

8. Natural Hazards

The Horowhenua District has the potential to be subject to a range of natural hazards, including flooding and river erosion, coastal erosion and inundation (storm surges and tsunamis), land instability (slips, slumps and runoff), seismic activity (ground rupture, shaking and liquefaction) and volcanic activity.

Flooding is the most frequently experienced natural hazard in the District, and the likelihood of a major flood occurring in any year is high. The other natural hazards occur less frequently, but have the potential to cause significant adverse effects and pose a risk to people and property.

The location, nature and magnitude of these natural hazards vary throughout the District, with some areas at significant risk while other areas are less susceptible. The vulnerability to natural hazard events can be increased by human activity which can increase the intensity and effects from flooding and erosion (e.g. earthworks in flooding paths), as well as reducing the effectiveness of mitigation measures (e.g. works which compromise stopbanks). In addition, the number of people living in hazard-prone areas (including associated infrastructure) can increase the risk of potential damage from natural hazard events to people and properties.

Below is a description of the natural hazards and the risks they pose to people, property and the environment generally.

Surface Water Flooding and River Bank Erosion

As much of the developed land of the District is located on floodplains, periodic surface water flooding occurs. The impacts of floods are mostly localised and relate mainly to the major rivers and streams (Manawatu River, Tokomaru Stream, Mangaore Stream, Ohau River, Manakau Stream and Waikawa Stream) and their tributaries. In addition to flooding from rivers and streams, some areas are subject to poor drainage which leads to surface ponding.

Given the flood risks and susceptibility to surface ponding, river and drainage schemes (with the associated construction of stopbanks, floodgates, spillways and retention dams) were developed to protect some parts of the District.

For example, flooding of the Manawatu River has been an historical problem for the low-lying land in the vicinity of the lower reaches of the river. The former Manawatu Catchment Board has developed the "Lower Manawatu Flood Protection Scheme", incorporating stopbanks, floodways, and flood warning systems, to assist landowners in that vicinity to manage the flood hazard.

Flood protection schemes offer a level of protection to people and property from the flooding and ponding risks. However, there is still a risk that stopbank and/or spillway capacity may be exceeded.

The February 2004 storm event caused widespread flooding in the lower reaches of the Manawatu River, and was the largest flood in the Manawatu River since 1902. This event highlighted that if the size of the flood exceeds the design standard of the flood protection works (e.g. 100 year flood event), or the flood protection works fail, significant flooding can occur. The 2004 event was larger than the previously understood scale of a 100 year flood

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event and caused significant short and long term adverse effects on people, property and the environment in the area affected. As a result, Horizons Regional Council is currently undertaking a project to upgrade the Lower Manawatu Flood Protection Scheme to the new 1 in 100 year flood event design standard.

The Koputaroa, Moutoa and Makerua areas are former swamps and are subject to drainage by drainage schemes. The drainage schemes have enabled the land to be farmed and ongoing reviews and upgrades to the schemes occur to meet the demands of farming systems. Land in these areas is subject to flooding, particularly if the pump systems fail.

Similarly, flooding of the Ohau River, Waikawa River, Waiwiri Stream and Managua Stream (west drain) has been an historical problem for landowners in the lower reaches of those catchments. Local flood protection and drainage schemes were developed by the former Manawatu Catchment Board for the Ohau River, the Waikawa and Manakau Streams and the Waiwiri Stream. In 1976 these schemes were combined to form the "Ohau-Manakau Scheme". The combined flood protection scheme comprises stopbanks, streambed and riverbank protection and maintenance works along defined sections of the Ohau River and the Waiwiri, Kuku, Waikawa, and Manakau Streams. Horizons Regional Council has an ongoing programme of reviewing the scheme and the nature of the flood hazard in these catchments. Historical records associated with the catchments and the flood protection scheme provide an indication of flood risk in these areas. The level and extent of flood risk may be adjusted as a result of the scheme review. These reviews may require an upgrade of the flood protection scheme or other options, such as land use and building controls, where necessary.

Erosion of riverbanks can occur as a result of a flood event or the on-going change of a river system and can encroach into adjacent land. While the erosion risk can alter over time, there are some areas at risk from river erosion on an ongoing basis. Localised river bank protection works (e.g. groynes, rock embankments, straightening, etc) have been used in places to mitigate river bank erosion and provide for development on adjacent land. While engineering works can reduce the risks of river bank erosion, they cannot eliminate the risks and they can be expensive to construct and maintain.

