

Appendix 3.28.2 Issues paper: Natural hazard risk 27 September 2011

Issue 5: Natural Hazard Risk

Life, property, infrastructure, natural resources and the Auckland region economy are at risk from natural hazards such as floods, coastal inundation, storm surge, land instability, cyclones, volcanic eruptions, tsunamis and earthquakes.

Background to the issue

Significant areas of Auckland's rural and urban land are at risk to a variety of natural hazards. Auckland is a major centre of employment and is a nationally strategic distribution and transport hub. Economic activity in the Auckland region is significant, contributing an estimated 35% of the national gross domestic product, and economic modelling has shown that the potential financial impacts of an emergency in the Auckland region would be significant. For example, a hypothetical volcanic eruption would result in a 47% reduction in regional GDP and a 7% reduction in GDP nationally in the first year. Importantly, this economic loss estimation is likely an underestimation of the potential economic risk posed by volcanic eruptions, as it does not include intangible losses incurred by the disaster.

Determination of possible hazard risk location, types of return periods and resilience of vulnerable communities has provided Auckland Council with an important baseline understanding of the likelihood of hazard risk as well as social, economic, and environmental consequences in specific locations.

However, as the long term social, economic and environmental consequences of the 2010/2011 Canterbury Earthquake Sequence are being qualified and quantified, a new nation wide awareness of natural hazard risk brings a fundamental change to existing national and regional natural hazard risk management practices. Auckland Council will need to undertake a significant amount of new research and analysis to understand the implications of specific hazards and the risks they pose to Auckland communities, infrastructure, the economy, and the environment as well as what the most effective tools and techniques are for managing natural hazard risks. This will include a mix of regulatory and non-regulatory methods to ensure a proactive management approach, including communicating risks effectively and actively managing and monitoring land use and activities, is undertaken on a regional basis.

The RMA defines natural hazards 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”

Under the Resource Management Act 1991 (RMA), natural hazards are managed by both regional (section 30(1)(c)(iv), (1)(d)(v)) and territorial authorities (section 31(1)(b)(i)). Sections 30 and 31 of the Act specify the control of land use, development and protection for the purpose of natural hazard avoidance and mitigation. Specifically, regional plans and policy statements have scope for policies and controls related to natural hazards whereas district plans have a particular focus

on managing land use activities such as development and building activities through controls.

Natural hazard management is also largely dependent on national legislation, including the following:

Resource Management Act (RMA) 1991

- Sets out the functions for regional and territorial councils which includes natural hazard avoidance and mitigation

Building Act (BA) 2004

- Provides comprehensive statutory control over building activities on land subject to natural hazards
- Sets out regulations to ensure structural standards and development techniques remove or reduce natural hazard risks

Civil Defence Emergency Management Act (CDEMA) 2002

- Relates predominantly to emergency situations related to extreme events such as volcanic eruptions, tsunamis and earthquakes
- Does not include controls on land use activities
- Requires the Council to take a proactive approach towards:
 - Hazard and risk management
 - Planning and preparation for emergencies
 - Identification and assessment of hazard risk and implementing cost-effective risk reduction

New Zealand Coastal Policy Statement (NZCPS) 2010

- Must be given effect to by regional policy statements and plans and district plans
- Natural hazard management relates mostly to erosion, sea level rise, coastal inundation and extreme events such tsunamis and wave action during storms
- Includes some high level policies relating to subdivision and land use activities and the need to consider coastal hazard risks
- Identification of areas at high risk from coastal hazards

Currently there are many resource management plans in the Auckland region managing natural hazards. These include nine district plans from the 7 ex-territorial councils, one regional policy statement from the ex-regional council as well as three regional plans (Air, Land and Water Plan, Coastal Plan and the Sediment Plan). These plans are often very different in their management of natural hazards which has resulted in a legacy database of inconsistent and unreliable natural hazard information and management techniques. Natural hazard management also often focussed on an 'all-hazards' approach rather than a specific hazard approach.

