

# SECTION 22: NATURAL HAZARDS

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## 22. NATURAL HAZARDS

### 22.1 Introduction

Palmerston North City is subject to a number of hazards which can be broadly divided into four categories, viz.

- Flooding hazards associated with the Manawatu River, Mangaone, Kawau, Turitea and various smaller streams. This also includes areas subject to poor drainage which leads to surface ponding.
- Seismic Hazards, associated with the City's close proximity to the Wellington fault system, which tracks along the eastern side of the Tararua Ranges, and its proximity to numerous other earthquake sources, such as: the Indo-Australian/Pacific Plate subduction zone, which lies beneath the eastern portion of the North Island; fault systems within the Wanganui Basin, and; fold structures within Manawatu District. This hazard includes earthquake induced ground shaking, surface fault rupture, amplification of ground shaking and liquefaction of soft sediment areas.
- Earth movements and instability which is associated with particular soil and slope conditions predominantly in the Aokautere area and those areas in the foothills of the Tararua Ranges.
- Wildfire associated with large areas of woody vegetation in close proximity to dwellings.

The management responsibilities of the Palmerston North City Council and the Manawatu-Wanganui Regional Council regarding the avoidance or mitigation of these natural hazards are identified within Chapter 9 of the One Plan. Policy 9-1 divides the responsibilities between the Manawatu-Wanganui Regional Council and the Palmerston North City Council as follows:

- (a) The Manawatu-Wanganui Regional Council and the Palmerston North City Council must be jointly responsible for:**
- i. raising public awareness of the risks of natural hazards through education, including information about what natural hazards exist within Palmerston North, what people can do to minimise their own level of risk and what help is available.
- (b) Manawatu-Wanganui Regional Council must be responsible for:**
- i. developing objectives and policies for Region-wide management of activities for the purpose of avoiding or mitigating natural hazards;
  - ii. developing specific objectives, policies and methods (including rules) for the control of all land use activities in the beds of rivers and lakes, for the purpose of avoiding or mitigating natural hazards;
  - iii. taking the lead role in collecting, analysing and storing regional natural hazard information and communicating this information to Territorial Authorities.
- (c) Palmerston North City Council must be responsible for:**
- i. developing objectives, policies and methods (including rules) for the control of the use of land to avoid or mitigate natural hazards and for all activities except those areas and activities described in Policy 9 1(b)(ii) of the One Plan, and
  - ii. identifying Floodways (mapped in Schedule I of the One Plan) and other areas known to be inundated by a 0.5% annual exceedance probability (AEP) flood event on planning maps and controlling land use activities in these areas in accordance with Natural Hazards Policies 9-2 and 9-4 in the One Plan.

## Seismic Hazards

Palmerston North City has the unenviable position of not only being bounded to its immediate west, north, east and south by numerous prominent and “hidden” potential earthquake sources, but also having a surface and sub-surface geology which is susceptible to ground shaking amplification and, potentially, the phenomenon known as “liquefaction”.

To the west of the City, offshore, lies the Wanganui Basin which has historically been the locus of frequent swarm like seismicity. Immediately to the south and east of the City, on the eastern side of the Tararuas, lies the northern extension of the largest, most continuous and active fault within the Manawatu-Wanganui Region - the Wellington fault system.

Underlying Palmerston North and those areas to the north-east and south-west of the City, at a depth of some 30km, and extending eastwards beneath Tararua District, is the Pacific and Indo-Australian plate subduction zone, where the Pacific plate is currently being forced beneath the Australian plate. This area is a source of numerous small to moderate earthquakes from the “downgoing slab” of the Pacific Plate, and moderate to large, and potentially even great, earthquakes along the plate interface (which are likely to produce widespread strong shaking).

In addition to these identified fault systems, numerous other smaller and buried structures also lie north, east, south and west of the City. These include, but are not limited to, the Pohangina, Feilding, Mt Stewart-Halcombe and Himatangi anticlines and the Ruahine reverse fault.

