

11.1 Introduction

The Auckland Region, like much of New Zealand, is at risk from a range of natural hazards. The irregular occurrences of natural hazard events means they are often poorly understood. Many of the land use management decisions made in the past have tended to exacerbate the risk. With the continual growth of the Auckland Region, it is important that public authorities recognise the risk from hazards and undertake co-ordinated responses to ensure the long-term reduction in risk posed to the Region.

Natural hazards are defined within the RM Act as:-

“Natural hazard means any atmospheric or earth or water related occurrence (including earthquake, 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.”

Throughout the Auckland Region natural hazards occur in varying severity, in location, and in time. Each hazard poses a different risk to human safety and wellbeing, and the environment. To deal with the risks posed by natural hazards the RM Act (sections 30, 31 and 35) gives functions to the ARC and TAs aimed at the avoidance or mitigation of the resulting impacts. These functions include developing and placing controls, such as policies and rules, within planning documents or resource consents to ensure adequate measures are taken to protect human life, property and the environment from the impacts of natural hazards. In addition to the function of regional councils and TAs towards the avoidance or mitigation of natural hazards, it may be possible in some cases to remedy the effects of some natural hazards (e.g., beach nourishment to remedy the effects of coastal erosion).

In developing policies and rules aimed at dealing with the risks and impacts of natural hazards, it is recognised that a ‘partnership’ between development and nature must be established. This partnership must aim at keeping people away from hazards, rather than hazards from people.

The most commonly occurring natural hazards in the Auckland Region are flooding, both in rural and urban areas, and erosion/land instability. Impacts of erosion/land instability are generally limited to smaller areas and are not Regionally significant. TAs have a number of

existing controls for these hazards, which are referenced in district plans, and exercised mainly under the Building Act 1991. The ARC has traditionally worked with these councils towards compatible policy.

The coastal environment is particularly susceptible to natural hazards. Within the Auckland Region the primary hazards arising from coastal processes include erosion, inundation of low lying areas, land instability, rising mean sea level and tsunami. These hazards may occur individually, or combine to create a cumulatively more significant hazard.

The sustainable management of the coastal environment with respect to natural hazards should involve the consideration of the particular hazard in the wider context (both above and below MHS, and over longer time periods), to ensure appropriate methods are used to avoid, remedy, or mitigate natural coastal hazards, while protecting the natural character and processes of the coastal environment.

The least frequently occurring natural hazards include earthquakes, volcanism, tsunami, various meteorological effects (cyclones, tornadoes, drought) and fire. While of low frequency, they are potentially of major Regional significance and not easily dealt with through land use control strategies. The risks of these hazards are poorly understood. Potential impacts are currently mainly dealt with by contingency controls such as civil defence and insurance systems.

11.2 Issues

11.2.1 Natural hazards pose a risk to people, property and the environment

Much of the Region is at risk from one or more natural hazards. In particular, flood damage has had significant impacts in catchments such as the Kaipara River, Hingaia stream, and Opanuku stream. There are innumerable smaller urban catchments in which the risks posed by flooding are serious. Often these risks are exacerbated by the inappropriate location of buildings in flood prone areas or by flood peaks heightened by an increase in impermeable surfaces in urban catchments.

Serious coastal erosion is occurring around the Region, creating a risk to property. Destruction of property at Omaha in the late 1970s provided a graphic demonstration of the Region’s vulnerability to coastal erosion

hazards. With continual development along the coastal margins and with predicted sea level rises associated with global climate changes, the risk is likely to increase in the future. The setting aside of esplanade reserves or strips is one means of addressing this issue (See Chapter 18).

Land instability occurs as a result of steepness, and because of the existence of a number of inherently unstable geological units, which are widely distributed in the Region.

Although the frequency of occurrence is much less than the above hazards, the impacts of major hazard events, such as volcanic activity or earthquakes, would be extremely catastrophic for the Region.

Traditional approaches to hazard management have involved the protection of people and the environment from hazards. Some of these measures, such as flood protection schemes and seawalls, may themselves have an adverse impact on the environment.

11.3 Objective

To avoid, remedy, or mitigate the adverse effects of natural hazards on human life, property and the environment, while minimising the adverse effects of measures implemented to reduce the risks of natural hazards.

11.4 Policies, Methods and Reasons

11.4.1 Policies

The following policies and methods give effect to Objective 11.3.