Many parts of the District are susceptible to localised overland flows and ponding, where intensive rainfall and/or high groundwater levels exceed the capacity for natural and artificial drainage systems. These overland flows and ponding can be for short periods such as a high storm event during dry summer conditions resulting in high surface water levels for a short period of time. Alternatively, ponding can occur for prolonged periods, such as during winter months where a high water table results in limited drainage, and low lying areas can pond for a considerable period of time. This localised overland flow and ponding have the potential to cause damage to people and property.

Coastal Erosion and Inundation

Wind and water erosion and inundation of low-lying areas due to a possible rise in sea level, are constant threats for the entire coastal plain and is a significant natural hazard in the District. Coasts are dynamic areas, and while the Horowhenua coast is generally accreting, there are periods and locations where coastal erosion occurs. The nature and rate of coastal erosion can vary depending on a particular area of the coastline and whether many storms have occurred over a particular time period. Coastal accretion and erosion is a natural part of beach behaviour and erosion becomes a particular hazard where built development has occurred within the area of natural beach movements, such as at each of the coastal settlements.

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Foredune protection designations or reserves and dune stabilisation and protective planted areas exist in most of the settlements. Any future urban development in those settlements will need to be located and constructed so as to avoid worsening the inundation hazard and to protect property from extreme inundation events. Accretion and sand creep are also features of some parts of the coastline e.g. Waitarere Beach. River mouth migration is an important natural factor in the long-term erosion-vs-accretion pattern of the coastline.

Certain uses of the dunes can exacerbate wind erosion of the sand - especially those activities which result in removal of vegetation (e.g. motor vehicles which disturb the sand and vegetation cover, exposing it to the wind). Coastal erosion is a potential hazard for sand dunes immediately adjacent to the coastline and for more inland sand country. Wind and water action, together with some inappropriate grazing and removal of surface vegetation cover, can cause erosion of the fragile sand country.

Hazards can result from sand drifts or the undermining of land or structures which are caused by such erosion. Large areas of the sand plain are planted in plantation pine forest. One of the objectives of the original planting was to stabilise the potentially fragile sand. Those plantations are progressively being harvested and re-planted.

Tsunami events and sea level rise are also considerations. In the event of a significant tsunami, all parts of the coastal margin could be at risk of inundation or damage. It is not possible, at this time, to anticipate the precise level of risk or the extent of potential environmental damage expected to result.

Climate change is likely to influence the frequency, scale or intensity of atmospherically influenced natural hazards such as coastal erosion and inundation from storm surges.

Seismic Activity

The Horowhenua and the wider region are affected by seismic activity. Fault lines run through the Horowhenua District and their existence means that the District is vulnerable to earthquakes. Potentially an earthquake could cause devastation from the hill country to the coastline.

Seismic activity poses different types of natural hazards. Movement along fault lines can cause ground rupture or deformation. Fault or ground rupture can occur during a very large earthquake where the movement creates discrete breaks at the ground surface, which is of particular risk to buildings, structures and infrastructure. Liquefaction is another type of seismic hazard, where some soils become like liquid due to seismic action. During liquefaction, the soil loses its ability to support buildings, causing damage to buildings and other infrastructure. Ground shaking is also experienced during a large earthquake, and can occur from close or distant faults. Ground shaking can be amplified due to sub-surface geology.

Each of the seismic hazard types vary throughout the District. The known active faults are predominantly located in the Tararua Ranges away from any areas of intensive development and settlement. Therefore, the risks of fault or ground rupture are most likely to occur in the hill country. The types of soils most susceptible to liquefaction are low to medium density sands and silts (known as "flexible soils"), as well as areas with shallow groundwater levels. The coastal areas and swampy land are most at risk from liquefaction.

Seismic hazard poses implications for standards of building construction, for the location and construction of essential services infrastructure, and for emergency response planning. Seismic events themselves cannot be avoided or mitigated. Effective environmental

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standards, structural design, and emergency response planning will, though, be important to successful post-event management and minimising damage for communities and the environment.