Movement or rupture within or along any of these faulting systems is likely to cause ground shaking which, depending on ground conditions related to soils and geological structures, will generally vary in felt intensity throughout Palmerston North.

### Ground Shaking

In 1992, the Manawatu-Wanganui Regional Council commissioned an Earthquake Hazard Analysis from the Institute of Geological and Nuclear Sciences (IGNS) and Victoria University to assess seismic hazard across the entire region. This exercise involved a comprehensive assessment of earthquake hazards within the Manawatu-Wanganui Region, including: an assessment of active geological structures; earthquake hazard (magnitude and frequency); an assessment of liquefaction induced ground failure, and; a ground shaking hazard assessment of the various urban centers.

This study subsequently identified those areas within Palmerston North City that were more, or less, susceptible to ground shaking amplification (ie the situation where the felt intensity of an earthquake varied between sites) and liquefaction, and the likely frequency or probability of earth shaking events that would typically induce liquefaction.

In terms of ground shaking amplification Palmerston North is broadly divided into four distinct zones. Zone 1, which is confined to the Tararua’s, represents an area within which little or no amplification of ground shaking would be expected in response to an earthquake event. Zone 4, alternatively, is broadly characterised by being underlain by considerable thicknesses of river sediments which, combined with its particular sub-surface geology, produces an area within which a high amplification of ground shaking motion is expected in response to an earthquake event. Zone 2, which covers the majority of the City, exhibits low to moderate amplification of earthquake shaking motion. Zone 3, which broadly covers the western most portion of the Palmerston North urban area, defines an area within which moderate amplification of earth shaking motion is anticipated.

### Liquefaction

In some circumstances soil liquefaction may also occur at some sites within the City. Soil liquefaction is induced where ground shaking is of sufficient intensity and duration to cause soils, such as those typically found in river valleys, on floodplains and in swamps, to compact, increasing pore water pressure and decreasing shear strength (i.e. the soils ability to withstand applied pressure) to a point where the soil is transformed to a liquid state. This phenomenon can result in significant ground deformation.

Significant areas of Palmerston North City are particularly susceptible to ground shaking amplification and “liquefaction” due to the City’s particular sub-surface geology and it largely being positioned on a flood

plain and, to a much lesser extent, on swampland sediments.

In 2011, Palmerston North City Council commissioned an assessment of liquefaction and related ground failure hazards in Palmerston North. The report was undertaken by Geological and Nuclear Sciences (GNS) and assessed liquefaction susceptibility for the City area. This report built on an earlier report undertaken in 1992 also by GNS. The 2011 report assessed information on liquefaction susceptibility and opportunity and considered these factors together to determine liquefaction potential and gave an indication of the relative likelihood of where liquefaction may occur in the city. The report noted that liquefaction susceptibility is a function of soil properties and water saturation, whereas opportunity is a function of the number of seismogenic sources in the region, and the periodicity of earthquake generation.

In terms of liquefaction hazard, the GNS report identified four liquefaction susceptibility zones as follows:

- Zone 1-3 Moderate to Very High Liquefaction Ground Damage Potential
- Zone 2-3 Moderate to High Liquefaction Ground Damage Potential
- Zone 4 Low Liquefaction Ground Damage Potential
- Zone 5 Negligible Liquefaction Ground Damage Potential.

### Seismic Hazard Mapping

Arising out of the 1992 and 2011 studies, two Maps “22.6.1 - Ground shaking hazard map for Palmerston North City” and “22.6.2 - Liquefaction susceptibility zones for Palmerston North City” have been included within the District Plan. These Maps are intended to broadly raise public awareness of the potential ground shaking and liquefaction hazard which is associated with seismic events which impact on the City. However, it should be noted that this information is indicative only. Additional site-specific geological and geotechnical investigations would be required to accurately determine a site’s susceptibility to amplified ground shaking and liquefaction.

