(2) seeks to ensure that risks ‘are not increased overall and where practicable are reduced’. As noted above, there is no definition provided in the RMA s6(h) for what comprises a ‘significant risk’.
- The concept of risk treatment is complex. The diagram shown in Figure 15 provides a visual representation of some of the options to reduce risk:

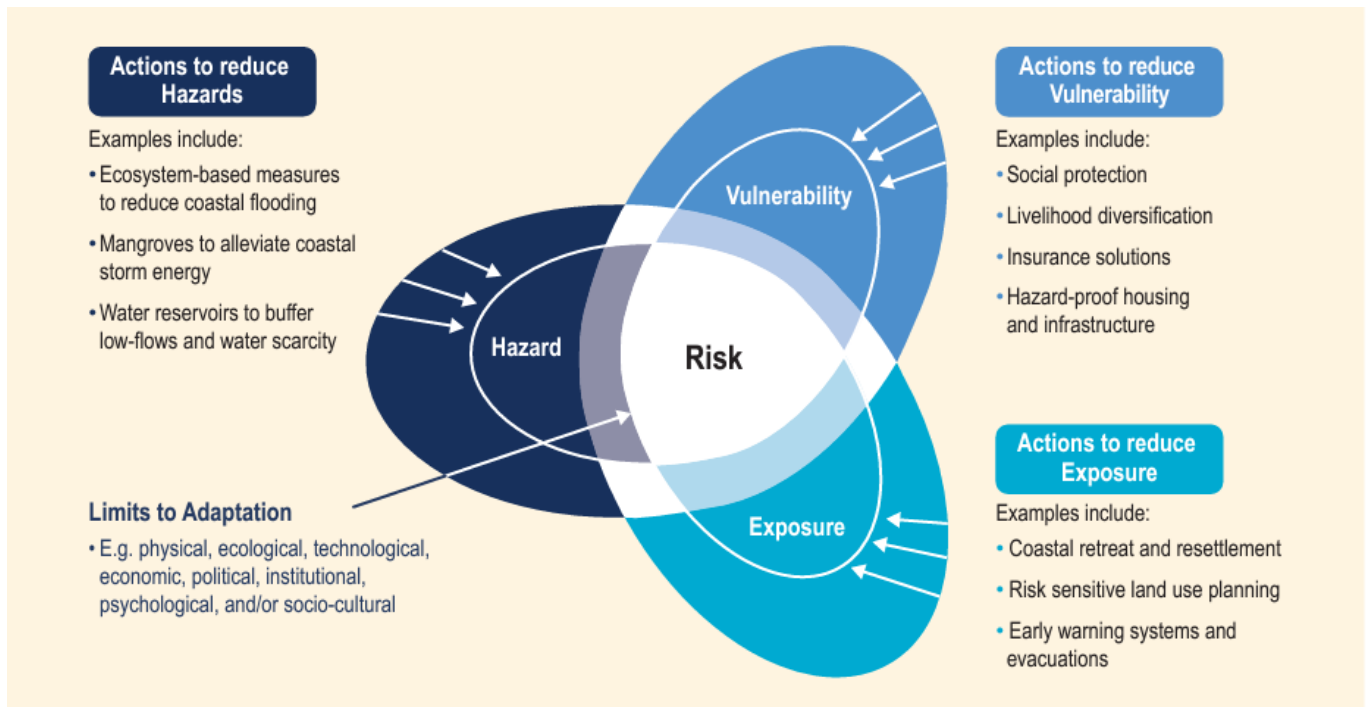


Figure 15: IPCC risk-based conceptual framework. (Source: IPCC. (2019). *Technical Summary*. In: *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*, pg. 46).

- Often there are multiple factors that can influence the risk equation. Using intensification of an existing urban site that is within a floodplain as an example, risk could be reduced by ensuring that the additional dwellings have finished floor levels which results in the reduction in exposure to the hazard. But at the same time, the intensification has also increased risk by increasing the value of development within the hazard area and the potential number of residents being exposed to a hazard event. In addition, conversations with specialists confirm that while there may be suitable engineering solutions to reduce risk, reliance on engineering solutions, particularly if they are designed to protect a large area or multiple developments, is not guaranteed. If these solutions fail, then the consequences are significant. This then adds another layer of complexity to how the level of risk is determined.
- While it is acknowledged that the AUP has a framework that enables a site-by-site approach for risk assessments, a potential gap identified is that the AUP provisions do not fully reflect this complexity and instead refer to risk in a generic sense. This has the potential to lead to outcomes that may not fully align with what the RPS seeks to achieve, particularly as it also makes it difficult to determine whether risk is being created or being increased in a particular scenario.
- There is no clear guidance or directives in the Plan that clarify how risk should be managed, and whether there is a preferred option that should be explored or utilised above other measures. For example, relying on the ability to obtain/retain insurance for a property is a risk management method, but is not necessarily the optimal method to achieve the outcomes of the RPS. From a technical perspective, specialists have advised that avoiding subdivision, use and development in natural hazard areas in the first place is clearly preferred over the other directives. This is particularly relevant in some parts of Auckland where specialists consider that the risks from hazards are so high that avoidance may be the only appropriate method to achieve the RPS outcomes.

Interpretations of ‘avoid’ and mitigate’

- From the consent analysis and investigations undertaken, another potential gap identified is that differing interpretations can be applied in implementing the AUP provisions that relate to avoiding or mitigating hazard risk. ‘Avoid’ and ‘mitigate’ are different measures to address risk but sometimes it appears these terms are not fully understood. Examples indicate that there were two common ways the term ‘avoid’ was interpreted:
 - avoiding risk by not enabling subdivision, use and development within an area at risk (i.e. avoid creating a hazard risk)
 - avoiding risk by undertaking engineered intervention and mitigation measures, such as earthworks, raising floor levels or land, providing protection structures or infrastructure (i.e. intervention serves to avoid or acceptably mitigate a hazard risk)
- These two interpretations are illustrated in the council evidence presented at the hearing (15 September 2021) on Plan Change 45 (Private): 272,274 and 278 Clevedon Kawakawa Road, which proposed to rezone 9.9 hectare of land at Clevedon from Rural Coastal to Countryside Living on land subject to flooding and coastal inundation and one metre sea level rise:

The council planner concluded:

*...experts agree that design solutions exist to avoid the identified 1 per cent AEP coastal inundation plus 1 m sea level rise and the 1 per cent AEP catchment flood plain, and the land to be developed is outside these areas, the natural hazard risk as conceived by the AUP in policies E36.3(3), E 36.3(5), E 36.3 (9) and E36.3(16) is therefore able to be avoided.*²²

While the council coastal specialist concluded:

*The site is subsequently also at risk of exposure to cumulative hazard events, and both hazards will be further exacerbated by future climate change effects including sea level rise.... Dr Carpenter’s concluding opinion was that while PC45 is technically feasible the potential future adverse effects of natural hazards (including coastal inundation and climate change) at the site make rezoning and residential development inappropriate.*²³

The decision was to decline the plan change and this decision has been appealed to the Environment Court.

- Based on the consents reviewed, common measures to ‘avoid’ risk using mitigation include:
 - ensuring floor levels are situated above projected flood levels so that floodwaters do not affect the development during a flood event
 - coastal protection structures, retaining walls or other structures to reduce the impact of coastal hazards

However, these measures do not actually result in the complete avoidance of the risk. Instead, these measures only reduce risk to acceptable levels, leaving behind residual risk. For example, a seawall may protect developments from the majority of storm events but there is still risk present as it will not be able to do so for extreme storm events or the on-going effects of climate change

²² Decision for PC45 – 272, 274 and 278 Clevedon Kawakawa Road (15 September 2021): pg. 14

²³ Decision for PC45 – 272, 274 and 278 Clevedon Kawakawa Road (15 September 2021), pg. 11

and sea level rise. The misunderstanding of these nuances by plan users is likely to also impact on the ability for the outcomes sought under the RPS to be achieved in a consistent manner.

AUP wording relating to ‘risk’

- It is also noted that there is a subtle difference in wording between the B10.2 objectives and the E36 objectives. For the RPS, reference is made to ‘risk’ itself, whereas for Chapter E36, reference is specifically made to ‘the risks of adverse effects from natural hazards’. Even when it comes to the term ‘avoid’, B10.2 refers to ‘avoid[ing] the creation of new risks’ whereas E36 refers to ‘significant adverse effects are avoided’. As such, there may be situations where mitigation that achieves the outcomes sought under Chapter E36 do not necessarily achieve the outcomes sought under the RPS. Using a similar example to the above, a seawall might achieve the Chapter E36 objectives because the risks of adverse effects have been adequately addressed, but the risk of the hazard itself may still be increased or created by the activity. It is recommended that further investigation be undertaken to understand the implications of the differing AUP references to ‘risk’ and ‘risk of adverse effects’.

Activity status of rules that apply in natural hazard areas

- The activity status for activities in hazard areas also plays a role in the approach taken to managing risk. Chapter A Introduction of the AUP explains the basis of the hierarchy of the various activity statuses:

Permitted activity

Activities are classed as permitted where the character, intensity and scale of their effects are expected to be in keeping with the quality of the existing environment or the relevant objectives and policies of the relevant zone or precinct.

Controlled activity

Activities are classed as controlled where the activity is in keeping with the existing environment and the likely effects are well understood and able to be avoided, remedied or mitigated by conditions.

Restricted discretionary activity

Activities are classed as restricted discretionary where they are generally anticipated in the existing environment and the range of potential adverse effects is able to be identified in the Plan, so that the restriction on the Council’s discretion is appropriate.

Discretionary activity

Activities are classed as discretionary where they are not generally anticipated to occur in a particular environment, location or zone or where the character, intensity and scale of their environmental effects are so variable that it is not possible to prescribe standards to control them in advance. A full assessment is required to determine whether the activity, subject to any conditions, would be appropriate in terms of the provisions of the Plan, the effects of the activity on the environment and the suitability of the proposed location.

- Most subdivision, use and development in hazard areas is provided for as either a permitted or restricted discretionary activity. Table 4 below shows the activity status of activities in natural hazard areas.

Table 4: Activity status for activities in hazard areas

Activity Status	Activities
Activities on land in the coastal erosion hazard area [Table E36.4.1]	
Permitted activity	(A1), (A3)
Restricted discretionary activity	(A2), (A4), (A5)
Activities on land in the coastal storm inundation 1 per cent AEP area [Table E36.4.1]	
Permitted activity	(A6), (A8)
Restricted discretionary activity	(A7), (A9), (A10)
Activities on land in the coastal storm inundation 1 per cent AEP plus 1 m sea level rise area [Table E36.4.1]	
Permitted activity	(A11), (A12)
Discretionary activity	(A13)
Activities in the 1 per cent annual exceedance probability (AEP) floodplain [Table E36.4.1]	
Permitted activity	(A23), (A24), (A27), (A28), (A31), (A32), (A34), (A35)
Controlled activity	(A25)
Restricted discretionary activity	(A26), (A29), (A30), (A33), (A36), (A37), (A38)
Activities in overland flow paths [Table E36.4.1]	
Permitted activity	(A39), (A40)
Restricted discretionary activity	(A41), (A42)
Activities on land which may be subject to land instability [Table E36.4.1]	
Permitted activity	(A43), (A44), (A47), (A48), (A49)
Restricted discretionary activity	(A45), (A46), (A50), (A51)
Subdivision of land within any of the following natural hazard areas [Table E38.4.1 - Urban and E39.4.1 - Rural]	
Restricted discretionary activity	(A11) (urban) and (A8) (rural)
Subdivision establishing an esplanade reserve [Table E38.4.1 - Urban and E39.4.1 - Rural]	
Restricted discretionary activity	(A8) (urban) and (A5) (rural)

- Subdivision, use and development in hazard areas in nearly all cases is provided for as a permitted or restricted discretionary activity. While it is acknowledged that consents can still be declined as a restricted discretionary activity, this activity status suggests that these activities are ‘anticipated’ (as stated in Chapter A above) in these areas. The restricted discretionary activity status applies regardless of whether a site is only partly or fully within a natural hazard area, and regardless of whether the hazard risk is low or high. Even if a site is subject to multiple natural hazards, subdivision, use and development is still provided for as a restricted discretionary activity.

- There is only one activity provided for as a discretionary activity. This applies to (A13), which applies to habitable rooms in new buildings and additions of habitable rooms (greater than 25m²) to existing buildings in the coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area that do not comply with standard E36.6.1.1. Standard E36.6.1.1. requires finished floor levels of habitable rooms to be above the inundation level.
- Chapter A Introduction states that activities provided for as discretionary activities are *particular environment, location or zone or where the character, intensity and scale of their environmental effects are so variable that it is not possible to prescribe standards to control them in advance* and a comprehensive assessment is required to determine if consent should be granted. A more directive ‘avoid’ approach would require:
 - objectives and policies that provide clear guidance as to when an activity should avoid locating in a hazard area (i.e. where there are multiple risks, uncertainty on the long-term effectiveness of mitigation or the risk suggests it is not appropriate).
 - rules that provide for subdivision, use and development in such areas as a discretionary, non-complying, or even prohibited activity if the risk was understood and determined unacceptable. A discretionary or non-complying activity status would indicate that there is uncertainty over the hazard risk and suitability of land for subdivision, use and development, that a precautionary approach may apply, and that a comprehensive assessment against all the relevant AUP provisions is required.
- In the context of the development pressure in Auckland, the lack of clear policy and rule direction makes an ‘avoid’, rather than an ‘avoid through mitigation’, approach difficult to implement, even if it is considered the approach that best gives effect to the objectives in B10.2.1. and the NZCPS. This limits the effectiveness of the AUP in managing hazard risk and the effects of climate change.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to²⁴:

- Evaluate whether the AUP should be updated to provide greater acknowledgement of the complexities of risk management and to provide clearer policy direction on how risk should be managed and, particularly in what circumstances ‘avoiding creating a risk’ is the most appropriate risk management method.
- Undertake further investigation of the implications of the difference in wording between B10.2.1 and Chapter E36 on managing ‘risk’ vs. ‘the adverse effects of risk’ and determine whether there is a consistent policy cascade between the B10.2.1 objectives and the subsequent chapters of the Plan.
- Consider whether the permitted and restricted discretionary activity status applying to almost all subdivision, use and development in natural hazard areas is appropriate and effective, particularly noting that the level of risk (including those from multiple hazards) and the spatial extent of the hazard area varies across different parts of the region.

²⁴ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.2.4 Zoning of land within natural hazard areas

4.2.4.1 AUP zoning

Context

- The zone that applies to land plays a significant role in determining the extent of development that can occur on a site. A zone identifies what has been determined, through a statutory process, as the most appropriate use and development of areas, subject to rules that apply to the zone, any Auckland-wide provisions including overlays, and any precincts.
- Aside from the various residential, business, special purpose, rural and open space zones, there is also the Future Urban zone. This zone signals the location for future development in the region, with a plan change being required to re-zone the land for urban purposes.
- The operative AUP zones, including the extent and location of the Future Urban zone, were determined through the IHP hearings on the AUP. In applying new zones to land, and particularly in enabling urbanisation of greenfield land, important strategic consideration must be given to the level of risk to the land from natural hazards and the effects of climate change and giving effect to the objectives and policies in Chapters B2.2 and B.10 and the directives of the NZCPS. The planning process to introduce zones into the AUP for the urbanisation of greenfield land is usually:

Steps in planning process to determine the zoning of greenfield land	
Planning process	Description
Identifying land within the Rural Urban Boundary (RUB)	A determination being made that the land is suitable for future urbanisation, subject to more detailed analysis to determine the location and form of development through a structure plan process (RPS B2.2 and B10 directives apply)
A Future Urban Zone (FUZ) being applied to the land	Essentially limiting the use of the land to rural activities until such time as the use/form and location of future development and provision of infrastructure is determined
A Structure Plan (Appendix 1) exercise being undertaken	Undertake detailed analysis in accordance with Appendix 1 AUP, including of risks from natural hazards and climate change to determine the form and location of development, staging of infrastructure and other matters
A Plan Change process	Schedule 1 RMA process to introduce AUP zones into the AUP that will apply to the land. This should be in accordance with a Structure Plan. This can be through a council plan change or private plan change. Private Plan changes may propose to zone greenfield land outside of the above process. This requires an assessment against the objectives and policies of the AUP, NZCPS and RMA 6(h). Following the resolution of any appeals the new zones are incorporated into the AUP.

- The RPS has a strong policy direction to ‘avoid’ identifying areas for future development in areas at risk from natural hazards and climate change. Policy B2.2.2(2) states, that in determining land suitable for urbanisation:

(2) (l) avoid(ing) areas with significant natural hazard risks and where practicable avoiding areas prone to natural hazards including coastal hazards and flooding;

Objective B10.2.1(3) also states that:

(3) New subdivision, use and development avoid the creation of new risks to people, property and infrastructure.

The NZCPS also has a strong policy direction that coastal hazard risk be managed ‘by locating new development away from areas prone to risks’ (Objective 5 and Policy 25).

Analysis and Findings

Correlation of AUP zones to natural hazard risk

- As a zone has been applied through a plan-making process, the assumption and general perception is that the natural hazard risk has already been partly assessed against the objectives of the AUP, and the level of development provided for by that zone is assumed to be appropriate at that location, subject to assessments against the relevant Auckland-wide provisions of the Plan. Therefore, the effectiveness of the relevant Auckland-wide provisions in managing risk is impacted by the level of development that is provided for by each zone.
- Based on the consent data review and discussions with specialists, it is noted that the potential natural hazard risk is inherently increased by land parcels within natural hazard areas having zones that provide for greater development opportunities, compared to zones that provide for lesser development opportunities. For example, there are different development expectations on a site zoned Residential – Single House compared to a site zoned Residential – Mixed Housing Urban. Even if both sites are exposed to the same extent of natural hazard risk and subject to the same provisions under Chapter E36, the site zoned Residential – Mixed Housing Urban by virtue of the zone is signalled to provide more development opportunity than the one zoned Residential – Single House.
- A general observation from the consent data review is that there appears to be a strong focus on enabling development that reflects what the zone provides for, with other matters that sit outside of the zone-specific provisions, such as the Auckland-wide provisions in E36 Natural hazards and climate change, appearing more as a secondary consideration.
- Specialist feedback indicates that it is difficult to limit the development potential of a site where expectations of a certain level of development potential exist by virtue of the zone that applies, even where there is high risk from natural hazards.

Review of residential zoning of land within coastal hazard areas

- Using residential development in coastal hazard areas as an example, Tables 5- 8 illustrate the relationship between residential zones in the Auckland region and the areas that are within, or partly within, coastal storm inundation areas and/or the definition of “coastal erosion hazard area”. For the purposes of this review, land was identified from the mapping of coastal storm inundation and sea level rise in GeoMaps, and for coastal erosion, only the low-lying areas (i.e. [b]) covered in the “coastal erosion hazard area” definition have been included as there is insufficient information available to enable the area landward of cliffs (i.e. [a]) and any modifications to these specified areas due to site-specific studies (i.e. [c]) to be mapped. The key findings are summarised below:
 - Parcels of land with a residential zoning and are within either or both identified coastal hazard areas accounts for 3.2 per cent of all parcels of land zoned residential in the region.

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- The pattern of zoning distribution for land parcels within these two identified coastal hazard areas are similar.
- Out of all the residential zones, Residential – Single House zone is the most common zoning for land parcels that are within the coastal inundation area (52.1 per cent), low-lying areas of the coastal erosion hazard area (40.9 per cent) or both (45.9 per cent).
- The second most common residential zoning for these identified hazard areas is the Residential – Mixed Housing Suburban zone. This is followed by the Residential – Rural and Coastal Settlement zone and then by the Residential – Mixed Housing Urban zone.
- A relatively smaller proportion of land parcels within these identified coastal hazard areas are zoned Residential – Large Lot or Residential – Terrace Housing and Apartment Building zone.

Table 5: Correlation between AUP residential zones and land within coastal hazard areas

Residential Zones	Total number of parcels in Auckland	Number of parcels within coastal storm inundation 1 per cent AEP and/or 1 per cent AEP + 1m SLR area (per cent of parcels that is in this hazard area in relation to all parcels with this zoning)	Number of parcels within (b) of coastal erosion hazard area* (per cent of parcels that is in this hazard area in relation to all parcels with this zoning)	Number of parcels within coastal storm inundation 1 per cent AEP, 1 per cent AEP + 1m SLR area and/or coastal erosion hazard area* (per cent of parcels that is in these hazard area in relation to all parcels with this zoning)
Residential - Large Lot Zone	7,444	235 (3.2 per cent)	281 (3.8 per cent)	359 (4.8 per cent)
Residential - Mixed Housing Suburban Zone	179,244	2,404 (1.3 per cent)	3,324 (1.9 per cent)	4,263 (2.4 per cent)
Residential - Mixed Housing Urban Zone	87,134	607 (0.7 per cent)	425 (0.5 per cent)	890 (1.0 per cent)
Residential - Rural and Coastal Settlement Zone	6,300	811 (12.9 per cent)	838 (13.3 per cent)	1,002 (15.9 per cent)
Residential - Single House Zone	84,900	4,657 (5.5 per cent)	3,546 (4.2 per cent)	5,496 (6.8 per cent)
Residential - Terrace Housing and Apartment Building Zone	29,870	231 (0.8 per cent)	261 (0.9 per cent)	317 (1.1 per cent)
Total	394,892	8,945 (2.3 per cent)	8,675 (2.2 per cent)	12,627 (3.2 per cent)

Table 6: Breakdown of the zoning of residential land in the coastal storm inundation 1 per cent AEP and/or 1 per cent AEP + 1m SLR area

Residential Zones	Number of parcels within coastal storm inundation 1 per cent AEP and/or 1 per cent AEP + 1m SLR area	Proportion of parcels with this zoning in relation to all the residential parcels within this hazard area
Residential - Large Lot Zone	235	2.6 per cent

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Residential - Mixed Housing Suburban Zone	2,404	26.9 per cent
Residential - Mixed Housing Urban Zone	607	6.8 per cent
Residential - Rural and Coastal Settlement Zone	811	9.1 per cent
Residential - Single House Zone	4,657	52.1 per cent
Residential - Terrace Housing and Apartment Building Zone	231	2.6 per cent
Total	8,945	100 per cent

*Table 7: Breakdown of the zoning of residential land in the coastal erosion hazard area**

Residential Zones	Number of parcels within (b) of coastal erosion hazard area*	Proportion of parcels with this zoning in relation to all the residential parcels within this hazard area
Residential - Large Lot Zone	281	3.2 per cent
Residential - Mixed Housing Suburban Zone	3,324	38.3 per cent
Residential - Mixed Housing Urban Zone	425	4.9 per cent
Residential - Rural and Coastal Settlement Zone	838	9.7 per cent
Residential - Single House Zone	3,546	40.9 per cent
Residential - Terrace Housing and Apartment Building Zone	261	3.0 per cent
Total	8,675	100 per cent

*Table 8: Breakdown of the zoning of residential land in the coastal storm inundation 1 per cent AEP, 1 per cent AEP + 1m SLR area and/or coastal erosion hazard area**

Residential Zones	Number of parcels within coastal storm inundation 1 per cent AEP, 1 per cent AEP + 1m SLR area and/or coastal erosion hazard area*	Proportion of parcels with this zoning in relation to all the residential parcels within these hazard areas
Residential - Large Lot Zone	359	2.8 per cent
Residential - Mixed Housing Suburban Zone	4,263	33.8 per cent
Residential - Mixed Housing Urban Zone	890	7.0 per cent
Residential - Rural and Coastal Settlement Zone	1,002	7.9 per cent
Residential - Single House Zone	5,796	45.9 per cent
Residential - Terrace Housing and Apartment Building Zone	317	2.5 per cent
Total	12,627	100 per cent

- In broad terms, Residential – Large Lot zone, Residential – Single House zone and Residential – Rural and Coastal Settlement zones provide for lower density development on larger-sized lots. In all three of these zones, only one dwelling is generally provided for as a permitted activity and the

larger lot sizes allow for greater flexibility to set development outside of natural hazard areas. Table 9 summarises the relevant provisions and activity statuses that apply to residential development in these three zones. The lower density intention for these zones is reflected in the relevant objectives and policies in each respective zone.

Table 9: Summary of relevant provisions and activity statuses in the Residential - Large Lot, Rural and Coastal Settlement and Single House zones

	Dwelling (one per site)	Minor Dwellings (one per site)	Conversion of a principal dwelling into two dwellings	More than one dwelling (other than via conversion or a minor dwelling)
Residential – Large Lot zone	P	RD	-	D
Residential – Rural and Coastal Settlement zone	P	RD	RD	NC
Residential – Single House zone	P	P	P	NC

- The other three residential zones provide for higher density development. In the Residential – Mixed Housing Suburban and Residential – Mixed Housing Urban zones, up to three dwellings is provided for as a permitted activity, with four or more dwellings being a restricted discretionary activity. In the Residential – Terrace Housing and Apartment Building zone, all dwellings are restricted discretionary activities. However, there are no controls that limit the number of dwellings on the site in this zone.
- As outlined above, although the Residential – Single House zone is the most common residential zone that is applied to land parcels affected by the identified coastal hazards areas, it is noted that there is still a significant portion of land parcels that have a zone that provides for higher density development. Table 10 shows the proportion of the lower density and higher density zoned land parcels in the identified coastal hazard areas. It is noted that the background to these zoning patterns have not been able to be explored as part of this analysis, but it is acknowledged that this zoning pattern may be partly a result of direct translation from legacy district plans and/or other area-specific hazard studies.

Table 10: Proportion of lower density zoning and higher density zoning in coastal hazard areas, based on Tables 6 to 8 above

Natural hazard area	Lower density (Single House, Large Lot or Rural and Coastal Settlement)	Higher density (Mixed Housing Suburban, Mixed Housing Urban or Terrace Housing and Apartment Building)
Coastal storm inundation	63.8 per cent	36.3 per cent
Coastal erosion hazard area*	53.8 per cent	46.2 per cent
Either or both	56.6 per cent	43.3 per cent

Relationship between zoning and the Auckland-wide provisions

- Currently, the zone provisions sit largely independent of the other site and/or area specific matters that also need to be considered. In the context of the management of risk from natural hazards, the only difference in consideration between a development on a site outside of a natural hazard area and one within a natural hazard area are the relevant Auckland-wide natural hazard provisions.
- From the discussion above, an identified weakness of the AUP is the reliance on the Auckland-wide hazard provisions to ‘intervene’ over the zone provisions and to determine the appropriate development potential of a site. This inevitably sets up a contest between the presumed development provided for by the zone against any loss in potential required through the Auckland-wide provisions to avoid or mitigate a hazard risk. The achievement of the zone potential becomes the aim, or starting point for discussion, rather than what is required to avoid or mitigate risk and for this prerogative to lead in determining the development potential of a site.
- The natural hazard provisions in the AUP focus on managing or avoiding the risks from hazards but do not actually ensure, or apply, a potential reduction in the anticipated development right yield set by the overarching zone. Even when a site may be subject to natural hazard risk that is considered to be ‘significant’ and/or where further intensification is not considered to be suitable from a hazard risk perspective, there is no clear directive in the plan to suggest that a density or level of development that is lower than that signalled by the underlying zone may be more appropriate. This is particularly important for sites or areas where there is clearly demonstrated risk, or cumulative risk with available supporting information, without the need to undertake a site-specific assessment to determine the level of risk. This framework can limit the effectiveness of the Auckland-wide provisions in achieving the outcomes sought under the RPS and contributes to an issue identified relating to perceived development potential of sites. Further consideration should be given to whether it is appropriate to better utilise zoning and/or other development control measures to achieve the B10.2 objectives, particularly (2) and (3).

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through zoning, it is recommended to²⁵:

- Investigate the zoning that applies to areas where there is already sufficient information on the level of risk or cumulative risk and determine if it reflects the likely level of appropriate development or redevelopment potential.
- Review the development potential of sites within natural hazard areas to determine whether they are appropriate and give effect to the AUP objectives. For example, lower development potential could be applied to sites in demonstrated areas of natural hazard risk, or variations to densities could be introduced to identify when a lower density may be warranted based on the level of risk or cumulative risk identified at site-specific assessment stage.

²⁵ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.2.4.2 Structure plans

Context

- A plan change is required to rezone Future Urban zoned land before it can be used for urban activities. Structure planning enable a detailed analysis to be undertaken to determine the appropriate form of urban development and are considered the appropriate foundation for a plan change process to rezone land. Policy B2.2.2(3) in Chapter B2 Urban Growth and Form states:

(3) Enable rezoning of future urban zoned land for urbanisation following structure planning and plan change processes in accordance with Appendix 1 Structure plan guidelines.

Appendix 1 Structure plan guidelines states:

Structure plans are an important method for establishing the pattern of land use and the transport and services network within a defined area. They can provide a detailed examination of the opportunities and constraints relating to the land including its suitability for various activities, infrastructure provision, geotechnical issues and natural hazards. They should identify, investigate and address the potential effects of urbanisation and development on natural and physical resources in the structure plan area and in neighbouring areas...

- Chapter B2 Urban Growth and Form relies on structure plans to determine the appropriate form and location of urban development, and they are referred to throughout the policies (Table 11).

Table 11: References to structure plans in Chapter B2 Urban Growth and Form

B2 Urban growth and form policies – references to Structure Plans
B2.2.2 [Development capacity and supply of land for urban development]
(2) Ensure the location or any relocation of the Rural Urban Boundary identifies land suitable for urbanisation in locations that: (f) follow the structure plan guidelines as set out in Appendix 1;
(3) Enable rezoning of future urban zoned land for urbanisation following structure planning and plan change processes in accordance with Appendix 1 Structure plan guidelines.
(7) Enable rezoning of land within the Rural Urban Boundary or other land zoned future urban to accommodate urban growth in ways that do all of the following: (d) follow the structure plan guidelines as set out in Appendix 1.
B2.5.2 [Growth in ‘centres’]
(4) Enable new metropolitan, town and local centres following a structure planning process and plan change process in accordance with Appendix 1 Structure plan guidelines , having regard to all of the following:
B2.6.2 [Rural and Coastal towns and villages]
(3) Enable the establishment of new or significant expansions of existing rural and coastal towns and villages through the structure planning and plan change processes in accordance with Appendix 1 Structure plan guidelines.
B2.8.2 [Social facilities]
(4) In growth and intensification areas identify as part of the structure plan process where social facilities will be required and enable their establishment in appropriate locations.
B2.9. [Explanation and principal reasons for adoption]
... . In Auckland, most urban growth is expected to be inside the Rural Urban Boundary: • to promote efficient and timely provision of infrastructure; • to protect natural and physical resources that have been scheduled for particular identified values; and • to avoid urbanisation without appropriate structure planning.

Analysis and Findings

Assessment considerations for structure plans

- Structure plans provide a critical opportunity, prior to making any decision on development, to assess the risks to land from natural hazards and the effects of climate change. The requirements in Appendix 1 of the AUP for assessing natural hazard and climate change risk provide important guidance on how this should be addressed.
- Appendix 1 of the AUP includes a list of external documents that are to be taken into account when preparing structure plans which are ‘*to be considered where appropriate*’. This includes the NZCPS, AUP, catchment plans and council’s Code of Practice for Land Development and Subdivision.

The reference to ‘be considered where appropriate’ is assumed to mean that only documents that are relevant to a proposal need to be considered. However, this does not reflect the requirement to ‘give effect to’ documents, including the AUP policy directions and NZCPS provisions for natural hazards and climate change.

- The only reference made in Appendix 1 of the AUP on the need to identify, investigate and address natural hazards as part of structure planning is under section 1.4.2 Natural resources:

(4) Measures to manage natural hazards and contamination.

The reference to a structure plan identifying ‘measures to manage natural hazards’ suggests identifying the interventions to ‘manage’ risk (i.e. ‘managing’ through earthworks or protection structures). It is acknowledged that this term is broad and covers a range of potential responses because certain management measures might be more viable than others in some instances. However, it is not clear whether there should be any prioritisation of the management measures if multiple options are available, particularly where avoidance should be achieved in areas where are significant natural hazard risks, as referred to under B2.2.2(2), or when new risks may be created through new use and development, as directed under B10.2.1(3). This relates back to the discussion about the difference between ‘avoid’ and ‘mitigate’ in Section 4.2.3 Approaches and directives for managing risk.

- It is also noted that the directive under Appendix 1 of the AUP refers to natural hazards in general, and not just the natural hazards that the AUP provisions focus on. As such, consideration of natural hazards at the structure planning stage may need to go beyond just the hazards currently managed by the provisions of the Plan. However, there is no guidance to clarify to what extent these hazards need to be considered and how they should be managed, given that the existing AUP provisions do not currently have the scope to cover them. This is particularly an issue if it is determined that another hazard risk does require a land use planning response.
- No direct reference is made to the effects of climate change being considered in the identifying ‘measures to manage natural hazards’, nor is there any clarification on what timeframes or the level of caution is appropriate when identifying and assessing these risks. This is a gap, particularly given the significant effect of climate change on natural hazard risk and does not reflect the requirements of the NZCPS and RPS objective B10.2.1(4).

Implementation of structure plans

- An issue that has been raised by specialists is that although structure plans are prepared under Appendix 1 of the AUP, the plan changes that follow the adoption of a structure plan are not required to be in accordance with an approved structure plan. Private plan changes that can be, and have been, initiated within structure plan areas have not always been in accordance with the adopted structure plan. This can negate the extensive work and analysis (and consultation) that has gone into identifying the form and location of development that is suitable for the level of natural hazard risk present as part of the structure plan process. In addition, it is noted that plan changes may only be for certain sections within the whole structure plan area and therefore resulting in a piece-meal or inconsistent approach across different parts of the structure plan area, particularly for the purposes of hazard risk management.
- Timing can also be an issue when it comes to the implementation of structure plans. In some cases, there can be a lengthy period between when the structure plan is developed and when development in the structure plan area eventuates. In between these steps, there could be new information on natural hazards or climate change, and therefore may affect the extent and pattern of development as intended by the structure plan. There should be a requirement to review the hazard risk assessment used for structure planning where there are some years between the Structure Plan being adopted and plan changes being introduced. Further advice from hazard specialists would need to be sought to determine how regularly hazard risk assessments should be reviewed.

Gap in AUP zones to apply to land for ‘green infrastructure’

- Chapter E36 enables flood tolerant activities, such as informal recreation, to be provided for in floodplains where they do not involve buildings or structures that can exacerbate the flood hazard (Policy E36.2 (18)). However, these uses are provided for through the Open Space zones that provide for a recreation range of uses and are not intended to function for the primary purpose of hazard mitigation.
- The AUP lacks a zone to apply to land which is intended to function as green infrastructure: essentially land which is to remain undeveloped to allow for stormwater, flood waters and overflow from rivers and streams, or to allow for coastal erosion and provide setbacks to mitigate coastal hazard processes.

In the absence of a ‘green infrastructure’ zone, one of the Open Space zones is usually considered as the most appropriate zone to apply to land intended to function as green infrastructure.

However, this creates a tension with the purpose of the Open Space zone as:

- the use of the land does not directly fit with the purpose of any of the AUP Open space zones which provide for differing recreation or conservation uses
- while land that functions as green infrastructure may also still be able to be used for ‘passive’ recreation (i.e. walking, running), this is not the primary purpose, and it is not intended to manage the land for recreational use or any other purpose
- there are associated costs to council in managing and maintaining land that is zoned for an Open Space zone purpose, which may not be required, or appropriate, for green infrastructure land.

The lack of a suitable zone to apply to land to function as green infrastructure can result in the perverse situation of council not seeking the provision of land in plan change processes for this

purpose, as the land does not fit with the purpose of an Open Space zone and will entail the associated management costs.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the structure planning and plan change process, it is recommended to²⁶:

- Consider strengthening the wording in Appendix 1 of the AUP to allow for stronger connection between the preparation of structure plans and the external documents that should be considered.
- Consider strengthening the consideration of natural hazard risk as part of the structure plan process by adding specific requirements in Appendix 1 of the AUP to undertake a robust assessment of natural hazard risk and to provide greater emphasis on avoidance as a management measure where practical. Appendix 1 should also outline the matters relating to natural hazard risk that need to be assessed as part of the structure planning process.
- Consider amending Appendix 1 of the AUP to provide greater clarity that structure plans should assess the increased natural hazard risks posed by climate change for new urban development and prescribe parameters to consider when undertaking this assessment.
- Explore options to ensure that plan changes within a structure plan area give effect to the land use zoning adopted under the relevant structure plan, and the need for natural hazard risk to be re-assessed in light of more up-to-date information when development actually takes place. It is noted that the relationship between spatial planning and subsequent land use planning may be addressed as part of the RMA reforms.
- Re-evaluate the current zone options for land that functions as green infrastructure and determine whether an 'Green Infrastructure zone' (with accompanying provisions) needs to be added to the AUP zones to better provide for natural hazard risk management through zoning. This zone should be a relevant consideration in the development of greenfield land and in structure planning.

4.2.5 Identifying and managing activities within natural hazard areas

Analysis and Findings

- The provisions under the AUP generally require resource consent to be obtained when certain specified activities occur on land or within an area that is identified to be potentially subject to natural hazards. Using flooding as an example, the provisions are typically relevant only when buildings, structures or earthworks are being proposed to be located within a floodplain or overland flow path, or when subdivision is being proposed on land that is within the 1 per cent AEP floodplain.
- Identification of land or an area that may be subject to natural hazards can be an issue. The mapping of natural hazard information (where available) on Geomaps are indicative only and seeks

²⁶ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

to prompt the need to undertake a site-specific assessment to better understand the nature and spatial extent of the hazard. For hazards where there is no consistent mapping, definitions are used as a proxy. However, both the mapping and the definitions have their limitations and as such, may not identify all sites where a hazard risk assessment is warranted. As discussed in more detail in the subsections of Section 4.3 Hazard-specific AUP provisions, there are also different interpretations of whether consent is required or not depending on whether the activity itself is located within the identified natural hazard area or whether any part of the land is located within the identified natural hazard area.

- In addition, it is noted that sometimes there may be risk to people even when the building or structure itself is not located within an identified natural hazard area. Two identified examples are outlined below:
 - Maintaining safe access to and from the site is particularly important in managing the vulnerability of people during a natural hazard event. While there is the requirement for surface parking and private roads in the 1 per cent AEP floodplain to be located where the depth of floodwaters does not exceed 200mm above ground level under standards E36.6.1.7 and E36.6.1.8, there are no similar land use provisions that apply to areas affected by the other natural hazards. Therefore, accessibility of the site during a natural hazard event may not be appropriately assessed if changes on the site do not involve a specified activity that requires a resource consent.