1. *The responsibilities of the ARC and the TAs shall be as per the Methods in 11.4.2.*
2. *Natural hazard management shall be integrated and co-ordinated between the ARC and TAs within the Auckland Region, and with adjoining regional councils.*
3. *Before provision is made enabling significant development or redevelopment of land which will result in intensification of land use, any flood hazards and measures to avoid or mitigate their adverse effects shall be identified.*
4. *Development shall be discouraged in flood hazard zones unless it can be demonstrated that all habitable floor levels are protected from the 1% AEP flood level, and that structures in the 1% AEP flood level do not divert overland flows onto neighbouring properties.*
(See Appendix D for the definition of AEP)
5. *Development shall not be permitted if it is likely to accelerate, worsen or result in inundation of other property, unless it can be demonstrated that the adverse effects can be avoided or mitigated.*
6. *Where changes in the use of land allows for the construction of habitable buildings, such buildings shall not be permitted to be constructed in the 1% AEP flood hazard zone, unless the hazard can be avoided and access maintained.*
7. *Construction of mitigation works shall be encouraged only where people, property and the environment are subject to unacceptable risk from flood hazards.*
8. *When carrying out flood mitigation works, existing vegetation shall be retained, where appropriate, to aid stability and maintain environmental quality. However, the planting of vegetation, which may, because of growth habit etc., restrict water flow and exacerbate the flooding hazard, shall be avoided.*
See also Chapter 12 – Soil Conservation, Policy 12.4.4-1.
9. *Development shall not be permitted in areas subject to erosion/land instability unless it can be demonstrated that the adverse effects can be avoided or mitigated.*
10. *In the coastal environment, new subdivision, use or development should be located and designed, so that the need for hazard protection measures is avoided.*
11. *Where existing subdivision, use or development is adversely affected by a coastal hazard, coastal protection works should be permitted only where they are the best practicable option for the future. The abandonment or relocation of existing structures and the use of non-structural solutions should be considered among the options. Where coastal protection works are the best practicable option, they should be located and designed in a manner consistent with Chapter 7 – Coastal Environment.*

12. *A precautionary approach shall be used in avoiding, remedying, or mitigating the adverse effects on development, of earthquake, volcanic activity, sea level rise and global climatic change.*

11.4.2 Methods

1. *The ARC will co-ordinate the management of natural hazards throughout the Region by setting standards and ensuring consistency among TAs, by co-ordination of action in respect of natural hazards which extend across local boundaries, and by co-ordination of action with the appropriate regional council in respect of natural hazards which extend across regional boundaries.*
2. *The ARC will regulate diversions and discharges of stormwater in order to avoid or mitigate adverse effects of flooding and erosion, through the resource consent process.*
3. *The ARC and TAs will jointly advocate methods to avoid, remedy, or mitigate the adverse effects of natural hazards on the environment.*
4. *The ARC will promote a comprehensive catchment-wide approach to flood management.*
5. *The ARC will, where appropriate, transfer day to day flood management functions, powers and duties to TAs.*
6. *TAs will give effect to these policies by including objectives, policies and methods of implementation within district plans to control the use of land for the avoidance or mitigation of natural hazards.*
7. *TAs will ensure that flood management plans are prepared before any new areas are rezoned in ways which enable intensification of use, or where development is likely to cause adverse effects. This may be done as part of a wider planning process or structure planning process (as described in Appendix A).*
8. *TAs will ensure that any required hazard mitigation works are undertaken, and that they are adequately maintained.*
9. *Within the 1% AEP flood hazard zone TAs will control infilling and storage of materials likely to be moved by flood events, and ensure that development within the zone is located in such a manner as to limit the restriction of flood flows.*
10. *The ARC will implement objectives, policies and rules with respect to coastal hazards in the coastal environment, through the provisions in the Regional Plan – Coastal, which will encourage subdivision, use and development in the coastal environment to locate in appropriate areas.*
See also Chapter 7 – Coastal Environment.
11. *In consultation with the TAs, the ARC will develop and maintain a Regional coastal hazards database, and provide information on appropriate methods of avoiding, remedying, or mitigating the adverse effects of coastal hazards, including sea level rise.*
12. *TAs will implement objectives, policies and rules with respect to coastal hazards through provisions in district plans, including the use of esplanade reserves and strips.*
See also Chapter 18 – Esplanade Reserves and Strips.
13. *TAs will ensure that current information about known hazards is available to all persons.*
14. *The ARC will develop and carry out educational strategies aimed at providing the general public with a greater understanding of risk associated with natural hazards, and how these risks are being addressed throughout the Region.*
15. *The ARC will undertake research on the risks and impacts of natural hazards, particularly those that are Regionally significant, and make this information available to TAs and the general public.*
16. *The ARC, in consultation with relevant parties, will establish monitoring programmes for natural hazards of Regional significance, and make this information available to TAs and the general public.*
17. *The ARC will undertake research on methods to avoid or mitigate natural hazards and make this information available to TAs and the general public.*
18. *The ARC will provide support for Civil Defence in planning and implementing measures to guard against, prevent, reduce or overcome the effects of natural hazards.*