For further information and explanation of terms related to Palmerston North’s susceptibility to earth shaking, ground shaking amplification and liquefaction, plan users are advised to contact the Council.

#### **NOTE TO PLAN USERS**

The Palmerston North City Council’s specific management responsibilities for natural hazards are outlined within Section 22.1. Material discussed within this section has been sourced from the horizons. mw publication “Hazard Analysis Manual- Volume II - Seismic Analysis”, prepared by the Institute of Geological and Nuclear Sciences- 1994 and the GNS Science 2011 report titled, ‘Assessment of liquefaction and related ground failure hazards in Palmerston North, New Zealand. Additional information can be obtained from these documents.

## Land Instability Hazards

Much of the elevated land on the eastern side of the City has potential for instability resulting in slippage, slumping, slope failures and general soil erosion. This reflects to a large degree the relatively young geological age of New Zealand and is common throughout the country.

In rural areas particularly, such soil and slope movements are of lesser concern as low levels of development make the triggering of instability less likely. In addition, the maintenance of grass coverage, and planting of trees often assists in maintaining soil and slope stability. It is in areas of urban style development that soil and slope instability become of concern. This issue is of major concern in the Aokautere area where dissected landforms have created steep slopes which, combined with the soil types, make instability a potential problem. In 1989 the Palmerston North City Council commissioned an Urban Land Use Capability Study (ULUC Study) of the area of Aokautere intended for residential and rural-residential development. The Plan identifies land which should be excluded from development or should be subject to particular controls through its classification into developable and limited development-land.

The survey method is based on six factors being rock type, soils, dominant slope, dominant land form, dominant land cover and mass-movement hazard. The analysis assessed the impact of these factors alone and in combination on the suitability of land for urban purposes. This resulted in land in Aokautere being classified into five classes in terms of their potential for urban development. These can then be placed into

three groups, viz.:

**ULUC Classes A and B** — which offer negligible or slight physical limitations to urban development and use.

**ULUC Class C** — which imposes moderate physical constraints on urban development and use.

**ULUC Classes D and E** — which imposed severe constraints to urban development and use.

The area in Aokautere zoned for residential development has been surveyed to determine the boundary between developable and limited development land as shown on Map 10.1. The boundary between developable and limited development land includes a set-back of 10 metres, where ULUC Class A or B land abuts ULUC Class D or E land, and a variable set-back distance, generally greater than 10 metres, where ULUC Class C land abuts ULUC Class D or E land. Where ULUC Class C land has been included as developable land a specific engineering design may be required to ensure that any structure can be safely established on it.

The controls which emerge from the use of the ULUC study are contained within Section 7 Subdivision and Section 10 Residential Zone.

Following the ULUC report, a 2005 report was developed by Tonkin and Taylor Ltd for Palmerston North City Council titled, 'Development of Land which is, or is likely to be, subject to Erosion of Land Slippage'. The 2005 report uses the same classes as the ULUC report and, amongst other things, recommends that a geotechnical report is required before development is undertaken on land classes C, D and E.

#### **NOTES TO PLAN USERS**

1. Such applications require specific information to accompany such applications. These requirements are detailed in Section 5.
2. Council's specific management responsibility for this identified hazard is outlined within Section 22.1.
3. Sections 6, 7, 9 and 10 contain additional policy rules and performance standards that relate to earthworks and development in areas susceptible to land instability.

## **Wildfire Hazard**

Wildfire occurs when favorable climatic conditions combine with a significant fuel source (vegetation) and an ignition source (such as a lightning strike or discarded cigarette butt). Wildfire has a potentially large impact on people and property in areas where this combination of contributing factors is present. Individual buildings, especially in rural areas, may be located close to or within areas of bush or plantation forests where there is a higher potential for wildfire to occur. Management of the hazard is primarily achieved through avoiding the establishment of buildings, particularly dwellings, close to existing areas of vegetation and avoiding planting new areas of vegetation near existing buildings. Where buildings are already located close to wildfire fuel sources, warning and evacuation procedures are often the most practicable method for managing the hazard.