In addition, there is limited scope as part of the consenting process to consider the extent of potential natural hazard impact on public roads and how this affects access to and from the site. For example, intensification may occur on sites that are not in any identified natural hazard area even if the road or access points may be compromised during a natural hazard event. Structure planning and plan changes contribute an important role to address this aspect of risk for greenfield areas. This issue is more difficult to address in brownfield areas where zoning and intensification opportunities have already been established, and there is no scope to consider this as part of the consent process.

- Outdoor living areas associated with residential dwellings can be established as a permitted activity in a floodplain if the dwelling itself is not located within a floodplain as no new structures or buildings are being proposed in the 1% AEP floodplain. As such, residents may be exposed to flood risk without the need for any site-specific assessment.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the structure planning and plan change process, it is recommended to²⁷:

- Undertake further investigation into how natural hazard areas that are currently managed by the AUP have been identified and consider whether the AUP should be amended so that there is a greater scope and more opportunities for natural hazard risk to be considered or assessed beyond that currently provided for.

²⁷ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.2.6 Consistency of assessments and quality of information provided

Analysis and Findings

- Under E36.9, the council requires applicants to provide appropriate technical assessments to support an application for an activity or development that may be subject to or exacerbate natural hazard risk. Given the limitations in resourcing and the statutory timeframes, council specialists largely rely on these technical assessments to inform their assessment of a resource consent application. It is the role of the council to review this information, but not to undertake an analysis for the applicant. That responsibility lies with the applicant's specialists. While council specialists can identify inaccuracies in reporting such as incorrect calculations or outdated data sources, there is a degree of trust that the information presented is accurate and based on the most relevant data available. However, discussions with specialists indicate that sometimes information presented can be misleading or not entirely accurate, which then affects the ability for the AUP provisions to manage natural hazard risk as intended.
- Consent data review and discussions with specialists also suggest that the information and assessment requirements under E36.9 may not be fully understood and therefore not being utilised to its full potential. Consent data review suggests that not all matters that can and should be considered as part of the assessment have been addressed as part of a resource consent application in every instance. Examples include the ability to relocate a building in relation to coastal hazards, or access to and from a site or building on a site in a natural hazard event. The recent and upcoming practice and guidance notes may assist with this matter.
- Adding to this is the fact that there is often a disconnect between the scope covered in the matters of discretion and assessment criteria and the scope covered by all the relevant objectives, policies and E36.9 requirements. A general observation is that the objectives and policies are less effective for assessment purposes in practice – there are so many objectives and policies that plan users end up assessing the ones that are deemed most relevant. Feedback from specialists suggest that there is always an argument that can be made by applicants to support their proposal given the various objectives and policies that are available to choose from.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to²⁸:

- Continue to provide additional guidance on the special information requirements under E36.9 and consider adopting a more stringent policy to applying these requirements
- Investigate the clarity and directiveness of rules, including the matters of discretion and assessment criteria, and objectives and policies to focus assessments on the most relevant and important considerations

²⁸ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.2.7 Impact of existing development on hazard risk management

Analysis and Findings

- Existing development, particularly where established prior to the AUP, can add complexity to how risk from natural hazards is managed. Objectives in B10.2 and E36 provide for redevelopment in existing developed areas and seek to ensure that risks of adverse effects from natural hazards are not increased overall, and where practicable reduced, in these situations. However, consents investigated indicate that sometimes these buildings and structures, which have not been designed to avoid or mitigate hazard risk to the extent required by the AUP, play a role in influencing risk management outcomes. For example, there have been instances where additions to an existing building have floor levels that match the existing, even though the existing building now sits below coastal storm inundation levels or flooding levels, or when upper floor additions are added to an existing building where the ground floor is of a level that would be flooded or inundated during a hazard event.

The policy direction in these scenarios is unclear. Is the risk not increased overall because the risk was already present, or is the risk being increased overall because the consequence of additional building means possibly more people are subject to natural hazard risk? This also links back to the discussion of understanding risk under [Section 4.2.3 Approaches and directives for managing risk](#).

- The AUP provisions do not provide clear guidance on what is the most appropriate way to address the tension between existing development and natural hazard risk management, and this is reflected in the varied assessments seen in the consents investigated. For example, it is noted that the relevant matters of discretion and the assessment criteria for additions to existing buildings in the coastal storm inundation 1 per cent AEP or in the 1 per cent AEP floodplain are the same as establishing a new building or structure in the respective hazard areas.

If it is considered that risk is increased overall as a result, then potentially these activities would need to be managed more carefully to achieve the outcomes sought under B10.2. However, at the same time, it may not be lawful or reasonable to impose additional requirements given the existing development on site.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to²⁹:

- Further investigate the appropriate response to existing development (and redevelopment) and natural hazard management, acknowledging that existing use rights under s10 of the RMA and ‘reasonable use’ under s85 of the RMA impose restrictions in this space.

²⁹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.2.8 Differentiation in risk tolerance

Analysis and Findings

- With reference to coastal storm inundation and flooding, the AUP provisions utilise differentiating terms such as ‘more vulnerable’, ‘less vulnerable’, ‘habitable rooms’ and ‘non-habitable rooms’, as a method to manage risk. This is reflected not only in the rules and standards themselves, but the relevant matters of discretion and assessment criteria. It is noted that the term ‘vulnerable’ is not used in any of the objectives under B10.2.1 or E36.2, with this term only starting to feature in the policies under B10.2.2 and E36.3. The term ‘habitable’ is not used anywhere in B10.2.1 or B10.2.2, but only in the policies under E36.3.
- While ‘more vulnerable activities’ and ‘habitable rooms’ are inherently more sensitive to risk from natural hazards, the question lies as to whether such a strong focus on these activities achieves the outcomes sought under B10.2. As noted above, the objectives under B10.2.1 do not indicate any differentiation - both objectives B10.2.1(2) and B10.2.1(3) refer to risk generally to people and property. Therefore, this suggests that potentially any risk to people or property, regardless of whether the activity or type of building, should be subject to the same assessment considerations. Even though the AUP management framework suggests that a higher level of risk is tolerated for these ‘less vulnerable activities’, it does not mean that there is no risk involved.
- Issues stemming from this differentiation have been highlighted in some of the consents investigated. ‘Less vulnerable activities’ such as commercial activities or most community activities, and ‘non-habitable rooms’ such as garages, are subject to less onerous provisions, with less comprehensive assessment requirements and sometimes with no or little conditions imposed. However, there is still a risk to people and property during a hazard event, and by having less onerous provisions, it may be mean that there are less mitigation requirements to address a similar level of risk.
- Discussions with specialists and consent data review also indicate that the assessment outcomes vary where a development includes both ‘less vulnerable’ and ‘more vulnerable’ activities, particularly if the ‘less vulnerable activity’ is located on the ground floor and the ‘more vulnerable activity’ above. As the ‘less vulnerable activity’ is subject to less onerous provisions, a different level of consideration is required to be given to the ‘human’ aspect of risk, resulting in situations where, for example, emergency access to and from the building is not possible during a flood event with the only mitigating factor being that people on the upper floors can remain inside at a level that is higher than the anticipated flood level.

It is noted that minimum floor levels are recommended for ‘less vulnerable activities’ in the Stormwater Code of Practice, however this sits outside of the AUP and the AUP provisions do not necessarily reflect the need for this to be considered. Consents investigated indicate that imposition of conditions for minimum floor levels do not appear to be common for ‘less vulnerable activities’. Conversations with specialists suggest that there could be more policy guidance on this in the AUP, particularly on what level of risk is considered to be acceptable in these circumstances. Without clear guidance on how this should be managed, this results in varied assessments with different hazard risk management outcomes.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to³⁰:

- Undertake further investigation into the management framework for flooding and coastal storm inundation and consider re-evaluating whether this achieves objectives B10.2.1(2) and B10.2.1(3).
- Provide additional guidance or policy direction on how ‘more vulnerable activities’ or ‘habitable rooms’ that are located in the same building as ‘less vulnerable activities’ or ‘non-habitable rooms’ should be managed.

4.2.9 Implementing a precautionary approach

Analysis and Findings

- Policy B10.2.2(6) relates to the circumstances when a precautionary approach to risk assessment and management is required:

(6) Adopt a precautionary approach to natural hazard risk assessment and management in circumstances where:

- (a) the effects of natural hazards and the extent to which climate change will exacerbate such effects are uncertain but may be significant, including the possibility of low-probability but high potential impact events; or**
- (b) the level of information on the probability and/or impacts of the hazard is limited.**

Chapter E36 does not contain any reference to the term ‘precautionary approach’ and the AUP does not define what this term means. It is not clear how the provisions in the AUP support this policy.

- The current activity status for subdivision, use and development in hazard areas and the ambiguity of how certain rules should be interpreted does not imply a precautionary approach is required. The circumstances when a precautionary approach may be required should be clarified through the policies (i.e. policies that identify significant risk such as multiple hazards, or uncertainty that requires comprehensive assessment) and through rules that are less ambiguous and do not imply development is anticipated, but that requires assessment to determine if it is appropriate (i.e. a discretionary or non-complying activity). Likewise, the zoning of land could apply a ‘precautionary approach’ where land is known to be subject to significant and/or cumulative risk. These matters have been discussed in more detail above in [Section 4.2.3 Approaches and directives for managing risk](#).

³⁰ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to³¹:

- Consider clarifying when a precautionary approach may be required and re-evaluating how the AUP achieves policy B10.2.2(6), including how this could be reflected in zoning, rule/activity status and clearly through policies.

4.2.10 Risk from multiple hazards

Analysis and Findings

- The AUP lacks direction on the management of risk from cascading and coincidental hazards. As discussed in [Section 4.2.3 Approaches and directives for managing risk](#), the same restricted discretionary activity status applies regardless of how many natural hazard risks are present.
- It is noted that the relevant objectives, policies, and provisions in the AUP, including the special information requirements under E36.9, do not explicitly require the consideration of risk associated with multiple hazard events occurring at the same time. For example, specialists have raised that there is a degree of confusion as to how to assess risk when a site is subject to both flooding and coastal storm inundation, and whether the technical information available includes this scenario in the modelling. The relevant rules and associated matters of discretion and assessment criteria for each of the hazards seem to sit largely separate and independent of one another, which may impact on their effectiveness in achieving the RPS outcomes. Furthermore, the impact of climate change on the magnitude, frequency and intensity of natural hazard events is also not very well understood and exacerbates this risk.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to³²:

- Investigate whether there are any gaps associated with the assessment of natural hazard risk or cumulative natural hazard risk arising from coincidental and cascading hazards, and whether the AUP provisions should indicate that a precautionary approach should apply in scenarios where the interaction between coinciding hazards is difficult to understand and predict.

4.2.11 Duration and timeframes for consents

Analysis and Findings

- The AUP does not provide policy guidance on timeframes related to duration of consent. There are several different timeframes that are relevant regarding hazard risk management:

³¹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

³² These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- the AUP requires the assessment of risk based on a 100-year timeframe,
- land use consents and subdivision consents have an unlimited duration (unless specified in the consent or excluded under s123 of the RMA)
- coastal permits for hard protection structures in the coastal marine area cannot be granted for more than 35 years (s123 (c) RMA).
- assessments for buildings and structures under the Building Act is for 50 years
- resource consents are valid for five years after being granted before they lapse, with subdivisions taking longer before fully been given effect due to the s223 and s224 process.

While the duration of consent is a matter that can be considered under Policy E36.3(3) and various subsequent matters of discretion or assessment criteria, consent data review suggests that a condition limiting the duration of consent is only imposed for coastal permits. In some cases, it may be appropriate to limit the duration of the consent or require buildings or structures to be relocated after a certain period, for example in response to the effects of increasing risk from climate change. However, there is currently no policy guidance on when this would be applicable, and therefore can limit the full potential of the AUP provisions in achieving the RPS objectives.

The various timeframes that apply in the natural hazard risk management space poses impediments to the management of natural hazards. This is discussed further in [Section 4.5 Natural hazards and the Building Act 2004](#).

- It is also noted that the risk assessment is based on an assessment of risk at the time consent is sought, but the hazard risk may change over time, particularly as a result of changing climate change projections. Aside from limiting the duration of consent, this issue could also be addressed through the requirement to review or re-evaluate the situation at a future date. Again, based on consents investigated, review conditions have not been frequently imposed, and if included, have been generally imposed in relation to coastal permits. There is also a lack of policy direction in the AUP to clarify when a review condition is warranted and should be imposed.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to³³:

- Consider amending the AUP to provide policy direction on situations where it is appropriate to limit the duration of a consent and include review conditions as a mechanism to manage risk.

4.2.12 Permitted activities

Context

- Under Chapter E36, there are a range of activities for use and development in identified natural hazard areas that do not require a resource consent. These include activities such as external alterations to buildings which do not increase the gross floor area of the building on land in the coastal erosion hazard area, and additions of habitable rooms up to 25m² to existing buildings in

³³ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

the coastal inundation 1% AEP + 1m SLR area. Some activities have permitted activity standards that must be met, while others do not.

Analysis and Findings

- As permitted activities do not require a resource consent, it is difficult to confirm exactly how much development has occurred in identified natural hazard areas, or to conclude whether these provisions are being applied correctly and are effective. While it may be possible to do so by investigating building consent data, this was not able to be carried out given the limitations in time and resourcing.
- There is also the question of whether permitted activities are appropriate for managing risk from natural hazards. Two examples of where this issue should be considered further are outlined below:
 - Under E36.4.1(A12), the establishment of new habitable rooms in the coastal storm inundation 1 per cent AEP plus 1m sea level rise as a permitted activity subject to complying with standard E36.6.1.1. The only requirement of standard E36.6.1.1 is that the finished floor level of habitable rooms be above the modelled coastal storm inundation level plus 1m sea level rise.

Relying on this one standard to manage the risk to the safe use of habitable rooms within the coastal storm inundation area over the long-term limits the effectiveness of the AUP in achieving the objectives in B10.2.1 as it does not include any standards, or enable an assessment, that address:

- the matters additional to those modelled for coastal storm inundation that should be included within the freeboard allowance such as wave run-up and overtopping
- changes in climate change modelling and whether 1m sea level rise is still appropriate
- access to and from the building and/or site in an inundation event
- the vulnerability of those living or operating in the habitable rooms
- the long-term effects on liveability.

The limitations on the matters assessed may lead to potentially undesirable outcomes in the longer term as a result of sea level rise and climate change. This may include the effects on people from not being able to leave the building and/or the site if access points and/or surrounding roads are inundated during a storm event. This also applies to emergency services, who may not be able to access areas.

- Policy E36.3(33) indicates that potential adverse effects arising from land instability risk should be avoided first, and then remedied or mitigated if avoidance cannot be totally achieved. However, the provision of use and development on land which may be subject to land instability as a permitted activity under E36.4.1(A43) do not reflect this approach.

In order to meet the permitted standard, the building and structure would need to be constructed in accordance with a geotechnical completion report and any relevant conditions of a resource consent. There is no aspect in this framework that would require the consideration of whether risk can be ‘avoided’ in the first place or infers that mitigation and remediation of instability risk in the form of engineering solutions is the back-up option. In addition, the content and standards required in a geotechnical completion report, and the acceptable levels of risk that they may propose, are variable. The requirements for such

reports are not defined in a form that allows them to be enforced. This potential gap in the policy cascade is discussed further in [Section 4.3.4 Land instability](#).

- With specific regard to E36.4.1(A43), some specialists have questioned how effective the approval process framework required under standard E36.6.1.11 is at managing land instability risk and whether there are any liability issues associated with this practice, particularly as this is in relation to an activity that is deemed as a permitted activity in the AUP. It is recommended to explore this further as it has not been investigated as part of this analysis.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal inundation, it is recommended to³⁴:

- Investigate the efficiency and effectiveness of the relevant permitted standards through building consent data and other means.
- Investigate the impacts and risks associated with the relevant permitted activities and its appropriateness as a permitted activity, particularly with regards to how effective E36.4.1(A43) is at managing land instability risk and what liability issues may result.

4.3 Hazard-specific AUP provisions

4.3.1 Coastal storm inundation

4.3.1.1 Resource consent data summary

Based on the resource consent database, there were a total of 132 consents (granted or declined between November 2016 and April 2021) where rules relating to use and development within coastal storm inundation areas were identified as a reason for consent. Table 12 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 12: Resource consent data for coastal storm inundation

Rule or standard under Chapter E36 Natural hazards and flooding	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Activities on land in the coastal storm inundation 1 per cent annual exceedance probability (AEP) area		
E36.4.1 (A7) External alterations to buildings which increase the gross floor area of the building on land in the coastal storm inundation 1 per cent annual exceedance probability (AEP) area	14	Not investigated

³⁴ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

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E36.4.1 (A9) All other buildings and structures on land in the coastal storm inundation 1 per cent annual exceedance probability (AEP) area	111	54 (48.6per cent)
Activities on land in the coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area		
E36.4.1 (A13) Habitable rooms in new buildings and additions of habitable rooms (greater than 25m ²) to existing buildings in the coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area that do not comply with Standard E36.6.1.1	7	7 (100per cent)

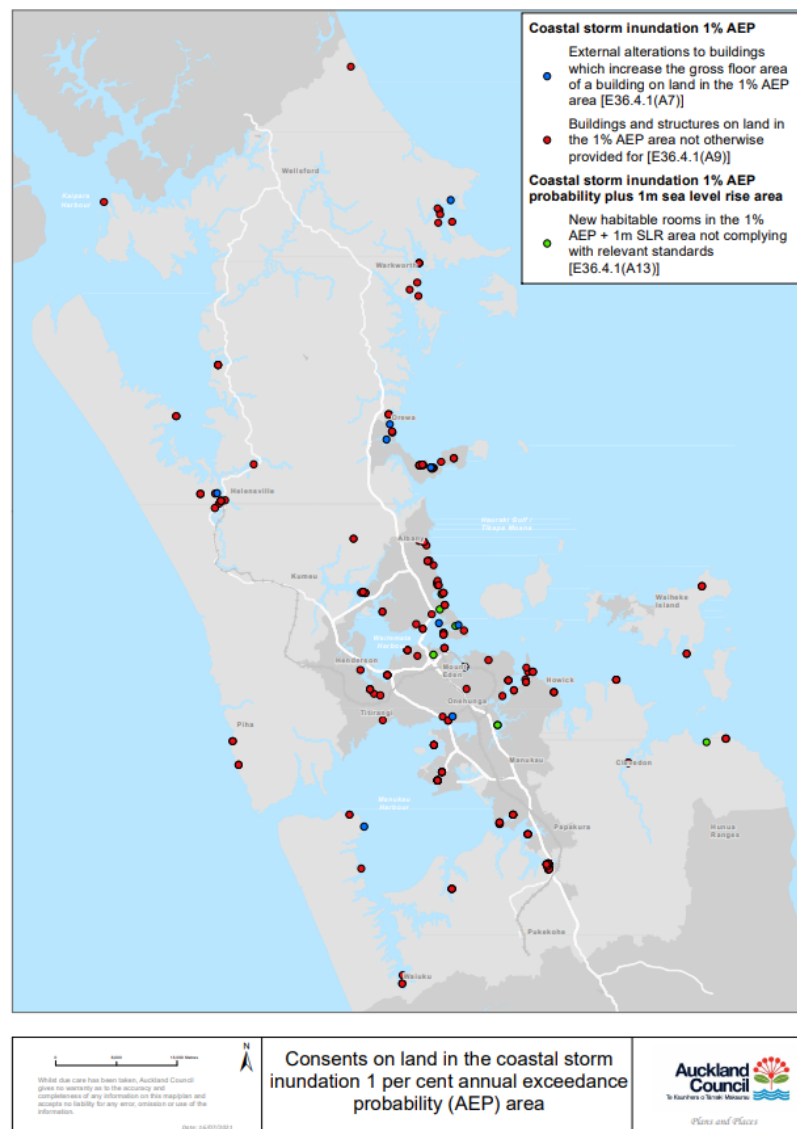


Figure 16: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to the coastal storm inundation 1% AEP area or the coastal storm inundation 1% AEP + 1m sea level rise area

Figure 16 above shows the spatial distribution of all the consents extracted from the resource consents database that required a reason for consent for buildings or structures in the coastal storm inundation 1 per

cent AEP area or coastal storm inundation 1 per cent AEP + 1m sea level rise area under rules E36.4.1 (A7), (A9) or (A13).

4.3.1.2 Definition

Context

- Chapter J Definitions of the AUP includes two definitions that apply to land subject to coastal storm inundation, namely:

Coastal storm inundation 1 per cent annual exceedance probability (AEP) area

The area of coastal land subject to inundation caused by high sea level elevations during storm events, where the sea level elevation is of such height as to have a one per cent chance of being equalled or exceeded in any year. This includes wave set up for open coastal areas and excludes wave set up for inner harbours and estuaries. Wave run up is not included.

The Coastal storm inundation 1 per cent AEP area is:

- the area shown in the Council's publicly available online GIS viewer as the modelled extent of affected land for a 100 year return period (Average Recurrence Interval); or
- as identified in a site-specific technical report prepared by a suitably qualified and experienced professional.

Note: The Coastal Storm Inundation maps included in the Council's GIS viewer represent the area of inundation indicated in the tables of the report: Stephens, S., Wadhwa, S., and Tuckey, B., (2016) Coastal inundation by storm-tides and waves in the Auckland Region, prepared by NIWA and DHI for Auckland Council, Auckland Council Technical Report TR2016/17). These maps may be amended should more updated information be made available.

Coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area

The area inundated during a coastal-storm inundation 1 per cent AEP event plus an additional one metre of sea-level rise relative to the present-day mean sea level.

The area of coastal storm inundation 1 per cent AEP plus 1m sea level rise is defined as:

- the area shown in the Council's publicly available online GIS viewer as the modelled extent of affected land for a 100 year return period (Average Recurrence Interval) plus 1m sea level rise; or
- as identified in a site-specific technical report prepared by a suitably qualified and experienced professional.

The term ‘habitable room’ is also defined as:

Habitable room

Any room in a building used for a residential nesting table activity and in a care centre or healthcare facility with an overnight stay facility, excluding a laundry, bathroom, toilet or any room used solely as an entrance hall, passageway, garage, or other space of a specialised nature occupied neither frequently nor for extended periods.

Analysis and Findings

- The definition of ‘coastal storm inundation’ provided under Chapter J appears to be clear in defining the areas which are potentially at risk from coastal storm inundation as the referenced mapping layer can be adjusted to add or remove areas based on more recent modelling information. No major issues have been identified with this definition from the consent data review or through discussions with specialists.
- The note in the definition that mentions council’s coastal inundation maps does not clarify where these mapping layers can be found in GeoMaps. The various layers and titles under which the maps sit may not be intuitive for plan users to know how to access them.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal inundation, it is recommended to³⁵:

- Include a reference (i.e. as a note) following the definitions for ‘*coastal storm 1 per cent annual exceedance probability (AEP)*’ and ‘*coastal storm 1 per cent annual exceedance probability (AEP) + 1m sea level rise*’ to advise how the mapping information referred to can be found in the council’s GIS viewer.

4.3.1.3 Mapping

Context

- The main tool used to illustrate where inundation is likely to occur is through geospatial mapping. Council’s GeoMaps (public) include mapping layers for coastal storm inundation. These mapping layers are non-statutory and can be found under the ‘Climate Impact’ and ‘Environment’ themes. As mentioned in the [Section 2.3 Mapping](#), these mapping layers are also accessible via the AUP planning maps portal, but they are not part of statutory AUP planning maps.
- The ‘Coastal inundation (1 per cent AEP)’ layers, as shown in Figure 17 below, include mapping layers that provide information on:
 - Coastal storm inundation 1 per cent AEP
 - Coastal storm inundation 1 per cent AEP plus 1m sea level rise

³⁵ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

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- Coastal storm inundation 1 per cent AEP plus 2m sea level rise

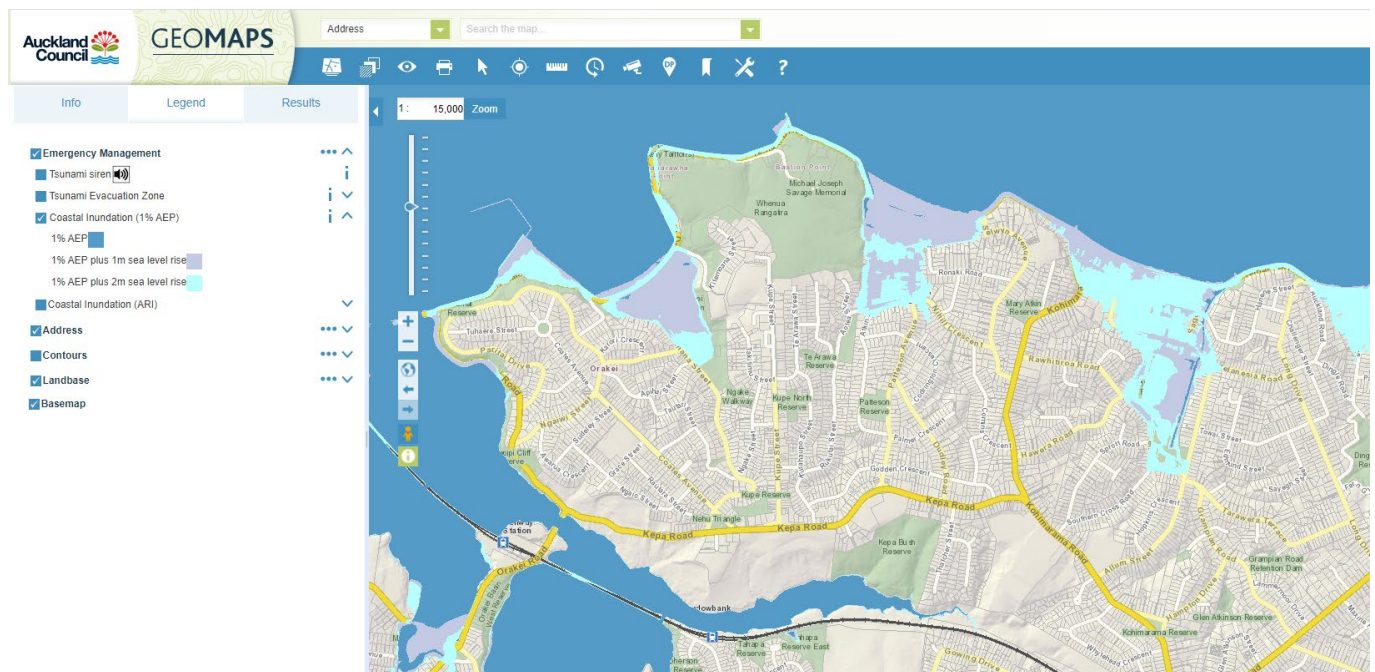


Figure 17: Auckland Council GeoMaps (public) – Mapping layers under 'Coastal storm inundation (1% AEP)' subsection

The 'Emergency management' GIS data also includes layers titled 'Coastal inundation (ARI)'. The mapping layers, as shown in Figure 18, provide information on:

- coastal storm inundation at average recurrence intervals of 5, 20, 50 and 100 year return periods
- modelled coastal storm inundation for 50 and 100 year return periods combined with both 1 metre and 2 metre sea level rise scenarios.

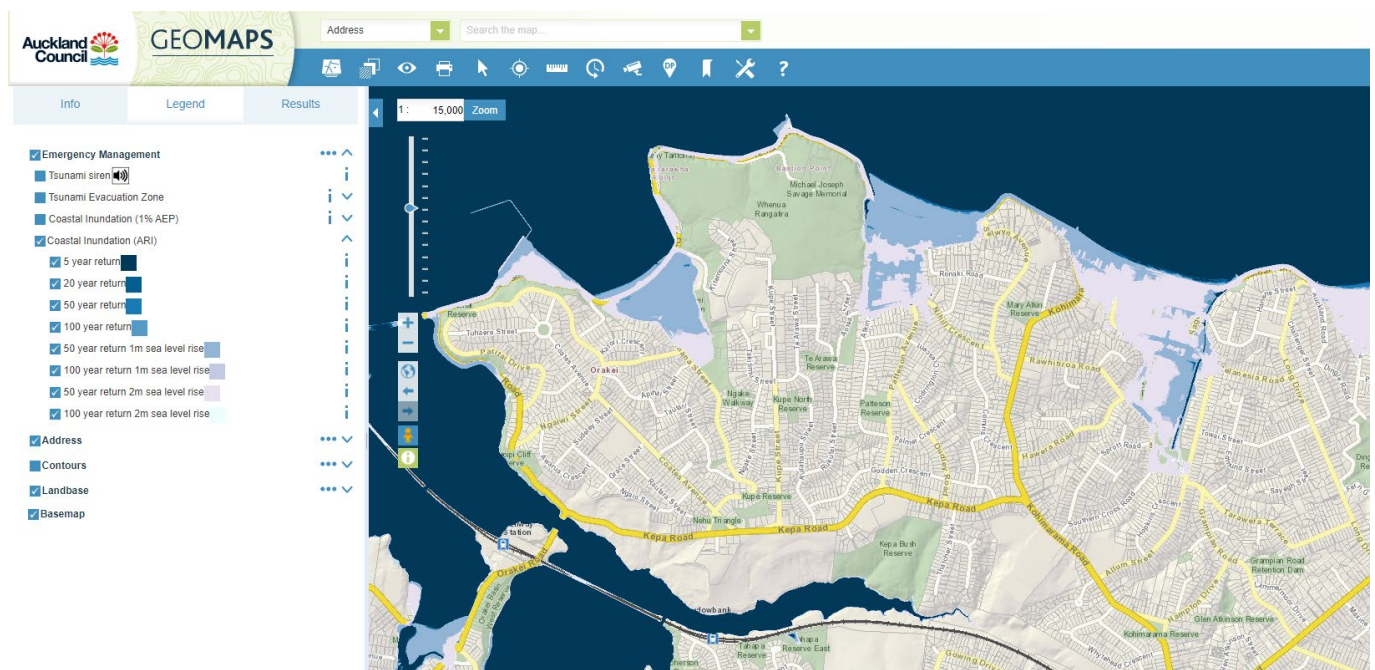


Figure 18: Auckland Council GeoMaps (public) – Mapping layers under 'Coastal inundation (ARI)' subsection

- In addition to the above, the AUP planning maps include an additional mapping layer titled ‘Coastal storm inundation 1 per cent AEP plus 1m sea level rise control’. This layer is part of the statutory AUP planning maps and is shown in Figure 19. As discussed below, this map does not reflect the updated mapping of this control on GeoMaps.

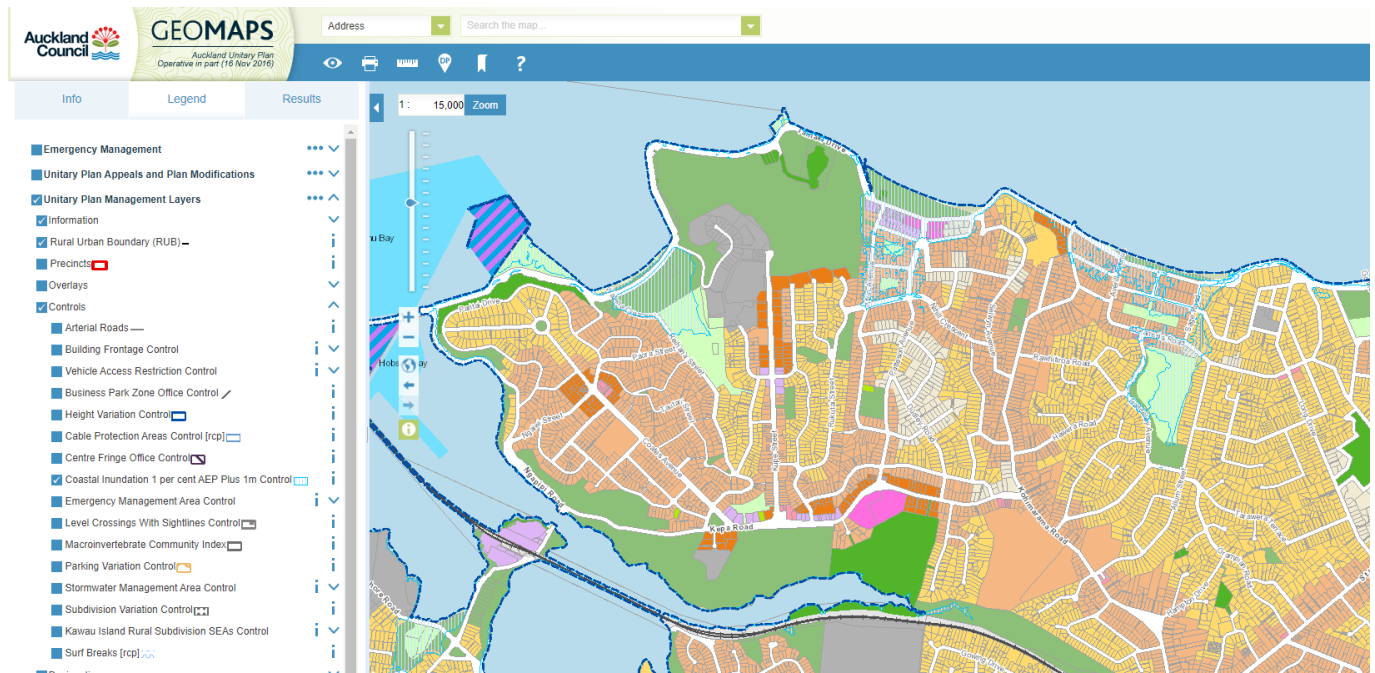


Figure 19: Auckland Council AUP planning maps – Mapping layer for ‘Coastal storm inundation 1% AEP plus 1m sea level rise control’

Analysis and Findings

- Since the AUP became operative in part in November 2016, further information and modelling of coastal storm inundation has been undertaken. The information from this latest modelling is reflected in the coastal storm inundation mapping layers in GeoMaps.
- Specialists confirm that it is preferable that the coastal storm inundation mapping information that the AUP rules relate to are on GeoMaps rather than the statutory AUP planning maps as it allows the maps to be updated to reflect the latest modelling and information available without the need for a formal plan change process. This means the most up-to-date information on inundation can be used in implementing the AUP provisions and contributes to the effectiveness of the AUP. The ability to update mapping layers to identify areas potentially affected by coastal storm inundation is aligned with Policy B10.2.1 as it provides the most up-to-date information and is therefore the most effective starting point for the assessment and management of risks associated with coastal storm inundation to achieve the outcomes sought under the RPS.
- The ‘coastal storm 1 per cent AEP plus 1m sea level rise control’ mapping layer in the statutory AUP planning maps has not been adjusted to reflect the updated modelling information because of the lengthy formal plan change process required. This means that the AUP planning maps do not show the most up-to-date information on coastal storm inundation risk and is inconsistent with the updated information located on GeoMaps. As a result, areas, such as Parakai, that have had the coastal storm inundation extent updated through improved hydrodynamic modelling, show a

different extent of areas subject to coastal inundation on the AUP maps than is shown on GeoMaps, as shown in Figure 20 below.

- This difference in mapping has potential to cause confusion for plan users and technically the statutory out-of-date AUP maps apply for this rule. Having only one statutory and out-of-date map for the coastal storm inundation risk creates confusion and lessens the effectiveness of the AUP provisions in achieving the outcomes of B10.2.

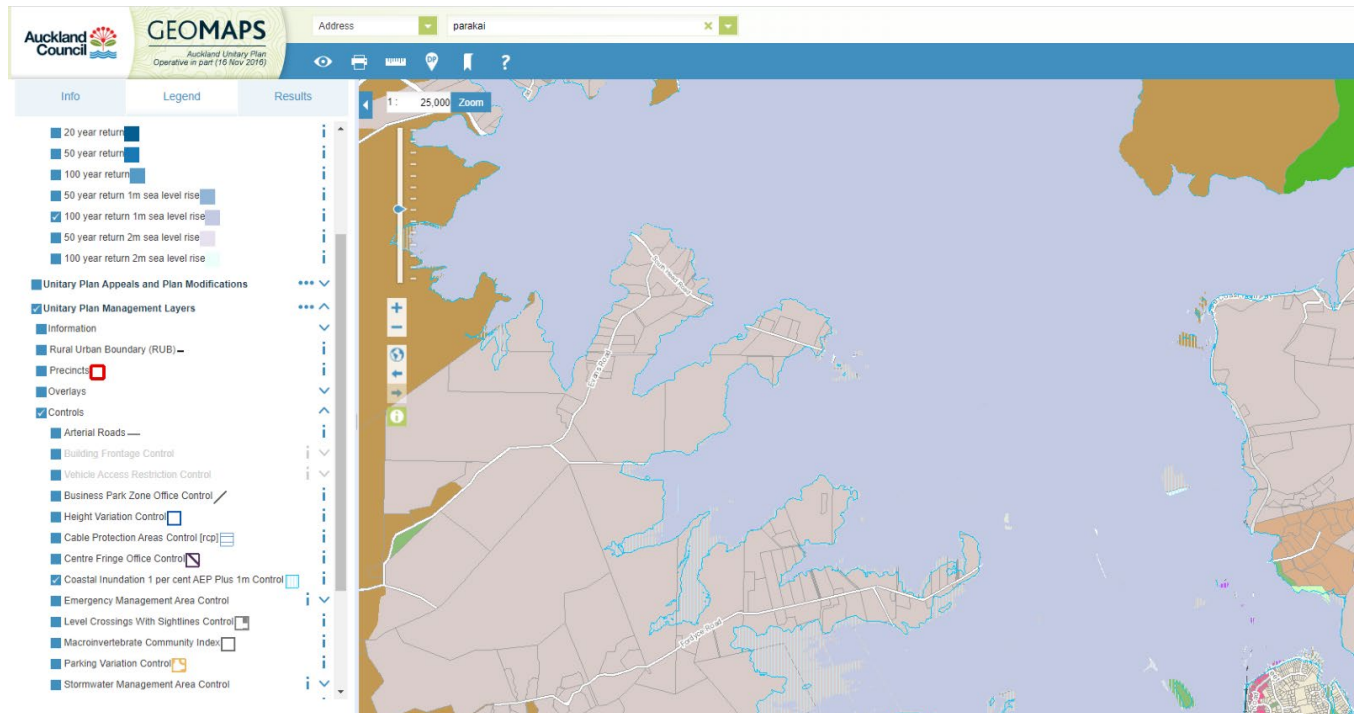


Figure 20: Auckland Council AUP maps – Difference between 1% AEP + 1m sea level rise (blue) and 'Coastal storm inundation 1% AEP plus 1m sea level rise control' (hatched) in Parakai

- Based on consent data review, there have been at least six instances where the 'coastal storm inundation 1 per cent AEP plus 1m sea level rise area' has been identified in the planning assessment (through mapping) but the 'coastal storm inundation 1 per cent AEP area' has not, even though both affect the site and separate rules apply in each circumstance. Discussions with specialists confirm, as identified above, that this is likely to be attributed to the discrepancy between the fact that the 'coastal storm inundation 1 per cent AEP plus 1m sea level rise control' is a mapped control layer in the AUP while the 'coastal storm inundation 1 per cent AEP area' is not. This limits the effectiveness of the AUP as plan users do not always know, or refer, to both the AUP planning map controls and the separate 'coastal inundation (1 per cent AEP)' mapping layer to identify which rules apply. There is likely to be an assumption that the AUP planning map control is the only mapping layer that needs to be referred to.
- Consent data review also indicates that there have been at least three instances where coastal storm inundation has been mistaken for floodplains, or vice versa. Investigations into this have not been conclusive, however it has been observed that there may be a degree of misconception that flooding and coastal inundation are the same hazard. It is also noted that the mapping colours used to identify areas of flooding and coastal storm inundation are similar, particularly in the case of the 1 in 50-year return + 1m sea level rise which is the same colour as the 1 per cent AEP floodplain

modelling. This increases the risk of the wrong maps being referred to in the implementation of the AUP rules.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal inundation, it is recommended to³⁶:

- Remove the ‘coastal storm inundation 1 per cent AEP plus 1 m sea level rise area’ (under Control Layer) currently shown in the AUP planning maps.
- Improve awareness that the ‘coastal storm 1 per cent annual exceedance probability (AEP)’ and ‘coastal storm 1 per cent annual exceedance probability (AEP) + 1m sea level rise’ are separate and are subject to different rules and mapping information.
- For future mapping of coastal storm inundation and flooding, consider using colours, or other means, to make a clearer distinction between the two maps so it is easier to identify which, or whether both hazards apply to a site.