Land Instability

Land instability, generally resulting from soil erosion, occurs as a localised hazard throughout the District. The natural ground conditions of some parts of the District may combine to mean that the land is subject to possible subsidence (e.g. the area identified along Kawi Road which was recognised in earlier planning documents as being subject to possible subsidence).

Fire

Fire is an ever-present hazard throughout the District (e.g. in the peat-lands of the Opiki area). Fire is a naturally-occurring phenomenon and is also a necessary component of, or consequence of, some land use activities. For example, fire is a necessary part of certain crop farming techniques. The incidence of fire and the severity of fire damage can be influenced by land use practices and safety and mitigation measures incorporated into activities. In urban situations, building standards and community fire fighting services are established to manage fire hazard. Council is a Rural Fire Authority and assists in co-ordinating the emergency response to manage rural fire events.

Volcanic Activity

The relatively small geographic size of New Zealand means that the entire country is potentially at risk from the effects of volcanic events occurring anywhere in the country. Events such as ash fall are a possibility anywhere in the country. It is not reasonable to provide precise estimates of the probability of such events or of their likely extent or consequences. All parts of the environment, including settlements and land use activities, are at risk. The events themselves cannot be avoided or mitigated. Effective emergency response planning will, though, be important to successful post-event management and minimising damage for communities and the environment.

Roles and Responsibilities

Management of natural hazards under the RMA involves the combined efforts of a number of agencies including district and regional councils. The Regional Policy Statement of Horizons Regional Council states the different roles and responsibilities of the regional and district councils in relation to the management of natural hazards in the Manawatu-Wanganui region. Horizons Regional Council has taken on the role of setting a regional framework for natural hazard management, while allowing decisions on most land use activities to be made by district councils. Horizons Regional Council also has responsibility for setting objectives, policies and rules relating to activities in the bed of lakes and rivers, all land use activities in the coastal marine area, coastal foredunes, areas with flood control and drainage schemes, and erosion protection works that cross or adjoin mean high water springs. Council is responsible for controlling the use of land to avoid or mitigate natural hazards in all areas, except for those areas identified above. In addition to the roles and responsibilities under the RMA, regional and district councils and other agencies have further roles and responsibilities under other legislation. Most of Horizons Regional Council's operational work on natural hazard management is carried out under the Soil Conservation and Rivers Control Act 1941, which provides for the establishment of river and drainage schemes. Emergency response, community readiness, recovery planning and research into natural hazard risks, is carried out under the Civil Defence and Emergency Management Act 2002. These roles are

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implemented through the Civil Defence and Emergency Management Group Plan rather than through the Proposed One Plan or District Plan.

Therefore, the principal role of the District Plan is to identify where the risks are most significant, and to manage subdivision, development and activities in these areas to avoid the exacerbation of such risks, and to reduce the risks as appropriate.

Issue 8.1 RISKS AND ADVERSE EFFECTS OF NATURAL HAZARDS

The Horowhenua District is susceptible to the effects of natural hazards, with flooding the most prevalent, which pose risks to people, property and the environment.

ISSUE DISCUSSION

Land use activities can be affected by, or can accelerate, worsen, or cause adverse effects, in areas subject to natural hazards. There are areas in the District where natural hazards can occur and it is the responsibility of Council to control land uses and subdivision for the avoidance or mitigation of the effects from the natural hazard on people, property and the environment.

The impact of a natural hazard event on people, property and the environment is a function of the magnitude of the natural event, the density of population and the intensity of development. There is a higher potential impact of natural hazards in more densely developed areas.

Where subdivision, use, or development is intended or expected to occur, it is important that every endeavour is made to, avoid locations which have extreme risk of the hazard. In some situations it may not be possible to consider alternative locations (say, for the changed use of existing buildings) and for some hazards the risk may be fairly low or equal throughout the District. In these situations, every endeavour should be made to mitigate any adverse effects on people, property and the environment expected to result from the hazard.

Obtaining accurate information about natural hazards is one of the biggest challenges facing authorities. This information can relate to the frequency and intensity of natural hazards events such as flooding and earthquakes, and the accuracy and completeness of knowledge about the location and risks of faultlines or expected location and extent risks from tsunamis.