## **Flood Hazard**

The City has always been susceptible to flooding or to the development of ponding areas.

The City's major flood hazard is associated with the Manawatu River and between 1956 and 1965 stopbanks were constructed on the river from Ashhurst to Foxton as part of the Lower Manawatu River Flood Control Scheme. That Scheme offers the most protection to land used for urban purposes because of the enormous losses which would be experienced if there was a major flood event. The Lower Manawatu River Flood Control Scheme is administered by the Manawatu-Wanganui Regional Council.

A reassessment of part of the Lower Manawatu River Control Scheme, undertaken in 1994, indicated that although the existing flood protection works would perform reasonably well during the flood for which they had been designed (3450m<sup>3</sup> per second) there was the possibility, in some areas, that the existing stopbanks might fail.

Consequently, upgrade and extension of the stopbanks within the urban area of the City and a major realignment of the river, at Fitzroy Bend. These works, in combination, have significantly reduced the City's exposure to flood risk from the Manawatu River, providing protection against a 1% annual exceedance

probability (AEP) or “1 in 100 year” flood event.

After the 2004 Manawatu Floods, the Manawatu-Wanganui Regional Council resolved to further upgrade the City’s flood protection to provide protection for when the river flow reaches 4,500 m<sup>3</sup> per second (being a 0.2% (AEP) or “1 in 500” year flood event - the “City Reach” flood protection design standard). The “City Reach” Flood Protection Upgrade Project involved a range of flood protection works including raising the existing stopbanks within the urban area to remedy height deficiencies along its 8km length; rock lining construction to prevent stopbank failure at three locations; and the re-alignment of the River in the vicinity of the Anzac Park Cliffs. The proposed re-alignment works are to ‘soften’ a sharp bend in the river course which contributes to elevated flood levels upstream of the Anzac Cliffs and erosion of the Anzac Cliff face. The City Reach Upgrade Project is nearing completion with the exception of the re-alignment works which are scheduled for 2014/2015.

Although this upgrading work will significantly reduce the flooding risk to the City from the Manawatu River there still remains land which will continue to be subject to a flooding hazard and on which there needs to be restrictions on development. These areas are controlled by the provisions of the Flood Protection Zone or those relating to Flood Prone Areas. The Manawatu-Wanganui Regional Council also exercises controls with regard to excavations on or near the stopbanks. These controls are intended to protect the stopbanks and maintain the integrity of the stopbank system.

In terms of regional flood hazard management, the Manawatu-Wanganui Regional Council’s, the One Plan requires planning maps to specifically identify Floodways (mapped in Schedule I of the One Plan) and areas which are known to be inundated by a 0.5% AEP flood event (“1 in 200 year” flood), termed ‘Flood Prone Areas’. The Flood Prone Areas are identified on the Planning Maps.

The Flood Protection Zone identifies the land within the City which is most susceptible to significant flood hazard risks. The majority of the Flood Protection Zone is located adjacent to the Manawatu River and includes land within the urban areas of the City which is intended to flood as part of the overall design of the Lower Manawatu River Flood Control Scheme.

The Flood Protection Zone also encompasses the Flyers Line Floodway which is managed by the Manawatu–Wanganui Regional Council, as a flood control channel. The physical extent of the Flyers Line Floodway is identified in Map 22.5. Specific subdivision and development controls apply to land within the Flyers Line Floodway to avoid development which may impede the flow of floodwaters and undermine the effective functioning of the Floodway.

The boundaries of the Flood Protection Zone, Flood Prone Areas and the Flyers Line Floodway have been established by computer modelling and shown on Planning Maps. More detailed mapping information on the location of these boundaries, on specific properties, can be obtained from the Council.