4.3.1.4 Rules and standards

Analysis and Findings

- The relevant provisions can be unclear on how the rules should be applied. The consent data reviewed indicates that there are several different and inconsistent ways in which the relevant rules for use or development in the ‘coastal storm inundation 1 per cent AEP area’ are being interpreted and applied, namely:
 - If use or development in the ‘coastal storm inundation 1 per cent AEP area’ has been identified as a reason for consent when the activity is located within the mapped or site-specific identified area, the interpretation appears to be that the rules only apply to the part of the land within the ‘coastal storm inundation 1 per cent AEP area’.
 - If use or development in the ‘coastal storm inundation 1 per cent AEP area’ has been identified as a reason for consent, even though the activity itself is not located within the mapped or site-specific identified area, the interpretation appears to be that the rules apply to the whole site if any part of it lies within the ‘coastal storm inundation 1 per cent AEP area’.
 - If use or development in the ‘coastal storm inundation 1 per cent AEP area’ has been identified as a reason for consent, even though the land or the part of land where the activity is proposed is not within the corresponding area as per the definition under Chapter J, but the reason for consent has been identified when other mapped scenarios apply, such as ‘coastal storm inundation 1 per cent AEP plus 1m sea level rise area’ or a modelled layer that is not managed by the AUP (e.g. 1 per cent AEP + 2m sea level rise area or 2 per cent AEP area), the interpretation appears to broaden the definitions provided under Chapter J. This was less common but observed in at least three consents.

³⁶ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- In some cases, as mentioned above, use or development in the coastal storm inundation 1 per cent AEP has been identified as a reason for consent due to the presence of floodplains.

While various interpretations on the application of the ‘coastal storm inundation 1 per cent AEP area’ rules generally still result in the risk from coastal storm inundation being identified and assessed during the consenting process, the ambiguity of the rules do mean that there is an inconsistency in how the AUP rules are being administered and how risk is being managed across the region.

More importantly, it also suggests that there is a level of uncertainty in the extent of precaution the AUP seeks to undertake when managing risk from coastal storm inundation. For example, requiring a resource consent for development on any part of a site that is within the coastal storm inundation area can be considered a more precautionary approach than only when the development occurs on the part of the site that is within the coastal storm inundation area. The difference in interpretation impacts on the efficiency and effectiveness of these provisions in achieving the outcomes sought under the RPS. This relates back to the discussion of ‘precautionary approach’ in [Section 4.2.9 Implementing a precautionary approach](#).

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal inundation, it is recommended to³⁷:

- Provide guidance for regulatory staff on implementing the relevant rules referring to ‘land in the coastal storm inundation 1 per cent annual exceedance probability (AEP) area’ and the maps that should be referred to.

4.3.1.5 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Based on the consent data reviewed, nearly all applications for activities in the coastal storm inundation area were subject to a site-specific investigation and were accompanied by an engineering or flood report that was peer reviewed by a suitable council specialist. There are two council specialist teams that usually undertake this peer review, with their involvement dependent on the nature and complexity of the natural hazard risk.

Management of Risk and Assessment Considerations

- Based on the consents investigated, the management of risk for coastal storm inundation is primarily focused on ensuring developments achieve adequate finished floor levels, and/or using engineering solutions to reduce the impact of a coastal storm event.
- As identified above, it has been noted in the consent data review that there may be a degree of confusion between coastal storm inundation and flooding, where they may have been identified as the same hazard or assessed the same way. While the management technique is similar, coastal

³⁷ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

storm inundation assessment requires more specific design considerations for finished floor levels beyond the standard levels that apply for floodplains.

- The council's Stormwater Code of Practice (Version 2, November 2015) included reference to design criteria for coastal inundation, but it did not provide any guidance on recommended minimum freeboard requirements. Discussions with specialists confirm that not enough clarity has been provided in terms of what the coastal inundation data does and does not include, and what the modelled levels allow for. As a result, there has been no clear guidance on freeboard allowances for coastal flooding above the modelled water levels to accommodate other factors that should be considered which include:
 - potential uncertainty in predicted extreme water level calculations
 - factors that require site-specific calculation, such as wave run-up and wave overtopping

Specialists have however mentioned that there was work in progress to address some of these issues. Since then, the council's Stormwater Code of Practice has been updated (Version 3, September 2021) to provide additional guidance on recommended minimum freeboard levels within coastal inundation areas, which will enter implementation phase in January 2022. In addition, the recently released (August 2021) guidance document outlines the necessary consideration requirements for coastal hazard risk assessments. Additional guidance on how freeboard should be calculated or applied at a site-specific level is being developed.

While this additional guidance information will assist in improving the efficiency and effectiveness of the AUP provisions in managing risk from coastal storm inundation, it is noted that there have been over 132 consents (as of April 2021) that have been assessed and potentially granted without this guidance information available. As such, the gaps identified are still likely to have an impact on how risk has been managed to date. In addition, it is noted that there are limitations associated with guidance documents compared to clear objectives, policies, and rules in the AUP. Concern has been raised on how guidance documents on elements such as freeboards can be enforced particularly considering the differences between the Building Act and the RMA (which is discussed further in [Section 4.5 Natural hazards and the Building Act 2004](#)).

- For restricted discretionary activities in the coastal storm inundation 1 per cent AEP area, the matters of discretion and the assessment criteria that apply (i.e. E36.8.1.2 and E36.8.2.2) do not directly cover all the risks and effects associated with coastal storm inundation that should be assessed. Compared to the matters of consideration outlined in policy E36.3(3) and the special information requirements under E36.9, these matters of discretion and assessment criteria are much narrower in scope. For example, specialists note there is a lack of directive to consider access to and from the building and/or site during an inundation event. It is noted that the matters of discretion and assessment criteria refer to 'public access' only.

Based on the consent data reviewed, it is observed that these additional considerations, although within scope of the matters of discretion and required under E36.9, were not always considered as part of the assessment as focus was mainly on the relevant assessment criteria. This suggests that there may be a gap in the assessments of risk that are being undertaken to achieve objectives B10.2.1(2) and B10.2.1(3) of the RPS. This relates back to the issues outlined in [Section 4.2.6 Consistency of assessments and quality of information provided](#).

- The focus of the assessment under the AUP rules for coastal storm inundation is on buildings and structures for habitable use and the vulnerability of activities. It has been observed through both consent data review and discussion with specialists that there is generally a more limited

assessment of the risk for ‘less vulnerable activities’, such as commercial, industrial or community facilities (excluding overnight stay), located in the coastal storm inundation area. Conditions for minimum freeboard levels are also not generally imposed for such activities. This poses complications when a building contains both types of activities.

Buildings in the coastal storm inundation area are at increasing risks of effects as a result of climate change and the limited focus of the AUP on addressing the risk to ‘habitable rooms’ or ‘more vulnerable activities’ as part of the hazard management framework has been identified as a potential issue in achieving the outcomes sought under the RPS. This is discussed in more detail in [Section 4.2.8 Differentiation in risk tolerance](#).

It is noted that the recent update to the council’s Stormwater Code of Practice (Version 3, September 2021) has now included recommended minimum freeboard requirements. However, this sits outside of the AUP and the AUP provisions do not reflect the need for the Stormwater Code of Practice to be considered.

- Although there is scope under the policies and matters of discretion to consider the ability to relocate buildings or structures as part of the assessment, it is observed that from the consents reviewed this was not usually assessed or appeared to have limited assessment. This may be because of the type of building or structure proposed this was not a practical option, but it may also suggest that this aspect may not have been appropriate consideration.

Conditions

- Where use and development in coastal storm inundation areas has been correctly identified and assessed, the conditions imposed were generally consistent. The main difference was in the wording of the conditions, where some consents specifically stated the required minimum floor level of buildings as a condition of the consent where others refer to the submitted engineering or flood report as part of the condition.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal inundation, it is recommended to³⁸:

- Provide additional guidance on how the freeboard level should be calculated or applied at a site-specific level for coastal storm inundation and on the wording of conditions to improve consistency.
- Investigate:
 - specifying clearer provisions and design requirements to address coastal inundation risk through provisions in the AUP.
 - amending the relevant assessment criteria so that they are so that they are more reflective of all the relevant matters for consideration required by the E36 policies and the special information requirements under E36.9.

³⁸ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.3.2 Coastal erosion

4.3.2.1 Resource consent data summary

Based on the resource consent database, there were a total of 124 consents (granted or declined between November 2016 and April 2021) where rules relating to use and development within coastal erosion hazard areas were identified as a reason for consent. Table 13 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 13: Resource consent data for coastal erosion

Rule or Standard under Chapter E36 Natural hazards and flooding	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Activities on land in the coastal erosion hazard area		
E36.4.1 (A2) External alterations to buildings which increase the gross floor area of the building on land in the coastal erosion hazard area	17	Not investigated
E36.4.1 (A4) All other buildings and structures on land in the coastal erosion hazard area	107	64 (59.8 per cent)

Figure 21 below shows the spatial distribution of all the consents extracted from the resource consents database that required a reason for consent for buildings or structures within the coastal erosion hazard area under rules E36.4.1 (A2) or (A4).

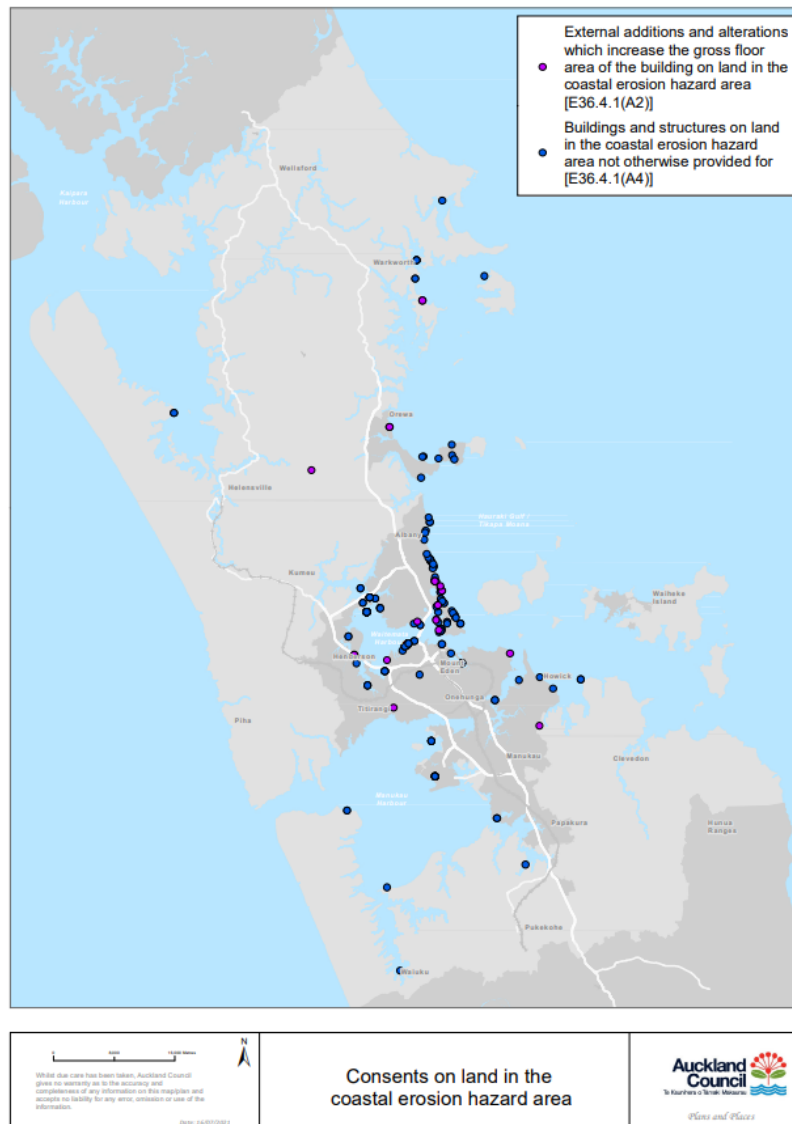


Figure 21: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to the coastal erosion hazard area

4.3.2.2 Definition and mapping

Context

- Areas susceptible to coastal erosion to which the AUP provisions apply are not mapped on the AUP maps or on GeoMaps.
- The AUP provisions were based on the best information available at the time which was a 2006 report 'Regional Assessment of Areas Susceptible to Coastal Erosion' prepared by Tonkin and Taylor for the Auckland Regional Council. This report used the existing scientific information available and field investigations to identify land susceptible to coastal erosion over a 100-year timeframe. The report noted that almost the entire length of the Auckland coastline is susceptible to coastal erosion, although the risk varies.
- At the time the report was prepared, the areas susceptible to coastal erosion could not be accurately mapped. In the absence of mapping a definition of 'coastal erosion hazard area' was included in the AUP as a mechanism to trigger rules in the AUP for coastal erosion hazards, namely:

Coastal erosion hazard area

Any land which is:

- (a) within a horizontal distance of 20m landward from the top of any coastal cliff with a slope angle steeper than 1 in 3 (18 degrees); or
 - (b) at an elevation less than 7m above mean high water springs if the activity is within:
 - (i) Inner Harbours and Inner Hauraki Gulf: 40m of mean high water springs;
or
 - (ii) Open west, outer and Mid Hauraki Gulf: 50m of mean high water springs;
or
 - (c) within a lesser distance from the top of any coastal cliff, or mean high water springs, than that stated in (a) and (b), where identified in a site-specific coastal hazard assessment technical report prepared by a suitably qualified and experienced professional to establish the extent of land which may be subject to coastal erosion over at least a 100 year time frame.
- Council recently released a report (December 2020) and mapping (May 2021) of coastal stretches that are potentially susceptible to coastal instability and/or erosion under a range of climate change (sea level rise) scenarios and timeframes. A site-specific assessment is required to assess the actual hazard risk for a property. There is work underway to begin preparation of plan change to incorporate this additional information into the AUP. This analysis does not consider this most recent mapping and relates to the efficiency and effectiveness of the currently operative AUP provisions.

Analysis and Findings

- The identification of the 'coastal erosion hazard area' relies on plan users being aware of the definition and the areas of land which the definition covers. As discussed above, there has been no mapping information available (until recently) for areas that are covered by this definition or to prompt users in checking whether the definition should apply or not.
- There are several gaps identified with the definition:

- The way the definition and rules are written suggest that only the land that falls within the defined area is at risk from coastal erosion and therefore the area where the rules apply. It is noted that it was never assumed that parts (a) and (b) were comprehensive.

This 'generic' definition of land at risk from erosion was based on a broad assessment of risk for different coastal landforms based on the best information available at the time. The definition was not intended to be applied as the actual determinate of land subject to erosion but was included to provide more certainty for landowners on what provisions may apply to their land. The intention was to identify land at risk from coastal erosion and trigger a site-specific analysis to determine the actual extent and level of risk.

Land may lie outside the area in the definition (i.e. 25 metres rather than 20 metres from the top of a cliff) and may also be at risk. Linking the rules to the definition leads to an assumption that the rules only apply to the area of land that falls within the definition. This can result in adjoining land immediately outside of the defined area that may equally be at risk of erosion not triggering the AUP rules and being assessed for risk. In addition, the definition allows for a lesser extent of land to be included in the hazard area if this is determined in a site-specific coastal hazard assessment, but not for a greater extent of land to be included if this is determined to be at risk. It is noted that this resulted from a High Court appeal relating to the definition.



Figure 22: Karaka Harbourside esplanade reserve following removal of undermined tree stumps and re-grading of cliff edge in 2015 (Source: Auckland Council)

- The definition only specifies land that is landward of a coastal cliff top but does not specify whether the definition also applies to the land between the coastal cliff top and MHWs (i.e. technically, the face, or front slope, of a cliff is not captured by the definition and there is no requirement for a consent under this particular rule).
- The definition does not explain how to determine the ‘top of any coastal cliff’ which could cause some confusion as to whether the rule applies on some sites.
- The definition refers to measurement from the top of a coastal cliff, or from MHWs. By inference its application is to land adjoining the coastal marine area, and not to other land, including land within the coastal environment outside of the coastal marine area. This means that reaches of rivers and streams that are still subject to coastal processes but are upstream of the coastal marine area are not subject to the AUP rules that relate to coastal erosion even though they may be subject to this hazard.
- There is some overlap with the definition of ‘land which may be subject to land instability’, which may also cause confusion for plan users.

Whether the relevant coastal erosion hazard area rules are identified as a reason for consent or not is directly dependent on whether the hazard is identified in the first place. Discussions

with specialists highlights the concern that the gaps in the definition and in the mapping limits the effectiveness of the AUP in managing erosion risk in this respect.

- Based on the consent data investigated, it has been confirmed that the need for a consent relating to use and development within the coastal erosion hazard area is not always identified and commonly missed. This was identified as being missed in at least 45 instances through the consent data review. This includes consents for the subdivision of land within the coastal erosion hazard area, which also relies on the definition. As such, the accuracy and implementation of this definition may have significant impacts on the efficiency and effectiveness of the relevant provisions in the AUP in achieving the RPS objectives and policies.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal erosion, it is recommended to:

- Address the gaps identified for the definition of ‘*coastal erosion hazard area*’. It is noted that some or all of these may be addressed as part of the pending plan change to link the AUP provisions with the recently released coastal erosion and instability mapping.

4.3.2.3 Rules and standards

Analysis and Findings

- In situations where the coastal erosion hazard area has been correctly identified, consent data review indicates that, as with the coastal inundation provisions, there are two different ways in which the relevant rules are being interpreted and applied:
 - Consent for use or development in the coastal erosion hazard area has been identified as a reason for consent when the activity is located within the area or areas specified under the definition. In this case, the interpretation appears to be that the rules only apply to the part of the land within the coastal erosion hazard area.
 - Consent for use or development in the coastal erosion hazard area has been identified as a reason for consent even though the activity itself is not located within the area or areas specified under the definition. In this case, the interpretation appears to be that the rules apply to land where any part of a site lies within the coastal erosion hazard area.

The way that the relevant rules are interpreted and applied in this instance impacts on whether the risk of coastal erosion is appropriately addressed as intended in the RPS. As discussed above, areas beyond the extent of land in the coastal erosion hazard area may be subject to the same level of risk as those areas within. How the rules are applied will impact on the effectiveness of the AUP in managing the risk from coastal erosion. When the latter interpretation of the rules is applied, it provides the opportunity for the hazard to be properly assessed during the consenting process, as intended by the ‘generic’ definition. The difference in interpretation also results in inconsistencies in how the AUP rules are being administered and affects the accuracy of any monitoring work.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal erosion, it is recommended to³⁹:

- Provide clarification on how the relevant rules referring to ‘land in the coastal erosion hazard area’ should be applied.

It is noted that the recently released coastal erosion and instability mapping will (through a future plan change) replace the ‘coastal erosion hazard area’ definition to determine the application of the AUP coastal erosion rules. These maps include a notice that clearly states they should not be used for the purpose of identifying the erosion risk for individual properties and that a site-specific analysis is required for consenting and insurance purposes.

It is anticipated that this will provide further clarity on how coastal erosion hazard mapping will be utilised and improve the efficiency and effectiveness of the AUP in addressing coastal erosion hazard risk.

4.3.2.4 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Based on consent data reviewed, applications relating to coastal erosion that were investigated were generally accompanied with an engineering or geotechnical report. These usually get reviewed by a council engineering specialist or a suitable specialist from other teams. Internal guidance notes indicate that whether additional specialist guidance is sought is up to the discretion of the reviewing engineer based on the complexity and the level of natural hazard risk.

Management of Risk and Assessment Considerations

- Out of those consents investigated, consents that triggered coastal erosion provisions were more commonly for hard protection structures and ancillary buildings or structures. Consents for dwellings appeared to be less common, although it is observed that many of the consents investigated that did not correctly identify the relevant coastal erosion rules were for dwellings or accessory buildings to residential activity (at least 13 instances) with no evidence to suggest that this hazard has been considered. As such, in these cases, it is not clear that the risk has been appropriately evaluated as part of the assessment.
- Management of risk for coastal erosion appears to be primarily dependent on ensuring developments appropriately avoid the risk (e.g., ensuring that a dwelling is outside of the 100-year risk area) or ensuring that the features proposed are relocatable if the land does recede. It has also been observed that reliance on existing hard protection structures is the common response to addressing coastal erosion risk. Hard protection structures are discussed further in [Section 4.4.3 Hard protection structures](#). Further discussion on reliance on engineering solutions to manage risk is covered in [Section 4.2.3 Approaches and directives for managing risk](#).

³⁹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- It has been observed as part of the consent data review that there may be a degree of confusion as to what coastal erosion is and how it should be assessed. Based on the assessments that were investigated, it is noted that sometimes coastal erosion was assessed in terms of instability or earthworks effects during site works, while in other cases, it was assessed as being the same as coastal inundation. This impacts on the risk management outcomes that these rules intend to achieve with regards to coastal erosion and therefore limits the effectiveness of the AUP provisions in achieving the objectives and policies under the RPS.

Conditions

- There does not appear to be standard conditions that are being imposed on all consents relating to use and development in the coastal erosion hazard area. There also does not appear to be any requirements to trigger the consider of adaptive or relocation actions, where appropriate.

Recommendation/s
To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from coastal erosion, it is recommended to:
Improve awareness of what coastal erosion is, all the matters to consider for coastal erosion and how it should be assessed appropriately.

4.3.3 Flooding

4.3.3.1 Resource consent data summary

Based on the resource consent database, there were a total of 3,244 consents (granted or declined between November 2016 and April 2021) where rules relating to use and development within or affecting floodplains and/or overland flow paths were identified as a reason for consent. Table 14 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 14: Resource consent data for flooding

Rule or Standard under Chapter E36 Natural hazards and flooding	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Activities in the 1 per cent annual exceedance probability (AEP) floodplain		
E36.4.1 (A25) Surface parking area and above ground parking area in the 1 per cent annual exceedance probability (AEP) floodplain, that do not comply with Standard E36.6.1.7	92	Not investigated
E36.4.1 (A26) Below ground parking or parking areas in the 1 per cent annual exceedance probability (AEP) floodplain	25	Not investigated

Te Aroturukitanga o te Mahere ā-Wae ki Tāmaki Makaurau

E36.4.1 (A29) Storage of hazardous substances in the 1 per cent annual exceedance probability (AEP) floodplain	12	Not investigated
E36.4.1 (A36) New structures and buildings (and external alterations to existing buildings) with a gross floor area up to 10m ² within the 1 per cent annual exceedance probability (AEP) floodplain that do not comply with standard E36.6.1.9	47	Not investigated
E36.4.1 (A37) All other new structures and buildings (and external alterations to existing buildings) within the 1 per cent annual exceedance probability (AEP) floodplain	951	48 (5 per cent)
E36.4.1 (A38) Use of new buildings to accommodate more vulnerable activities, and changes of use to accommodate more vulnerable activities within existing buildings located within the 1 per cent annual exceedance probability (AEP) floodplain	518	20 (3.9 per cent)
Activities in overland flow paths		
E36.4.1 (A41) Diverting the entry or exit point, piping or reducing the capacity of any part of an overland flow path	352	52 (14.7 per cent)
E36.4.1 (A42) Any buildings or other structures, including retaining walls (but excluding permitted fences and walls) located within or over an overland flow path	975	54 (5.5 per cent)
Rule or Standard under Chapter E12 Land disturbance - district	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
General standards		
E12.6.2(11) Earthworks (including filling) within a 100 year annual exceedance probability (AEP) flood plain: must not raise ground levels more than 300mm, to a total fill volume up to 10m ³ which must not be exceeded through multiple filling operations; and must not result in any adverse changes in flood hazard beyond the site	222	Not investigated
E12.6.2(12) Earthworks (including filling) within overland flow paths must maintain the same entry and exit point at the boundaries of a site and not result in any adverse changes in flood hazards beyond the site, unless such a change is authorised by an existing resource consent	34	Not investigated

E12.6.2(13) Temporary land disturbance and stockpiling of soil and other materials within the one per cent annual exceedance probability (AEP) flood plain and/or overland flow path for up to a maximum of 28 days in any calendar year may occur as part of construction or maintenance activities	16	Not investigated
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Figure 23 below shows the spatial distribution of all the consents extracted from the resource consents database that required a reason for consent for buildings or structures in a floodplain and/or the accommodation of a more vulnerable activity within a building located in floodplain under rules E36.4.1 (A36), (A37) and (A38).

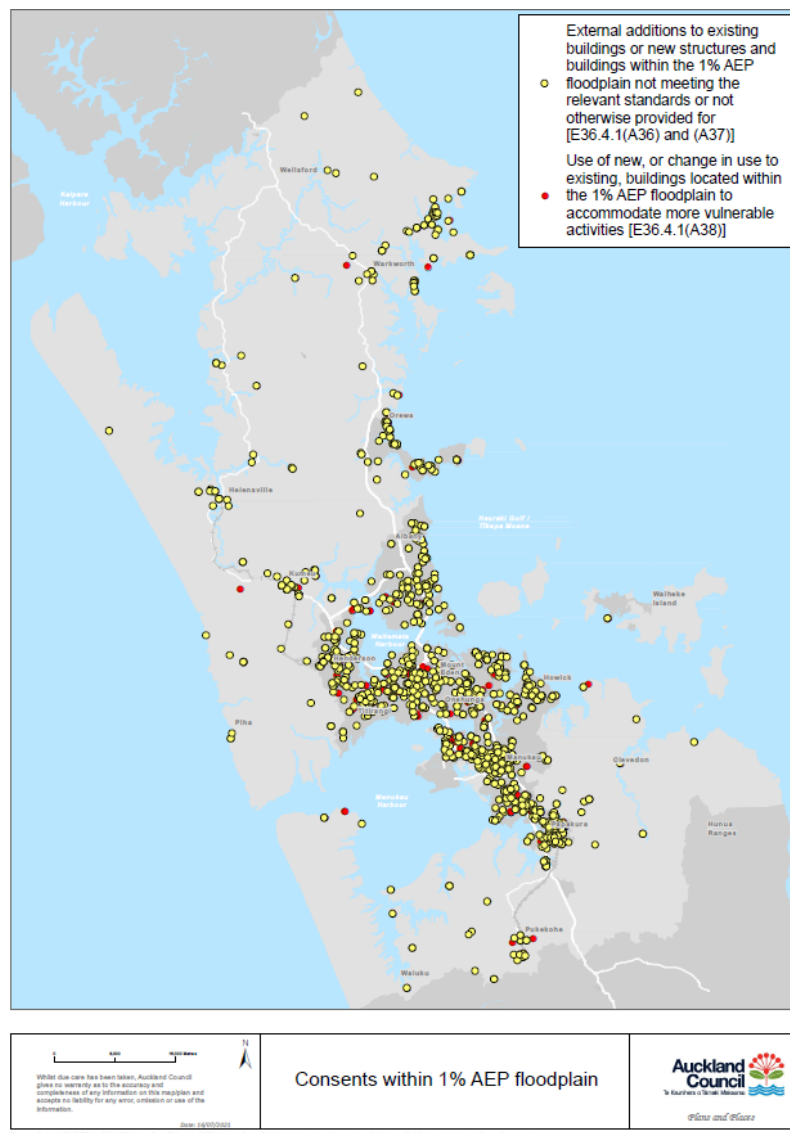


Figure 23: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to the 1% AEP floodplain

Figure 24 below also shows all the consents extracted from the resource consents database that required a reason for consent in relation to overland flow paths under E36.4.1 (A41) and (A42).

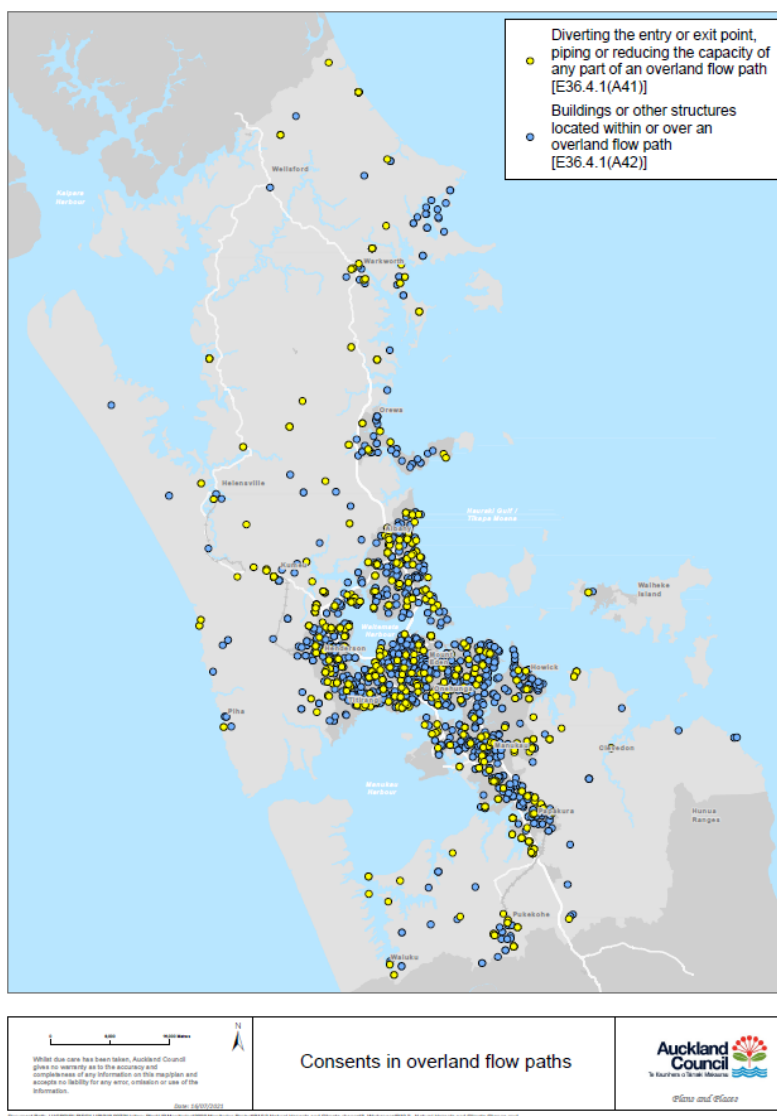


Figure 24: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to overland flow paths

4.3.3.2 Definitions

Context

- The definitions that relate to flooding and overland flow paths in Chapter J of the AUP are as follows:

Floodplain

The area of land that is inundated by runoff from a specified rainfall event, with an upstream catchment generating 2m³/s or greater of above ground flow, taking into account:

- any increases in impervious areas that would arise from changes in land use enabled by the policies and zonings of the Plan;
- the effects of climate change over a 100 year timeframe in respect of the frequency and duration of rain fall events and a 1m sea level rise; and
- assuming that primary drainage is not blocked.

Excludes the following areas:

- constructed depressions or pits within the Special Purpose - Quarry Zone

Note: The Council holds publicly available information showing the modelled extent of floodplains affecting specific properties in its GIS viewer for the one per cent annual exceedance probability (AEP) rainfall event (the floodplain maps). The floodplain map is indicative only although Council accepts its accuracy with regard to land shown on the floodplain map as being outside the floodplain. A party may provide the Council with a site specific technical report prepared by a suitably qualified and experienced person to establish the extent, depth and flow characteristics of the floodplain.

When taking account of impervious areas that would arise from changes in land use enabled by the policies and zonings of the Plan, recognition should be given to any existing or planned flood attenuation works either existing or planned in an integrated catchment management plan.

Council will continually update the floodplain map to reflect the best information available.

Annual exceedance probability

The probability of exceeding a given threshold within a period of one year. It can be applied to any type of risk. For example in relation to flooding, a one per cent AEP flood plain is the area that would be inundated in a storm event of a scale that has a one per cent or greater probability of occurring in one year.

Equivalent average return intervals (ARI) are:

- one per cent AEP = 100 year ARI.
- two per cent AEP = 50 year ARI.
- 10 per cent AEP = 10 year ARI.
- 20 per cent AEP = 5 year ARI.
- 50 per cent AEP = 2 year ARI.

Flood tolerant activity

Flood tolerant activities for the purpose of the Plan are:

- informal recreation and leisure;
- organised sports and recreation including park fields structures;
- public amenities;
- farming and intensive farming and artificial crop protection structures and crop support structures;
- forestry;
- mineral extraction;
- car parking and loading areas; and
- buildings for network utilities.

Overland flow path

Low point in terrain, excluding a permanent watercourse or intermittent river or stream, where surface runoff will flow, with an upstream contributing catchment exceeding 4,000m².

Excludes the following areas:

- constructed depressions and pits within Special Purpose - Quarry Zone.

Note

The Council holds publicly available information showing the modelled Overland Flow Paths in its GIS viewer for specific properties. The Overland Flow Path map is indicative only. A party may provide the Council with a site specific technical report prepared by a suitably qualified and experienced person to establish the location, depth or flow characteristics of the Overland Flow Path.

Council will continually update the Overland Flow Path map to reflect the best information available.

Less vulnerable activities

Means activities listed in the following nesting tables:

- Commerce;
- Community, excluding care centres, and healthcare facilities with overnight stay facilities;
- Industry; and
- Rural.

More vulnerable activities

Means activities listed in the residential nesting table and also includes care centres, and healthcare facilities with overnight stay facilities.

Analysis and Findings

- The AUP definition of ‘overland flow path’ excludes catchments less than 4000m², so therefore there may be a degree of flooding risk associated with the overland flow paths with catchments that do not meet this threshold as the relevant AUP provisions do not apply. Specialists advise that they are not aware of any issues with this provision, however this conclusion may be a result of not undertaking a review of proposals, as a consent is not required.
- Specialist feedback indicates that there are issues with some natural hazards related definitions in Chapter J:
 - The abbreviation ‘ARI’ is defined in Chapter J as ‘Average rain index’. This is incorrect as experts advise that there is no such term as ‘average rain index’ in common use. The abbreviation ‘ARI’ is usually used as an abbreviation for the more common term; ‘Average Recurrence Interval’.
 - With regards to the definition of ‘annual exceedance probability’:
 - The term ‘or greater’ in the example given with this definition is incorrect.
 - The conversion table provided between AEP and ARI is incorrect.

However, specialist advice is that these errors do not appear to have resulted in issues with the application of the definition.

- The note attached to the ‘floodplain’ definition includes this statement: “*The floodplain map is indicative only although Council accepts its accuracy with regard to land shown on the floodplain map as being outside the floodplain*”.

Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan and council's declaration of a climate emergency have superseded this aspect of the AUP. By adopting this approach, specialists have advised that this means that the underlined portion of this statement is no longer accurate as it does not reflect the preferred approach to flood risk management.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from flooding, it is recommended to⁴⁰:

- Investigate whether there are any gaps associated with the definition of ‘overland flow path’, which specifically excludes catchments less than 4000m².
- Correct the errors raised relating to the relevant definitions in Chapter J.

⁴⁰ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.3.3.3 Mapping

Context

- Council’s GeoMaps (public) include mapping layers for data for both floodplains and overland flow paths:
 - The floodplains layer indicates areas modelled to be covered by flood water as result of a rainstorm event of a scale that occurs on average once every hundred years (1 per cent AEP).
 - The overland flow paths layer indicates the lowest point in the topography where surface runoff is likely to flow, with the ability to identify the catchment sizes along the overland flow path through the use of the ‘identify’ function.
- The floodplain data shown is based on hydraulic modelling while the overland flow path layer is only based on an analysis of the topography. As highlighted in the notes that accompany the definitions of ‘floodplain’ and ‘overland flow path’, the mapping of the floodplains and the overland flow paths in GIS is indicative only and not always accurate, as they are based on a series of assumptions which may or may not be relevant in each location.
- The mapping layers are non-statutory and can be found in GeoMaps. As mentioned in [Section 2.3 Mapping](#), these mapping layers are also accessible via the AUP planning maps portal, but they are not part of statutory AUP planning maps.