11.4.3 Reasons

The RM Act gives the ARC and TAs similar responsibilities in relation to the avoidance or mitigation of natural hazards. The RM Amendment Act 1993 enables the RPS to define the respective responsibilities of regional and territorial councils. It is important to clarify the respective roles of these agencies in order to avoid public confusion and to ensure that natural hazards management is undertaken at optimum efficiency and effectiveness.

While most natural processes which cause coastal hazards originate in the CMA, their adverse effects are usually expressed on the land above Mean High Water Springs (MHWS) where regional councils and TAs both have respective responsibilities. In order to achieve integrated and co-ordinated management of coastal hazards in the Auckland Region, these responsibilities need to be clearly identified.

The ARC will ensure consistency of approach and maintenance of standards across the Region. By virtue of its responsibilities under sections 14 and 15 of the RM Act, the ARC regulates diversions and discharges of stormwater which occur as a result of development. Because of the TAs' involvement in land use planning and the control of building development, it is more appropriate that they control stormwater discharges, subject to attaining standards adopted across the Region. The ARC intends to continue to allocate direct control to TAs via the comprehensive resource consent process or via regional plans. Any such allocations shall be based on the production of flood management plans produced on a catchment by catchment basis.

Due to the localised nature of flooding in the Region, responsibility for the construction and maintenance of flood protection works should fall at the local level where the community of interest lies.

The RPS requires that TAs will take responsibility via their district plans for ensuring that redevelopment or intensification is discouraged in known hazard zones. For presently undeveloped areas (e.g., rural), where the land use may change (e.g., urbanised), no new development will be permitted in the 1% AEP flood hazard zone, unless the hazard can be avoided by, for example, setting floor levels above the flood hazard level. Access to and from buildings should be maintained during flooding for purposes of evacuation.

The community has accepted a level of flood protection equivalent to a 1% AEP for a number of years, and it is considered appropriate to maintain this standard.

Traditionally, the management of risk from natural hazards in New Zealand has revolved around mitigation works, or the physical protection of people, property and the environment from the effects of hazards. A typical response to flood risk, for example, is to attempt to prevent flood events from inflicting damage on the environment. The erection of stopbanks is a classic example. Whilst protection works are generally of immediate success, they only afford protection up to their design capacity. Yet this is frequently ignored by public authorities who at times permit development in areas 'protected' by structural works. The resulting damage when the design capacity of the works is exceeded is often catastrophic.

In the future the approach in the Auckland Region to natural hazard management will be one of emphasising avoidance, or prevention, as opposed to protection. This chapter recognises that hazard events are natural occurrences and that the risk is created by locating activities in inappropriate places. However, where there are existing areas at risk from natural hazards, reduction or mitigation of the risk must be undertaken.

Mitigation works can have significant environmental effects and should be considered as the least desirable option for hazard control, except where there is an unacceptable risk to people and their property. In assessing any mitigation works, it is necessary to assess the benefits afforded versus any potential effects on the environment.

Mitigation works may involve the unnecessary removal of existing vegetation, when this may provide, in the case of stream banks, some natural stability. The unnecessary removal of vegetation may exacerbate erosion. The planting of inappropriate types of vegetation needs to be controlled so as to avoid any unnecessary restrictions to water flow which may exacerbate, or create, a flood hazard.