Coastal Hazards

Auckland is a coastal city with large investments in infrastructure, private property and people at or near the coast. These are all at risk from natural hazards with major economic, social and environment losses possible effects.

Coastal hazards include storms and resultant wave action, erosion, landslips, inundation, flooding and extreme events such as tsunamis. These hazards also have the possibility of increasing in frequency and magnitude under climate change and subsequent sea level rise.

The majority of regional and district RMA plans within the Auckland region have provisions relating to avoiding and mitigating coastal hazards. These provisions include limiting activities at the coast, building setback areas, the use of esplanade reserves and strips and in some cases raised floor levels.

Flood Risk

Flooding is defined as the inundation of land by water. Land prone to flooding covers a significant proportion of Auckland's urban and rural areas and is a significant issue for development located in or near floodplains.

Flooding is a common occurrence in the Auckland region, particularly during periods of heavy rainfall when waterways reach their flow level capacity. Flooding problems can also be worsened by human activities such as vegetation clearance and increases in impervious surfaces.

Flooding poses a risk when it has the potential to impact on infrastructure, assets and resources of value. Flood hazard assessments illustrate that the impact of floods include the movement of debris, the build up of debris against structures, silt and/or mud deposition, erosion, and water damage to buildings and vehicles. Overloaded sewerage systems or transportation of hazardous substances also create consequential public health effects.

Plan provisions on the development of land in floodplains are critical for the management of flooding hazards. These provisions include controls on minimum floor levels, vegetation clearance and stormwater infrastructure provisions.

Land Instability

Erosion, slips and rock falls are different types of land instability hazards occurring within the Auckland region. These hazards are a significant issue for development and infrastructure located on or below steep slopes comprised of soft, weak and/or poorly consolidated rock that is prone to failure. These hazards are also worsened by periods of prolonged or heavy rainfall as well as human activities such as vegetation clearance, earthworks and excavations.

The potential effects of land instability include economic loss, damage to infrastructure and property as well as harm to persons. Development and other land use activity controls are used to mitigate or avoid land instability hazards. These include earthworks and vegetation clearance provisions. The avoidance or mitigation of instability hazards should be based on risk (the likelihood and consequences of a hazard). Ideally, the risk of instability hazards should be managed as not to exceed an acceptable level. Plan provisions can manage land instability hazard risk through identifying and mapping areas of instability; requiring site investigations to assess risk in areas of identified land instability and developing rules and standards to assess consents for activities in areas prone to these hazards.

Volcanic Risk

The Auckland Volcanic Field (AVF) is located in the central part of the Auckland region and is an active volcanic centre. The AVF is largely monogenetic, meaning that the location of the next volcanic eruption is uncertain and will probably occur in a new location. Volcanic eruptions tend to involve small volumes of magma.

Research is currently being commissioned within Council to establish an evidence base of technical information to establish a more appropriate volcanic hazard risk management approach. This will not be ready before the initial notification of the Unitary Plan but general risk management plan provisions incorporated within the Unitary Plan will mean that as new evidence is gained by Council, plan provisions to proactively manage volcanic risks can be incorporated effectively.

Tsunami Hazard Risk

As a coastal city, Auckland could potentially be affected by a tsunami. Tsunami waves are generated by the sudden displacement of water (caused by a submarine landslide, volcanic eruption or earthquake). Areas that may be at risk to tsunamis are often overtaken by the destructive tsunami overland flow path, and lives, property and infrastructure are often lost as a result of poor planning or warning systems.

Regulatory management techniques such as controls of land use activities in tsunami prone areas and non regulatory methods such as wave monitoring systems and alert systems are relatively underused in New Zealand and Auckland. If used, these methods are designed to either remove people and assets from risk or to manage exposure to tsunami effects.

Significant research is needed to provide an evidence base of tsunami threat and impacts in Auckland. This research could in the future inform a tsunami specific hazard management approach for implementation in Auckland.