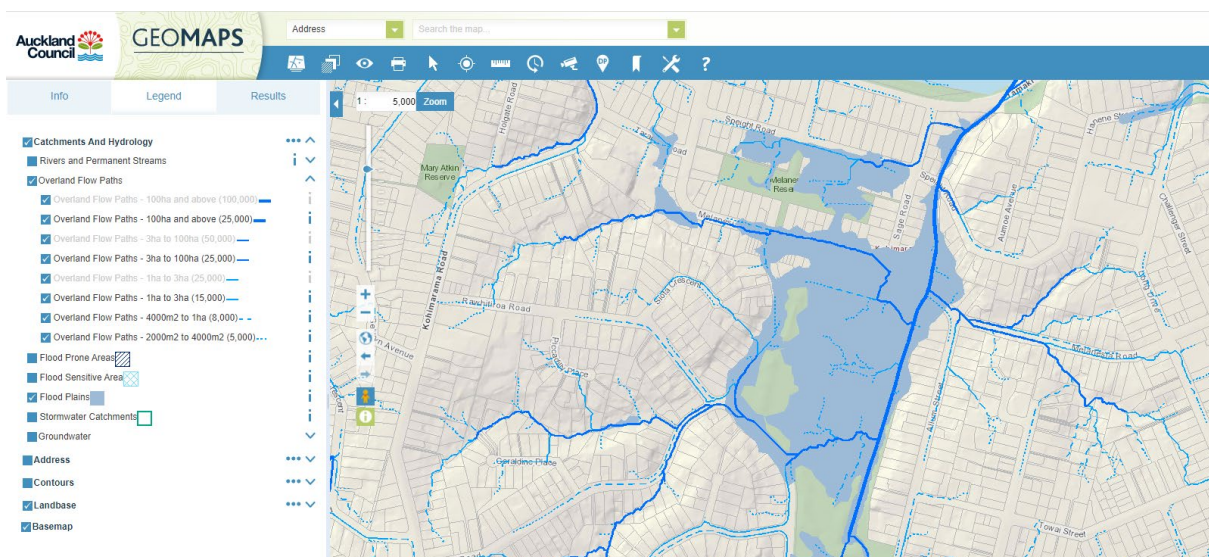


Figure 25: Auckland Council GeoMaps (public) – Mapping layers for floodplains and overland flow paths

The ‘Catchment and Hydrology’ section also includes two additional flooding layers:

- Flood Prone Areas - topographical depressions (either natural or formed by embankments such as road or rail embankments or excavations) that have no natural outlet from the depression low point and may flood frequently
- Flood Sensitive Areas - areas adjacent to the 100yr ARI floodplain that are within 0.5m of the predicted 100yr ARI flood level

Analysis and Findings

- As stated in the AUP, the mapping layers for floodplains and overland flow paths are indicative only. This is reflected in the consents investigated, where there have been instances where the actual flooding situation on site is clarified through on-site investigation. For example, in some cases the overland flow path does not cover or enter a site or follow the path as shown, and in other cases there is an overland flow path traversing through part of a site even though the GIS layer does not show this. Discussions with specialists reveal that the indicative nature can be an issue in certain scenarios. While the presence of floodplains and overland flow paths in the vicinity prompts consideration of flooding risk, an assessment of flood risk may not be picked up in some instances as the exact extent of the floodplain or overland flow path is not immediately clear. For example, the indicative overland flow path mapping does not factor in potential impediments such as kerbs and channels, and it also does not signal the width of the affected catchment along different sections of the flow path.
- The floodplain mapping layer contains the most up-to-date information for each of the 233 Stormwater Catchments in the Auckland region and is regularly updated by council's specialists. Most of the flood plains do incorporate an allowance for climate change (although varies due to the update cycle), and this can be checked by reviewing the linked report for a particular floodplain through GeoMaps.
- It is acknowledged that changes to floodplains and overland flow paths resulting from land modification during the development process is not always reflected in the GIS mapping, especially immediately following new subdivision. Consents investigated in these areas show that these floodplains and overland flow paths are still identified via the mapping layers, but the consequential assessments recognise that the floodplain and/or overland flow path has already been modified as part of a previous consent and assessed on this basis.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from flooding, it is recommended to⁴¹:

- Investigate options to improve the accuracy of the floodplain and overland flow path mapping, including methods or procedures to update the mapping to reflect changes resulting from known site works or development, acknowledging the limitations on updating this data currently.
- Review the relevant provisions in the AUP to ensure that they accommodate the limitations in floodplain and overland flow path mapping.

4.3.3.4 Rules and standards

Analysis and Findings

- Based on consent data review, there have been instances where consent has been identified for development within the 1 per cent AEP floodplain, but reference has been made to 'flood sensitive areas' or 'flood prone areas'. The examples investigated suggests that sometimes these areas have

⁴¹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

been interpreted to be included as part of the 1 per cent AEP floodplain even though GeoMaps did not show the 1 per cent AEP floodplain present on these sites. This results in an inconsistent application of the relevant rules.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from flooding, it is recommended to⁴²:

- Improve awareness that the ‘1 per cent AEP floodplain’, ‘flood prone areas’ and ‘flood sensitive areas’ are separate and are subject to different controls and mapping information.

4.3.3.5 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Applications relating to floodplains and overland flow paths are generally accompanied with a supporting flood report and peer reviewed by council’s engineering specialists. Inter-department processes enable further technical modelling analysis and expert flood assessment reviews and offer additional support to the processing engineer if the scale and complexity of the risk warrants it. However, it is noted that it is the role of council staff to review the documentation, not do an analysis for the applicant.

Management of Risk and Assessment Considerations

- Consents investigated indicate that risk from flooding is commonly managed by ensuring development is outside of the floodplain or using engineering solutions. Engineering solutions include establishing minimum floor levels for buildings and ensuring that floodplains and overland flow paths are not obstructed, either by providing suitable clearance or gaps as part of the building design or diverting overland flow paths (within a site), often down accessways and driveways, so they are clear of buildings.
- There was a period (from November 2016 to January 2020) where the matters of discretion for building or structures built over an overland flow path under E36.8.1(13) did not have a corresponding set of assessment criteria. This was corrected by Plan Change 14 (operative on 17 January 2020), through which E36.8.2(12A) was added. As a result, there may have been a degree of inconsistency with how assessments were carried out during this period.
- The advice from specialists is that the flexible risk-based approach framework enabled by the AUP works well for the management of flooding hazards (particularly for brownfield development) and that engineering solutions adopted are an acceptable solution to maintain the functioning of floodplains and overland flow paths, as sought under objectives B10.2.1(5) and (6), provided a suitably robust assessment has been undertaken. This is because a case-by-case assessment allows the potential flooding risks to be assessed based on the latest flooding information available. However, the ability for suitably robust assessments to be undertaken is sometimes hindered by

⁴² These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

the implementation and utilisation of the associated AUP provisions. These issues are explored further throughout this section.

- Locating development outside of a floodplain or overland flow path is the preferred approach, however it is noted that this may not always be possible for a brownfield development given that some sites are completely within a floodplain. For greenfield development, floodplains need to be considered when identifying areas for development or intensification, and the appropriate zones to apply to land. This is discussed further in Section 4.2.4 Zoning of land within natural hazard areas.
- The two consent requirements for floodplains that have been investigated have two different purposes. E36.4.1(A37) is used to manage the cumulative effects of new buildings within floodplains and to address the displacement of floodwater and how this effects the wider catchment and the function of the floodplain, while E36.4.1(A38) manages vulnerable activities (such as a residential dwelling) within a floodplain, and the effects on people and property from flood events.

Most consents should have triggered both as new dwellings are observed to be the most common activity requiring consent in a floodplain. However, consent data review indicates that there is a trend of one being triggered and assessed, and the other being overlooked, when both should be assessed. The resource consent practice note on floodplains details the reasons why both require separate assessments, however in practice there seems to be a lack of understanding of the nuances between both rules and the different effects they manage.

The practice note says:

Effects from activities requiring resource consent broadly fall into two categories:

1. **Off-site effects**
2. **Effects on more vulnerable activities.**

Of (A37):

These effects relate to the impact that buildings, structures, vehicles, goods and materials may have on floodplain dynamics from the displacement of flood waters onto other sites adjacent to, upstream or downstream of the application site, including:

- **increasing the extent, depth and velocity of flood waters experienced by other properties by constricting or modifying flood flows**
- **creating blockages to the wider stormwater network that cause flood waters to back up, such as from building failure, or vehicles or goods being washed off sites.**

Of (A38):

The effects addressed by (A38) are in addition to the effects addressed by (A36) and (A37). That is, when a more vulnerable activity is proposed, then additional assessment matters apply relating to the "human" issues present, such as safe egress during a flood event.

It is important to note that since only one of these rules is triggered and referenced in the resource consent decision, it does not necessarily mean that the relevant flooding considerations have not been assessed by the council's engineer. Further investigation would be required to examine these engineering assessments in more detail to understand the extent of this issue.

The inconsistency identified does however suggest that the differences between the purpose of these two rules may not be widely understood and may have consequences on the overall effectiveness of the management of floodplains and their functions. For example, only setting a minimum finished floor level addresses the risks and effects on vulnerable activities but this is not effective in managing the effects of the displacement of floodwater and on the wider catchment. Other measures, such as ensuring that the building is built above the floodplain on well-spaced support poles, are also required to achieve this outcome.

While it is noted that technically an assessment on all relevant issues relating to flood risk, including cumulative effects, is required under E36.9, specialist feedback and consent data review indicate that these requirements are sometimes not fully understood. This is discussed further in [Section 4.2.6 Consistency of assessments and quality of information provided](#).

- Some discussions brought up the lack of a standard minimum freeboard level being specified in the AUP. Feedback from specialists note that setting an appropriate freeboard is often an issue as there is no rule or guidance in the AUP on this. Reliance is on the Stormwater CoP, which sits outside of the AUP, and therefore has no statutory weighting. As a result, these requirements are difficult to apply when challenged. In addition, there are overlaps between the AUP and the Building Code, which is discussed further in [Section 4.5 Natural hazards and the Building Act 2004](#).
- There are no rules or standards that apply to “flood prone areas” and “flood sensitive areas” even though they are mapped. These are areas located at low points or adjoining floodplains that can be affected by flooding but do not require any additional assessment under the AUP. Specialist feedback indicates that in some cases these areas are assessed adequately as they coincide with the 1 per cent AEP floodplain (particularly for flood prone areas). However, in other cases, there is no overlap and therefore there is no mandate for the associated flood risk to be considered under the AUP provisions.
- It has been advised by specialists that there may be a gap in the building consent and resource consent process where insufficient consideration is given to how the impact of finished ground levels that may be changed by associated landscaping can affect flooding risk. Gardens, planting, fences and walls can result in raising ground levels around buildings and structures and change the dynamics of the floodplain or overland flow path.
- It is observed through consent data review that standard E12.6.2(11) appears to be sometimes overlooked. These have been identified through the investigation of consents that required consent for activities relating to floodplains or overland flow paths. This may be because this standard sits separately to Chapter E36 and is included as a general standard. This gap is partially addressed by the fact that the assessment criteria for all restricted discretionary land disturbance activities under Chapter E12 require consideration of the risks of natural hazards under E12.8.2(1)(i). However, this does mean that flooding risk associated with earthworks that meet the permitted thresholds may not be appropriately assessed.
- One example was identified in the consents investigated where a subsequent consent was sought to address a flooding-related issue associated with a previously granted consent. Specialists have also advised of a few similar examples where additional flooding considerations were required beyond that assessed at resource consent stage. Scenarios included realising the buildings would be affected by flooding at the detailed design stage or recognising that an overland flow path entered the site when the assessment determined it would not. The examples of these unanticipated circumstances presented suggests that they result from imperfect data or assumptions at the resource consent stage, rather than any gaps in the AUP provisions themselves. This matter is discussed further in [Section 4.2.6 Consistency of assessments and quality of information provided](#).

To understand the extent of this issue further, preliminary investigation was undertaken by Healthy Waters to determine a correlation between consents which triggered the flood hazard provisions under Chapter E36 and reported habitable floor flooding to council between November 2016 and April 2021. The investigation showed that there have been no consents that correlate with

subsequent reported habitable floor flooding and therefore cannot be attributed to the implementation of the AUP. However, the scope of this investigation was limited, and further analysis using other data sources, measurements and variables may provide more information on this matter.

It is also noted, that as provided for in policy B10.2.2(4), the flooding risk is assessed as occurring in up to a 100-year timeframe. Not enough time has elapsed since the AUP provisions became operative to confirm whether these provisions are effective in the long-term.

Conditions

- Consent data review indicates that there appears to be a degree of inconsistency with regards to conditions relating to flood risk management. For example, it is noted in some cases conditions and/or covenants are imposed to require minimum floor levels, while in other cases no conditions are imposed. Some require easements to be established for overland flow paths in favour of council, while others do not include a condition, or an advice note to ensure consent holders know that the overland flow path should not be obstructed by structures or fencing. Specialists advised that this reflects the flexible risk-based approach, where the extent of assessment and conditions imposed is likely to be dependent on the level of risk.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from flooding, it is recommended to⁴³:

- Improve awareness of the purpose of each of the rules and standards relating to flooding.
- Improve awareness the assessment requirements under E36.9 and provide further guidance on what information is required to be provided to support an application relating to a floodplain or overland flow path in order to meet these requirements.
- Investigate flood risk associated with earthworks within floodplains, particularly for site disturbance activities that meet the permitted thresholds.
- Consider specifying clearer provisions and design requirements to address flood risk through provisions in the AUP, acknowledging that there are benefits of having these sit outside the Plan so that they can be updated without a plan change.
- Investigate whether there are any gaps or risk associated with ‘flood prone areas’ and ‘flood sensitive areas’ not being managed by any rules or standards in the AUP.
- Investigate the nature and extent of the issue raised relating to the gaps in the consideration of finished ground levels and other permitted activities as part of the building consent and resource consent processes.
- Expand on the preliminary analysis that was undertaken to determine whether there have been situations where additional flooding considerations were required beyond that assessed at the resource consent stage by using other data sources, measurements and variables.
- Investigate the conditions imposed for developments relating to floodplains and overland flow paths and provide additional guidance on wording and content of conditions, if required.

⁴³ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.3.4 Land instability

4.3.4.1 Resource consent data summary

Based on the resource consent database, there were a total of 102 consents (granted or declined between November 2016 and April 2021) where rules relating to use and development within land which may be subject to land instability were identified as a reason for consent. Table 15 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 15: Resource consent data for land instability

Rule or standard under Chapter E36 Natural hazards and flooding	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Activities on land which may be subject to land instability		
E36.4.1 (A46) Storage of hazardous substances on land which may be subject to land instability	1	Not investigated
E36.4.1 (A50) External additions to buildings and to any structures excluding decks under 1.2m high and 20m ² gross floor area on land which may be subject to land instability	13	13 (100 per cent)
E36.4.1 (A51) All other buildings and structures, on land which may be subject to land instability not otherwise provided for	88	57 (64.7 per cent)

Figure 26 below shows the spatial distribution of all the consents extracted from the resource consent database that required a reason for consent for buildings or structures on land which may be subject to land instability under rules E36.4.1 (A50) or (A51).

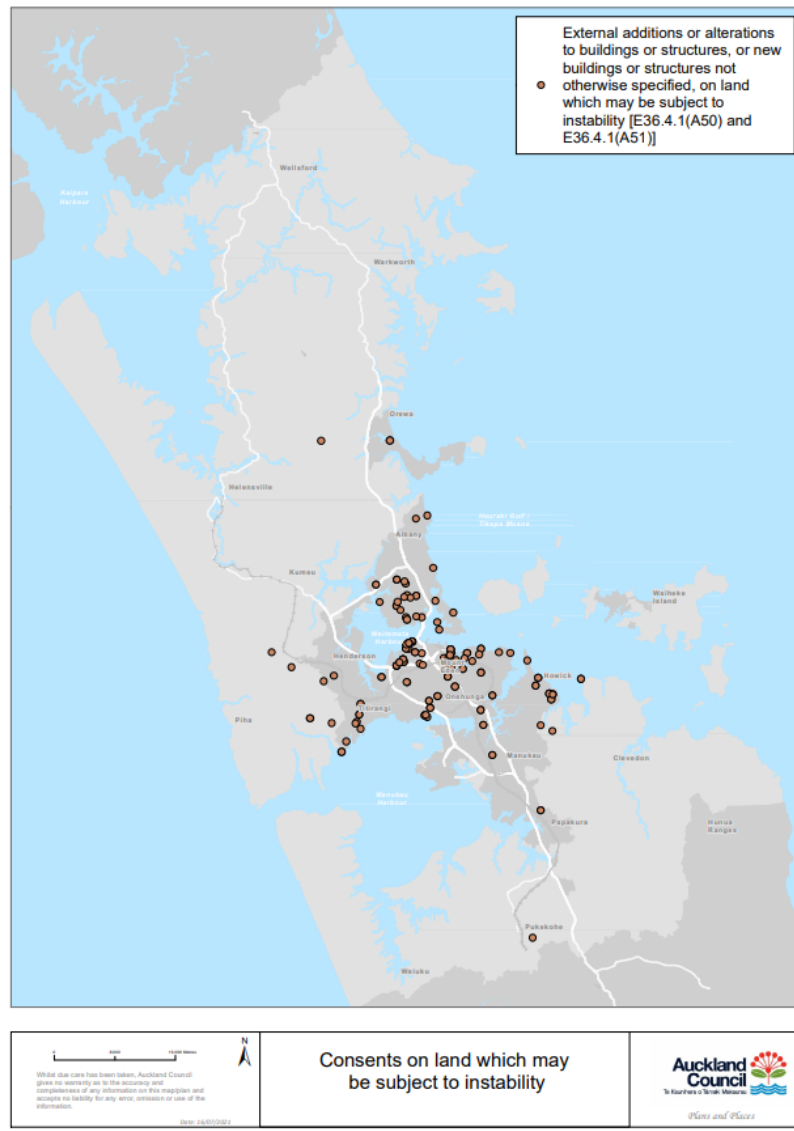


Figure 26: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to land which may be subject to land instability

4.3.4.2 Definitions

Context

- 'Land which may be subject to land instability' is defined in Chapter J of the AUP as the following:

Land which may be subject to land instability

Any land with one of the following characteristics:

- (a) Where the land which is underlain by Allochthonous soils has slope angles greater than or equal to 1 vertical to 7 horizontal;
- (b) Where the land which is underlain by Holocene or Pleistocene sediments which has a slope angle greater than or equal to 1 vertical to 4 horizontal;

- (c) Where the land is underlain by any other soil type and has a slope angle greater than or equal to 1 vertical to 3 horizontal;
- (d) On sloping sites where fill greater than 600mm depth has been placed in uncontrolled conditions or not to engineered (certified) standards and where the original underlying natural terrain gradient was greater than or equal to:
 - (i) 1 vertical to 7 horizontal for slope comprising Allochthonous soils;
 - (ii) 1 vertical to 4 horizontal for slopes comprising Holocene or Pleistocene soils; or
 - (iii) 1 vertical or 3 horizontal for slopes comprising any other soil types;
- (e) Within a horizontal distance of 2.5 times the cliff vertical height behind the base of any natural cliff; or
- (f) Within a horizontal distance of 2 times the cliff vertical height in front of the base of any natural cliff.

Note

A natural cliff may be considered to be any slope with a vertical height of greater than 3.5m and a gradient equal to or greater than 1 vertical to 1 horizontal (45-degrees). The vertical height of the cliff must only be measured over that part of the cliff where the slope gradient is equal to or greater than 45 degrees.

Geological conditions, including soil types not mapped in the Plan and soil conditions as referred to in the above definition may be identified at a regional level through the following sources:

- *reference to information in GNS Sciences Qmaps;*
- *Geology of Auckland (compiled by Edbrooke for IGNS 2001);*
- *property files material and reports held by Council; and*
- *by a suitably qualified professional.*

Analysis and Findings

- As the AUP uses specific defined terms throughout, the way a hazard is defined is critical in its effectiveness and efficiency at identifying and managing the risk associated with that hazard. It is noted that given the limited mapping information in the public realm for land which may be subject to instability as discussed further below, the public are largely reliant on the definition of the AUP to identify the hazard of land instability.
- There are several gaps identified with the definition:
 - The definition does not capture all the sites that may be subject to land instability. The definition uses geology and slope angle as a proxy for instability. This covers site characteristics where land instability is more likely to occur but does not include all the possible conditions or circumstances where land instability may be an issue and can include many stable sites. It does not include other characteristics such as peat soils.

- In particular, the definition does not refer to or reference all the other various forms of mapping information available that may indicate that a site is susceptible to land instability. For example, a site is likely to have been included as part of the “Soil Register” mapping layer because of soil instability issues, but if the physical characteristics of the site do not meet any of the defined criteria, then it does not technically meet the definition under the AUP. The same applies to sites which are recorded in landslide databases (e.g., the GNS Landslide Database) or shown as landslides on geological maps.
- Consent review data indicates that some flatter sites, which would not meet the gradients specified in the definition, have been identified as being subject to land instability, and that there have been instances where potential land instability has only been identified due to reporting provided by an applicant. This means that it is likely that there are activities occurring on land susceptible to land instability without any geotechnical assessment requirements under the AUP.
- The definition is not clear how the slope gradient is measured. The definition uses the term ‘where the land... has a slope...’ but does not specify whether this gradient should be measured across the entire piece of land or whether specifically where the use or development is proposed to be situated. Consent review data suggests that both interpretations are being applied in practice. This may result in the land instability risk not being appropriately assessed under the AUP requirements depending on how the gradient is calculated.
- Parts of the definition are not easy to identify without on-site investigation or detailed technical reporting. For example, it is difficult to ascertain whether a sloping site has been subject to fill greater than 600mm depth in uncontrolled conditions, or not to engineered standards, and what the underlying natural terrain gradient was prior the fill activity. Similarly, there are currently no mapping information identifying locations of ‘natural cliffs’ or their sloping gradients and their heights. This makes it difficult to identify, particularly as a desktop analysis, whether the criterion of the definition is met or not, and whether the AUP provisions apply.
- The definition uses the geology of the site for identification but does not refer to a specific map or information source from which this should be determined. The definition is also unclear what happens when there is conflicting information from different sources. Geological maps always contain inaccuracies due to the scale of mapping so there may be instances where one map states that a site is of ‘stable’ geology while a site-specific borehole investigation indicates otherwise. While it would be more appropriate to rely on more site-specific information where available, the definition does not reflect this requirement.

The definition of land which may be subject to land instability in the AUP directly correlates with policy E36.3(31). All four listed features in the policy are covered by one or more of the individual criteria in the definition. However, as discussed above, the gap is that the definition does not include all land that may be susceptible to this hazard. Accordingly, policy E36.3(31) only partially satisfies the outcomes sought under policy B10.2.2(1) as there are other areas that are potentially affected by land instability that are not directly identified by the AUP.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from land instability, it is recommended to⁴⁴:

- Address the gaps identified with the definition of ‘*land which may be subject to land instability*’, including undertaking further investigation to improve the accuracy of the definition to accurately reflect all land which may be subject to this hazard and/or refer to updated region-wide mapping.

4.3.4.3 Mapping

Context

- The definition for ‘land which may be susceptible to instability’ in the AUP uses a combination of geology and slope angle as a proxy for instability. This is a relatively crude measure.
- There is mapping of susceptibility to slope instability currently available for the Auckland region from a study undertaken in 1996 (Slope Instability Hazards in the Auckland Region, for Auckland Regional Council). This was undertaken at a very high level and was not incorporated into the AUP, and so the mapping does not provide a basis for interpreting the AUP rules.
- To interpret the AUP rules, it is necessary to know the geology and the slope angle. Aside from the ability to measure gradients using the “Draw and Measure” tool in GeoMaps, and the ability to view the geological maps, there is currently no specific information available to the public in either the AUP maps or in Auckland Council – GeoMaps (public) that assists with identifying land that may be subject to land instability.
- There are, however, data sets available (some internal to council) that provide additional information to assist with identifying this hazard. The various data sets provide useful information that may assist with identifying whether land meets one or more of the criteria listed in the definition. Publicly available data sets include the New Zealand Geotechnical Database and the GNS Science Geological Maps. In addition, there is internally available data including geotechnical reports submitted as part of past resource or building consents, sites recorded with soil condition issues, and information derived from specific studies or research.

Analysis and Findings

- As outlined above, there is limited information in the public mapping systems regarding land which may be subject to land instability. Only the mapping of land susceptible to coastal instability and erosion, which only became available recently, is included on public version of GeoMaps. Additional information is available on the internal GeoMaps viewer as shown in Table 16 below. Where this information has not been made public it is often because the data is not suitably validated or reliable, and so would not be appropriate for use in assessing the hazard.

The absence of reliable maps showing susceptibility to instability makes it more difficult for staff and the public to identify areas at risk from land instability and understand its spatial implications.

⁴⁴ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Table 16: Information on land instability: GeoMaps public and internal views

Information on instability and soils on GeoMaps (public)	Information on instability and soils on GeoMaps (internal)
☒ Development Restrictions ☒ Areas Susceptible to Coastal Instability and Erosion ☒ Wind Area	☒ Development Restrictions ☒ Natural Hazards ☒ Overland Flow Paths ☒ Flood Prone Area ☒ Flood Sensitive Area ☒ Flood Plains ☒ Volcanic Cones ☒ Sea Spray ☒ Areas Susceptible to Coastal Instability and Erosion ☒ Coastal Inundation ☒ Coastal Inundation High Water Levels ☒ Wind Area ☒ Hazards ☒ Gas Main Pipeline ☒ RNZ Liquid Fuels Pipeline Marsden to Wiri ☒ Soil Warning Area (Soil Condition)(ACC and PDC) ☒ Soil Warning Area (FDC) ☒ Northland Allochthon (RDC) ☒ RDC Expansive Soils (RDC) ☒ Soil Register ☒ Contaminated Sites ☒ Historic Horticulture ☒ Closed Landfill ☒ Franklin District Council Hazards ☒ Hazards NZ Steel Slurry and Water line ☒ Hazards Air Discharge ☒ Hazard No Soakage ☒ Special Land Features - Soil Warning Area ☒ Hazards Hingaia Stream Catchment M
☒ Geology and Geotechnical ☒ Areas Susceptible to Coastal Instability and Erosion ☒ Geological Maps	☒ Geology and Geotechnical ☒ Geotechnical Report Extent ☒ Soil Expansivity ☒ Liquefaction ☒ Slope Instability ☒ Areas Susceptible to Coastal Instability and Erosion ☒ Sites Geological Significance ☒ Geological Maps

- While the council's internal systems show additional information regarding land instability, there is no mapping layer that directly identifies land that is covered by the definition of 'land which may be subject to land instability' in the AUP. It is important to note that the available mapping layers have not been created for the use of applying the AUP rules and existed prior to the AUP's inception. As such, the layers have never been intended as the basis of land instability information for the AUP. Therefore, the gap here is that there is no separate dedicated mapping layer that aligns with the AUP definition. The lack of a corresponding geospatial layer makes it more

difficult for land subject to instability to be identified for the purposes of applying the relevant provisions.

- The additional data available in council’s internal systems ranges in accuracy and relevancy, and as a result it is of limited use in identifying land susceptible to instability. Factors that affect the geospatial data’s overall helpfulness include:

- The limited extent to which there is direct correlation to the terms and criteria used in the AUP definition:

While some layers relate directly to AUP terms (for example, the “Allochthon Geology” layer that assists in identifying Allochthonous soils), there are other layers that do not relate to the AUP (for example, the “Geotechnical Report Extent” layer which identifies sites with geotechnical reports available in Auckland Council’s systems). There are also aspects of the AUP definition that is not covered by any of the available layers.

- The varying spatial extent which the information is available for:

While some layers are mapped across the entire Auckland region (for example, the “Landslide Susceptibility 1997” layer), other layers are only applicable to specific areas (for example, the “Allochthon Geology” layer is confined to the patchy areas within the former Rodney District Council area).

- The accuracy, currency and consistency of the information presented:

Many of the existing layers were taken from the databases of legacy district councils and have not been updated (for example, the ‘Soil Warning Area (Soil Condition)’ layer was taken from the former Auckland City Council and Papakura District Council, while the ‘Soil Warning Area’ layer was taken from the former Franklin District Council). This results in inconsistencies in the information across the region as different legacy district councils had different criteria for identifying land instability in their own mapping.

All the above factors influence the ability for the GeoMaps mapping information to be utilised meaningfully in managing the risk of land instability.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from land instability, it is recommended to⁴⁵:

- Consider creating a specific mapping layer that is based on up-to-date land instability information that covers the entire region which directly corresponds with the definition or definitions relevant to this hazard.

4.3.4.4 Identification

Analysis and Findings

- As a result of the varying types and robustness of information available and the challenges with the definition, this analysis has identified that in practice marginally different approaches are being

⁴⁵ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

applied to address the risks associated with land instability than that specified in the AUP itself. The key findings on approaches being taken, based on consent data review and discussions with specialists, are outlined below:

- Sometimes whether a site is identified as being subject to land instability is based on the AUP definition, whereas in other cases, it is dependent on the level of risk based on the proposal and site characteristics, or other information available to suggest that there is a degree of risk that warrants assessment.
- The various information layers in GeoMaps are mainly used to identify land that may be subject to land instability but there are other sources of information that are utilised as well. These include legacy documentation, site notes, and historic evidence. This is supported by the consent data review, which includes examples of reasons for consents being triggered because the site is noted as being 'site stability sensitive', 'within the zone of influence' and 'having historic stability issues'. It is noted however that there is no single source of information and some of the consents reviewed refer to mapping layers or information records that could not be found as part of a preliminary review.
- The identification of whether land may be subject to land instability or not is inconsistent across the region. This is likely due to the different approaches adopted by the former district councils and the information available in each, as discussed above. For example, consent data suggests that despite the introduction of the AUP, consents in the former Auckland City Council area still rely on the 'soil warning area' and 'soil register' mapping layers to identify instability, while consents in the former North Shore City Council area still rely on land having a gradient greater than 1 in 4, which mirrors the approaches adopted in the respective legacy district plans.

These different interpretations mean that the approach to risk management for land instability is likely to be inconsistent across the region and therefore has varying degrees of effectiveness in achieving the RPS outcomes.

- Council has additional information regarding sites around the region, based on the technical reports that have been provided with applications, that help identify and manage land stability risk as well as other hazards. However, there appears to be a degree of a lack of awareness of what relevant information is available for a site or region, and the associated reports are not always easily found in the council systems. In addition, this additional information is not readily available to the public.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from land instability, it is recommended to⁴⁶:

- Provide additional guidance to ensure a consistent approach is taken to identifying land which may be subject to this hazard.
- Improve access and awareness of available site- or region-specific technical reports in council's database and investigate options for them to be publicly available.

⁴⁶ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.3.4.5 Rules and standards

Analysis and Findings

- Relevant rules in Chapter E36 are not being applied inconsistently. This is likely due to the activities in Table E36.4.1 overlap and have been worded in a way that could result in different interpretations.

Consent review data indicates that proposals that seek to construct new buildings and structures, or external additions and alterations to existing buildings or structures, on land which may be subject to land instability, have been considered to be a permitted activities under (A43) in some instances, but a restricted discretionary activity under (A50) or (A51) in others.

Discussions with specialists and further investigation suggests that there are no formal practice notes to clarify how these rules are applied. However, this inconsistency in interpretation is likely to be of relatively low risk as a geotechnical assessment is required to support a proposal under both rules, and is peer reviewed by council's engineering specialists as part of the building or resource consenting process.

- The different provisions and the inconsistency by which they are applied do have implications on monitoring the AUP. As use and development proposals are being assessed as both permitted and restricted discretionary activities, it is impossible to confirm exactly how much development has occurred on land that may be subject to land instability. In addition, consent data review indicates that it is also difficult to ascertain whether the provisions of the AUP are being applied correctly as sometimes it is not clear whether land instability was not mentioned because the activity was considered to be permitted, or whether it was a matter that was missed. This is a significant impediment to being able to identify any issues in the AUP or accurately evaluate how effective and efficient the AUP is at achieving the outcomes sought under the RPS.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from land instability, it is recommended to⁴⁷:

- Provide additional guidance to ensure consistency with the application of E36.4.1(A43), E36.4.1(A50) and E36.4.1(A51)

4.3.4.6 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Based on consent data review, almost all applications relating to land instability that were investigated were accompanied with a geotechnical report and were peer reviewed by an engineering specialist.

⁴⁷ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- There have been instances where the specialists reviewing the application has considered that geotechnical assessments of that detail were not warranted. Those that were not accompanied by a geotechnical report were generally small-scale works where the reviewing engineer considered it to be of low enough risk to be managed via appropriate conditions.
- The specialists reviewing these types of applications are usually engineers that assess all aspects of engineering matters during the resource consent process. Involvement from council's specialist geotechnical team is limited, and generally only occurs if the geotechnical issues are of a scale that is beyond the expertise of the reviewing engineer.

Management of Risk and Assessment Considerations

- Risk assessments are being carried out as per policy E36.3(33), but the quality and robustness of these assessments appears to vary. The relevant matters of discretion under E36.8.1.16 and the hazard risk assessment requirement under E36.9 cover a range of matters that should be considered as part of a risk assessment. However, consents investigated suggest that not all these matters are being assessed. This may be a result of the fact that the assessment criteria under E36.8.2.15 prompts a much narrower and limited scope of assessment compared to the matters of discretion under E36.8.1.16, and the fact that special information requirements under E36.9 do not appear to be fully understood. Three matters that have been observed that are not always addressed are:
 - The impact of climate change and sea level rise on instability risk. Groundwater changes, high intensity rainfall and drought all impact on soil conditions and should be taken into consideration as part of the design of structures to manage site stability.
 - Private access to and from the structure/building or site in the event of a land instability event.
 - The ability to relocate buildings or structures and the duration for occupation of these buildings or structures.

This may result in aspects of land instability risk not being assessed or accounted for as intended and as such, impacts on the achievement of the outcomes sought under the RPS. As some proposals are deemed permitted activities, this further exacerbates the potential inconsistencies in risk assessment across the region. This relates to the discussion under Section 4.2.6 Consistency of assessments and quality of information provided.

- An identified trend is for a focus on engineering structures as solutions to addressing the risk from land instability. However, discussions with council specialists suggest that reliance on structures is problematic in the long term, particularly due to issues relating to how these structures are maintained and their intended lifespan. The issues identified are:
 - There appears to be a lack of consideration of how retaining walls and geotechnical structures are maintained over their intended lifespan, and this is not a matter that is directed by the AUP. Based on consent data review, there are often no requirements to ensure that there is a plan for the operation and maintenance or need for eventual replacement, of such structures. There is therefore no guarantee that these structures will be of the appropriate quality or integrity to mitigate or manage the risk of land instability to the level and timeframe anticipated. This is particularly significant for structures designed to mitigate instability resulting from coastal erosion (such as in-ground palisade walls) because their eventual exposure and failure is inevitable.

- Retaining and geotechnical structures may be designed or located in a position that makes it difficult or impossible to undertake maintenance or for their replacement if this was determined necessary, for example when retaining walls are located immediately adjacent or behind buildings.
- The issue of the lifespan for which these structures are designed. As discussed further in [Section 4.5 Natural hazards and the Building Act 2004](#), it has been noted that there is a disconnect between the requirements under the Building Act 2004 which apply to structures for a 50-year timeframe and the RMA provisions which manage risk over a 100-year timeframe. This is particularly relevant for sub-soil drainage, which is often installed to stabilise slopes but rarely has a design life to match RMA requirements and can be challenging or impossible to maintain.

All three issues raised above reduce the intended effectiveness of the AUP provisions in managing risk from land instability.

- In some cases, geotechnical assessment has been deferred to building consent stage. Discussions with specialists suggest that in general, this could be acceptable if the instability was related just to the building or structure and will not affect an adjacent property or the wider environment. No in-depth investigation has been carried out regarding this.
- Policy E36.3(33) indicates that potential adverse effects arising from land instability risk should be avoided first, and then remedied or mitigated if avoidance cannot be totally achieved. However, the provision of use and development on land which may be subject to land instability as a permitted activity, and the wording of the relevant assessment criteria for restricted discretionary activities, do not reflect this approach.

In order to meet the permitted standard, the building and structure would need to be constructed in accordance with a geotechnical completion report and any relevant conditions of a resource consent. There is no aspect in this framework that would require the consideration of whether risk can be 'avoided' in the first place or infers that mitigation and remediation of instability risk in the form of engineering solutions is the back-up option. In addition, the content and standards required in a geotechnical completion report, and the acceptable levels of risk that they may propose, are variable. The requirements for such reports are not defined in a form that allows them to be enforced.

For a restricted discretionary activity, the matters of discretion under E36.8.1(16) and the assessment criteria under E36.8.2(15) apply. Similarly, none of the matters listed appear to direct consideration of whether risk can be 'avoided' where possible but focus instead on how effects can be mitigated or remediated.

It may be in most cases that avoidance is not completely practicable on land which may be subject to land instability and, as a result, engineering solutions may be appropriate as mitigation or remediation measures. However, there is still appears to be a missing link that bridges this outcome with the policy direction set under E36.3(33).

Conditions

- The way that conditions are being imposed for use and development on land which may be subject to land instability does not appear to be consistent. Sometimes specific geotechnical conditions are not imposed at all, or the wording and requirements of the conditions vary between consents for similar developments. This may be because the extent of conditions imposed is based on the level of perceived risk. However, this inconsistency may suggest that in some cases, particularly those

with no or limited conditions imposed, a precautionary approach to instability risk has not been adopted. The term ‘precautionary approach’ is discussed further in [Section 4.2.9 Implementing a precautionary approach](#).

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from land instability, it is recommended to⁴⁸:

- Consider the opportunity for council geotechnical specialists to be more involved in providing technical advice for resource consent applications.
- Investigate the quality and robustness of the risk assessments being provided in relation to land instability risk and provide additional guidance on what matters should be considered and assessed to satisfy the requirements under E36.9.
- Investigate the scale of the issues raised regarding the design and maintenance of retaining walls and geotechnical structures and explore options to ensure that these are maintained for their intended lifespan.
- Investigate whether there are any gaps associated with deferring geotechnical assessments to the building consent stage.
- Undertake further evaluation and consider whether amendments are required to ensure that the provisions achieve the direction outlined in Policy E36.3(33), where greater direction is provided on when ‘avoid’ approach is warranted.
- Investigate the conditions imposed for developments relating to land instability and provide additional guidance on wording and id content of conditions, if required.

4.3.5 Wildfire

4.3.5.1 Resource consent data summary

There are no rules under Chapter E36 that relate to the management of wildfire risk.

There are 33 rules in Chapter E15 Vegetation management and biodiversity that provide for vegetation removal as a restricted discretionary activity. All of the restricted discretionary resource consent applications for vegetation removal granted since November 2016 would need to be reviewed to identify those that were specifically for the purpose of mitigating bush fire risk. It was not possible to undertake a review on this scale as part of this analysis.

4.3.5.2 Identification and mapping

Context

- There is no definition or AUP maps that identify land at risk from wildfires.
- Council’s GeoMaps (internal) includes a layer on ‘rural fire’ and ‘hazard’ information, but this relates to fire management matters, such as fire stations and the recording of incidents such as arcing of

⁴⁸ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

electrical equipment or powerlines. It does not include any maps that identify land considered to be at risk from wildfires.