In addition to the flood risk presented by the Manawatu River there are areas in the City where ponding of water or surface flooding occurs at times of high rainfall. Where a specific ponding area has been identified, controls have been included which are aimed at mitigating, as far as possible, the effects of this hazard on residential development. These are dealt with in Section 10 of the Plan. Elsewhere, such as in the Amberley Avenue area, minimum floor levels are required. Specific information on the ponding areas can be obtained from the Council.

## 22.2 Resource Management Issues

The following resource management issues have been identified as pertaining to natural hazards:

1. A range of natural hazards exist in Palmerston North City that can adversely affect property, infrastructure and the health and well-being of the community. These include, but are not limited to, flooding, liquefaction, wildfire, ground shaking and land instability;
2. The identification of areas of the City susceptible to the effects of natural hazards and the associated risk posed by those hazards may be difficult to quantify;
3. The actual or potential costs of natural hazards to the community;
4. The need to provide for the avoidance or mitigation of natural hazards.

5. The adverse effects of natural hazards on people, property, infrastructure and the environment.
6. Recognition of climate change and its influence on the frequency, scale and intensity of atmospherically influenced natural hazards;
7. The identification of areas affected by flood hazards on planning maps and the control of development within these areas to ensure the avoidance or mitigation of flood hazard risks.
8. Not all areas susceptible to a 0.5% AEP flood event have been mapped on the District Planning Maps.
9. Not all areas susceptible to natural hazards are able to be mapped on District Planning Maps.

## 22.3 Objectives and Policies

Within the broad framework of the City View objectives, the following specific objectives and policies have been identified with regard to natural hazards:

### OBJECTIVE 1

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**To recognise the existence of natural hazards within Palmerston North City.**

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#### POLICIES

- 1.1 To identify any land subject to the effects of a natural hazard.
- 1.2 To educate the community with regard to the existence, nature and risks posed by natural hazards and ways to avoid or minimise such risk.
- 1.3 To identify the Flood Protection Zone, the Flyers Line Floodway and Flood Prone Areas on planning maps.

### OBJECTIVE 2

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**To control development on land which is or might be adversely affected by natural hazards.**

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#### POLICIES

- 2.1 To exclude development on hazard-prone land where the effects of the hazard cannot be effectively avoided, remedied or mitigated.
- 2.2 To establish appropriate controls to avoid, remedy or mitigate the effects of natural hazards.
- 2.3 To control subdivision and development within the Flood Protection Zone and within Flood Prone Areas to avoid or mitigate adverse effects of flooding hazards on people, property, infrastructure and the environment.
- 2.4 To control subdivision and development in the Flyers Line Floodway to maintain the effective functioning of the Floodway and avoid exacerbating flooding hazard.
- 2.5 To avoid built development on unstable land unless it can be demonstrated by a suitably qualified and experienced practitioner that the hazard can be avoided, remedied or mitigated.
- 2.6 To avoid development on land subject to liquefaction where the effects of the hazard cannot be effectively avoided, remedied or mitigated.
- 2.7 Ensure any built development on areas subject to liquefaction is located and/or designed in a manner that suitably addresses the hazard on the site.
- 2.8 Recognise that the risk from wildfire is higher where built development occurs in close proximity to woody vegetation.



## 22.4 Methods

1. District Plan Rules and Planning Maps
2. Performance standards and matters of discretion relating to subdivision, development and earthworks.
3. Flood Protection Works, Stopbanks, Floodways and River and Drainage Schemes of the Manawatu-Wanganui Regional Council.
4. The Building Act 2004 to control the development of land subject to a natural hazard.
5. Public Education and awareness, including referring applicants to the regional council when developing in low lying areas, areas in proximity to waterways and overland flow paths so that they are aware any flood risk associated with the site.
6. Section 106 of the Resource Management Act to control the subdivision of land subject to a natural hazard.
7. Land Information Memorandum (LIM) process under the Local Government Act 1974 to inform landowners about natural hazards which the Council is aware of on individual properties.
8. Project Information Memorandum (PIM) process under the Building Act 2004 to inform landowners of potential and identified natural hazards areas.