Coastal protection measures have the potential to worsen the adverse effects on coastal hazards, and adversely affect many aspects of the coastal environment. Softer solutions (planting, beach nourishment, etc.) often prove to be more effective in mitigating or remedying the adverse effects of hazards and better preserve the natural

character, landscape and amenity values of the coastal environment. Coastal protection measures should be avoided unless they are the best practicable option. Refer also to the NZCPS and the Regional Plan – Coastal.

To implement controls which avoid, reduce, or mitigate the risk and/or effects of natural hazards, an assessment of these hazards must be undertaken.

For coastal hazards, a regional coastal hazards database will be developed, which will define the extent of areas likely to be subject to coastal hazards in the Region, including the possible effects of sea level rise.

Generally, development of land, and the form in which it takes place, is allowed through the district plan and/or resource consents. In order to effectively control the impact of natural hazards on development, TAs must therefore ensure that risks, and likely effects of locally important natural hazards, are defined, and measures adopted to deal with these. A number of techniques have been developed for assessing and controlling these hazards including:

- Flood routing and flood plain delineation procedures. (Most consulting firms have standard or proprietary programmes for this.)
- Coastal erosion sensitivity indexes and hazard mapping techniques. (DoC has established methodologies and national databases in this area.)
- Geotechnical instability assessments including seismic response. (Standard, internationally used engineering and geological tests are available.)
- Sea level rise estimates. (DoC has established methodologies and national databases in this area.)

Many of these techniques have been developed by central government organisations for national use, and these are recommended as initial starting points for analysis. Other methodologies are easily obtained through universities or consulting firms. (The ARC has in the past provided a lead in the preparation of flood management plans and intends to continue this approach for coastal, seismic and atmospheric hazards.)

It is important for TAs to prioritise assessments and controls towards natural hazards most common and best able to be addressed through planning and engineering techniques. Currently throughout the Auckland Region, flooding, erosion and instability (dominantly coastal) are the main hazards which directly affect or threaten the

regional environment, and effort should be initially directed towards these.

Other hazards such as seismic events, volcanism, severe meteorological conditions, and sea level rise also pose threats to the Regional environment. The scale and locale of effects of these are comparatively difficult to determine. The ARC will provide guidance on assessment and avoidance or mitigation techniques to the Region on these hazards, develop a regional database, and establish risk assessment models for this purpose.

The issue of climate change and its predicted impacts, including sea level rise, intensification and increasing regularity of extreme weather events, has national as well as Regional significance. The ARC will actively encourage national research in this area.

Generally it is considered that planning and engineering controls can be exercised through district plans and resource consents to ensure:

- Restriction of development from zones which have active hazards (e.g., coastal cliff tops and cliff bases or stream banks).
- Development is not adversely affected by hazards (e.g., requiring engineering stability reports and designs).
- Development does not increase the risk and adverse effects of hazards (e.g., enforcing strict vegetation clearance controls, ensuring floor heights of buildings are above flood levels of concern, controlling development in areas which have potential problems such as land instability).
- Use of vegetative techniques wherever possible to reduce hazard risks and/or effects of hazards (maintaining vegetation in catchments, planting of coastal cliffs or sand dunes).

In dealing with natural hazards where little information is available, it is considered prudent to use a precautionary approach, e.g., the NZCPS policies. This is particularly important when dealing with the effects of global climate change and subsequent sea level rise trends. Further, in light of MfE documents discussing global climate issues, the most recent estimates from the Inter-governmental Panel on Climate Change, as well as national and regional estimates, will be used in determining the likely change in sea level.

Civil Defence plans and educational strategies are considered important components of dealing with the effects of natural hazards. It is recommended that both the regional and district authorities co-operate in preparation of Civil Defence plans and educational programmes and material.

11.5 Environmental Results Anticipated

- (a) The impacts of natural hazards on development and the human population of the Auckland Region will be avoided or mitigated.
- (b) The costs to the community of dealing with the effects of natural hazards will be reduced.
- (c) Improved public awareness of the potential risks posed by natural hazards.

11.6 Monitoring

- (i) Regular monitoring of compliance with conditions on Regional resource consents, including comprehensive diversion and discharge consents, will be undertaken to ensure that flooding problems caused by new development are avoided.
- (ii) The establishment of monitoring procedures will provide warning of volcanism and a record of the Region's seismicity, so as to facilitate contingency procedures and minimise adverse effects.
- (iii) Coastal hazard assessment procedures will assist in the identification of coastal hazard zones and act as a base line for the avoidance of development in hazard areas.