Analysis and Findings

- Policy E36.3(1)(d) requires identification of land at risk of wildfire, however there is no mapping or information available to support this policy.

4.3.5.3 Management, assessment, and process

Context

- There are no rules in Chapter E36 that apply to managing wildfire risk.
- It is noted however that the general standards for subdivision in both urban and rural areas (Chapter E38 – Subdivision Urban and E39 – Subdivision Rural) include a requirement for sites to be designed and located to enable the provision of water supply, or for unreticulated sites to have a water supply for firefighting purposes.
- Chapter E15 Vegetation management and biodiversity provides for a number of vegetation removal activities, beyond minimum areas of permitted removal, as restricted discretionary activities. The matters of discretion and assessment criteria include wildfire risk as a matter to be assessed for vegetation removal.

Analysis and Findings

- Policy E36.3(1)(d) and Policy E36.3(34) imply that the AUP contains rules to control land use and subdivision activities where that is justified by the risk from wildfires, like the other natural hazards managed under the AUP. However, no clarity is provided, either through definitions or mapping, on where any such rules would apply.
- If land use or subdivision activities are proposed on a site that may be subject to wildfire hazard risk, there appears to be no opportunity for this to be considered based on the current AUP provisions. For example, wildfire is not listed as a hazard as a restricted discretionary under E38.4.1(A11) or E39.4.1(A8) so consent under these rules would not be required. Even if the relevant objectives and policies under E36, E38 and E39 can be considered through other means, there does not appear a sufficient policy framework to provide direction on how wildfire risk should be assessed.
- The AUP attempts to address the gap relating to the lack of mapping through the Note under policy E36.3(34):

Note 1 Areas of high wildfire risk may be determined applying the National Rural Fire Authority New Zealand Wildfire Threat Analysis.

The National Rural Fire Authority uses the Fire Danger Rating System to monitor fire risk in New Zealand at multiple sites (210 climate stations) around the country. Fire danger ratings are calculated using four weather variables: 24-hour rainfall, temperature, relative humidity and wind speed⁴⁹. The fire damage rating systems has five categories with the two highest representing a significant risk of wildfire outbreaks. The risk assessment is used to indicate the fire danger and if fire permits are required and does not appear to be intended to be used for the purpose of implementing land use planning rules.



Figure 27: A display board to communicate daily fire danger (Source: NIWA (2017). Fire Risk Assessment: A measure to quantify fire risk for New Zealand locations, pg. 5)

- The relevant subdivision provisions do not control subdivision of land related to the risk of wildfire but include a general standard that requires subdivision to include provision for water supply, and for the provision of water supply for firefighting purposes in the case of unreticulated sites. The rules under E15 include criteria for removal or alteration of vegetation beyond the extent permitted as a restricted discretionary activity for the purpose of mitigating fire risk. While consent can be sought to remove vegetation, this is not a pro-active or strategic plan approach to managing wildfire risk.
- The AUP rules presently take a minimal risk mitigation approach to wildfires. This reflects wildfire risk not being considered a significant enough risk to require further land use controls and because of its management through fire and emergency agencies. However, this approach is not likely to be effective over the longer term, particularly given the increasing drought conditions anticipated as a result of climate change.

⁴⁹ NIWA (2017). Fire Risk Assessment: A measure to quantify fire risk for New Zealand locations, pg. 5

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from wildfires, it is recommended to⁵⁰:

- Investigate the need for the AUP to take a more risk management rather than risk mitigation approach to wildfire risk. This could include creating a mapping layer that identifies areas that are at risk from wildfires, and including policies, rules, and standards to manage such risk (i.e. buffer areas, use of fire-resistant plant species, location of buildings etc.)

4.4 Other AUP provisions that manage risk from natural hazards and climate change

4.4.1 Subdivision in natural hazard areas

4.4.1.1 AUP context

Rules relating to the management of risk from natural hazards via subdivision controls are covered in Chapters E38 and E39. The most relevant rules are E38.4.1 (A11) and E39.4.1(A8) - both rules have the same wording, but they are separate as they are split between urban areas (Chapter E38) and rural areas (Chapter E39).

In addition to the above, Chapters E38 and E39 also contain a range of general and specific standards that apply to subdivision of land within natural hazard areas. These generally require subdivision to provide the required shape factor or specified building areas (an identified area of a certain shape and/or size which is outside of any natural hazard area) or be in accordance with a land use consent that authorises development or building in the natural hazard area or natural hazard areas.

4.4.1.2 Resource consent data summary

Based on the resource consent database, there were a total of 1,420 consents (granted or declined between November 2016 and April 2021) where rules relating to subdivision within a natural hazard area under E38.4.1(A11) and E39.4.1(A8) were identified as a reason for consent. The other standards have not been investigated and this is discussed in more detail in the sections below. Table 17 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

⁵⁰ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Table 17: Resource consent data for subdivision in natural hazard areas

Rule or standard under Chapters E38 Subdivision – Urban and E39 Subdivision – Rural	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Subdivision for specific purposes		
E38.4.1 (A11) Subdivision of land within any of the following natural hazard areas: • 1 per cent annual exceedance probability floodplain; • coastal storm inundation 1 per cent annual exceedance probability (AEP) area; • coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area; • coastal erosion hazard area; or • land which may be subject to land instability.	1128	64 (5.7 per cent)
E39.4.1(A8) Subdivision of land within any of the following natural hazard areas: • 1 per cent annual exceedance probability floodplain; • coastal storm inundation 1 per cent annual exceedance probability (AEP) area; • coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area; • coastal erosion hazard area; or • land which may be subject to land instability.	292	51 (17.5 per cent)

Figure 28 below shows the spatial distribution of all the consents extracted from the resource consent database that required a reason for consent for subdivision under rule E38.4.1(A11) or E39.4.1(A8).

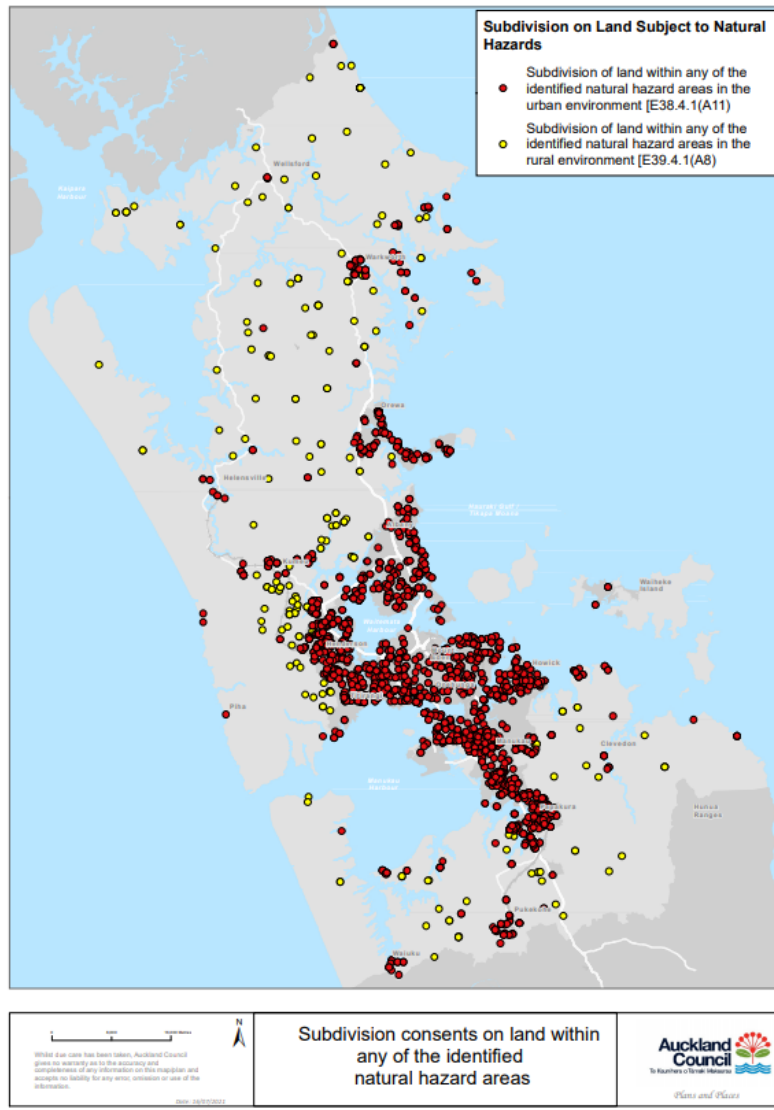


Figure 28: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to subdivision on land within a natural hazard area

4.4.1.3 Rules and standards

Analysis and Findings

E38.4.1 (A11) and E39.4.1 (A8)

- Both E38.4.1 (A11) and E39.4.1 (A8) cover land within all the different types of natural hazard areas. As such, it is not possible to separate out the consents that involved subdivision of land affected by one hazard area from those of another hazard area. In several cases, the land may be within two or more natural hazard areas. For future monitoring purposes, it would be helpful if the information is recorded in a way that allows subdivision in each hazard area to be easily identified and investigated.
- Subdivision involving land within one or more natural hazard areas is not always identified as a reason for consent. Consent data review highlights two common scenarios where this occurs:

- The appropriate subdivision standard has not been identified as a reason for consent because the hazard or hazards have not been identified or acknowledged. This applies to both joint land use and subdivision consents, as well as sole subdivision consents. These instances were identified via resource consents that required consent under other rules which were investigated as part of this analysis. Consent data review signals that the coastal erosion hazard area is the most common hazard area to be missed in the consenting process. The discussions relating to the mapping, interpretation, and identification of each hazard in Section 4.3: Hazard-specific AUP provisions are particularly relevant in this regard.
- For some joint land use and subdivision consents, the appropriate subdivision standard has not been identified as a reason for consent because the relevant hazard or hazards have already been assessed under the land use component. Based on discussions with specialists, it is noted that this discrepancy may be a result of the fact that there are different interpretations on how the rules should be applied.
- In cases where the relevant rule is identified as a reason for consent, not all the applicable natural hazard areas are correctly identified or acknowledged. This is particularly relevant for sole subdivision consents, or joint land use and subdivision consents where a reason for consent relating to natural hazards is not required at land use stage. Consent data review indicates that there have been situations where only one natural hazard area has been identified, while the other applicable hazards have not. Because these rules encompass all the hazards in one, it is impossible to check which natural hazard areas have been identified and subsequently assessed without investigating each consent in detail. To establish how often this occurs, it would involve examining all consents that triggered E38.4.1 (A11) or E39.4.1 (A8), which has not been undertaken given the time available for this analysis.

Other Relevant Rules

- The subdivision chapters (E38 and E39) are detailed and contain several different sets of rules, some of which overlap. As an example, for urban residential subdivision on land within the coastal erosion hazard area under Chapter E38, consent is required under two different activity tables (E38.4.1 and E38.4.2), and there are three sets of standards that are applicable (E38.6, E38.7 and E38.8), with several of the standards referring to compliance with another rule in a different set of standards. Table 18 provides a brief overview of the inter-relationship of the relevant subdivision standards:

Table 18: Relationship between the relevant rules and standards applicable to subdivision on land within a natural hazard area

Rule	Condition or Requirement	Activity Status	Relevant Rule and Activity Status If Rule Not Met
E38.4.1 (A11) Subdivision of land within any of the following natural hazard areas: 1 per cent annual exceedance probability floodplain; - coastal storm inundation 1 per cent annual exceedance probability (AEP) area; - coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area; - coastal erosion hazard area; or - land which may be subject to land instability.	N/A	RD	N/A
E38.4.1 (A12) Any subdivision listed in this activity table not meeting the standards in E38.6 General standards for subdivision	Not meeting any of the standards in E38.6	D	N/A
E38.4.1 (A13) Any subdivision listed in this activity table not meeting the permitted, controlled, or restricted discretionary activities standards in E38.7 Standards for subdivision for specific purposes	Not meeting any of the standards in E36.7	D	N/A
E38.4.2 (A14) Standard E38.8.2.3 Subdivision in accordance with an approved land use resource consent complying with Standard E38.8.2.1	Complying with Standard E38.8.2.1	RD	D under E38.4.2(A31) for not meeting a standard under E38.8
E38.8.2.1. Subdivision in accordance with an approved land use resource consent (1) Any subdivision relating to an approved land use consent must comply with that resource consent			
E38.4.2 (A16) Vacant sites subdivision involving parent sites of less than 1ha complying with Standard E38.8.2.3	Complying with Standard E38.8.2.3	RD	D under E38.4.2(A31) for not meeting a standard under E38.8

E38.8.2.3. Vacant sites subdivisions involving p sites of less than 1 hectare (1) The following standards do not apply to subdivision that is in accordance with existing or concurrently approved land use consents, or for any lots around existing buildings and development. (2) Site sizes for proposed sites must comply with the minimum net site areas specified in Table E38.8.2.3.1 Minimum net site area for subdivisions involving parent sites of less than 1 hectare below.			
E38.4.2 (A30) Any subdivision listed in this activity table not meeting E38.6 General standards for subdivision	Not meeting any of the standards in E36.6	D	N/A
E38.4.2 (A31) Any subdivision listed in this activity table not meeting the standards in E38.8 Standards for subdivision in residential zones	Not meeting any of the standards in E36.8	D	N/A
E38.6.1 Site size and shape (1) Except where the purpose of the site is for a network utility (including a site to be vested in Council), sites must meet one of the following: (a) in residential zones and business zones - a shape factor that meets the requirements of Standard E38.8.1.1 Site shape factor in residential zones or Standard E38.9.1.1 Site shape factor in business zones; (b) be in accordance with an approved land use resource consent; or (c) be around an existing lawfully established development	Applies to all subdivision listed in Tables E38.4.1 - E38.4.5	N/A	D under E38.4.1(A12) for not meeting a standard under E38.6 D under E38.4.2(A30) for not meeting a standard under E38.6 <i>D under E38.4.2(A31) for not meeting a standard under E38.8</i>

E38.7.3.4 Subdivision of land in the coastal erosion hazard area; or the coastal storm inundation 1 per cent annual exceedance probability (AEP) area (1) Each proposed site on land in the coastal erosion hazard area or the coastal storm inundation 1 per cent annual exceedance probability (AEP) area must demonstrate that all of the relevant areas/features in E38.7.3.4(a) to (c) below are located outside of any land that may be subject to coastal erosion or coastal storm inundation: (a) in residential zones and business zones - a shape factor that meets the requirements of Standard E38.8.1.1 Site shape factor in residential zones or Standard E38.9.1.1 Site shape factor in business zones; (b) access to all proposed building platforms or areas; and (c) on-site private infrastructure required to service the intended use of the site.	Applies to E36.4.1 (A11)	N/A	D under E38.4.1(A13) for not meeting a standard under E38.7 <i>D under E38.4.2(A31) for not meeting a standard under E38.8</i>
E38.8.1.1. Site shape factor in residential zones ... (2) All vacant sites must be able to contain a rectangle of 8 metres by 15 metres except the Residential - Terrace Housing and Apartment Buildings Zone must contain a rectangle of 15 metres by 20 metres, to accommodate a building that complies with all applicable standards of the zone and is located outside: (a) the 1 per cent annual exceedance probability floodplain; in (b) the coastal erosion hazard area; (c) the coastal storm inundation 1 per cent annual exceedance probability (AEP) area; and the coastal storm inundation 1 per cent annual exceedance probability (AEP) plus 1m sea level rise area; (d) land and which may be subject to land instability; ... (k) yard setback requirements of the zone including riparian, lakeside or coastal protection yards; and (l) the National Grid Yard	Applies to all subdivision listed in Table E38.4.2	N/A	D under E38.4.2(A31) for not meeting a standard under E38.8

- A hypothetical proposal to subdivide a site less than 1 ha around an approved development to create a vacant site on land within the coastal erosion hazard area would require consideration under all the standards listed in Table 18 above. Such an activity requires the following three reasons for consent at a minimum:
 - Subdivision of land within the coastal erosion hazard area under E38.4.1 (A11)
 - Subdivision in accordance with land use consent under E38.4.2 (A14)
 - Vacant site subdivision of parent site under 1 ha under E38.4.2 (A16)

If the proposed vacant site cannot accommodate the required site size shape factor outside of the coastal erosion hazard area (as required under E38.8.1.1), then it would require four more reasons for consent:

- Vacant site subdivision not meeting the required site size shape factor under E38.4.1 (A12) for not complying with standard E38.6.1 which requires compliance with standard E38.8.1.1
- Vacant site subdivision not meeting the required site size shape factor under E38.4.2 (A30) for not complying with standard E38.6.1 with standard E38.6.1 which requires compliance with standard E38.8.1.1
- Vacant site subdivision not meeting the required site size shape factor under E38.4 (A31) for not complying with standard E38.8.1.1
- Subdivision of land within the coastal erosion hazard area not meeting the required shape factor under E38.4.1 (A13) for not complying with standard E38.7.3.4 which requires compliance with standard E38.8.1.1

This is not including potential reasons for consent under other subdivision rules, such as establishing or waiving an esplanade reserve or strip under E36.4.1 (A8), (A9) or (A10), which is common for subdivision in the coastal environment where the coastal erosion hazard area applies.

Noting that all the standards outlined above are interspersed throughout the subdivision chapter with various other standards in between, some of which may be relevant and others which may not, it is observed that there is potential for these chapters to be confusing and for users to be unaware of all the standards which apply, and to identify under which rule/rules consent is/are required, particularly if vacant site subdivision is involved.

- Many of the standards listed in E38 and E39 could be identified as a reason for consent in a variety of different scenarios. For example, E38.8.1.1 could be identified as a reason for consent as a result of a vacant site not being able to accommodate the required site size shape factor outside of a natural hazard area or outside any of the other listed criteria. Similarly, E38.4.2 (A31) could be identified as a reason for consent for not meeting any of standards listed in E38.8, which include standards relating to access to rear sites or minimum lot sizes.

Due to this framework, it is impossible to determine which of the consents that triggered these standards are directly related to the management of risk from the subdivision of land subject to natural hazards without analysing every subdivision consent. As such, it poses a barrier to understanding or verifying whether the relevant standards are being applied correctly, the extent of confusion caused by the provisions, and the number of developments that have triggered these rules. How resource consent data is recorded also poses another layer of complexity and this is discussed in more detail in the overarching monitoring summary report. These factors led to the analysis to focus solely on E38.4.1 (A11) and E39.4.1 (A8) of the AUP.

- Using standard E38.7.3.4 which applies to subdivision in coastal erosion hazard or coastal storm inundation 1 per cent AEP hazard areas as an example, it is noted that in the resource consents database, there have been five instances where this standard has been triggered. This is considered to be a low number given the amount of consent data available and the areas within which these coastal hazards would apply. This low number could suggest that either these coastal hazards are not being identified consistently, as identified in [Section 4.3.1: Coastal storm inundation](#) and [Section 4.3.2: Coastal erosion](#), that users are not aware that this standard exists, or may be an error in the data (i.e. this specific standard may not have been listed or recorded as a reason for consent, however the corresponding activity triggers in Tables E38.4.1 and E38.4.2 may have been).
- As part of the consent data review and analysis of the AUP provisions, additional matters have been identified which relate to the wording and content of other rules that impact on the efficiency and effectiveness of these AUP provisions in achieving the RPS outcomes:
 - It is not clear whether standard E38.7.3.4 applies to non-vacant site subdivision or subdivision in accordance with an approved land use resource consent. In comparison, standard E38.7.3.3, which covers subdivision of land in the 1 per cent AEP floodplain, specifies that being in accordance with an approved land use consent is one method by which the standard is met. If a land use consent authorises a building, associated access areas or private infrastructure to be constructed within a coastal hazard area, it is not clear whether consent is still required under this provision or not. It is also not clear if this standard is applicable if there are no proposed building platforms or areas (e.g., around existing or approved development).
 - The requirement for standard E38.7.3.4 is different from the requirement for development in coastal hazard areas at the land use stage. Standard E38.7.3.4 requires access to all proposed building platforms and areas to be outside of the coastal hazard areas, however the corresponding rules in E36 only are relevant when buildings and structures are proposed in these areas. Therefore, it is possible for access to be an issue at subdivision stage when a land use component has already been granted or development already completed on site without a need for resource consent.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from subdivision of land within natural hazard areas, it is recommended to⁵¹:

- For future monitoring purposes, consider collecting consent data information in a way so that applications relating to subdivision within each type of hazard area can be more easily differentiated and investigated.
- Provide additional guidance to ensure consistency on how E38.4.1 (A11) and E39.4.1 (A8) is applied across the region.
- Undertake further investigation into the issue raised regarding the fact that not all the applicable natural hazard areas are correctly identified or acknowledged, and therefore assessed, at subdivision stage.

⁵¹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- Undertake an analysis of the efficiency and effectiveness of the other relevant subdivision rules or standards and consider whether additional guidance should be provided to assist with their implementation and interpretation.
- Consider simplifying the structure and content of Chapters E38 and E39 and/or provide additional guidance to improve awareness of all the rules and standards that apply.

4.4.1.4 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Applications for subdivision are consistently assessed by a council engineer, with input from a subdivision specialist if required. Consent data review indicates that the allocated engineer also generally provides assessment regarding the natural hazard aspect of the subdivision, although other specialists may provide comments if land use consents or establishment or waiver of esplanade reserves are involved.

Management of Risk and Assessment Considerations

- There are many different types of subdivision activities that occur on land that is within one or more natural hazard areas. Based on consent data review, it is observed that boundary adjustments and vacant lot subdivisions are more common in rural areas, while subdivision around existing and/or approved development is more common in urban areas. Future development on parts of the land within natural hazard areas appear to be more often avoided in rural areas, noting that this is likely to be because sites in urban areas are generally smaller and more constrained with less or no alternative locations outside of natural hazards areas to site future development.
- The consequences and impact of subdivision of land that is within one or more natural hazard areas do not appear to be fully appreciated. Based on consent data review, it is observed that for joint land use and subdivision consents, emphasis appears to be given to the land use component, with the subdivision component being a subsequent matter as any risks associated with the natural hazard or hazards have already been assessed at land use stage.

For vacant lot subdivision consents, it is observed that a similar approach is applied – generally, provided that the vacant site can meet the site shape factor and appropriate conditions and/or consent notices are imposed to manage the natural hazards that apply, then assessment can be deferred until any future land use consent (when physical development on the site) is proposed.

Subdivision creates opportunities for future development, and therefore the subdivision of land in these natural hazard areas could result in the creation of additional risk, or at least an increase in situations where risk needs to be managed.

Interviews with specialists indicate that it is a challenge to deter development on sites subject to natural hazard risk if it has already been subdivided, as the granting of subdivision has created a lot and a right for it to be developed in accordance with the zone that applies. The rule framework does not support a stronger focus on avoiding risk (i.e. by not enabling subdivision in the first instance) where that may be the most appropriate approach.

- Due to limitations in time and resource, in-depth analysis on this matter was not able to be undertaken and further analysis is recommended. However, there are several key observations that have been identified in the data collection and AUP review process that may be suitable starting points for further investigation. These are outlined below.
 - As mentioned above, it has been observed that emphasis on the management of risk from natural hazards is at the land use stage when it comes to joint land use and subdivision consents. Looking at the current AUP framework, it can be identified as to why this potentially is the case. Taking a hypothetical, but common, proposal for infill subdivision including a new dwelling in the 1 per cent AEP floodplain for an example, it would require at least the following reasons for consent:
 - New building within the 1 per cent AEP floodplain under E36.4.1 (A37)
 - Use of new building to accommodate a vulnerable activity within the 1 per cent AEP floodplain under E36.4.1 (A38)
 - Subdivision of land within the 1 per cent AEP floodplain under E38.4.1 (A11)
 - Subdivision in accordance with land use consent under E38.4.2 (A14)
 - Subdivision around existing buildings and development under E38.4.2 (A15)

At land use stage, the effects associated with the establishment of the new dwelling in the floodplain would be assessed. Although dependent on the level of risk and the extent of the floodplain, it is assumed that in this scenario, the proposal is deemed acceptable from an engineering perspective, likely due to minimum floor levels being achieved, and conditions are imposed to ensure that the capacity of the floodplain is not reduced.

At subdivision stage, there are two sets of assessment criteria that would apply to the proposal. The assessment criteria under E38.12.2.6 applies to both subdivision around existing development as well as around approved development, and covers general considerations such as servicing and access, which is required for all subdivision, regardless of whether it is in a natural hazard area or not. The assessment criteria under E38.12.2.1 applies specifically to subdivision in the 1 per cent AEP floodplain and states the following:

(1) subdivision of a site within the one per cent annual exceedance probability floodplain:

(a) the effects of the hazard on the intended use of the sites created by the subdivision and the vulnerability of these uses to flood hazard events:

- (i) whether measures are proposed to ensure the long term protection of flood plain conveyance functions;**
- (ii) whether the location and design of development including building platforms and access ways are located to avoid the hazard;**
- (iii) the extent to which changes to the landform and the design of mitigation structures/features are necessary for the subdivision; and**
- (iv) refer to Policy E38.3(2).**

In this scenario, as the new dwelling and resulting flooding effects have already been assessed at land use stage, it appears that the assessment criteria listed have already been fulfilled:

- The intended use of the site is residential, and the vulnerability of the residential activity and long-term protection of the floodplain have been previously addressed via appropriate conditions.
- The dwelling, its access, and the associated site works to establish the development have already been considered, and they have been designed and/or located appropriately to ensure the hazard is avoided' (refer to Section 4.2.3 Approaches and directives for managing risk)
- Policy E38.3(2) requires consideration of the objectives and policies in Chapter E36 and to provide safe and stable building platforms and vehicle access, which again both would have been assessed at land use stage.

The relevant assessment criteria for the other natural hazards are relatively similar in scope. The issue observed in this scenario is that there could be a stronger directive in the assessment framework to consider the future risk generated by the development opportunities created by the establishment of a new site in a natural hazard area. The natural hazard risk from subdivision is not just that associated with the dwelling around which subdivision occurs, but the risk associated with any development potential that newly created site may have.

- A practice that has sought to address this issue in the urban environment is imposing conditions and consent notices to ensure that only the development that has been assessed as part of the resource consent can be established on the newly created sites. This limits the future development opportunity for these sites and subsequently potential additional risk associated with natural hazards. However, consent data review indicates that only some joint land use and subdivision consents have these restrictions imposed. Discussions with specialists suggest that these conditions and consent notices are no longer being imposed as by doing so, it limits future development to a single resource consent scheme that is only valid for five years before it lapses. If this is the case, it poses issues for the subdivision management framework, not only in terms of management of natural hazards but the management of urban development in general. It is recommended that this potential issue is explored further.
- With regards to vacant lot subdivision, the relevant standards and assessment criteria direct focus on ensuring that the site can accommodate a suitable building platform and access way outside of the natural hazard areas, among other assessment considerations. There are several potential challenges that are identified in relation to this:
 - As mentioned above, it has been observed through consent data review that assessment of natural hazard risk arising from vacant lot subdivision is partially deferred to the time when physical development is proposed on site. While this is logical in the sense that that is when risk can be identified and assessed more appropriately, it appears that the management framework does not provide sufficient emphasis on considering the impact on natural hazard risk management by enabling greater development opportunity through the act of subdivision itself.
 - The vacant lot subdivision standards only require a/one building platform to be outside of the natural hazard areas. While this may be appropriate for land with zones that only provide for a single dwelling or building, this does not reflect the development potential for land with zones that enable higher intensity development. Using the Residential – Mixed

Housing Suburban zone as an example, this zone provides for up to three dwellings as a permitted activity. While development within natural hazard areas will still generally require a resource consent, the prospect of being able to build three dwellings increases the potential likelihood of development occurring within natural hazard areas as the site may have only had sufficient space to accommodate one building platform. The issue of anticipated development rights is also relevant and discussed further in [Section 4.2.4 Zoning of land within natural hazard areas](#).

- While a proposed vacant site might be able to accommodate a building platform outside of the natural hazard areas, there is also no guarantee that future development will be sited in this specified area. Based on consent data review, it appears that this is less so of an issue in the rural environment, where consent notices are generally imposed to ensure that all buildings are established within the identified building platform. However, in the urban environment, there does not appear to be any mechanisms imposed to ensure that future development opportunities created by the new subdivision avoid the natural hazard areas. Therefore, this then undermines the use of identifying a hazard-free building platform requirement at subdivision stage as a method to manage risk.
- The effectiveness in ensuring that building platforms are outside of natural hazard areas as a management method also depends on how the natural hazard is identified and assessed. As such, the discussions outlined in [Section 4.3 Hazard-specific AUP provisions](#) are also relevant. This is particularly relevant for coastal erosion hazard areas, as providing a building platform outside of the areas specified under the definition does not mean that risk from coastal erosion is appropriately addressed unless site-specific assessment determines that this is the case.
- An assessment under s106 of the RMA is also required as part of an assessment for any subdivision. This was not investigated as part of this analysis due to time and resource constraints, and the fact that it was considered outside the scope of the AUP.

Conditions

- There are inconsistencies in the way conditions and consent notices are being imposed to manage natural hazards at subdivision stage. Based on consent data review, it is noted that in some cases, consent notices are imposed to ensure that risks from applicable natural hazards are continuously managed, whereas in other cases, none are imposed.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in managing the risk from subdivision of land within natural hazard areas, it is recommended to⁵²:

- Undertake further analysis of the relevant subdivision standards and assessment criteria, particularly relating to subdivision around existing and/or approved development and vacant lot subdivisions to determine whether amendments are required, including to the activity status, to the standards that apply, and to the assessment required to subdivide land that is within one or more natural hazard areas. Specific attention should be given to whether the subdivision

⁵² These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

standards and assessment criteria enable and direct a comprehensive assessment of what could be established on a site, rather than what is specifically proposed at the time of consent.

- Undertake further investigation into the conditions and consent notices that have been imposed to date to ensure that only the development that has been assessed as part of the resource consent can be established on newly created sites and clarifying whether these are still being imposed. If they are no longer being imposed, consider exploring how this gap can be addressed.
- Investigate the role of s106 RMA and its impact in the subdivision process.
- Investigate the conditions and consent notices imposed for the management of hazards at subdivision stage and provide additional guidance on wording and content of conditions, if required.

4.4.2 Esplanade reserves and strips

4.4.2.1 Auckland context

Esplanade reserves play an important role in mitigating the risk from hazards. A significant extent of land in Auckland is subject to coastal and flooding hazards which is likely to increase as a result of climate change. In many cases 20 metres or more of esplanade reserve or strip land is needed to mitigate the long-term hazard risk, and/or to fulfil other functions such as providing public access. However, in practice it has often proved difficult to achieve a 20-metre-wide esplanade reserve or strip (as required under RMA), and even more difficult to acquire a greater width, even if this is identified as needed – this is discussed further in the sections below.

The pressures that affect the provision of a 20-metre esplanade reserve or strip in Auckland include:

- the extent of land potentially required to be provided for reserves, given Auckland's location on an isthmus with a long coastline and multiple harbours and streams/rivers
- the high value of land
- the pressure for urban development and desire to maximise yield/development potential
- the real estate premium for a coastal location
- a desire to avoid the public access adjoining private property that a reserve may provide
- a preferred option to build protection structures or other engineering solutions to mitigate a hazard rather than provide additional land for a reserve, for the reasons above
- the AUP zoning of land (refer to discussion in [Section 4.2.4 Zoning of land within natural hazard areas](#)) not always indicating that the development potential/yield of a coastal lot is not the same as other similar landward zoned land because of the need to set back development and to potentially provide a reserve or strip
- the lack of coastal protection yard, riparian protection yard or other set back requirements ensuring that development is set back 20 metres to enable the provisions of an esplanade reserve in the event of the later subdivision of a site and/or to mitigate the need for future hazard protection works.

4.4.2.2 RMA context

The RMA sets out the statutory requirements for esplanade reserves or esplanade strips that are implemented through the subdivision provisions of the AUP. The RMA requirements are discussed below.

Requirement to provide an esplanade reserve or strip

Section 229 RMA sets out the range of purposes for esplanade reserves and strips:

229 Purposes of esplanade reserves and esplanade strips

An esplanade reserve or an esplanade strip has 1 or more of the following purposes:

- (a) to contribute to the protection of conservation values by, in particular,—
 - (i) maintaining or enhancing the natural functioning of the adjacent sea, river, or lake; or
 - (ii) maintaining or enhancing water quality; or
 - (iii) maintaining or enhancing aquatic habitats; or
 - (iv) protecting the natural values associated with the esplanade reserve or esplanade strip; or
 - (v) mitigating natural hazards; or
- (b) to enable public access to or along any sea, river, or lake; or
- (c) to enable public recreational use of the esplanade reserve or esplanade strip and adjacent sea, river, or lake, where the use is compatible with conservation values.

An esplanade reserve is required on creation of an allotment of four hectares or less of land that adjoins the coast, a river or lake unless a rule in a plan or a resource consent is granted to waive or reduce the width of a reserve (s230 RMA). An esplanade reserve can be replaced with an esplanade strip under s232 if a district plan has a relevant rule under s77(1)(c).

The reserve or strip is measured from the mark of mean high-water springs (MHWS), along the bank of a river where the bed has an average width of three metres or more, or the along the margin of a lake where the bed has an area of eight hectares or more.

No compensation is required for the provision of an esplanade reserve under s230 and the land is vested in council ownership as a local purpose reserve (s231(1) and s237E(1) RMA).

Variations to esplanade reserves

In considering the range of purposes of an esplanade reserve, s77 RMA enables a rule to be included in a district plan that:

- requires an esplanade reserve or strip on subdivision of allotments greater than 4 hectares of land that adjoins MHWS, a river or lake (s77(2), s230(5) RMA)
- requires a greater or lesser reserve width than 20 metres, including the circumstances or locations the additional width applies (s77(4) RMA)
- allows that an esplanade strip rather than an esplanade reserve may be created (s77(1) RMA).

If a width greater than 20 metres is required on an allotment less than four hectares, the council is required to compensate the landowner for the additional land unless the owner agrees otherwise (s237E RMA).

Difference between esplanade reserves and esplanade strips

Unlike esplanade reserves, the width of an esplanade strip is not set under RMA but needs to be specified in a rule in a plan (s232(1) RMA). An esplanade strip does not vest in council, as council-owned land, but is registered, usually as a covenant, on the property title and is part of the privately owned property. As an

esplanade strip is not in council ownership as a reserve a landowner can at a later point in time apply to council to vary or cancel the esplanade strip (s234 RMA).

An esplanade strip does not have a fixed landward boundary as in the case for a surveyed esplanade/local purpose reserve. Where the mark of MHWS or bank of a river or lake boundary alters (for example, as a result of coastal erosion), the landward boundary accordingly moves inland without any requirement to change the covenant relating to the strip (s233 RMA). In contrast, if an esplanade reserve erodes, it gets narrower or can be completely lost over time.

The sections below discuss matters identified for both esplanade reserves and strips. Table 19 below clarifies the differences between the two.

Table 19: Difference between esplanade reserves and esplanade strips

Esplanade reserve	Esplanade strip
Required on subdivision of less than 4 hectares	Required on subdivision of less than 4 hectares if provided for in a rule in a district plan
Measured from the mark of MHWS or the margin of a river or lake at a fixed point in time (when subdivision occurs)	Measured from the mark of MHWS or the margin of a river or lake Not fixed at a point of time (but measured at point of subdivision)
Landward boundary 20 metres from the mark of MHWS or the margin of a river or lake unless waiver or reduction granted	Landward boundary 20 metres from the mark of MHWS or the margin of a river or lake unless waiver or reduction granted
Both MHWS (or the margin of a river or lake) and landward boundary fixed at a time and surveyed as a separate lot.	Both MHWS and landward boundary are not fixed and the location of strip alters with movement of MHWS (or the margin of a river or lake) over time. This requires adequate set back of structures or development to enable the strip to move taking into account anticipated changes, for example the coastal erosion hazard mapping.
Reserve vested in council as a local purpose reserve including any assets or structures and shown on AUP maps	Esplanade strip requirement registered on title of property usually as a covenant and not shown on AUP maps
No ability to later revoke an esplanade reserve	Ability to apply to have covenant removed from title, but would require council approval

Esplanade reserves, as publicly owned land, are identified on the AUP maps as reserves, usually with an Open Space zone, for example as shown in Figure 29 below. This supports the notion of obtaining esplanade reserve land on further subdivision in an area to make connections with existing esplanade reserves.

As esplanade strips are identified on a property title, they are not shown on the AUP planning maps and their location is generally not visible to the public or to council when assessing development relating to nearby land. While an esplanade strip may have a condition allowing for public access it is difficult for anyone except the owner to identify this and for council to identify their location in considering connections with other strips or reserves.

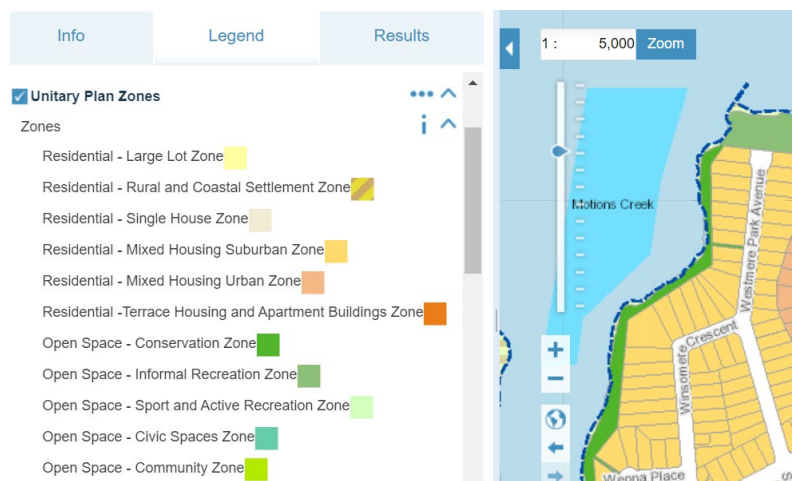


Figure 29: Auckland Council AUP planning maps - example of an esplanade reserve with Open Space zoning

4.4.2.3 AUP context

Rules relating to the esplanade reserves and strips are covered in Chapters E38 and E39. Consent is required to establish an esplanade reserve or strip and to reduce the width of or to waive the need to provide an esplanade reserve or strip.