In the area of the mitigation of the effects of natural hazards, the District Plan can, through rules and zoning, provide specific guidance or restrictions on development. This is particularly true with regard to the flooding and land instability hazards. In these areas the District Plan is a cost-effective method of achieving the objectives and policies. However, with a seismic hazard limited information and the sheer unpredictability of an earthquake event means that there is little a District Plan can effectively contribute in terms of mitigation of this hazard, other than through the provision of information

There are a number of other methods however, which can deal more positively with the issue of natural hazards. Physical flood protection works (stopbanks) are significant with regard to the flooding hazard and this is the responsibility of the Manawatu-Wanganui Regional Council. Controls put in place through the Building Act 2004 also assist in the mitigation of the effects of natural hazards. Finally, public education is also an important tool in informing the public of the existence of natural hazards and means of avoiding the effects of those hazards. A combination of these other methods will most effectively achieve the rest of the objectives and policies in this Section.

## 22.5 Flood Protection Zone

### R22.5.1 RULES: PERMITTED ACTIVITIES

#### 22.5.1.1 Permitted Activities

The following activities are Permitted Activities:

- (i) Passive recreational activities.
- (ii) Grazing and cropping, including horticulture.
- (iii) Walkways, bridle paths and cycleways.
- (iv) Soil conservation and river control works carried out or supervised by the Manawatu-Wanganui Regional Council
- (v) Non-habitable structures on production land or network utilities (excluding network utilities that are also critical infrastructure) within the Flood Protection Zone provided they are:
  - a. Not within the Flyers Line Floodway shown on Map 22.5: or
  - b. no wider than .65m in width across the overland flow path if located within 5m of an existing habitable structure;

- c. no wider than 1m in width across the overland flow path if located between 5m and 20m of an existing habitable structure;
  - d. no wider than 15m in width across the overland flow path if located further than 20m from an existing habitable structure:
- (vi) The operation and maintenance of existing network utilities or critical infrastructure
  - (vii) Minor upgrading of network utilities provided it complies with (v)(b), (v)(c) and (v)(d) of this rule.
  - (viii) Installation of underground network utilities.

***Explanation***

*Flooding poses a significant hazard within the Flood Protection Zone. As a result, only a small number of activities are permitted within the Flood Protection Zone to avoid risks to people, property and infrastructure.*

### **R22.5.1.2 Temporary Military Training Activities**

Temporary Military Training Activities are a Permitted Activity, provided the following performance standards are complied with:

**Performance Standards**

- (a) Compliance with R9.5.8(a), (b), (c) and (d)(i)-(iii).
- (b) Sound emissions from any other activity sources not described in R9.5.8(d)(i)-(iii), shall comply with R9.11.1

## **R22.5.2 RULES: RESTRICTED DISCRETIONARY ACTIVITIES**

### **22.5.2.1 Non-Habitable Structures**

**Non-habitable structures on production land and network utilities located within the Flood Protection Zone which do not meet the requirements of R22.5.1.1(v)(b), (v)(c) and (v)(d) shall be a restricted discretionary activity.**

The matters over which the council restricts its discretion for the purposes of assessments are:

- The extent to which the location and design of the structure will impede or divert the flow of flood waters, especially as it relates to nearby existing structures and activities.

## **R22.5.3 RULES: DISCRETIONARY ACTIVITIES**

### **22.5.3.1 Discretionary Activities**

The following activities are Discretionary Activities.

- 1) Quarrying;
- 2) Concrete Manufacturing, including machinery, plant, buildings and associated retailing activities.

**Determination Clause**

In determining whether to grant consent and what conditions to impose, if any, Council will, in addition to the City View objectives in Section 2 and the Natural Hazards objectives and policies, assess any application in terms of the following assessment criteria:

**Assessment Criteria**

- (a) The extent to which the effects of traffic on the safe and efficient operation of the roading network and on the surrounding area through adequate provision of parking, loading, manoeuvring and access space, can be avoided, remedied or mitigated.
- (b) The extent to which the effects of noise, dust and other environmental disturbances on the amenity values of the area, particularly on adjacent residential uses are avoided, remedied or mitigated.
- (c) The adequacy of any proposed reinstatement works to return the land to its previous or better state.
- (d) The extent to which any exacerbation of flooding hazard associated with the site is avoided, remedied or

mitigated.