Seismic Hazards

Earth shaking, ground displacement, and liquefaction can be experienced during seismic events and can cause damage and losses to infrastructure, property and lives as well as the economy and environment.

Seismic hazards can be managed through the identification of active faults on planning maps and using buffer zones to exclude or restrict development, or require structures, infrastructure and activity in the vicinity of the faults to be designed in such a way as to minimise risk to life, property and the economy. This is particularly important if insurance becomes more difficult to access to remedy the effects of such hazards on people, property and infrastructure.

Along with possible plan provisions, work in other areas of Auckland Council to recognise and manage seismic hazards is currently being undertaken. This includes the draft Earthquake-prone Building Policy. In depth research on seismic hazards in Auckland needs to be undertaken to ensure that any plan provisions can effectively deal with potential hazards.

Approaches to manage the issue

Approach 1: Do Nothing

The status quo has resulted in inconsistent natural hazard management across Auckland. The existing plan provisions for land use activities related to natural hazards are inconsistent and will cause operational inefficiencies for Council in the future as well as unclear guidance, information and rules for landowners. Hazard maps and hazard registers are also out of date and not readily available to the public. This may be a serious liability issue for Council.

Approach 2: Unitary Plan

As an effective, integrated, and proactive natural hazard and risk management approach is now required of the Auckland Council, significant issues currently exist that need to be dealt with to ensure this approach can be undertaken. To manage the threats that natural hazards pose to life, property, infrastructure and the environment, consistent and specific plan provisions and information on natural hazards is necessary. These plan provisions should be to control the use of land and the effects of the use of land for the avoidance or mitigation of hazards. Ideally, the risk of hazards should be managed as not to exceed an acceptable level.

An overarching Council wide multi-hazard risk management strategic policy framework will also assist with clarifying natural hazard information requirements to fulfil Council's statutory obligations and will provide direction for future research, monitoring and information collection.

Approaches in the Unitary Plan to better manage natural hazard effects include:

- Development of risk based plan provisions and assessment. This is dependent on accurate information, proactive planning and effective communication of risks
- Development of consistent hazard plan provisions to manage land use activities at risk from natural hazards. This includes:
 - Overall recognition of regional issues to develop consistent objectives and policies, acknowledge the threat that natural hazards pose and to ensure that their effects are avoided or mitigated
 - Consistent controls for land use activities subject to natural hazards such as floor levels, vegetation clearance, stormwater infrastructure and earthworks
 - Consistent assessment criteria for activities such as site suitability and the requirement of geotechnical reports.
- Having specific hazard provisions that deal with hazards separately rather than having an 'all-hazards' approach as is commonly used. This requires that provisions focus on:
 - The effects that need to be addressed to achieve natural hazard objectives, and
 - How those effects are going to be addressed
- Development of consistent assessment criteria for developing hazard models which provide the basis for plan provisions. Examples of this include:
 - Unitary Plan controls for flooding. These should include consistent use of annual exceedence probability (AEP) flood levels to determine floor levels
- Any hazard information that needs to be included in resource consent applications should be clear and should ensure that natural hazard risk can be properly addressed through the consent process.
- Development of consistent, reliable and accurate hazard maps based on known hazards in the region
- Investigations and recognition within plan provisions of climate change and how this may exacerbate the effects of natural hazards
- Consistent hazard data and information storage. This involves:
 - Compiling hazard data from all ex-territorial authorities to a single natural hazard register
 - Increasing the awareness of the availability of natural hazard maps and registers
 - Ensuring that new information on hazards is collected and stored appropriately

- Investigation of the issues surrounding Council's liability in regards to natural hazards. This includes:
 - How the Council manages natural hazard information and data
 - How this information is communicated to the public.
- Continuing to work with and improve integrated hazard management with Civil Defence. This involves taking a proactive and integrated approach to natural hazard avoidance and mitigation. Actions includes:
 - Public awareness and education initiatives
 - Developing detailed emergency management plans for implementation when necessary