4.4.2.4 Resource consent data summary

Based on the resource consent database, there were a total of 255⁵³ consents (granted or declined between November 2016 and April 2021) relating to esplanade reserves or strips. Table 20 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 20: Resource consent data information for subdivision involving esplanade reserves or strips

Rule or Standard under Chapters E38 Subdivision – Urban and E39 Subdivision – Rural	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Subdivision for specific purposes		
E38.4.1 (A8) Subdivision establishing an esplanade reserve	85	Not Investigated
E39.4.1 (A5) Subdivision establishing an esplanade reserve	45	Not Investigated
E38.4.1 (A9) Subdivision establishing an esplanade strip	18	Not Investigated
E39.4.1 (A6) Subdivision establishing an esplanade strip	4	Not Investigated

⁵³ Refer to Note in Table 20

E38.4.1 (A10) Any reduction or waiver of esplanade reserves or strips	91	52 (57.1 per cent)
E39.4.1 (A7) Any reduction or waiver of esplanade reserves or strips	12	12 (100 per cent)
Note: There is likely to be some 'double-counting' with consents that sought to reduce the width of an esplanade reserve as the activity would trigger both the establishment of esplanade reserve and the reduction of esplanade reserve.		

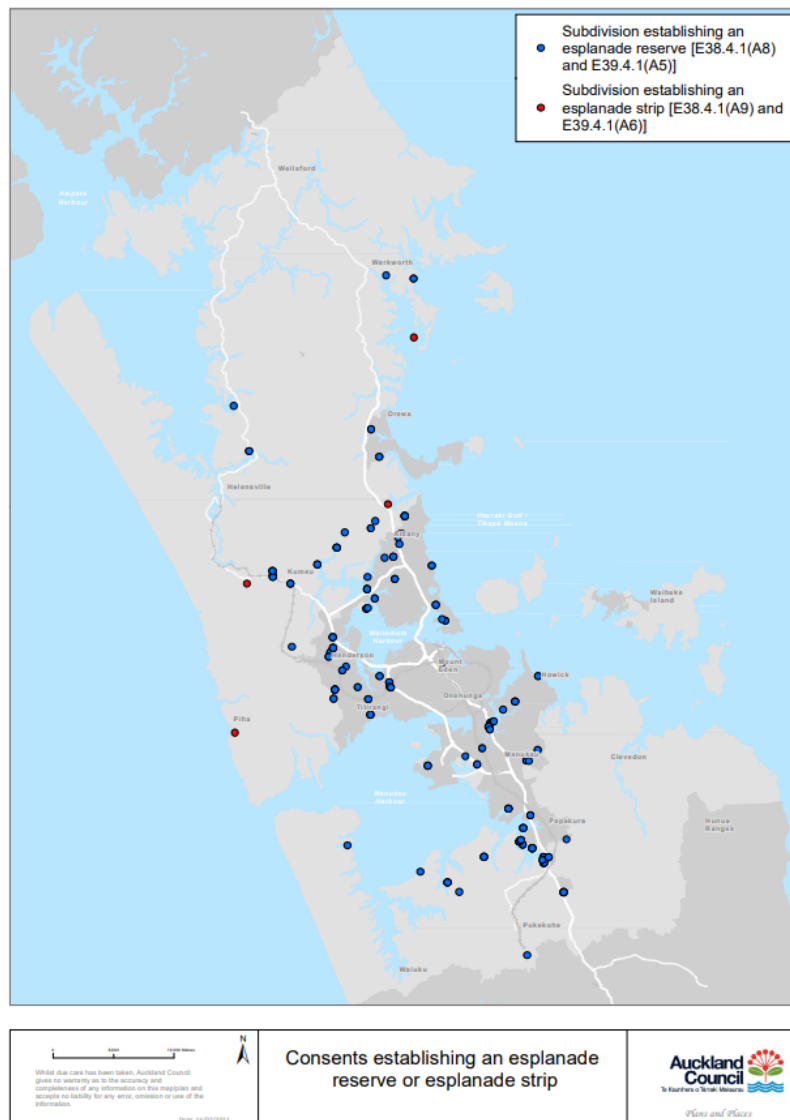


Figure 30: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to the establishment of esplanade reserves or strips

Figure 30 above shows the spatial distribution of all the consents extracted from the resource consent database that required a reason for consent for the establishment of an esplanade reserve or strip under rule E38.4.1(A11) or E39.4.1(A8).

Figure 31 below shows the spatial distribution of subdivision consents that sought to reduce or waiver an esplanade reserve or strip under rule E38.4.1(A10) or E39.4.1(A7).

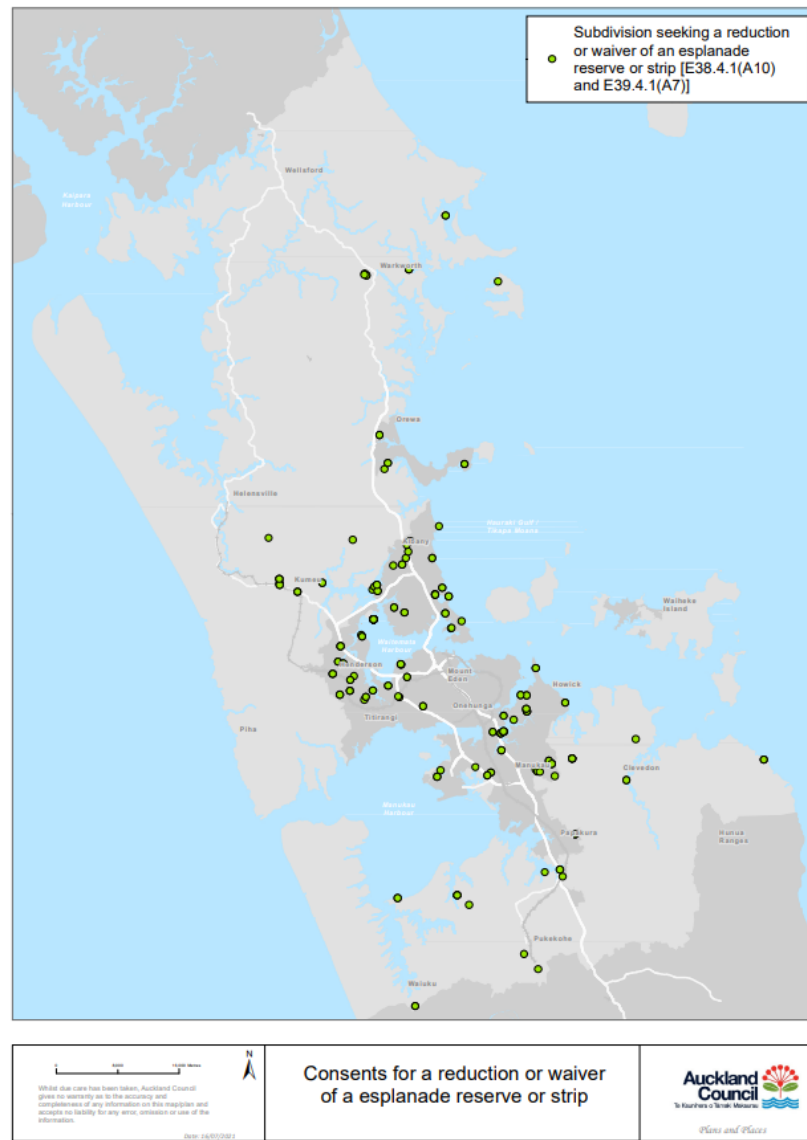


Figure 31: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to the reduction or waiver of an esplanade reserve or strip

4.4.2.5 RMA provisions influence on AUP outcomes

Context

- The AUP provisions give effect to the esplanade reserve and esplanade strip requirements of the RMA, and these provisions significantly influence the effectiveness of esplanade reserves and strips in mitigating the increasing risk of natural hazards over the long term.

Analysis and Findings

The width of esplanade reserves and strips

- The RMA requires a 20-metre reserve to be provided on the subdivision of land creating an allotment less than four hectares without compensation by council (s230(3) and s237E RMA). If a wider width is identified as necessary to fulfil the hazard mitigation (or other purpose s229), the

provision of the additional land beyond 20 metres must be agreed with the landowner. The council has to compensate the landowner for the additional land unless the owner agrees otherwise (s237E(2) RMA). This situation, together with the pressures identified above, results in limiting the instances when a wider than 20 metre reserve is provided, even when it can be demonstrated as necessary to address the long-term hazard risk.

The long-term effects of erosion can result in a significant portion of reserve land being lost over time and require significant public/council funding to address the effects on the reserve and any council assets. It can also result in pressure for council to take mitigation protection measures because of buildings/assets on land adjoining the reserve. An example of this situation and the recent cost to council is provided in Appendix 1.

There have been instances where a wider than 20 metre esplanade reserve has been provided to mitigate hazard risk following discussions with landowners/developers by coastal specialists. A recent example where this has been achieved, without cost to council for the additional land beyond the 20-metre width, is provided as an example in Appendix 1. In this instance, a sufficient width reserve to both mitigate (i.e. accommodate) the predicted erosion and still provide for public access along the coast in the long term was provided. This approach avoids the need for costly protection structures to protect land and assets in the future as erosion occurs.

The provision of a wider reserve to mitigate natural hazard risk is not known to have resulted from a resource consent for subdivision, although further investigation is required to confirm that this is the case.

- Section 236 of the RMA enables an esplanade reserve set aside on earlier subdivision (for allotments created less than four hectares) that has a lesser width than 20 metres to be ‘topped up’ on a time of a subsequent resource consent for subdivision of land. This provides an opportunity to assess the coastal processes affecting a reserve and to acquire a full width reserve land to mitigate coastal hazards, and to provide for other reserve purposes.

Only a few consents that were investigated involved existing esplanade reserves, and in these particular cases, there was generally either no additional ‘top up’ or minor ‘top up’ to align with adjoining parcel boundaries. Further investigation may be appropriate to determine whether the full 20m ‘top up’ has ever been applied.

An example of where limited land was included within the esplanade reserve is provided in Appendix 1.

Reserves on subdivision of land creating allotments over four hectares

- As discussed above, the RMA requires the provision of a 20-metre reserve on the subdivision of land creating allotments less than four hectares in size without compensation. There is no requirement for the provision of a reserve or strip on the subdivision of land where the allotments created over four hectares in size.
- If a reserve is sought on the subdivision of land creating allotments greater than four hectares, council is required to compensate for the reserve land, unless its provision can otherwise be agreed with the landowner (s237F RMA). In some cases, the subdivision creating an allotment greater than four hectares may provide an opportunity to secure land to connect to other reserves, or to enable a reserve to be taken in the event of subsequent development and/or subdivision that may otherwise limit the ability to provide a reserve.



Figure 32: Damage caused by a storm event in early 2018 at Hudson Beach along Awhitu Peninsula (Source: Auckland Council)

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the provision of esplanade reserves and strips, it is recommended to⁵⁴:

- Consider submitting on pending legislation to replace RMA that the requirement for council to compensate a landowner for land wider than 20 metres (s237E RMA) be replaced with a requirement to provide a reserve width to the extent demonstrated as necessary and as practical to mitigate risk over a 100-year timeframe in addition to any other function it is intended to perform, such as providing public access for the long term, particularly for greenfield development.
- Investigate whether objectives and policies should be included in the AUP to raise awareness and support the ‘topping up’ of reserves to a 20-metre width where appropriate, for example in the subdivision provisions.

4.4.2.6 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Applications relating to esplanade reserves are referred to the council’s parks specialists. Consent data review indicates that in most cases specialist advice on hazards is not obtained in making an assessment on the waiver or reduction of an esplanade reserve or strip. However, it has been

⁵⁴ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

advised that sometimes input is sought from council's coastal specialists for applications involving the creation of future esplanade reserves that are to be vested with council to understand the associated hazard risks and the adequacy of information to inform the assessment.

General

- Most of the consents that involved the reduction or waiver of an esplanade reserve or strip were on sites that were within one or more natural hazard areas. This is likely to be a similar trend for those consents that involved the creation of a full-width esplanade reserve or strip as all these sites are located next to a river, stream, lake, or coast, where flooding, coastal inundation and coastal erosion hazards are likely to be present.
- The following breakdowns have been extrapolated from the resource consent database (using the data outlined in Table 20) to provide some estimated statistics⁵⁵ on the nature of the consents that have been sought for in relation to esplanade reserves and strips:
 - There have been at least 103 consents sought for the establishment of an esplanade reserve or strip in the urban environment under E38.4.1 (A8) and (A9), and at least 49 consents sought for the establishment of an esplanade reserve or strip in the rural environment under E39.4.1 (A5) and (A6). As discussed in the [Section 3 Data and Information](#), it is noted that not all the relevant consents in the resource consents database would have been identified as part of this analysis.
 - Out of the identified 85 consents in the urban environment that established an esplanade reserve under E38.4.1 (A8), 51 of these did not also require a reason for consent under E38.4.1 (A10). This suggests that 34 of these consents required a reduction to the 20-metre width.
 - Out of the identified 18 consents in the urban environment that established an esplanade strip under E38.4.1 (A9), 8 of these did not also require a reason for consent under E38.4.1 (A10). This suggests that 10 of these consents required a reduction to the 20-metre width.
 - Out of the identified 45 consents in the rural environment that established an esplanade reserve under E39.4.1 (A5), 40 of these did not also require a reason for consent under E39.4.1 (A7). This suggests that 5 of these consents required a reduction to the 20-metre width.
 - Out of the identified four consents in the rural environment that established an esplanade strip under E39.4.1 (A6), none of these required a reason for consent under E39.4.1 (A7). This suggests that all four consents established a full 20-metre width.
 - Out of the identified 91 consents in the urban environment that sought a reduction or waiver of an esplanade reserve or strip under E38.4.1 (A10), 49 of these did not also require a consent under E38.4.1 (A8) or (A9). This suggests that these consents were all in relation to a waiver of an esplanade reserve or strip.
 - Out of the identified 12 consents in the rural environment that sought a reduction or waiver of an esplanade reserve or strip under E39.4.1 (A7), eight of these did not also require a

⁵⁵ Assumption is that a reduction in width requires consent under both relevant rules, whereas a waiver only requires consent under one rule as no esplanade reserve or strip is proposed to be established. These statistics also do not account for other factors, including potential inconsistencies in the application of these rules and the fact that in some instances more than one esplanade reserves or strips are involved.

consent under E39.4.1 (A5) or (A6). This suggests that these consents were all in relation to a waiver of an esplanade reserve or strip.

- Based on the consents investigated, reductions are more common than waivers, although in some cases both are sought. The extent of width reduction varies, with some reducing a reserve to a two-metre width and others reducing to a 19-metre width.

A 20-metre wide reserve provides a greater buffer than a lesser width, but even this width may not be adequate in some situations. Inadequate reserves and setbacks may limit the potential for natural features such as wetlands, mangroves, and dunes that act as natural defences to hazards, to migrate inland in response to sea level rise. There is pressure to reduce or waive a reserve or strip but there are very limited instances where a greater reserve width is achieved to mitigate hazard risk (as discussed above).

- The role of a reserve in mitigating a natural hazard is not included as a matter that discretion however reference is made is to ‘conservation values’ as a matter of discretion. This is assumed to mean ‘conservation values’ as referred to in RMA s229(a) that includes, amongst other matters, (v) *mitigating natural hazards*’.

The restricted discretionary assessment criteria also refer to Policies E38.3(24), (25) and (26), which include:

E38.3(25)(f) *it can be demonstrated that the reduced width of the esplanade reserve or strip is sufficient to manage the risk of adverse effects resulting from natural hazards, taking into account the likely long-term effects of climate change;*

While in a ‘round-about-way’ the role of an esplanade reserve in mitigating hazard risk is captured in the restricted discretionary provisions, it is not clear. This role is more likely to be overlooked than roles such as public access, that are specifically referred to. Given the increasing importance of reserves in mitigating hazard risk, it is considered that:

- the role of esplanade reserves in mitigating the risk from natural hazards taking into account the long-term effects of climate change should be included as a matter of discretion
- that the assessment criteria include as a matter for assessment the role of a reserve in mitigating the risk for natural hazards taking into account the long-term effects of climate change.

Assessing applications to waive or reduce an esplanade reserve or strip

- A discretionary activity consent is required to reduce or waive the width of an esplanade reserve or strip, with assessment focused against the relevant objectives and policies in Chapters E38 and E39. In the case where a reduction is sought, the relevant matters of discretion and assessment criteria discussed above also apply as an esplanade reserve is still being established.

Policy E38.3(25)(f) and E39.3(22)(f) are the key policies used to assess discretionary applications to reduce or waive an esplanade reserve or strip. These policies contain a number of criteria, based on the purposes for esplanade reserves and strips outlined in RMA s229, against which an application for a reduction of width or waiver is to be assessed, namely:

Policy E38.3(25)

Avoid reducing the width of esplanade reserve or strip, or the waiving of the requirement to provide an esplanade reserve or strip, ***except where any*** of the following apply:

- (a) safe public access and recreational use is already possible and can be maintained in for the future;*
- (b) the maintenance and enhancement of the natural functioning and water quality of the adjoining sea, river or other water body will not be adversely affected;*
- (c) the land and water-based habitats on, and adjoining, the subject land area will not be adversely affected;*
- (d) the natural values, geological features and landscape features will not be adversely affected;*
- (e) any scheduled historic heritage places and sites and places of significance to Mana Whenua will not be adversely affected;*
- (f) it can be demonstrated that the reduced width of the esplanade reserve or strip is sufficient to manage the risk of adverse effects resulting from natural hazards, taking into account the likely long-term effects of climate change;*
- (g) it can be demonstrated that a full width esplanade reserve or strip is not required to maintain the natural character and amenity of the coastal environment;*
- (h) a reduced width in certain locations can be offset by an increase in width in other locations or areas which would result in a positive public benefit, in terms of access and recreation;*
- (i) restrictions on public access are necessary to ensure a level of security for business activities in limited circumstances having regard to the policies in B8.4 relating to public access and open space in the coastal marine area; or*
- (j) direct access to the sea or other water body is required for a business activity in limited circumstances.*

The wording of these policies starts with the strong direction to ‘avoid’ reducing the width or waiver of a reserve, but then follows with the proviso of ‘except where any of the following apply’.

The criteria are not connected with the word, ‘and’, making it clear that they all apply. It could be interpreted to mean if ‘any one’ of the criteria can be met then the requirement to ‘avoid’ a reduction or waiver does not apply. The interpretation of this policy in this way will result in a limited assessment of the multiple roles an esplanade reserve or strip may perform (s229 RMA), including an assessment against criteria (f) in deciding on the appropriateness of reducing or waiving an esplanade reserve.

This issue is highlighted in the consent data review. Consents investigated show that not all the criteria in this policy were always assessed. In many cases, analysis for a reduction or waiver focused mainly on the public access role of a reserve. This reflects the common presumption that the main purpose of esplanade reserves and strips is to provide public access. As public access is a matter listed under Policies E38.3(25)(a) and E39.3(22)(a), technically these policies would be met if it can be demonstrated that public access can still be achieved and maintained.

The assumed emphasis of the role of esplanade reserves being to provide public access, together with the wording of these policies, is likely to mean that the other purposes of reserves, outlined in s229 RMA, is not always being assessed directly, and limits the effectiveness of esplanade reserves and strips in mitigating hazard risk.

- The same activity applies to consents that seek to waive an esplanade reserve or strip and those that seek a reduction. The way that data has been recorded makes it difficult to easily identify how many consents involved a waiver and how many involved a reduction for the purposes of analysis, resulting in estimated statistics outlined above. In addition, using the same activity suggests that the effects of a waiver and a reduction can be addressed in the same way and result in similar effects. However, this may not always be the case as sometimes the reduction is minimal and close to the full width. Furthermore, an esplanade reserve or strip with a reduced width is more likely to be able to provide more opportunities for natural hazard buffering than no reserve or strip.

Esplanade strips

- A discretionary activity consent is required for the establishment of an esplanade strip. Policies E38.3(26) and E39.3(23) provide guidance on the circumstances when an esplanade reserve or strip should be preferred. The criteria relevant to natural hazards is:

(26) Require esplanade reserves rather than esplanade strips unless any of the following apply:

(e) land is subject to natural hazards or stability issues taking into account the likely long term effects of climate change; or

This is aligned with Policy 18 of the NZCPS, amongst other policies.

Only a limited number of consents triggered the establishment of an esplanade strip. Although no direct investigation was carried out on consents that triggered this rule, it has been observed through the consent data review that there appears to be limited analysis given to the amount of land needed over the long term to allow an esplanade strip to migrate landward. Further investigation may be appropriate on this matter.

Land use development preceding subdivision and esplanade reserve requirement

- Discussions with specialists and the analysis of consent data reveal that there is potentially an inconsistency in the consideration given to esplanade reserves and strips between land use consents and subdivision consents. A problem arises in situations where development precedes the later subdivision of the site, and the location of development prevents the provision of a full-width esplanade reserve or strip. This then impacts on the extent of buffer the esplanade reserve or strip can provide to a development that is already located in the anticipated 20m width.



Figure 33: Coastal storm inundation of an esplanade reserve along Clarks Beach (Source: Auckland Council)

- Consents investigated show that the prospect of a future esplanade reserve is considered as part of the land use consent in some instances, and not in others. The current provisions relating to esplanade reserves are mainly contained in the subdivision chapters, with no direct correlation to the land use provisions and as the coastal protection yard setback is often 10 metres rather than 20 metres or wider (this issue is discussed further in [Section 4.4.4 Coastal protection yards and riparian yards](#)). As such, there is little to prompt consideration of the width of a potential esplanade reserve or strip at the land use stage. At the same time, it is also noted that no subdivision is being applied for at this stage and there is no guarantee that subdivision will take place at a later date either. As this issue extends beyond just natural hazard risk management, further investigation may be needed on this matter.
- A reduced or waived esplanade reserve or strip, or insufficient width of a reserve to mitigate the hazard risk in the long-term, can have financial implications for council to mitigate the effects of coastal hazards on council reserves and assets in the longer-term. An example of this situation is discussed in Appendix 1.

In addition to the creation of new esplanade reserve, existing reserves and structures are increasingly being affected by coastal hazards and requiring council to undertake works to protect land or mitigate hazard risk. This can result in significant on-going costs to council in addressing the effects of coastal erosion on existing reserves.



Figure 34: Cobble and sand nourishment to protect a narrow reserve along Kawakawa Bay Coast Road (Source: Auckland Council)

Esplanade reserves as green infrastructure

- s231(1) of the RMA requires that esplanade reserves be vested as local purpose reserves under the Reserves Act 1977. Esplanade reserves whose primary purpose is to mitigate hazard risk, which may include their potential ‘loss’ to erosion, or for the reserve to be regularly flooded, does not fit well with the classification and purpose reserves under the Reserve Act, or with any of the AUP Open Space zones that are applied to reserve land. This is discussed further in [Section 4.2.4 Zoning of land within natural hazard areas](#).

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the provision of esplanade reserves, it is recommended to⁵⁶:

- Consider amending the assessment criteria in E39.8.1(5) and E39.8.2(5) to specifically refer to the role of esplanade reserves in mitigating hazard risk as a matter of discretion and for assessment in providing an esplanade reserve.
- For future monitoring purposes, consider collecting consent data information in a way so that applications seeking reductions and waivers could be easily differentiated and investigated.
- Investigate whether guidance is needed to prompt consideration of the likelihood of a land use consent for multiple properties being later followed by a subdivision consent and the later need for an esplanade reserve. This links to the discussion on coastal protection yard requirements being made consistent with esplanade reserve requirement, which would also address this issue.

⁵⁶ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- Consider amending policy E38.3(25) and E39.3(22) to direct that the waiver or reduction of an esplanade reserve or strip be avoided unless all the criteria can be met and consider providing clarity by connecting the criteria with the word ‘and’.
- Consider whether a waiver or reduction or an esplanade reserve or strip should have the same activity status and subject to the same assessment considerations. A waiver should only apply in limited circumstances, given the policy direction of the AUP and NZCPS and multiple purposes of a reserve or strip.
- Investigate whether the policies and/or assessment criteria need to provide clearer guidance on assessing the width required, and for development to be set back, to enable an esplanade strip to ‘move inland’ in response to climate change and to retain the width of a strip over a 100-year period.
- Consider submitting on the pending legislation to replace RMA seeking provision be made for esplanade reserves to vest for the purpose of ‘green infrastructure’ and consider whether changes are needed to both RMA and Reserves Act provisions to achieve this.

4.4.3 Hard protection structures

4.4.3.1 AUP context

Hard protection structures are manmade structures often used to mitigate the risks to people, property and infrastructure from natural hazard risk. They can be used to stop or disrupt natural processes, and therefore preventing erosion and flooding, at least in the short term.

The relevant rules relating to hard protection structures on land are found in Chapter E36. Some precincts include specific rules that relate to hard protection structures. As outlined in [Section 3.1 Scope of this report](#), precincts were not investigated as part of this report.

Hard protection structures in the coastal marine area are provided for as either a discretionary or a non-complying activity under (A142) of Table F2.9.10 in the Coastal – General Coastal marine zone, depending on whether any overlays apply. Some of the other coastal zones have more specific provisions that apply, for example, hard protection structures or wave attenuation devices in the Coastal – Minor Port zone are restricted discretionary activities under (A35) of Table F5.4.3, while in the Coastal – Ferry Terminal zone wave attenuation devices are restricted discretionary activities under (A18) of Table F6.4.3. The provisions in these other coastal zones were not analysed for the purpose of this report.

4.4.3.2 Resource consent data summary

Based on the resource consent database, there were a total of 122 consents (granted or declined between November 2016 and April 2021) relating to esplanade hard protection structures under Chapters E36 or F2. Table 21 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 21: Resource consent data for hard protection structures

Rule or standard under Chapter E36 Natural hazards and flooding	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Defence against coastal hazards		
E36.4.1 (A20) Extension (including upgrading that increases the area occupied by the structure) or alteration of existing lawfully established hard protection structures	5	5 (100 per cent)
E36.4.1 (A21) New hard protection structures located landward of the coastal protection yard that may serve as a defence against coastal erosion or inundation	21	21 (100 per cent)
E36.4.1 (A22) Hard protection structures not otherwise provided for	38	38 (100 per cent)
Rule or standard under Chapter F2 Coastal – General Coastal Marine Zone	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Structures		
F2.19.10 (A142) Hard protection structures	58	55 (94.8 per cent)

Figure 35 below shows the spatial distribution of all the consents extracted from the resource consents database that required a reason for consent to extend and alter an existing, or establish a new, hard protection structure under rules E36.4.1 (A20), (A21) or (A22) and F2.19.10 (A142).

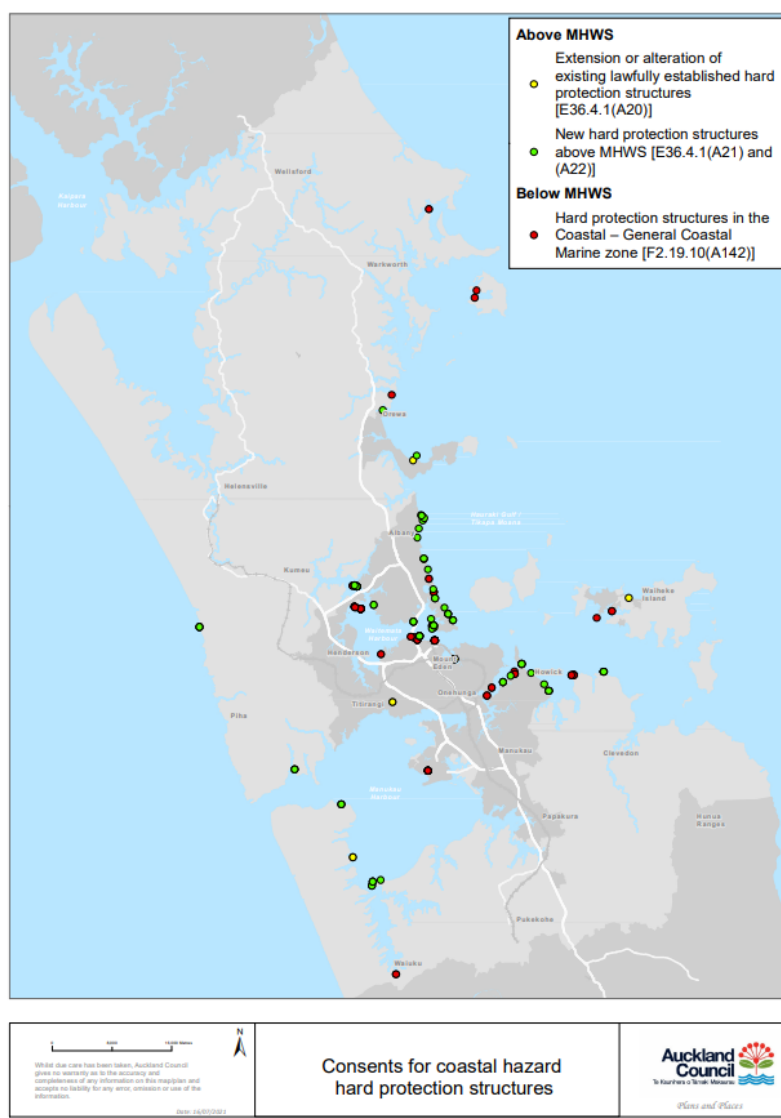


Figure 35: Map showing location of consents between November 2016 to April 2021 that required a reason for consent under the specified rules or standards relating to hard protection structures

4.4.3.3 Definitions

Context

- 'Hard protection structure' is defined in Chapter J of the AUP as the following:

Hard protection structure

Includes:

- seawalls;
- rock revetments;
- groynes;
- breakwaters;

- stop banks
- retaining walls; or
- comparable structure or modification to the seabed, foreshore or coastal land that has the primary purpose or effect of protecting an activity from a coastal hazard, including erosion.

Analysis and Findings

- The definition of ‘hard protection structure’ under the AUP is aligned with that provided for in the NZCPS, which provides the following definition:

Includes a seawall, rock revetment, groyne, breakwater, stop bank, retaining wall or comparable structure or modification to the seabed, foreshore or coastal land that has the primary purpose or effect of protecting an activity from a coastal hazard, including erosion.

- Based on the consent data review, it appears that there is a degree of confusion of what is considered to be a hard protection structure. For example, installing soil nails with meshing and installing in-ground palisade walls are both common methods to address cliff instability and coastal erosion, however, as they are not listed under the definition, sometimes they are interpreted as hard protection structures, and other times they are not. This results in inconsistency on how these types of structures are identified and whether they are assessed against the policy framework.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in providing for hard protection structures it is recommended to⁵⁷:

- Undertake further investigation into the definition of ‘hard protection structure’ and consider whether additional guidance is required to improve the understanding of this definition.

4.4.3.4 Rules and standards

Analysis and Findings

- Based on the consent data review and discussions with specialists, other than in some cases where the definition has resulted in inconsistencies in whether a proposed feature is assessed as a hard protection structure or not, no issues were identified or raised regarding the interpretation or application of the rules relating to hard protection structures. As such, it is understood that the rules and standards relating to hard protection structures are appropriate and effective.

⁵⁷ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.4.3.5 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Applications for hard protection structures are usually reviewed by a council engineer or coastal specialist. Peer reviews from other council specialist teams are limited, and generally relate to hard protection structures in esplanade reserves which are to be vested to council.

Management of Risk, Assessment Considerations and Conditions

- Applications for hard protection structures mostly relate to protecting existing development or addressing recent events, such as landslips or cliff failure. In terms of hard protection structures for new development, these were usually associated with larger greenfield development, particularly Special Housing Areas.



*Figure 36: Repairing of an existing failing seawall along the western end of Sandspit Beach.
(Source: Auckland Council)*

- Hard protection structures can be found in both public and private land. Based on the consent data available, approximately 35 per cent (43 of 122) of the consents that related to hard protection structures were applied for by council or by a CCO. There have also been instances where consents for hard protection structures on council-owned land have been applied for by adjoining landowners.
- Retrospective applications for hard protection structures are not uncommon, particularly for those located on council-owned land. It is noted that these may result from emergency works carried out under s330 of the RMA or established prior to the RMA.
- The assessment of applications relating to hard protection structures appears to be inconsistent. Consent data review indicates that most of the consent decisions had no or limited documented assessment of all the matters that are to be considered under the relevant matters of discretion and assessment criteria, similarly not all policies had been documented to be considered. This is

particularly shown in the assessment for the consideration of whether natural defences, natural features or alternative development locations or designs were practicable instead of utilising hard protection structures. Often the assessments documented focus solely on visual effects, the coastal character of the area or what impacts the hard protection structure will have on the environment. In particular, it is common that as part of the assessments undertaken, the presence of existing hard protection structures along the coastline were seen to indicate that natural character values have been compromised and that natural defences are not a practicable option going forward.



Figure 37: Mass concrete retaining wall (Auckland Council asset) constructed at Andersons Bay, Glendowie (Source: Auckland Council)

- It has been observed that hard protection structures are better managed via conditions and more comprehensively assessed when they are located in the coastal marine area than compared to those located on land. This may be a result of the different wording in the policies under Chapter E36 and Chapter F2. Coastal permits for hard protection structures are assessed by a coastal specialist and the same standard conditions apply to all of the decisions, notably a duration of consent condition (usually 35 years) and a general condition to ensure that the structure is maintained during this period. In some cases, additional conditions have been imposed to ensure that the integrity of the structure is reviewed on a regular basis. With land use consents for hard protection structures, from the consents analysed, there were no examples of where a duration of consent is specified, even when the assessment suggests that the structure has been designed for a specific timeframe. As mentioned above, these consents may be assessed by different specialists from varying perspectives or expertise. In addition, most of the consents investigated did not have

any specific conditions relating to the structure, with only a few consents imposing maintenance or review conditions.

- The lack of conditions relating to hard protection structures on land may compromise their ability to manage risk as there is no requirement for these structures to be maintained properly or for the integrity of these structures to be reviewed regularly during their lifespan. This suggests that potentially the natural hazard risks that these structures are intended to manage may not be managed to the extent anticipated as time goes by. The general absence of conditions also means that there is no trigger to ensure that another assessment is carried out once the structure reaches its actual lifespan.



Figure 38: An example of soil nails and hard coastal protection structure at Beachlands (Source: Auckland Council)

This is of importance as analysis of consent data suggests that further development is occurring on the basis that land is currently being protected by existing hard protection structures. While some consents for additional development have triggered the imposition of conditions to ensure that the new hard protection structure that is being relied on is maintained and/or reviewed appropriately, there are also examples where this has not been the case.

A further issue identified relates to the lifespan for which these structures are designed. As discussed in [Section 4.5 Natural hazards and the Building Act 2004](#), it is noted that there is a disconnect between the design criteria requirements under the Building Act and the RMA.

- Based on consent review, it has been observed that there may be an issue with the assessment of retrospective applications for hard protection structures, particularly for protecting private property. It is noted that as the hard protection structures have already been built, the retrospective assessments are often focused on the permanence of the structure already being in place to manage the risk, and that it is not practical to consider alternatives or replace the

structure with a more natural mitigation method. This can undermine the intent of the objectives and policies of the RPS to rely less on hard protection structures where possible.

- Based on discussions with specialists, it is acknowledged that hard protection structures may be the only practicable option in some cases. For example, for nature-based options to function appropriately they typically require a wide buffer of land. However, in other cases, hard protection structures can cause negative indirect effects such as worsen erosion of adjacent land or contribute to beach lowering. Further investigation is required to understand the extent to which the latter impacts have been adequately considered. If these effects are not appropriately considered, then this may impact on the efficiency and effectiveness of these provisions in achieving the outcomes sought under B10.2.



Figure 39: An example of coastal protection structures at Beachlands (Source: Auckland Council)

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 in providing for hard protection structures, it is recommended to⁵⁸:

- Provide additional guidance on the assessment of hard protection structures to ensure that all matters that should be considered are considered appropriately.
- Provide additional guidance on the imposition of conditions for consents relating to hard protection structures to ensure that these structures are adequately maintained, and to enable an opportunity to review the structure in the event of damage from storm events etc. Guidance should also cover what the process should be when the structure reaches its designed lifespan.

⁵⁸ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

- Undertake further investigation into the issue identified relating to retrospective resource consents for hard protection structures and consider providing additional guidance or amending the relevant assessment criteria to address this.
- Undertake further investigation to determine whether the consideration of negative indirect effects arising from the establishment of a hard protection structure are being considered appropriately.

4.4.4 Coastal protection yards and riparian yards

4.4.4.1 AUP context

Coastal protection yards and riparian yards require development to be set back from the edge of the coast and rivers for a range of purposes, with a focus on maintaining:

- natural character and landscape values
- ecological values
- amenity values

The width of yards is largely based on achieving these outcomes, However, requiring development to be set back from the edges of rivers and the coast also helps to mitigate the risk of effects from natural hazards.

The relevant rules relating to coastal protection and riparian yards are located within the various zone chapters as well as in Chapter E12 Land disturbance – district.

Zone-specific rules

The width of the yard is dependent on the zoning. The widths of coastal protection yards and riparian yards that apply across the zones are shown in Table 22 and Table 23 below.

For coastal protection yards, some of the zones refer to Appendix 6 of the AUP, which includes:

- a 200m Coastal Protection Yard for Te Arai (extent identified on map)
- varying coastal protection yard distances by property for the former North Shore City area, varying from 3 to 30 metres.