The costs and problems associated with obtaining such information over the whole District with a widely distributed populated area as the Horowhenua is significant – it is therefore important to work with other key agencies, particularly Horizons Regional Council, in building the information base and determining appropriate management mechanisms. Ongoing research and analysis of natural hazards would provide improved information to make more informed decisions, with these investigations to generally focus on areas of high concentrations of people and developed property.

Objectives & Policies

Objective 8.1.1 Risks and Adverse Effects of Natural Hazards

The adverse effects of natural hazards on people, property, the environment and the well-being of communities are avoided or mitigated.

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Policy 8.1.2

Identify the Moutoa Floodway on the Planning Maps and avoid the establishment of any new structure or activity, or any increase in the scale of any existing structure or activity, within the floodway unless:

- there is a functional necessity to locate the structure or activity within the floodway, and
- the structure or activity is designed so that the adverse effects of a 0.5% AEP (1 in 200 year) flood event on it, are avoided or mitigated, and
- the structure or activity is designed so that adverse effects on the environment, including the functioning of the floodway, arising from the structure or activity during a flood event are avoided or mitigated, in which case the structure or activity may be allowed.

Policy 8.1.3

Identify areas on the Planning Maps where land is at significant risk of inundation from flood events where there is a known high probability or high potential impact from a flood event's predicted effects (a 0.5% AEP (1 in 200 years)). The mapping of these areas is to be updated as new information becomes available.

Policy 8.1.4

Control the location and design of land use, structures and subdivision in identified areas at significant risk from flood events, as identified in Policy 8.1.3, to avoid or mitigate the adverse effects on people, property and the environment.

Policy 8.1.5

Avoid the establishment of any new structure or activity, or any increase in the scale of any existing structure or activity, within the identified areas at significant risk from flood events, as identified in Policy 8.1.3, unless:

- flood hazard avoidance is achieved or the 0.5% AEP (1 in 200 years) flood hazard is mitigated, or
- the non-habitable structure or activity is on production land, or
- there is a functional necessity to locate the structure or activity within such an area,

in which case the structure or activity may be allowed.

Policy 8.1.6

Flood hazard avoidance must be preferred to flood hazard mitigation.

Policy 8.1.7

Ensure any development undertaken within identified flood areas, as identified in Policy 8.1.3, adopts specifically designed measures to avoid or mitigate the hazard risks by ensuring:

- Occupied structures have a finished floor or ground level, which includes a reasonable freeboard above the 0.5% AEP (1 in 200 years) flood level.

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- In a 0.5% AEP (1 in 200 years) flood event, the inundation of access between habitable structures and a safe area where evacuation may be carried out (preferably that will not be flooded) must be no greater than 0.5 metres above finished ground level with a maximum water velocity of 1.0 m/s, or some other combination of water depth and velocity that can be shown to result in no greater risk to human life, infrastructure or property.
- Adverse effects on the effectiveness of existing flood hazard avoidance or mitigation measures, including works and structures within River and Drainage Schemes, natural landforms that protect against inundation, and overland stormwater flow paths, are avoided.
- Adverse effects on existing structures and activities are avoided or mitigated.
- Regard is had to the likelihood and consequences of the proposed flood hazard mitigation measures failing.
- Regard is had to the consequential effects of ensuring occupied structures have a finished floor or ground level, including but not limited to landscape and natural character, urban design, and the displacement of floodwaters onto adjoining properties.
- Regard is had to the proposed ownership of, and responsibility for maintenance of, the flood hazard mitigation measures including the appropriateness and certainty of the maintenance regime.

Policy 8.1.8

Avoid, where practicable, the siting of new critical infrastructure and services within areas of significant risk from natural hazard events.

Policy 8.1.9

Ensure that all structures and activities are constructed so as to minimise material damage from seismic events.

Policy 8.1.10

Ensure that all structures and activities incorporate measures to minimise risk of, and damage caused by, fire.

Policy 8.1.11

Manage subdivision, development of buildings, and structures on areas which may be prone to coastal erosion or the effect of sea level rise unless the activities, buildings or structures:

- have a significant community benefit and have a functional requirement to be located in the coastal environment;
- do not adversely affect the natural character of the coastal environment; or
- are relocatable.