Table 22: Coastal protection yard requirements

AUP Zone	Coastal Protection Yard requirement
H3 Residential – Single House Zone H4 Residential – Mixed Housing Suburban Zone H5 Residential – Mixed Housing Urban Zone H6 Residential – Terrace Housing and Apartment Buildings Zone H27 Special Purpose – Maori Purpose Zone	10m or as otherwise specified in Appendix 6 Coastal protection yard
H2 Residential – Rural and Coastal Settlement Zone	20m or as otherwise specified in Appendix 6 Coastal protection yard

Te Aroturukitanga o te Mahere ā-Wae ki Tāmaki Makaurau

H1 Residential - Large Lot Zone H9 Business – Metropolitan Centre Zone H10 Business – Town Centre Zone H11 Business – Local Centre Zone H12 Business – Neighbourhood Centre Zone H13 Business – Mixed Use Zone H14 Business – General Business Zone H15 Business – Business Park Zone H16 Business – Heavy Industry Zone H17 Business – light Industry Zone H25 Special Purpose – Healthcare Facility and Hospital Zone H29 Special Purpose – School Zone H30 Special Purpose – Tertiary Education Zone	25m or as otherwise specified in Appendix 6 Coastal protection yard
H24 Special Purpose – Cemetery Zone	30m or as otherwise specified in Appendix 6 Coastal protection yard
H18 Future Urban Zone H19 Rural - Conservation Zone H19 Rural - Coastal Zone H19 Rural - Mixed Rural Zone H19 Rural – Rural Production Zone H21 Rural – Waitakere Ranges Zone	50m or as otherwise specified in Appendix 6 Coastal protection yard
H19 Rural – Countryside Living Zone	40m or as otherwise specified in Appendix 6 Coastal protection yard
H7 Open Space – Conservation Zone	25m
H7 Open Space – Informal Recreation Zone	20m
H7 Open Space – Sport and Active Recreation Zone H7 Open Space – Civic Spaces Zone H7 Open Space – Community Zone	10m
H8 Business – City Centre Zone H20 Rural – Waitakere Foothills Zone H22 Strategic Transport Corridor Zone H26 Special Purpose – Major Recreation Facility Zone H28 Special Purpose – Quarry Zone	No coastal protection yard requirement

Table 23: Riparian yard requirements

AUP Zone	Riparian Yard requirement
H1 Residential - Large Lot Zone H2 Residential – Rural and Coastal Settlement Zone H3 Residential – Single House Zone H4 Residential – Mixed Housing Suburban Zone H5 Residential – Mixed Housing Urban Zone H6 Residential – Terrace Housing and Apartment Buildings Zone H7 Open Space Zones H9 Business – Metropolitan Centre Zone H10 Business – Town Centre Zone H11 Business – Local Centre Zone H12 Business – Neighbourhood Centre Zone H13 Business – Mixed Use Zone H14 Business – General Business Zone H15 Business – Business Park Zone H16 Business – Heavy Industry Zone	10m

H17 Business – Light Industry Zone H24 Special Purpose – Cemetery Zone H27 Special Purpose – Maori Purpose Zone H28 Special Purpose – Quarry Zone* H30 Special Purpose – Tertiary Education Zone	
H18 Future Urban Zone H19 Rural Zones Rural - Conservation Zone Rural - Coastal Zone Rural - Mixed Rural Zone Rural – Rural Production H20 Rural – Waitakere Foothills Zone H21 Rural – Waitakere Ranges Zone	20m
H25 Special Purpose – Healthcare Facility and Hospital Zone H29 Special Purpose – School Zone	5m
H8 Business – City Centre Zone H22 Strategic Transport Corridor Zone H23 Special Purpose – Airports and Airfields Zone H26 Special Purpose – Major Recreation Facility Zone	No riparian yard requirements
* In the Special Purpose – Quarry zone, the standard specifies that the riparian yard is measured 10m from the edge of a river where a boundary adjoins a river whose bed has an average width of 3m or more, and only applies to land within the RUB. There is a separate yard rule for land outside of the RUB, which does not cover riparian yards.	

The coastal protection yard and riparian yard requirements are reflected in zone-specific permitted standards, which requires the yards to be clear of buildings or parts of buildings. The widths are shown within a ‘yard table’ that includes all the yard requirements that apply for a zone. Standard H5.6.8 is shown below as an example.

- (1) A building or parts of a building must be set back from the relevant boundary by the minimum depth listed in Table H5.6.8.1 Yards below.**

Table H5.6.8.1 Yards

Yard	Minimum depth
Front	2.5m
Side	1m
Rear	1m
Riparian	10m from the edge of all other permanent and intermittent streams
Lakeside	30m
Coastal protection yard	10m, or as otherwise specified in Appendix 6 Coastal protection yard

- (2) Standard H5.6.8(1) does not apply to site boundaries where there is an existing common wall between two buildings on adjacent sites or where a common wall is proposed.**

General rule C1.9(2) provides that any activity that does not comply with one or more standards is a restricted discretionary activity unless otherwise specifically provided for. There is no specific rule

changing this status for non-compliance with the yard standard, and therefore a restricted discretionary activity consent is required if the relevant yard requirement is not met.

There are other zone-specific standards that relate to coastal protection yards and riparian yards such as a maximum impervious surface area requirement. However, these provisions are not assessed as part of this analysis.

Auckland-wide rules

Under Chapter E12, there is a general standard (E12.6.2(1)) that applies to land disturbance in a coastal protection yard or riparian yard. A restricted discretionary activity under C1.9(2) is required if the permitted land disturbance thresholds are exceeded.

All activities (except ancillary farming earthworks, ancillary forestry earthworks and network utilities) listed as a permitted activity, controlled activity or restricted discretionary activity in Table E12.4.1, Table E12.4.2 or Table E12.4.3 must comply with the following standards.

(1) Land disturbance within riparian yards and coastal protection yards are limited to:

- (a) operation, maintenance and repair (including network utilities);**
- (b) less than 5m² or 5m³; for general earthworks;**
- (c) less than 10m² or 5m³ for the installation of new network utilities;**
- (d) installation of fences and walking tracks; or**
- (e) burial of marine mammals.**

4.4.4.2 Resource consent data summary

All yard requirements within each zone are categorised under one rule reference (i.e. H5.6.8) in the resource consents database, which meant it was not possible to separate out the consent applications that did not meet the coastal protection yard or riparian yard requirements from those consents that applied for one or more of the more general yard requirements. This is due to the sheer number of applications (3943) relating to yard infringements.

It was also not possible to ascertain whether an activity that triggered E12.6.2(1) involved land disturbance that exceeded the permitted thresholds in the coastal protection yard, the riparian yard or both.

Table 24 shows the number of consents (granted or declined between November 2016 and April 2021) that infringed a zone-specific yard standard and/or E12.6.2(1). Investigation into these standards was not undertaken for the purposes of this analysis. However, consent information relating to these standards was identified in part through the review of consents for other consent matters that were analysed, for example development in floodplains or vegetation alteration and removal. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

Table 24: Resource consent data for yards and land disturbance in yards

Rule or Standard under Chapters H1-H30	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Yards		
Zone-specific yard standard (including front yards, side yards, rear yards, riparian yards, lakeside yards and coastal protection yards)	3943	Not Investigated
Rule or Standard under Chapter E12 Land disturbance - district	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
General standards		
E12.6.2(1) Land disturbance within riparian yards and coastal protection yards are limited to: (a) operation, maintenance and repair (including network utilities); (b) less than 5m ² or 5m ³ ; for general earthworks; (c) less than 10m ² or 5m ³ for the installation of new network utilities; (d) installation of fences and walking tracks; (e) or burial of marine mammals	281	Not Investigated

4.4.4.3 Definitions

Context

- ‘Coastal protection yard’ is defined in Chapter J of the AUP as the following:

Coastal protection yard

A yard measured in a landward direction from mean high water springs.

- Riparian yard’ is defined in Chapter J of the AUP as the following:

Riparian yard

The area along the top of a permanent or intermittent river or stream measured horizontally and at right angles from the top of the bank.

- Rivers or stream’ is also defined as the following:

River or stream

A continually or intermittently flowing body of fresh water, excluding ephemeral streams, and includes a stream or modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal except where it is a modified element of a natural drainage system).

Analysis and Findings

- Based on the consent data review, there were no issues identified, or raised in discussions with specialists regarding the definitions in Chapter J. It is noted however that the coastal protection yard is measured from MHWS. The issue of relying on the line of MWHS as a point of measurement is discussed in [Section 4.3.2 Coastal erosion](#).

4.4.4.4 Identification and mapping

Context

- There are no mapping layers available to identify the part of a site which falls within a coastal protection yard or a riparian yard.
- The location of MHWS is identified on the AUP maps (as the ‘indicative coastline’) and GeoMaps, but these are indicative only. Rivers and streams are also mapped.

Analysis and Findings

- There is limited mapping information available to assist with the identification of consent infringements for these yards. It is possible that the lack of mapping information may contribute to reasons for consent not being identified during the consenting process as discussed below.
- It is observed that the coastal protection yards set out in Appendix 6 of the AUP could be confusing to navigate for users. An example of the yard width information in Appendix 6 is presented is shown below:

Table 2 Narrow Neck to Milford

Location	Coastal Protection Yard	Measured from
Narrow NeckBeach (Narrow Neck Reserve, Pt Allot 3 Sec 2 Parish of Takapuna - 4 Old Lake Rd, Lot 1 DP 57318)	9m	Mean high water springs
Narrow Neck - George Gair Lookout (2 Hamania St, Lot 1 DP 8411 - reserve seaward of 18 Winscombe St, Lot 3 DP 103959)	20m	Mean high water springs
George Gair Lookout - Takapuna Grammar School (Southern boundary of George Gair Lookout to northern boundary of Takapuna Grammar School)	30m	Mean high water springs
Takapuna Grammar School - 7 Clifton Rd	20m	Mean high

The locations (as shown above) are split based on addresses and legal descriptions. This may make it difficult for a user, particularly one unfamiliar with the area to identify which section of the coastline a site sits within and therefore which yard width applies.

While the information in Table 2 was taken from the former North Shore City District Plan provisions, this Plan had corresponding planning maps that assisted with visually identifying the required width along different parts of the coastline. This supporting mapping has not been included into the AUP. An example of this map is shown in Figure 40 below:

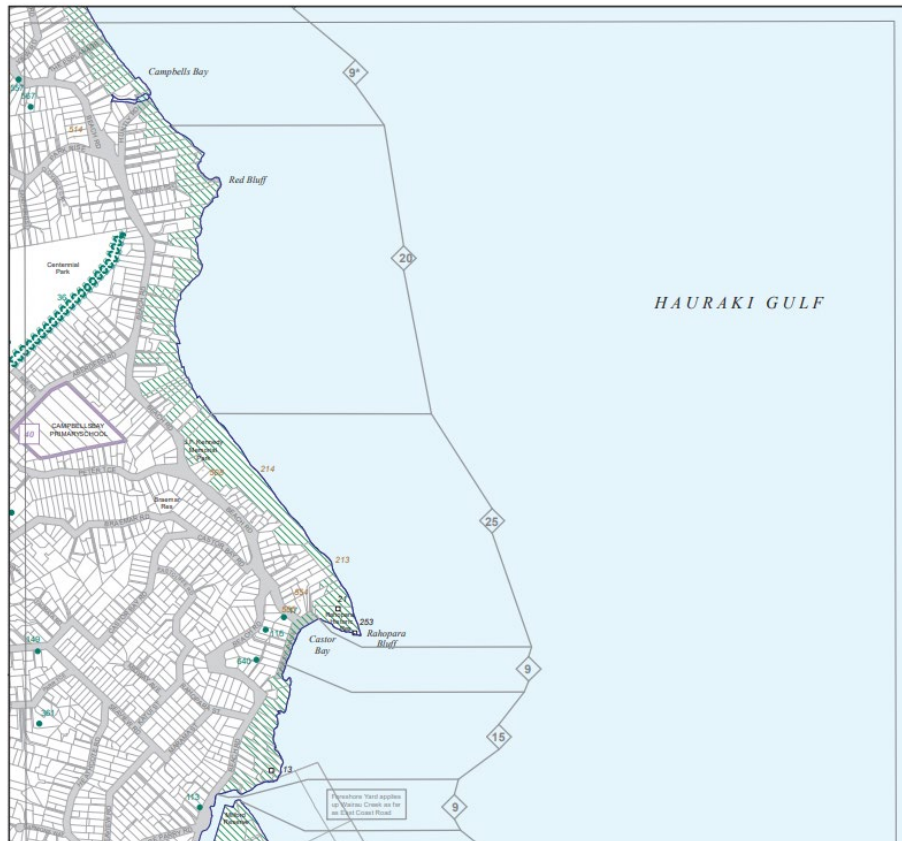


Figure 40: Example of coastal yard mapping information from Auckland Council District Plan - Operative North Shore Section 2002

The reliance on property information to identify the yard requirement, and the varying widths of coastal protection yards that apply under the AUP to the old North Shore District area (as opposed to the standard coastal yard requirement that applies to a zone in other areas), may make understanding the yard requirements more complicated for this area. This potentially hinders the efficiency and effectiveness in applying this standard through consent processes.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the provision of coastal and riparian protection yards, it is recommended to⁵⁹:

- Investigate whether any supporting information is required to complement Appendix 6 of the AUP.

⁵⁹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.4.4.5 Objectives and policies

Analysis and Findings

- Chapter B8 Coastal Environment includes several policies relating to setting development back from the coast, for example:

B8.3.2. Policies

(1) Set back development from the coastal marine area, where practicable, to protect the natural character and amenity values of the coastal environment.

B8.4.2. Policies

(1) Subdivision, use and development in the coastal environment must, where practicable, do all of the following:

(c) be set back from the coastal marine area to protect public open space values and access; and

(d) take into account the likely impact of coastal processes and climate change, and be set back sufficiently to not compromise the ability of future generations to have access to and along the coast.

However, there are no specific objectives or policies in Chapters B10 or E36 that directly refer to coastal protection yards or riparian yards, however the role they play in mitigating the risk from natural hazards is recognised in the ‘purpose’ statement, explaining the purpose of the yard requirement, for example:

H3.6.8. Yards

Purpose:

- to ensure buildings are adequately set back from lakes, streams and the coastal edge to maintain water quality and provide protection from natural hazards; and
- As identified above, the AUP currently lacks objectives and policies relating to the role of coastal protection yards and riparian yards in mitigating the risk from natural hazards and climate change. This role is recognised in the ‘purpose’ explanation for the rules requiring these yards, and in Policy B8.4.2, but not in the zone provisions. There is also no link between these provisions with the objectives and policies in Chapter E36. This results in a policy gap that weakens the recognition of these yards for this purpose.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the provision of coastal and riparian protection yards, it is recommended to⁶⁰:

- Consider amending the AUP to include objectives and/or policies that recognise the role of coastal protection and riparian yards in the mitigation of risk from natural hazards and climate change.

⁶⁰ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.4.4.6 Rules and standards

Analysis and Findings

- Because the applicable zones cover all the yard requirements under one single standard, it is not possible to separate out only the consents that related to infringing the coastal protection yard or the riparian yard. For future monitoring purposes, it would be helpful if the information is recorded in a way that allows each type of yard infringement to be easily identified and investigated.
- For the reasons mentioned above, in-depth analysis was not able to be undertaken as part of this monitoring to determine how many consents have not met the coastal protection yard or riparian yard requirements, or whether these requirements have been applied appropriately during the consenting process. However, it has been observed during the consent data review that there have been instances where activities that require consent within coastal protection yards and riparian yards have not been identified, particularly for exceeding the permitted thresholds for earthworks in these yards under rule E12.6.2(1). This may be due to the rule being located separately in Chapter E12 (as opposed to in the zones) and is listed as a permitted standard (that applies to all earthwork activities) that not all users may be aware of.
- An issue raised by specialists and noted as part of the consent data investigations is that there appears to be a disconnect between the yard provisions and the subdivision provisions. There have been several examples where the 20-metre esplanade reserve is unable to be provided at subdivision stage because a land use development that complies with the coastal protection yard or riparian yard requirements (often 10 metres) has been granted prior to the subdivision application and buildings or structures are located within 20 metres of MHWS. This necessitates a reduced, or potentially waived, esplanade reserve.
- While it is acknowledged that the purpose of the coastal protection and riparian yards are not to future-proof land for subdivision, this inconsistency in set-back widths may be undermining the opportunity of establishing sufficiently wide future esplanade reserves and for them to perform a role in mitigating natural hazards, as well as other purposes. Further investigation should be undertaken to determine the extent of this issue and whether it would be appropriate for these yard and esplanade reserve/strip provisions to be more aligned. A greater yard set-back requirement would also signal that the development potential/yield of sites in natural hazard areas cannot be assumed to be the same as for other areas because of the hazard risk.
- It is noted that there is a degree of overlap between the yard provisions and the natural hazard provisions in terms of their roles in natural hazard risk management. For example, the floodplain extent may coincide with the 10m riparian yard setback. Further investigation should be undertaken into whether the yard provisions would be more effective as a buffer for natural hazard risk if they were measured from a natural hazard area rather than just from the waterbody or coast.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the provision of coastal and riparian protection yards, it is recommended to⁶¹:

- For future monitoring purposes, consider collecting consent data information in a way so that infringements to each yard type to be more easily differentiated and investigated.
- Undertake further investigation of the issue raised with regards to the relationship between the coastal protection and riparian yard controls and the esplanade reserve and strip requirements and consider whether these provisions should be more aligned.
- Undertake further investigation on the overlap between the yard provisions and the natural hazard provisions under E36 and consider the possibility and effectiveness of applying a yard control based on setback from the natural hazard area itself rather than from the waterbody or coast.
- Investigate whether standards relating to coastal protection yards and riparian yards are being identified appropriately and consider adding cross-chapter references to alert plan users of the relevant provisions that may also apply. Table 25 below illustrates one way this could be done.

Table 25: Example option to include cross-chapter references for coastal protection and riparian yards

Coastal protection yards and riparian yards	
Coastal Protection Yard	Riparian Yard
Width xx metres from MHWS	Width xx metres
Other provisions that apply: • Impervious surface: standard xx • Fences and structures: standard xx • Vegetation alteration or removal: standard xx • Earthworks: standard xx • Coastal erosion hazard area/coastal storm inundation etc: standard xx	Other provisions that apply: • Impervious surface: standard xx • Fences and structures: standard xx • Vegetation alteration or removal: standard xx • Earthworks: standard xx

4.4.4.7 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Consents involving infringements to coastal protection yards and riparian yards are not usually assessed by a specialist. It is observed that if a rule in E36 also applies, any natural hazard implications appear to be dealt with separately, and input is sought from the relevant specialists.

⁶¹ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Management of Risk and Assessment Considerations

- As discussed above, there appears to be a disconnect between the intention of the hazard mitigation role of the coastal protection yard and riparian yard requirements and the objectives and policies of the AUP. This role is only recognised in the ‘purpose’ explanation for the rule but there are no supporting objectives or policies in either the zones or Chapter E36 that recognise the role these yards play in hazard mitigation.
- Unsurprisingly on the limited consents that were analysed as part of the consent data review, it has been observed that there was little, or no consideration given to natural hazard mitigation role of a yard where it did not comply with the setback requirements. This policy gap limits the effectiveness of this standard in achieving the outcomes sought under the RPS.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through the provision of coastal and riparian protection yards, it is recommended to⁶²:

- Consider including objectives and policies that recognise the role of coastal protection and riparian yards in natural hazard mitigation.

4.4.5 Vegetation alteration or removal

4.4.5.1 AUP context

Vegetation can help to mitigate the risk of natural hazards through:

- plants helping to stabilise coastal edges, streambanks and unstable land by slowing down rain run-off, taking-up water and retaining sediment
- mangroves and tidal saltmarsh acting as a natural buffer against coastal storm surges and erosion through dissipating wave energy and accumulating sediment.

The alteration or removal of vegetation may exacerbate natural hazard risk.

The relevant rules relating to vegetation alteration or removal are found in Chapter E15 of the AUP. Chapter F2 of the AUP also covers mangrove removal in the coastal marine area.

4.4.5.2 Resource consent data summary

The focus of investigation for vegetation alteration and removal was on vegetation in the coastal or riparian environment as the vegetation in these areas were more likely to have an influence on natural hazard risk management. Table 26 provides a breakdown of these consents and outlines the number of consents that were further investigated for the purposes of this analysis. The extent of these investigations was ultimately limited by the time and resource constraints. This analysis has only assessed the effectiveness of the vegetation removal rules adjoining riparian and coastal edge for the purposes of their role in mitigating natural hazard risk. Refer to [Section 3.3 Resource consent database methodology and limitations](#) for more information on the methodology and limitations of the consent data used.

⁶² These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Table 26: Resource consent data for vegetation removal or alteration in the coastal or riparian environment

Rule or Standard under Chapter E15 Vegetation management and biodiversity	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Riparian areas		
E15.4.1 (A16) Vegetation alteration or removal within 20m of rural streams, other than those in Rural – Rural Production Zone and Rural – Mixed Rural Zone	28	Not investigated
E15.4.1 (A17) Vegetation alteration or removal within 10m of rural streams in the Rural – Rural Production Zone and Rural – Mixed Rural Zone	15	Not investigated
E15.4.1 (A19) Vegetation alteration or removal within 10m of urban streams	217	22 (10 per cent)
Coastal areas		
E15.4.1 (A20) Vegetation alteration or removal of greater than 25m ² of contiguous vegetation, or tree alteration or tree removal of any indigenous tree over 3m in height, within 50m of mean high water springs in the Rural – Rural Production Zone, Rural – Mixed Rural Zone, Rural – Rural Coastal Zone, Rural – Rural Conservation Zone, Rural – Waitakere Ranges Zone and Rural – Countryside Living Zone or Future Urban zone	4	Not investigated
E15.4.1 (A21) Vegetation alteration or removal of greater than 25m ² of contiguous vegetation or tree alteration or tree removal of any indigenous tree over 3m in height within 20m of mean high water springs in all zones other than in a Rural – Rural Production Zone, Rural – Mixed Rural Zone, Rural – Rural Coastal Zone, Rural – Rural Conservation Zone, Rural – Waitakere Ranges Zone and Rural – Countryside Living Zone or Future Urban Zone	92	52 (56.5 per cent)
E15.4.1 (A22) Vegetation alteration or removal of greater than 25m ² of contiguous vegetation, or tree alteration or tree removal of any indigenous tree over 3m in height, that is within: (a) a horizontal distance of 20m from the top of any cliff with; (b) a slope angle steeper than 1 in 3 (18 degrees); and (c) within 150m of mean high water springs	98	37 (37.8 per cent)

Rule or Standard under Chapter F2 Coastal – General Coastal Marine zone	Number of consents from resource consent database where this rule was identified as a reason for consent	Number of consents further investigated as part of this analysis (sample size proportion in relation to total number from resource consent database)
Coastal Marine Disturbance		
F2.19.4 (A48) Mangrove removal to enable the operation, maintenance, use and functioning of existing lawful structures, infrastructure, or to ensure public health and safety in the use or operation of infrastructure: - greater than 200m² in the Coastal – General Coastal Marine Zone and SEA-M2, ONL and HNC overlay; or - greater than 30m² in SEA-M1, ONC, ONFs and HH overlays	1	Not investigated
F2.19.4 (A50) Mangrove removal, not otherwise provided for	7	Not investigated

4.4.5.3 Definitions

Context

- Vegetation alteration or removal is defined in Chapter J Definitions as:

Vegetation alteration or removal

Damaging, cutting, destroying or removing any part of vegetation.

Includes:

- roots; and
- crown pruning.

Excludes:

- the alteration or removal of vegetation planted as a crop or pasture.
- The terms ‘contiguous vegetation’ and ‘mangrove removal’ are also defined in Chapter J:

Contiguous vegetation

Vegetation with a continuous or near continuous canopy, or sub canopy or ground cover and any adjacent individual plants or groups of plants that connect to the continuous area in terms of species, structure or ecological gradient. It does not include vegetation planted as a crop, garden or pasture or the understorey in forests.

Mangrove removal

Partially or wholly removing, burying or clearing mangroves.

Includes:

- pruning mangrove branches;
- pulling out mangrove seedlings;
- removing mangroves at the trunk; and
- removing mangrove root systems.

Analysis and Findings

- Based on the consent data review and discussions with specialists, there were no issues identified or raised regarding the definition of the relevant terms in Chapter J regarding vegetation alteration or removal.

4.4.5.4 Rules and Standards

Analysis and Findings

- The rules under Chapter E15 primarily rely on a feature (e.g., from the top of a cliff or a waterbody) to identify land where vegetation removal or alteration may have an impact on natural hazard mitigation or exacerbation of natural hazard risk. Limited analysis was undertaken on this matter due to resource and timing constraints. Additional investigation should be undertaken to determine whether vegetation that may have an impact on natural hazard risk are adequately covered by these provisions. For example, removal of vegetation can exacerbate land instability risks but not all land that may be subject to land instability are in riparian or coastal areas as specified.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through vegetation management, it is recommended to⁶³:

- Investigate whether vegetation alteration or removal within the specified areas under Chapter E15 have been appropriately identified and evaluate whether additional areas or criteria should be identified for the purposes of managing natural hazard risk

4.4.5.5 Management, assessment, and process

Analysis and Findings

Specialist Reviews and Technical Information

- Applications for vegetation alteration or removal on land in the riparian and coastal environment are usually sent to suitable technical specialists for review. A general observation is that the

⁶³ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

technical assessments, particularly for those relating to vegetation removal on land, focus more on the biodiversity and ecological effects of the activity.

Management of Risk and Assessment Considerations

- The scale and nature of vegetation alteration or removal activities vary significantly. Based on consents investigated, consents ranged from the pruning of a branch or undertaking minor works within the dripline of a tree to the removal of multiple trees or large areas of contiguous vegetation.
- In-depth analysis was not able to be undertaken as part of this analysis on whether the relevant rules have been applied appropriately during the consenting process as it would require detailed investigation and review of each consent. However, as discussed in [Section 4.3.2 Coastal erosion](#) and [Section 4.4.4 Coastal protection yards and riparian yards](#), the need for consent relating to rules for coastal protection yards and riparian yards, and coastal erosion hazard area were sometimes not identified.

It is observed that this may also likely be the case for vegetation removal or alteration. It is common for natural features, such as rivers or streams, to be located on or adjacent to one site, but the specified distance or area to which the vegetation management rule applies to extend onto adjoining site/s, where the presence of these features may not have been identified. In addition, E15.4.1(A22) applies to an area within 150m of MHWS, which may extend across several properties and therefore potentially overlooked.

- The relevant assessment criteria for vegetation alteration or removal provides sufficient scope to consider the impact of the alteration or removal on mitigating, avoiding, or exacerbating natural hazard risk. However, its application appears to be potentially inconsistent. It is observed that only some of the consents investigated specifically refer to, or assess, the role the vegetation has on mitigating natural hazard risk. This seems to suggest that the relevant assessment criteria relating to this role may not always be addressed. It is acknowledged however that in some cases the vegetation in question may have little or no role in natural hazard mitigation. In some cases, the vegetation may have a negative contribution.

Conditions

- The imposition of conditions for activities involving vegetation removal on land appears to be inconsistent. The consent data review has identified that revegetation and replanting is a common and generally appropriate method to mitigate the effects of vegetation removal. However, the conditions relating to ensuring that this mitigation is carried out and maintained vary in specificity and duration.
- Examples from the consent data review indicate that there have been consents that have no specific conditions imposed to ensure that the mitigation and replacement planting is carried out, other than that they are in accordance with the submitted plans. For those consents where specific conditions are imposed, they largely fall under two categories:
 - where the planting is to be maintained for a two-year period
 - where the planting is to be maintained in perpetuity.
- The lack of conditions or having conditions that only apply for a certain amount of time, increases the risk of required planting to be removed or forgotten about. This could result in the role that re-planting was intended to play in mitigating natural hazard being compromised in the long-term, limiting its intended effectiveness in achieving the outcomes sought under the RPS.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through vegetation management, it is recommended to⁶⁴:

- Consider providing additional guidance to assist with improving awareness of the E15 provisions and understanding of the purpose of these provisions.
- Undertake further investigation on whether the hazard mitigation role of vegetation is being adequately considered as part of the assessment for vegetation removal or alteration and consider providing additional guidance to ensure that this matter is considered consistently.
- Investigate whether a standard condition should apply to planting with the purpose of long-term hazard mitigation to ensure it is maintained for the period intended.

4.4.5.6 Connection between Chapter E15 and Chapter E36

Analysis and Findings

- The two objectives in E15 focus on achieving ecological outcomes, and do not correspond to the protection, maintenance or enhancement of vegetation that plays a role in mitigating hazard risk. Therefore, the two relevant policies (E15.3(1) and E15.3(2)) do not have a direct link to either of the objectives in this chapter.
- In addition, while provisions in Chapter E15 and Chapter E36 both seek to manage the risk from natural hazards, there is no recognition of the role of vegetation in mitigating risk in Chapter E36.
- Chapter E36 contains one policy (Policy E36.4 (24) below) that relates to vegetation management. However, this policy refers to the role of vegetation in providing amenity and ecological values and for the potential for vegetation to create, rather than reduce hazard risk in floodplains:

(24) Enable the planting and retention of vegetation cover to enhance amenity values, green linkages and ecological values in floodplains as long as it does not create or exacerbate flooding upstream or downstream or otherwise increase flood hazards.

There is no reference to the policies in E15, particularly E15.3(1) below, that may also apply and creates some disconnect between the policies for vegetation management in areas prone to hazards/flooding between the two chapters.

E15.3. Policies [rcp/rp/dp]

- (1) Protect areas of contiguous indigenous vegetation cover and vegetation in sensitive environments including the coastal environment, riparian margins, wetlands, and areas prone to natural hazards.**

⁶⁴ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2 through vegetation management, it is recommended to⁶⁵:

- Consider amending the AUP include an objective for protecting and managing the effects of activities on vegetation that performs a role in mitigating the risk from natural hazards, which links to policies E15.3(1) and E15.3(2)
- For Chapter E15, consider adding a reference to highlight that the provisions of Chapter E36 also apply to activities on the coastal edge (in coastal hazard areas) and riparian areas, and investigate whether a more restrictive activity status should apply to a significant extent of vegetation removal, or to vegetation in the hazard areas identified in Chapter E36.
- For Chapter E36, consider adding a reference to highlight that the provisions of Chapter E15 apply to vegetation management activities on the coastal edge (in coastal hazard areas) and riparian areas/floodplains, and adding an objective that seeks the protection and enhancement of vegetation, dunes and features that act as natural defences against hazards.

4.5 Natural hazards and the Building Act 2004

Differences between the RMA and Building Act 2004 in managing natural hazards

- The Building Act 2004 (Building Act) manages the hazard risk to buildings on land subject to natural hazards. Buildings may require a resource consent under the AUP rules in addition to a building consent. If buildings are a permitted activity under the AUP, they will require only a building consent.
- Sections 71(1) and (2) of the Building Act⁶⁶ provides that building consent must be refused for the construction or major alteration to buildings on land that is subject to one or more natural hazards, or if building work will worsen or result in a natural hazard on the land or any other property, unless adequate provisions is made to:
 - protect the land, building or other property for the hazard/s
 - restore any damage to land or property from the building work.
- The Building Act includes a definition of natural hazards in s71(3) that differs from the RMA definition. Both definitions are shown in Table 27 below. It is not known if these two different definitions have caused any differences in the approach to natural hazards between the AUP and the Building Act.

⁶⁵ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

⁶⁶ Section 71 of the Building Act 2004 can be found in the following link:

<https://www.legislation.govt.nz/act/public/2004/0072/latest/link.aspx?id=DLM306818>

Table 27: Definitions of 'natural hazard' under the Building Act 2004 and RMA 1991

Building Act 2004 definition of natural hazard [s71(3)]	Resource Management Act 1991 definition of natural hazard [s2]
Natural hazard means any of the following: (a) erosion (including coastal erosion, bank erosion, and sheet erosion): (b) falling debris (including soil, rock, snow, and ice): (c) subsidence: (d) inundation (including flooding, overland flow, storm surge, tidal effects, and ponding): (e) slippage.	Natural hazard means any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

Application of sections 71 – 74 of the Building Act

- As outlined above, section 71(1) allows a building consent to be refused if the land on which the building work is located is subject to natural hazards, or the work may worsen the result of a natural hazard on the land or any other property. Section 71(2) provides that if a consent authority is satisfied that the adequate provision has been made to address the risk then section 71(1) does not apply.

Section 72 provides, that despite section 71, a building consent must be granted if the building work will not worsen the natural hazard on the land or any other property and it is reasonable to grant a waiver of modification of the building code in respect of the hazard concerned.

- If a consent is granted on this basis of an exemption of the building code under s72, s73 requires that the consent authority notify the consent to the appropriate authority (Minister, Surveyor General, Registrar of the Māori Land Court or Registrar-General of Land). Under section 74(1) (b) the Registrar-General of Land must record on the title of the land that a consent was granted under s72 and the particulars of the natural hazard. A Practice Note (AC2229 Building on land subject to natural hazards) outlines how these Building Act and Building Code sections are applied. The Note includes an explanation to the effect of a s74 notice:

The owner(s) of the land, which is subject to the natural hazards, takes and accepts the risk that the natural hazard affecting the site may under certain circumstances affect the proposed building. The section 73 notice protects Council from any associated liability as set out in section 392 of the Building Act. Without such a notice associated with each building consent, Council will not obtain the protection provided under section 392 of the Building Act.

In this circumstance, registration of any notices on the certificate of title may affect the owner's ability to obtain appropriate insurance cover.²³

As these provisions are not relevant for the assessment of resource consents, it is not clear how often these notices are being imposed at the building consent stage. However, based on discussions with specialists, it is understood to be a rare occurrence and something that is contested by property owners as it lessens the value of a property and could affect their insurance.

- The identification of natural hazard risk, either through mapping and identification on LIMs, site specific assessment or a s74 notice is important in ensuring the insurance cover for property. The Insurance Council of New Zealand provided a 'Information for Property Owners' letter to council in response to advice that a review of coastal erosion was being undertaken, that states:

Property owners are required to disclose to their insurer if their property has been identified as being at risk from any natural hazard by their local Council, through information being placed on the properties LIM or by way of a Section 74 notice on the property title. Failure to disclose may risk claims to your insurer being declined following an event such as a flood or landslip²⁴.

However, depending on how many buildings are being affected, the council may want to consider if s73 notices need to be used where there is a question over the hazard risk affecting buildings to protect council from future liability.

Analysis and Findings

- Discussions with specialists indicate that there are potentially gaps resulting from the differences between the requirements under the Building Act and the AUP, particularly in relation to the different timeframes involved and the hazard parameters that apply. These differences may reduce the overall effectiveness and efficiency in the AUP provisions in achieving the RPS outcomes.

Only limited investigation was able to be carried out on these matters. However, the investigation undertaken indicates that the timeframes under the Building Act and Building Code can create a conflict with the 100-year timeframe for evaluating hazard risk required under the AUP, particularly in relation to freeboard requirements. References in the Building Code and supporting practice notes suggesting design timeframes ranges from at least 5, 15 or 50 years for buildings to 100 years for hazard protection works. Conflicting timeframes could mean that even though a resource consent has been assessed for the 100-year timeframe, the associated buildings and structures may not be necessarily designed for this duration.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to⁶⁷:

- Undertake further investigation into the different timeframes that apply under the Building Act (or Code) and identify how this is aligned or is contradictory to the AUP and RMA requirements.
- Consider, as part of input to pending RMA changes and any Building Act review, suggesting that timeframes under the Building Act and Building Code be amended to be consistent with the AUP and RMA requirements.
- Investigate the imposition of s73 notices under the Building Act and whether this can be used to support management of natural hazard risk from a resource management perspective.

⁶⁷ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.6 Other methods

4.6.1 Background

Section 35(2)(b) requires the monitoring of the efficiency and effectiveness of policies, rules or other methods in its policy statement or plan. While the sections above analyse the efficiency and effectiveness of the regulatory provisions of the AUP, this section identifies other methods, including non-regulatory methods that contribute to achieving the objectives of B10.2, particularly Objective B10.2.1(1):

(1) Communities are more resilient to natural hazards and the effects of climate change.

Section B1.6 Methods of the RPS outlines the range of regulatory and non-regulatory methods used to implement the objectives and policies of the RPS. The non-regulatory plans and strategies referred to in Table B1.6.1 to implement the regional policy statement that are particularly relevant to managing the risk from natural hazards are shown below in Table 28.

Table 28: Other methods listed in AUP Table B1.6.1 that are relevant to managing the risk from natural hazards

Methods to implement the regional policy statement	
Non-regulatory plans and strategies	• Civil defence and emergency management plans • Catchment management plans
Advocacy and education	Programmes and toolkits that provide people and communities with information to increase their understanding of a particular subject such as: • resource consent processing guidance • environmental education • education on risk issues associated with natural hazards, hazardous substances and hazardous facilities
Monitoring and information gathering	Ongoing gathering of information to ensure policy is based on robust research such as: • state of the environment monitoring • natural hazards register • modelling effects of climate changes on areas susceptible to natural hazards

4.6.2 Non-regulatory plans and strategies

Council has developed a number of non-regulatory plans and strategies for managing the risk and effects of natural hazards. The particularly relevant plans and strategies include:

- Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan
- Shoreline Adaptation Plans (formerly coastal management plans)
- Natural hazards risk management plan for Auckland
- 'Resilient Auckland' - Auckland's emergency management plan
- Too Much Water policy

These non-regulatory plans and strategies also contribute to achieving the AUP B10.2 objectives. A brief overview of the natural hazard management plans is briefly discussed below.

Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan

Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan provide an overarching response to climate change with a focus on:

- Greenhouse gas emissions reduction targets of:
 - halving emissions by 2030 and reaching net zero emissions by 2050
- Preparing Auckland for the impacts of climate change:
 - How we will adapt to climate change
 - Taking a precautionary approach
 - Preparing for current emissions pathway and the prospect of a 3.5 degrees warmer region.

Shoreline Adaptation Plans

Shoreline Adaptation plans set out an integrated, sustainable approach to coastal management over the next 100 years. Council is developing Shoreline Adaptation plans (SAPs) informed by Auckland Council's Coastal Management Framework ('CMF'). Sixteen SAPs are planned to be developed for Auckland, including Waiheke and Great Barrier Island. To date one SAP has been completed for a part of the coast at Whangaparaoa as a pilot study. The SAPs are a key work programme for implementation of Te Taruke-a-Tawhiri: Auckland's Climate Plan.

Shoreline Adaptation Plans:

- are strategic documents that support the sustainable development of coastal cells (i.e. areas of the coast where sediment movement is expected to be contained or restricted by geomorphic features, such as headlands and harbours)
- are developed with affected communities but do not include private property or assets
- focus on sustainable development of publicly owned council land and assets (i.e. coastal reserves and regional parks, and public assets such as coastal defence structures, boat ramps, accessways etc)
- once completed will guide detailed regional coastal asset management plans.

While SAPs are non-statutory documents, the processes, analysis and information on hazard risk they contain can also support effective decision making under the AUP as they:

- consider risk over a 100-year timeframe
- are based on coastal cells appropriate for the coastal systems and geomorphological processes that affect a part of the coast, rather than a site-specific or geographic area of interest
- can provide locally specific information and guidance on risk that can inform planning and consenting decisions
- involve partnering with mana whenua to embed Māori values into decision making and management of the coast that can also inform planning and consenting processes
- take a region-wide approach to coastal management and can enable a more consistent approach through planning and consents i.e. guidance on appropriateness of response including for decision-making on hard-protection structures etc

- can support dynamic adaptive pathways planning under the guidance document from MfE (Coastal hazards and climate change: Guidance for local government, December 2017).

The present RMA framework makes it difficult to easily integrate the policy directives from a SAP into the AUP provisions even if they may provide direction on the management approach that should apply to subdivision, use and development within coastal cells. Dynamic adaptive pathways planning is a core component of coastal management planning but is difficult to implement through the RMA process as it requires a fast, responsive planning response to triggers.

The pending resource management reform and the introduction of the Climate Change Adaptation Act is anticipated to provide a more responsive coastal management planning approach, including for managed retreat response.

Natural Hazards Risk Management Action Plan (‘NHRMAP’)

The Natural Hazards Risk Management Action Plan (‘NHRMAP’) is an internal operational plan that largely relates to council’s own activities and seeks to coordinate council’s response in natural hazard management. It is a strategic deliverable of Te Taruke-a-Tawhiri: Auckland’s Climate Plan and builds on Auckland Emergency Management Group Plan 2016-2021 ‘Resilient Auckland’ and this document develops an all of council approach to natural hazards. The natural hazard risks that are managed through the AUP aligns to the risk profile in NHRMAP.

The NHRMAP identifies ten natural hazards that pose the largest risk to Auckland in terms of their impact to our natural, cultural, economic, and social environments, namely:

- tornados
- uncontrolled wildfire
- flooding
- coastal inundation
- coastal erosion
- land instability
- severe wind
- earthquake
- tsunami
- volcanic activity.

Council’s natural hazard risk actions are grouped into the following functional areas:

- Governance and leadership
- Strategy, policy, and planning
- Regulations and consents
- Asset management
- Knowledge and research
- Communication, education, and community resilience-building
- Partnerships.

There are overlaps with natural hazard risk to subdivision, use and development managed under the AUP and a co-ordinated response to all natural hazard risk across council's functions, in addition to the strategy, policy, planning and consenting role under the AUP, is an efficient and effective way to assist in achieving the objectives of B10.2.

Auckland's Emergency Management Plan - Resilient Auckland

Under the Civil Defence and Emergency Management (CDEM) Act 2002, the Auckland Emergency Management Group ('AEM group') is part of council but works in partnership with emergency services and other organisations (e.g., Fire & Emergency New Zealand) to ensure co-ordination of civil defence and emergency management. As the administering authority council is responsible for the funding and coordination of CDEM activities for Auckland.

The aim of AEM group is to:

- understand Auckland's hazard risks
- coordinate planning activities that relate to hazard and emergency management
- encourage cooperation and joint action across the region
- assist communities in becoming more resilient to hazards and prepared in the event of an emergency.

The AEM group provide a coordinated and integrated approach to the way significant risks and hazards are managed in the Auckland region across the four 'R's:

- reduction
- readiness
- response
- recovery.

Some risks with low probability but high potential impact (e.g., volcanic activity, tsunamis and earthquakes) cannot be sufficiently addressed through the AUP land use planning rules. The risks from these large-scale events are difficult to quantify and interpret into land use planning provisions. These hazards are better managed through emergency management.

Under the Civil Defence and Emergency Management (CDEM) Act 2002, the AEM group is required to prepare a group plan for the region. 'Resilient Auckland 2016-2021' prepared by AEM sets out a coordinated approach to significant risks and hazard managed in Auckland and outlines a vision and goals for managing and preparing for emergencies. It is a five-year strategic plan for the Auckland CDEM Group, key partners and stakeholders involved in CDEM functions and sets out a coordinated approach to significant risks and hazards managed in Auckland.

Hazard identification is not limited to natural hazards, but also human, biological, technological and other hazards.

Too Much Water policy

'Too Much Water' is a council-initiated policy that seeks to:

- Improve people's understanding of future risk in order to prioritise investment, make better risk-informed decisions and build resilience into everyday processes.

- Improve Auckland’s approach to risk where everyone has a role in reducing and managing risk.
- Minimise future risks on Auckland communities by shifting the focus from managing disaster to managing risks, including to reduce the underlying drivers of risk (exposure and vulnerability).

Work is currently being undertaken to align the outcomes sought under this policy with the other related strategies, plans and policies.

4.6.3 Monitoring and information gathering

As discussed in the sections above, council has applied significant resources to better understanding natural hazard and climate change risks and their predicted effects since the AUP became operative. This includes the research, modelling and mapping of flooding, coastal inundation, coastal erosion, and land instability risk managed under the AUP, as well as other risks discussed above.

Most information and council reports are available to the public, including the mapping of areas at risk in the AUP. This information helps to provide transparency of risks and assists in raising awareness and helping communities to plan and become more resilient to hazard risk.

Recommendation/s

To improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2, it is recommended to⁶⁸:

- For future monitoring purposes, investigate whether there could be better co-ordination of data collection between organisations that deal with natural hazards so that data can be used to assist with assessing the efficiency and effectiveness of the AUP and understanding risk tolerance.

It is noted that the recently introduced Natural Hazards Insurance Bill, that will replace the Earthquake Commission Act 1993, will assist with this, as a function of the Natural Hazards Commission under s126(e) is:

- (e) to facilitate research and education, and to contribute to the sharing of information, knowledge, and expertise, including in relation to—
- (i) natural hazards and their impacts:
 - (ii) damage to residential buildings, residential land, and other property as a result of natural hazards, including methods of reducing or preventing such damage:
 - (iii) community resilience to natural hazards:
 - (iv) natural hazard and risk management:
 - (v) planning for, and recovering from, natural hazards:
 - (vi) natural hazard cover and the operation of this Act:

Data from other sources who independently assess the hazard risk to land and property could help to identify areas where a more precautionary policy and rule approach is warranted given the significance of the natural hazard risk.

⁶⁸ These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

4.6.4 Land Information Memorandum (‘LIMs’)

Background

The information on the natural hazard risk to property owners is also provided through Land Information Memorandums (LIMs). LIMs are administered by councils under the Local Government Official Information and Meetings Act 1987 to provide landowners and prospective landowners with information that a local authority has in relation to land and buildings on the land. Information on the natural hazards that affect the land and buildings and that are known to the council at the time of the LIM being requested must be provided in the LIM.

It is not a legal requirement at the time of the sale of a house or property to obtain a LIM. However, the Standard Agreement for Sale and Purchase of a property includes a clause relating to obtaining a LIM. A LIM is one of the few tools that ensures that the hazard information relating to a piece of land is available to property owners or prospective buyers and provides transparency of the known hazard risks.

A LIM is not a risk disclosure mechanism⁶⁹. The LGNZ noted that LIMs are considered to be high risk to councils in terms of legal challenge and that several legal cases have led to councils being cautious and to only including site specific information that is known to council to avoid legal liabilities⁷⁰.

Information provided in LIMs

LIMs must include natural hazard information, information known to the council at a particular point in time. Section 44A of the Local Government Official Information and Meetings Act 1987 sets out the information to be provided in a LIM:

Section 44A Land information memorandum

(1)

(2) *The matters which shall be included in that memorandum are—*

(a) information identifying each (if any) special feature or characteristic of the land concerned, including but not limited to potential erosion, avulsion, falling debris, subsidence, slippage, alluvion, or inundation, or likely presence of hazardous contaminants, being a feature or characteristic that—

(i) is known to the territorial authority; but

(ii) is not apparent from the district scheme under the Town and Country Planning Act 1977 or a district plan under the Resource Management Act 1991:

(b) information on private and public stormwater and sewerage drains as shown in the territorial authority’s records:

(ba) any information that has been notified to the territorial authority by a drinking-water supplier under section 69ZH of the Health Act 1956

(bb)....

LIMs are a key method to communicate the natural hazards that affect the property and to support RPS objective B10.2.1(1). When a prospective buyer purchases a property the LIM information should disclose the nature of the natural hazard risk.

⁶⁹ Local Government New Zealand (2021). Review of Land Information Memorandums: Achieving Best Practice, pg. 10

⁷⁰ Local Government New Zealand (2021). Review of Land Information Memorandums: Achieving Best Practice, pg. 14

Councils have a duty of care under section 44A in terms of representing information on a LIM that is accurate and does not mislead the recipient.

Limitation of LIMs

Local Government New Zealand (LGNZ) in February 2021 released a report discussing the merits of developing a national LIM template as an approach to building community resilience to natural hazards and climate change. Some of the limitations of LIMs identified in this report included:

- the definition of a ‘hazard’ differs between LGOIMA, the Building Act and the RMA
- LIMs provide a disclosure of natural hazard information at a point in time, not a risk disclosure. Property owners may need to obtain further information to understand the risk implications of the natural hazard on the property.
- LIMs take 10 days to process and come at a cost of about \$300. This can be a barrier in some situations. Also, the LIM can be left until late in the buying process, where it will not feature in the decision-making process at all. This can add to the legal risks for local authorities if the property owner is unaware of a hazard when they purchased the property.
- LIMs are not compulsory at the time of the sale and purchase of a property, with real estate agents often being the purchaser of a LIM as part of marketing information.
- LIMs are considered to be high risk for councils in terms of legal challenge and legal teams are required to review LIM wording. Legal cases have led to councils generally only including information that is known to the council with the aim of avoiding legal liabilities (i.e. judicial review of damage claims in negligence).

A further limitation can be that the natural hazard information used for LIMs is at a regional scale and does not contain the details that might be required at a site-specific level. It was identified that several legal cases such as *Altimarloch Joint Venture LTD v Moorehouse* HC 2008 and subsequently *Marlborough District Council v Altimarloch Joint Venture Ltd* [2012 NZSC 11]⁷¹ that there is a low threshold for the identification of potential risk and that the council has a duty of care in relation to the provision of a LIM.

LIMs and the Auckland Unitary Plan

Natural hazard applicable to the site, such as flooding, subsidence, coastal erosion and inundation, are outlined in LIMs. However, the nature and form of the risk that natural hazard presents are unclear and there is a need to further delve into the likelihood and consequences of a natural hazard event and the effects of climate change.

4.6.5 Council activities to mitigate risk

In addition to plans, council under its responsibilities from other legislation, also allocates significant funds to undertaking works to mitigate hazard risk to protect both council/public land and assets and private land affected by hazards including through:

- coastal edge protection works, retaining structures and planting
- initiatives to provide education for, and platforms for discussion of, risks
- programmes to mitigate risk through sand replenishment, dune and riparian planting

⁷¹ Local Government New Zealand. (2021). *Review of Land Information Memorandums: Achieving Best Practice*, pg. 15

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- investment in infrastructure to mitigate the risk of flooding (i.e. New Lynn stormwater ponds)
- wai ora planting programmes with communities
- development of emergency response plans (e.g., Piha).

These activities can be an efficient and effective way of contributing to outcomes sought by the RPS objectives of making communities more resilient to natural hazard risks.



Figure 41: Example of Auckland Council funded flood mitigation works: Awakeri Wetlands Stage One – Takinini in November 2020 (Source: OurAuckland)

5.0 Summary and conclusions

At the time the AUP was written, managing the significant risks from natural hazards was not an RMA s6 matter of national importance. The effects of climate change were, and still are, only a matter to have particular regard to, along with matters such as amenity values, under s7(i) RMA. Since the AUP provisions were adopted in November 2016, the risk from natural hazards and climate change has increased and is likely to continue to increase.

Some of the AUP provisions and mechanisms are considered to be effective in managing natural hazard risk, although opportunities to improve their implementation have been identified. However, some AUP provisions have been identified to be lacking, most importantly in providing a policy and rule framework that more appropriately reflects the complexity of the risk management equation and providing a clearer guidance on the circumstances on where an ‘avoid’ risk approach should apply, and if in all situations’ engineered solutions are appropriate (i.e. an option to avoid risk through mitigation). This lack of direction and appreciation of the complexity of risk can result in conflicting policy interpretations and recommendations being made on consent applications and plan changes. In addition, it is noted that there are identified gaps of the way the AUP identifies and manages subdivision, use and development for the purposes of assessing natural hazard risk through the AUP.

Some of the gaps that have been identified are a result of the current RMA legislative framework and may be addressed through the replacement of the RMA with the Natural and Built Environments Act, the Strategic Planning Act, and the Climate Change Adaptation Act. Other legislative changes are already being introduced to better manage hazard risk (i.e. such as requiring information to be provided on LIMs, and for central government agencies like the Natural Hazards Commission having as a function the sharing information and playing a role in planning for hazards).

The matters identified in this report are likely to be most useful to inform analysis of the new legislation and in making submissions. Given the timeframes of these changes, versus making any changes to the AUP, this is likely to be the most effective way to address the matters raised.

6.0 Recommendations

Specific recommendations have been made following the analysis in the various topic sections of the report. These are collated in this section below.

As noted above, given the pending replacement of the RMA these findings and recommendations may be best applied to analysis of the new legislation and plan requirements for management natural hazards and climate change rather than making changes to the AUP.

Collation of recommendations⁷² to improve the efficiency and effectiveness of the implementation of the AUP provisions in achieving the objectives of B10.2:

Overarching matters

Scope of the AUP provisions

- Consider whether the AUP should include provisions that address risk from other natural hazards, including climate change related hazards, in addition to those currently forecovered.

Responsiveness to change under the AUP

- Investigate the possible mechanisms available to ensure that the AUP is as responsive as possible to the everchanging impacts of natural hazards and climate change.

Approaches and directives for managing risk

- Evaluate whether the AUP should be updated to provide greater acknowledgement of the complexities of risk management and to provide clearer policy direction on how risk should be managed and, particularly in what circumstances ‘avoiding creating a risk’ is the most appropriate risk management method.
- Undertake further investigation of the implications of the difference in wording between B10.2.1 and Chapter E36 on managing ‘risk’ vs. ‘the adverse effects of risk’ and determine whether there is a consistent policy cascade between the B10.2.1 objectives and the subsequent chapters of the Plan.
- Consider whether the permitted and restricted discretionary activity status applying to almost all subdivision, use and development in natural hazard areas is appropriate and effective, particularly noting that the level of risk (including those from multiple hazards) and the spatial extent of the hazard area varies across different parts of the region.

Zoning of land within natural hazard areas – AUP zoning

- Investigate the zoning that applies to areas where there is already sufficient information on the level of risk or cumulative risk and determine if it reflects the likely level of appropriate development or redevelopment potential.
- Review the development potential of sites within natural hazard areas to determine whether they are appropriate and give effect to the AUP objectives. For example, lower development potential could be applied to sites in demonstrated areas of natural hazard risk, or variations to densities

⁷² These recommendations will need to be tested fully through an RMA Section 32 assessment, be considered alongside other recommendations from other topics and the Plans & Places Department work programme.

could be introduced to identify when a lower density may be warranted based on the level of risk or cumulative risk identified at site-specific assessment stage.

Zoning of land within natural hazard areas – structure plans

- Consider strengthening the wording in Appendix 1 of the AUP to allow for stronger connection between the preparation of structure plans and the external documents that should be considered.
- Consider strengthening the consideration of natural hazard risk as part of the structure plan process by adding specific requirements in Appendix 1 of the AUP to undertake a robust assessment of natural hazard risk and to provide greater emphasis on avoidance as a management measure where practical. Appendix 1 should also outline the matters relating to natural hazard risk that need to be assessed as part of the structure planning process.
- Consider amending Appendix 1 of the AUP to provide greater clarity that structure plans should assess the increased natural hazard risks posed by climate change for new urban development and prescribe parameters to consider when undertaking this assessment.
- Explore options to ensure that plan changes within a structure plan area give effect to the land use zoning adopted under the relevant structure plan, and the need for natural hazard risk to be re-assessed in light of more up-to-date information when development actually takes place. It is noted that the relationship between spatial planning and subsequent land use planning may be addressed as part of the RMA reforms.
- Re-evaluate the current zone options for land that functions as green infrastructure and determine whether an ‘Green Infrastructure zone’ (with accompanying provisions) needs to be added to the AUP zones to better provide for natural hazard risk management through zoning. This zone should be a relevant consideration in the development of greenfield land and in structure planning.

Identifying and managing activities within natural hazard areas

- Undertake further investigation into how natural hazard areas that are currently managed by the AUP have been identified and consider whether the AUP should be amended so that there is a greater scope and more opportunities for natural hazard risk to be considered or assessed beyond that currently provided for.

Consistency of assessments and quality of information provided

- Continue to provide additional guidance on the special information requirements under E36.9 and consider adopting a more stringent policy to applying these requirements
- Investigate the clarity and directiveness of rules, including the matters of discretion and assessment criteria, and objectives and policies to focus assessments on the most relevant and important considerations.

Impact of existing development on hazard risk management

- Further investigate the appropriate response to existing development (and redevelopment) and natural hazard management, acknowledging that existing use rights under s10 of the RMA and ‘reasonable use’ under s85 of the RMA impose restrictions in this space.

Differentiation in risk tolerance

- Undertake further investigation into the management framework for flooding and coastal storm inundation and consider re-evaluating whether this achieves objectives B10.2.1(2) and B10.2.1(3).
- Provide additional guidance or policy direction on how ‘more vulnerable activities’ or ‘habitable rooms’ that are located in the same building as ‘less vulnerable activities’ or ‘non-habitable rooms’ should be managed.

Implementing a precautionary approach

- Consider clarifying when a precautionary approach may be required and re-evaluating how the AUP achieves policy B10.2.2(6), including how this could be reflected in zoning, rule/activity status and clearly through policies.

Risk from multiple hazards

- Investigate whether there are any gaps associated with the assessment of natural hazard risk or cumulative natural hazard risk arising from coincidental and cascading hazards, and whether the AUP provisions should indicate that a precautionary approach should apply in scenarios where the interaction between coinciding hazards is difficult to understand and predict.

Duration and timeframes for consents

- Consider amending the AUP to provide policy direction on situations where it is appropriate to limit the duration of a consent and include review conditions as a mechanism to manage risk.

Permitted activities

- Investigate the efficiency and effectiveness of the relevant permitted standards through building consent data and other means.
- Investigate the impacts and risks associated with the relevant permitted activities and its appropriateness as a permitted activity, particularly with regards to how effective E36.4.1(A43) is at managing land instability risk and what liability issues may result.

Hazard-specific AUP provisions

Coastal storm inundation

- Include a reference (i.e. as a note) following the definitions for ‘coastal storm 1 per cent annual exceedance probability (AEP)’ and ‘coastal storm 1 per cent annual exceedance probability (AEP) + 1m sea level rise’ to advise how the mapping information referred to can be found in the council’s GIS viewer.
- Remove the ‘coastal storm inundation 1 per cent AEP plus 1 m sea level rise area’ (under Control Layer) currently shown in the AUP planning maps.
- Improve awareness that the ‘coastal storm 1 per cent annual exceedance probability (AEP)’ and ‘coastal storm 1 per cent annual exceedance probability (AEP) + 1m sea level rise’ are separate and are subject to different rules and mapping information.
- For future mapping of coastal storm inundation and flooding, consider using colours, or other means, to make a clearer distinction between the two maps so it is easier to identify which, or whether both hazards apply to a site.

- Provide guidance for regulatory staff on implementing the relevant rules referring to ‘land in the coastal storm inundation 1 per cent annual exceedance probability (AEP) area’ and the maps that should be referred to.
- Provide additional guidance on how the freeboard level should be calculated or applied at a site-specific level for coastal storm inundation and on the wording of conditions to improve consistency.
- Investigate specifying clearer provisions and design requirements to address coastal inundation risk through provisions in the AUP and amending the relevant assessment criteria so that they are so that they are more reflective of all the relevant matters for consideration required by the E36 policies and the special information requirements under E36.9.

Coastal erosion

- Address the gaps identified for the definition of ‘coastal erosion hazard area’.
- Provide clarification on how the relevant rules referring to ‘land in the coastal erosion hazard area’ should be applied.
- Improve awareness of what coastal erosion is, all the matters to consider for coastal erosion and how it should be assessed appropriately.

Flooding

- Investigate whether there are any gaps associated with the definition of ‘overland flow path’, which specifically excludes catchments less than 4000m².
- Correct the errors raised relating to the relevant definitions in Chapter J.
- Investigate options to improve the accuracy of the floodplain and overland flow path mapping, including methods or procedures to update the mapping to reflect changes resulting from known site works or development, acknowledging the limitations on updating this data currently.
- Review the relevant provisions in the AUP to ensure that they accommodate the limitations in floodplain and overland flow path mapping.
- Improve awareness that the ‘1 per cent AEP floodplain’, ‘flood prone areas’ and ‘flood sensitive areas’ are separate and are subject to different controls and mapping information.
- Improve awareness of the purpose of each of the rules and standards relating to flooding.
- Improve awareness the assessment requirements under E36.9 and provide further guidance on what information is required to be provided to support an application relating to a floodplain or overland flow path in order to meet these requirements.
- Investigate flood risk associated with earthworks within floodplains, particularly for site disturbance activities that meet the permitted thresholds.
- Consider specifying clearer provisions and design requirements to address flood risk through provisions in the AUP, acknowledging that there are benefits of having these sit outside the Plan so that they can be updated without a plan change.
- Investigate whether there are any gaps or risk associated with ‘flood prone areas’ and ‘flood sensitive areas’ not being managed by any rules or standards in the AUP.

- Investigate the nature and extent of the issue raised relating to the gaps in the consideration of finished ground levels and other permitted activities as part of the building consent and resource consent processes.
- Expand on the preliminary analysis that was undertaken to determine whether there have been situations where additional flooding considerations were required beyond that assessed at the resource consent stage by using other data sources, measurements and variables.
- Investigate the conditions imposed for developments relating to floodplains and overland flow paths and provide additional guidance on wording and content of conditions, if required.

Land instability

- Address the gaps identified with the definition of '*land which may be subject to land instability*', including undertaking further investigation to improve the accuracy of the definition to accurately reflect all land which may be subject to this hazard and/or refer to updated region-wide mapping.
- Consider creating a specific mapping layer that is based on up-to-date land instability information that covers the entire region which directly corresponds with the definition or definitions relevant to this hazard.
- Provide additional guidance to ensure a consistent approach is taken to identifying land which may be subject to this hazard.
- Improve access and awareness of available site- or region-specific technical reports in council's database and investigate options for them to be publicly available.
- Provide additional guidance to ensure consistency with the application of E36.4.1(A43), E36.4.1(A50) and E36.4.1(A51).
- Consider the opportunity for council geotechnical specialists to be more involved in providing technical advice for resource consent applications.
- Investigate the quality and robustness of the risk assessments being provided in relation to land instability risk and provide additional guidance on what matters should be considered and assessed to satisfy the requirements under E36.9.
- Investigate the scale of the issues raised regarding the design and maintenance of retaining walls and geotechnical structures and explore options to ensure that these are maintained for their intended lifespan.
- Investigate whether there are any gaps associated with deferring geotechnical assessments to the building consent stage.
- Undertake further evaluation and consider whether amendments are required to ensure that the provisions achieve the direction outlined in Policy E36.3(33), where greater direction is provided on when 'avoid' approach is warranted.
- Investigate the conditions imposed for developments relating to land instability and provide additional guidance on wording and id content of conditions, if required.

Wildfire

- Investigate the need for the AUP to take a more risk management rather than risk mitigation approach to wildfire risk. This could include creating a mapping layer that identifies areas that are

at risk from wildfires, and including policies, rules, and standards to manage such risk (i.e. buffer areas, use of fire-resistant plant species, location of buildings etc.)

Other AUP provisions that manage risk from natural hazards and climate change

Subdivision in natural hazard areas

- For future monitoring purposes, consider collecting consent data information in a way so that applications relating to subdivision within each type of hazard area can be more easily differentiated and investigated.
- Provide additional guidance to ensure consistency on how E38.4.1 (A11) and E39.4.1 (A8) is applied across the region.
- Undertake further investigation into the issue raised regarding the fact that not all the applicable natural hazard areas are correctly identified or acknowledged, and therefore assessed, at subdivision stage.
- Undertake an analysis of the efficiency and effectiveness of the other relevant subdivision rules or standards and consider whether additional guidance should be provided to assist with their implementation and interpretation.
- Consider simplifying the structure and content of Chapters E38 and E39 and/or provide additional guidance to improve awareness of all the rules and standards that apply.
- Undertake further analysis of the relevant subdivision standards and assessment criteria, particularly relating to subdivision around existing and/or approved development and vacant lot subdivisions to determine whether amendments are required, including to the activity status, to the standards that apply, and to the assessment required to subdivide land that is within one or more natural hazard areas. Specific attention should be given to whether the subdivision standards and assessment criteria enable and direct a comprehensive assessment of what could be established on a site, rather than what is specifically proposed at the time of consent.
- Undertake further investigation into the conditions and consent notices that have been imposed to date to ensure that only the development that has been assessed as part of the resource consent can be established on newly created sites and clarifying whether these are still being imposed. If they are no longer being imposed, consider exploring how this gap can be addressed.
- Investigate the role of s106 RMA and its impact in the subdivision process.
- Investigate the conditions and consent notices imposed for the management of hazards at subdivision stage and provide additional guidance on wording and content of conditions, if required.

Esplanade reserves and strips

- Consider submitting on pending legislation to replace RMA that the requirement for council to compensate a landowner for land wider than 20 metres (s237E RMA) be replaced with a requirement to provide a reserve width to the extent demonstrated as necessary and as practical to mitigate risk over a 100-year timeframe in addition to any other function it is intended to perform, such as providing public access for the long term, particularly for greenfield development.

- Investigate whether objectives and policies should be included in the AUP to raise awareness and support the ‘topping up’ of reserves to a 20-metre width where appropriate, for example in the subdivision provisions.
- Consider amending the assessment criteria in E39.8.1(5) and E39.8.2(5) to specifically refer to the role of esplanade reserves in mitigating hazard risk as a matter of discretion and for assessment in providing an esplanade reserve.
- For future monitoring purposes, consider collecting consent data information in a way so that applications seeking reductions and waivers could be easily differentiated and investigated.
- Investigate whether guidance is needed to prompt consideration of the likelihood of a land use consent for multiple properties being later followed by a subdivision consent and the later need for an esplanade reserve. This links to the discussion on coastal protection yard requirements being made consistent with esplanade reserve requirement, which would also address this issue.
- Consider amending policy E38.3(25) and E39.3(22) to direct that the waiver or reduction of an esplanade reserve or strip be avoided unless all the criteria can be met and consider providing clarity by connecting the criteria with the word ‘and’.
- Consider whether a waiver or reduction or an esplanade reserve or strip should have the same activity status and subject to the same assessment considerations. A waiver should only apply in limited circumstances, given the policy direction of the AUP and NZCPS and multiple purposes of a reserve or strip.
- Investigate whether the policies and/or assessment criteria need to provide clearer guidance on assessing the width required, and for development to be set back, to enable an esplanade strip to ‘move inland’ in response to climate change and to retain the width of a strip over a 100-year period.
- Consider submitting on the pending legislation to replace RMA seeking provision be made for esplanade reserves to vest for the purpose of ‘green infrastructure’ and consider whether changes are needed to both RMA and Reserves Act provisions to achieve this.

Hard protection structures

- Undertake further investigation into the definition of ‘*hard protection structure*’ and consider whether additional guidance is required to improve the understanding of this definition.
- Provide additional guidance on the assessment of hard protection structures to ensure that all matters that should be considered are considered appropriately.
- Provide additional guidance on the imposition of conditions for consents relating to hard protection structures to ensure that these structures are adequately maintained, and to enable an opportunity to review the structure in the event of damage from storm events etc. Guidance should also cover what the process should be when the structure reaches its designed lifespan.
- Undertake further investigation into the issue identified relating to retrospective resource consents for hard protection structures and consider providing additional guidance or amending the relevant assessment criteria to address this.

- Undertake further investigation to determine whether the consideration of negative indirect effects arising from the establishment of a hard protection structure are being considered appropriately.

Coastal protection yards and riparian yards

- Investigate whether any supporting information is required to complement Appendix 6 of the AUP.
- Consider amending the AUP to include objectives and/or policies that recognise the role of coastal protection and riparian yards in the mitigation of risk from natural hazards and climate change.
- For future monitoring purposes, consider collecting consent data information in a way so that infringements to each yard type to be more easily differentiated and investigated.
- Undertake further investigation of the issue raised with regards to the relationship between the coastal protection and riparian yard controls and the esplanade reserve and strip requirements and consider whether these provisions should be more aligned.
- Undertake further investigation on the overlap between the yard provisions and the natural hazard provisions under E36 and consider the possibility and effectiveness of applying a yard control based on setback from the natural hazard area itself rather than from the waterbody or coast.
- Investigate whether standards relating to coastal protection yards and riparian yards are being identified appropriately and consider adding cross-chapter references to alert plan users of the relevant provisions that may also apply.
- Consider including objectives and policies that recognise the role of coastal protection and riparian yards in natural hazard mitigation.

Vegetation alteration or removal

- Investigate whether vegetation alteration or removal within the specified areas under Chapter E15 have been appropriately identified and evaluate whether additional areas or criteria should be identified for the purposes of managing natural hazard risk.
- Consider providing additional guidance to assist with improving awareness of the E15 provisions and understanding of the purpose of these provisions.
- Undertake further investigation on whether the hazard mitigation role of vegetation is being adequately considered as part of the assessment for vegetation removal or alteration and consider providing additional guidance to ensure that this matter is considered consistently.
- Investigate whether a standard condition should apply to planting with the purpose of long-term hazard mitigation to ensure it is maintained for the period intended.
- Consider amending the AUP include an objective for protecting and managing the effects of activities on vegetation that performs a role in mitigating the risk from natural hazards, which links to policies E15.3(1) and E15.3(2)
- For Chapter E15, consider adding a reference to highlight that the provisions of Chapter E36 also apply to activities on the coastal edge (in coastal hazard areas) and riparian areas, and investigate whether a more restrictive activity status should apply to a significant extent of vegetation removal, or to vegetation in the hazard areas identified in Chapter E36.
- For Chapter E36, consider adding a reference to highlight that the provisions of Chapter E15 apply to vegetation management activities on the coastal edge (in coastal hazard areas) and riparian

areas/floodplains, and adding an objective that seeks the protection and enhancement of vegetation, dunes and features that act as natural defences against hazards.
Natural hazards and the Building Act 2004
• Undertake further investigation into the different timeframes that apply under the Building Act (or Code) and identify how this is aligned or is contradictory to the AUP and RMA requirements. • Consider, as part of input to pending RMA changes and any Building Act review, suggesting that timeframes under the Building Act and Building Code be amended to be consistent with the AUP and RMA requirements. • Investigate the imposition of s73 notices under the Building Act and whether this can be used to support management of natural hazard risk from a resource management perspective.
Other methods
• For future monitoring purposes, investigate whether there could be better co-ordination of data collection between organisations that deal with natural hazards so that data can be used to assist with assessing the efficiency and effectiveness of the AUP and understanding risk tolerance.

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Appendix 1 – Esplanade reserve examples

Example 1: Inadequate esplanade reserve width and setbacks

Hingaia, on the coastal edge on the Manukau Harbour, provides an example of where the predicted coastal erosion that has occurred in less than a 20-year timeframe has resulted in a coastal hazard risk to land and property and where coastal protection works are an on-going cost to council.

As outlined below, the Hingaia coast was assessed as being subject to on-going coastal erosion to the extent that a wider esplanade reserve and building setback was sought in 2004, prior to the plan change to urbanise the land.



Figure 42: Karaka Harbourside esplanade reserve following removal of undermined tree stumps and re-grading of cliff edge in 2015 (Source: Auckland Council)

The following provides a **summary** of the history to the esplanade reserve and coastal setback provisions at Hingaia:

- In 2003 Papakura District Council notified Proposed Plan Change 5 to enable the urbanisation of the Hingaia Peninsula. Background technical reports included a coastal erosion assessment that identified the coastal edge as subject to active coastal erosion.
- The (then) Auckland Regional Council lodged a submission to Proposed Plan Change 5 seeking that for the areas identified as being subject to active coastal erosion:
 - that assessment criteria be included in the plan provisions to ensure that buildings were located a suitable distance from MHWS to avoid the need for future coastal protection works
 - that an esplanade reserve of a width greater than 20 metres be sought to ensure an adequate reserve width in the long-term, given the actual and anticipated coastal erosion

and the multiple open space and other functions the esplanade reserve was intended to fulfil²⁰

- The (then) Franklin District Council lodged a similar submission seeking that a precautionary approach be taken to coastal erosion and instability and the inclusion of appropriate coastal setbacks and buffers.
- Karaka Developments lodged further submissions in opposition to the ARC submission. The Papakura District planner's recommendation in the hearing report was that the ARC submission be rejected.²¹
- The plan change was approved with a 20-metre esplanade reserve, with nearly two kilometres of esplanade reserve being created. As the reserve was measured from MHWS this meant, when accounting for cliff height and slope, the grassed reserve land was as narrow as 13 metres in some locations. The first stage of the development involved the creation of approximately 650 metres of reserve.
- The housing development was undertaken between 2007 and 2010 and a number of assets including a concrete path, seating areas and concrete kerbing were constructed close to the cliff edge of the reserve. The 20-metre esplanade reserve, along with the assets on it, were vested in Papakura District Council and became Auckland Council property in 2010.



Figure 43: Esplanade reserve and footpath in 2007 (Source: Auckland Council)

Erosion and cliff instability has continued as anticipated in the specialist reports. As a result, between 2015 to 2021, council has undertaken 275 metres of coastal armouring (in two stages - 200m and 75m in length) and planting of the reserve at cost of over \$900,000. It is anticipated that ongoing maintenance will be required at further cost to council in the future.

The photos below show the various coastal protection interventions undertaken by council between 2015 and 2021:



*Figure 45: Council works to mitigate erosion of esplanade reserve and footpath in 2015
(Source: Auckland Council)*



Figure 44: Karaka Harbourside - Stage one rock revetment, constructed in 2015 (Source: Auckland Council)



Figure 46: Karaka Harbourside - Stage two rock revetment, completed in 2021 (Source: Land & Sea Civil Ltd)

Example 2: Provision of additional reserve width and setbacks

An example of where esplanade reserve widths and setbacks were provided to address coastal erosion over the long term, **without** cost for compensation for the additional land, is at Pararekau Island in the Manukau Harbour.

The below provides a summary of the history to the esplanade reserve and coastal setback provisions at Pararekau Island in the Manukau Harbour:

- In 2021, a developer sought resource consent to subdivide an 18-hectare greenfield site at Pararekau Island into 170 residential lots. Along the exposed seaward facing frontage of the island, a 690m long rock revetment was proposed to armour a 20-metre-wide esplanade strip to mitigate the risk presented by coastal erosion and instability.
- The coastal erosion rates were calculated to extend between approximately 26 and 30 metres on the exposed north-western side of the island.
- Council's Parks Planning team lodged a submission seeking that the proposed subdivision be modified to consider the results of the coastal hazard assessment. The submission sought that the hazard risk be avoided, and to ensure the provision of an esplanade reserve over a 100-year planning timeframe, including provision for sea level rise.



Figure 47: Aerial photo of Pararekau island – Manukau Harbour (coloured lines showing area susceptible to coastal erosion or instability over varying timeframes) (Source: Auckland council)

- The council submission highlighted that the proposal should consider softer options that avoid natural hazards rather than mitigate against them, and that:
 - the hard protection structure was not appropriate for a greenfield site that was not constrained by existing development
 - a hard protection structure would have significant effects on natural character, public access to and along the coast, effects on recreational use, visual impacts, habitat loss, and effects on ecosystems
 - a hard protection structure would be a long-term financial risk/cost to council to own, maintain and renew the structure in the future.
 - alternatives of providing greater setback, less intensive development and wider esplanade reserve were sought by council's Parks Planning team.

A strong argument was made by the council project team that the land held little value considering its long-term erosion risk and its purpose as a natural buffer.

The developer agreed to modify the proposal to include the additional esplanade reserve without seeking financial compensation from the council. A resource consent was approved for a 103 residential lot subdivision with creation of esplanade reserve of between 20-51 metres wide, providing for the 100-year coastal erosion rate plus 20 metre esplanade setback around the island's perimeter.



Figure 48: Plan showing agreed extended esplanade reserve to address coastal erosion over the long-term: Pararaekau island, Manukau Harbour (Source: Auckland Council)

Another recent example of a subdivision (182 lots in 2021) providing an esplanade reserve width that accommodates both for the identified coastal erosion and for a coastal walkway landward of the coastal erosion zone is the Auranga development adjoining the Manukau Harbour.

Example 3: Reduced width reserves - and ‘topping up’ reserves

An example of the issue of where a lesser width reserve was provided and has been subject to erosion is demonstrated in the esplanade reserve at Snells Beach.

- An esplanade reserve had been provided from a subdivision in 2013, which provided for the width of the reserve to be reduced to 15 metres in parts, although further erosion of the reserve was anticipated. The assessment of effects in relation to the esplanade reserve, as surveyed in 2013, was that the shoreline fluctuated but that approximately six to seven metres of erosion had recently occurred and that a one metre rise in sea level could result in erosion exceeding the reserve width:

The shoreline is currently subject to dynamic shoreline fluctuations of both erosion and accretion, with the shoreline most recently experiencing a period of erosion in the order of 6m-7m. This will change with sea level rise, depending on the rates. Sea level rise is expected to primarily affect the reserve area, but higher levels of sea level rise (such as 1m) could result in erosion exceeding the reserve width. The effect of sea level rise on the site varies also depending on what (if any) management options are implemented.

- The reserve is subject to erosion and Figure 49 below shows the extent of the reserve at the later subdivision in 2017 and the mapping of land identified as susceptible to coastal erosion and instability over different time periods on council’s Geomaps.



Figure 49: Esplanade reserve land at Snells Beach as measured from MHWS in 2017 [left] and areas identified as susceptible to coastal erosion over different time periods [right] (Source: Auckland Council)

- There is an ability to obtain a full 20 metre reserve where land previously subdivided has created a lesser width esplanade reserve as a condition of consent on later subdivision (on the creation of a lot under 4 hectares) (s236 RMA). However, there is no policy direction on when this should be applied. This did not apply in this case.
- A dune was constructed on the esplanade reserve land in front of the later development to mitigate the effects of coastal erosion and inundation. The consent holder is required to maintain the dune for a two-year bond period (from 25 September 2020), following which the dune will vest in council. Figure 50 below shows the reserve in 2020.



Figure 50: Snells Beach esplanade reserve with completed dune in December 2020 (Source: Auckland Council)

- Some minor erosion of the dune toe occurred following significant storm events in May/June 2020.
- When the dune vests in council it is likely to require some ongoing maintenance, such as periodic top-ups and maintenance planting.



Figure 51: Snells Beach esplanade reserve dune (June 2021) with some erosion of the toe of the dune (Source: Auckland Council)