Policy 8.1.12

Manage the use, storage, transportation and disposal of hazardous substances in areas subject to natural hazards, to avoid, or mitigate potential adverse effects caused by

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hazardous substances during natural hazard events.

Policy 8.1.13

Manage the effects of natural hazards caused by long-term shifts in climate and changes in sea-level in setting minimum floor levels, designing flood avoidance or mitigation measures.

Policy 8.1.14

Raise awareness and educate people about the risks of natural hazards, and help them prepare, design and plan for the occurrence of natural hazard events through the provision of information and advice.

Explanation and Principal Reasons

The District is subject to the effects of a range of natural hazards, with flooding the most common natural hazard. Existing information is available about the location and extent of areas subject to flood risk based on modelling undertaken by Horizons Regional Council and past flood events. However, there is limited information available about other natural hazards which are suitable for use in land use planning. This information is expected to improve over time.

The District Plan identifies areas subject to significant risk from flooding. In these areas, development will be managed and controlled through rules and performance standards to reduce or minimise the risk to people and property. By controlling the location and type of land use, structures and subdivision in natural hazard areas, the future losses experienced and the cost of response and recovery from natural disasters can be reduced.

Measures to avoid or mitigate flood risks will be assessed through resource consent applications, such as through managing the siting and design of buildings. Where the residual risks cannot be practicably avoided or reduced to acceptable levels, development may need to be prevented. Suitable measures will also need to be taken to inform existing and future owners of the risks from flooding.

Preferably, lifeline and critical infrastructure and services (e.g. electricity substations and transmission networks, public water supply/treatment plants, public wastewater treatment plants, strategic road and rail networks and health care institutions/hospitals) should be placed at minimal risk from natural hazards, and therefore some form of control on the location of such services within areas of significant risks is necessary. The presence of hazardous facilities or substances within natural hazard areas may also cause additional adverse effects during an event, and therefore need to be managed.

For risks from other types of natural hazards such as seismic events and fire, measures outside the District Plan are used to avoid or mitigate the effects from these natural hazards. For example, controls under the Buildings Act 2004 assist in the avoidance and mitigation of the effects of natural hazards.

Planning for and adapting to the effects caused by long term shifts in climate and changes in sea level need to consider both the natural environment (including effects on natural ecosystems), and existing and future development. These climatic and sea level changes should be taken into account when making decisions relating to development and land use in areas at risk from flooding and in the Coastal Environment.

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Buildings and structures in the Coastal Environment are potentially prone to coastal erosion and sea level rise. However, it is recognised some buildings and structures benefit the community and need to be located near or immediately adjacent to the beach for them to serve their functional purpose. Development in the Coastal Environment can also adversely affect other values, such as landscape and natural character. Therefore, specific requirements apply to manage buildings and structures in the Coastal Environment to assess the range of issues.

Informing people of the risks from natural hazards, including the ways to avoid or minimise such risks, and how to be prepared for natural hazards events, is a critical and ongoing requirement. Such preparation includes education about how to minimise the risks when planning subdivision and development. Adequate information, therefore, needs to be disseminated to the community, in conjunction with those other authorities with responsibilities for natural hazards management and response.

Methods for Issue 8.1 & Objective 8.1.1

District Plan

- Identify on the Planning Maps the areas subject to significant risk from the effects of flooding, being land at risk of inundation from flood events with a 0.5% AEP (1 in 200 years) and the Moutoa Floodway.
- Identify the Moutoa Floodway as a designated area by Horizons Regional Council.
- Rules and standards to control subdivision and development within identified areas subject to significant risk from the effects of flooding to avoid or reduce the potential adverse effects of natural hazards.
- Through the resource consent process, assess the potential effects of subdivision and development that do not comply with rules and standards or are a potentially incompatible land use.
- Conditions on resource consent to avoid or reduce the potential risks from natural hazards, such as the siting of structures and minimum floor levels in identified areas subject to significant risk from the effects of flooding.
- Where there are significant risks from natural hazards (erosion, falling debris, subsidence, slippage, or inundation) that have not yet been identified in the District Plan, control subdivision in these areas through Section 106 of the RMA. The “Risks and Responsibilities: Report of the Manawatu-Wanganui Regional Lifelines Project” (No. 2005/EXT/622) prepared by the Manawatu-Wanganui CDEM Group is a summary of all natural hazards in the region and could be used for this purpose.
- Rules to provide for soil conservation, erosion protection, river control and flood protection works undertaken by Horizons Regional Council.
- Necessary flood protection works will be protected by designations in the District Plan.
- Identify on the Planning Maps a Coastal Hazard Area located adjacent to the coast which is designed to protect the sensitive coastal foredunes and other coastal landscapes from erosion and destruction.
- Rules to manage all buildings, structures and the subdivision of land within the Coastal Hazard Area to assess the risks from natural hazards and effects on other values in the Coastal Environment.

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Building Controls

- Apply Sections 71 and 72 of the Building Act 2004 to control inappropriate development of land subject to a natural hazard. Also, the standards specified in the Building Act for geotechnical requirements, seismic design and fire protection will be imposed, as well as Section 36 registrations.

Regional Council

- Rules in the Proposed One Plan relating to activities in the bed of lakes and rivers, for land adjacent to rivers zoned for river and flood control, all land use activities in the coastal marine area, coastal foredunes, areas with flood control and drainage schemes, and erosion protection works that cross or adjoin mean high water springs.
- Designation of the Moutoa Floodway will enable Horizons Regional Council to use its powers as a Requiring Authority to control land use activities, buildings and structures within the designated area.

Monitoring

- Council will avail itself of information describing hazards affecting Horowhenua District as these come to hand from other agencies (and particularly from Horizons Regional Council).
- Council will cooperate with the monitoring and investigation studies undertaken by other agencies including Horizons Regional Council.

Collection and Provision of Information

- Working with Horizons Regional Council and other appropriate agencies on further research on the risks from natural hazards to obtain more reliable and updated information, including the effects of climate change.
- Council will make available information for the Public that would help raise awareness and educate people about the risks of natural hazards. The “Risks and Responsibilities: Report of the Manawatu-Wanganui Regional Lifelines Project” (No. 2005/EXT/622) prepared by the Manawatu-Wanganui CDEM Group is a summary of all natural hazards in the region and could be used for this purpose.
- Council will also make available to the public, through Project Information Memoranda (PIMs), Land Information Memoranda (LIMs) and individual enquiries, information about natural hazards held by Council.

Civil Defence and Emergency Management Functions

- The preparation and review of Civil Defence and Emergency Management Plans for response and recovery from natural hazard events, under the Civil Defence and Emergency Management Act 2002.
- Council will continue to act as the District's Rural Fire Authority.

The methods use a mix of regulatory and non-regulatory tools to avoid or mitigate the adverse effects of natural hazards on people, property and the environment. Flooding is the most common natural hazard, and flood prone areas are identified, and associated rules and standards are applied to manage the risks from the flood hazard. For other natural hazards where information is limited or uncertain, in these circumstances, the application of Section 106 of the RMA may be necessary to limit or manage potentially inappropriate subdivision, as well as the requirements and standards in the Building Act.

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In addition, as natural hazards are unpredictable and it is not always possible to avoid or mitigate the risks from natural hazard events, non-regulatory tools such as Emergency Management Plans and Response and Recovery Strategies are appropriate ways to prepare for such events. Ongoing liaison with Horizons Regional Council on natural hazard research and management will continue to ensure information and responses to risks from natural hazards are applied.

Issue 8.2 WORSENING THE RISKS OR SEVERITY OF NATURAL HAZARDS

The potential worsening of the risks or severity of natural hazards that can result from inappropriate use and development of land. Land use activities and development on, within, or adjacent to, flood protection and other natural hazard defensive works, can impair or compromise the effective or integrity of these works.

ISSUE DISCUSSION

Some activities have the potential to worsen the risk or consequences of hazards. Examples include the location of structures within floodplains which could impede the flow of flood waters and worsen flood risk for upstream properties. Another example is earthworks or construction which could worsen the potential for land slippage or erosion.

The risks of natural hazards can be avoided or mitigated by certain works and techniques. For example, flooding can be controlled by erecting stopbanks and constructing drainage schemes, and erosion can be controlled by protection planting. These protection works to mitigate the effects of flooding, are key structures that provide for the use and occupancy of flood plains at an acceptable level of risk. Land use activities on, within, or nearby, can impair or compromise the function or maintenance of these structures and works.

Objectives & Policies

Objective 8.2.1 Worsening the Risks or Severity of Natural Hazards

Land use and development that does not significantly worsen the risk of occurrence or the severity of natural hazards or compromise the effective functioning or integrity of natural hazard protection or mitigation works.

Policy 8.2.2

Ensure that the use and development of land does not accelerate or worsen any material damage to that land, or displacing to other land or structure resulting from erosion, subsidence, slippage, debris flow, or surface water flooding.

Policy 8.2.3

Avoid structures and activities that are likely to reduce the effectiveness of existing works, structures, natural landforms or other measures which serve to mitigate the effects of natural hazard events.

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Explanation and Principal Reasons

Land use activities and development can increase the severity of a natural hazard, alter the effects of a natural hazard, or cause the hazard to affect previously unaffected areas. Proposed activities and development, such as structures and earthworks within hazard areas should not alter the nature, scale, or intensity of the hazard or pass the risk onto other sections of the community.

The effects of natural hazards can be caused, accelerated, displaced, or increased by certain activities. The location of structures within hazard areas has the potential to increase the risk to other sites. Earthworks may alter the direction and intensity of a flood event by diverting floodwaters or altering drainage functions. Measures to ensure that there is no increase in risk as a result of land use activities within natural hazard areas need to be adopted.

Furthermore, land use activities and development could damage the effective functioning or integrity of flood protection works. For example, constructing buildings or undertaking earthworks in close proximity to a stopbank could compromise the structural integrity of the stopbank leading to potential failure. The Proposed One Plan contains rules managing activities within the beds of lakes and rivers and on adjacent land, which includes separation from stopbanks.

Methods for Issue 8.2 & Objective 8.2.1

District Plan

- Rules and standards to control subdivision and development which could worsen the risk of occurrence or the severity of flooding within identified areas subject to significant risk from the effects of flooding.
- Rules and standards to prevent the construction of structures and earthworks within essential flood channels which would impede flood flows and adjacent to flood protection structures and works.
- Through the resource consent process, assess the potential effects of subdivision and development that do not comply with rules and standards.
- Conditions on resource consents to ensure land use and development does not significantly worsen the risk of occurrence or the severity of natural hazards or integrity of flood protection works.

Building Controls

- Apply Sections 71 and 72 of the Building Act 2004 to control inappropriate development of land where the building work itself is likely to accelerate, worsen, or result in; erosion, falling debris, subsidence, inundation or slippage of that land or any other property.

Regional Council

- Rules in the Proposed One Plan relating to activities in the bed of lakes and rivers, for land adjacent to rivers zoned for river and flood control, and their proximity to flood protection works.

When assessing the effects of land use activities and development within areas subject to natural hazards, an important consideration is whether the proposal would alter or change the nature of a natural hazard event, increase the intensity of a natural hazard event or

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increase the risk of the event occurring. Through the resource consent process, the assessment and any conditions would need to ensure that the activities and structures do not increase the risk to the community or the environment. Similar requirements also apply under the Building Act for any new buildings.

Flood protection works (e.g. spillways and stopbanks) are designed to protect people and property from flooding. However, in the event that they fail, buildings in close proximity to them are highly vulnerable to damage. Therefore, it is important to anticipate this vulnerability by locating buildings outside of spillways and set back from stopbanks.

In addition, the construction of buildings or carrying out other works in close proximity to, or into/onto, stopbanks can reduce the integrity of the stopbank. In order to maintain stopbanks and waterways, buildings and other works need to be set back to protect their structural integrity and enable access. Horizons Regional Council has responsibility for managing activities and structures within the vicinity of water bodies and flood protection measures.

ANTICIPATED ENVIRONMENTAL RESULTS

The environmental results for natural hazards which are anticipated to result from the combined implementation of the above policies and methods are as follows:

- 8(a) The avoidance of further development in areas at significant risk from flooding where the hazards cannot be effectively mitigated.
- 8(b) Limited damage to life or property resulting from natural hazards in the District.
- 8(c) Activities or structures that do not create, accelerate, displace, or increase the effects of a natural hazard.
- 8(d) Greater public awareness of natural hazards, their potential effects on people and development, and ways to prepare for a natural disaster.

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