- (e) The extent to which the effects of the proposal on any area of environmental or cultural significance.
- (f) The extent to which the effects on the adjacent river including effects on flows, water quality, bank stability and habitats are avoided, remedied or mitigated.

### 22.5.3.2 Bridges

Bridges are a Discretionary Activity.

#### **Explanation**

*Given the dissected nature of urban development within the City, the Council recognises that the construction of a further bridge or bridges across the Manawatu River may be required in future to ensure a more efficient movement of vehicles across this watercourse.*

*The Council acknowledges though, that the potential range of effects associated with the construction of such structures necessitates a thorough assessment of any such application, and therefore considers it appropriate that this activity be treated as a Discretionary Activity.*

### R22.5.3.3 Temporary Military Training Activities which do not comply with Permitted Activity Performance Standards

Temporary Military Training Activities that do not comply with the Performance Standards of R22.5.1.2 are a Restricted Discretionary Activity, with regard to:

- Duration;
- Time of Day;
- Noise levels at the notional boundary of any site containing noise sensitive activity; and
- Any noise management and mitigation measures proposed.

#### **Determination Clause**

In determining whether to grant consent and what conditions if any to impose, Council will, in addition to the City View objectives in Section 2 and the Flood Protection Zone objectives and policies, assess any application in terms of the following assessment criteria:

#### **Assessment Criteria**

- (a) The extent to which the effects of noise, including the peak sound levels resulting from impulsive noise, impacts on noise sensitive activities.
- (b) The extent to which the noise management measures will avoid, remedy or mitigate the likely noise impacts.
- (c) Whether a consultation programme is available for communication with occupiers and owners of affected sites, prior to the military training activities commencing, with such consultation including notice of the event, methods for following up complaints received during and after the event, and the process of liaison with Council.

#### **Explanation**

*The New Zealand Defence Force (NZDF) may need to carry out military training activities that do not meet the performance standards for Permitted Activities. In this case, it is important to ensure that any adverse effects of military training activities on the environment are avoided, remedied or mitigated. The Restricted Discretionary Activity status provides Council with the opportunity to assess the proposed activities and to either grant or decline consent.*

## R22.5.4 RULES: NON-COMPLYING ACTIVITIES

### 22.5.4.1 Non-Complying Activities

- i. Any new building, structure (including Critical Infrastructure) or activity or any increase in the scale of any existing building, structure or activity within the Flood Protection Zone (including the Flyers Line Floodway shown on Map 22.7)) which is not provided for as a Permitted Activity, Restricted Discretionary Activity, Discretionary Activity or a Prohibited Activity shall be a Non-Complying Activity.

#### Determination Clause

The assessment criteria contained within R22.5.2.1 and the One Plan, Policy 9-2(a) and (b)(i)-(iii) and Policy 9-2(d)(ia)-(iii) and Policy 9-4, will be considered by the Council in addition to the City View and Natural Hazards Objectives and Policies in determining whether to grant consent and what conditions to impose, if any, in relation to an application for a Non-Complying Activity.

#### **Explanation**

*In the Flood Protection Zone, new structures and activities or any increase in the scale of any existing habitable structure or activity, are to be avoided, where the area is likely to be inundated in a 0.5% Annual Exceedance Probability (AEP) or (1 in 200 year) flood event. The few exceptions to this are where the activity and/or structure is non-habitable and on production land; or there is a functional necessity to locate the structure or activity within the Zone; or the proposed flood hazard mitigation measures will achieve protection for the site in a 0.5% AEP or (1 in 200 year) flood event. Where new critical infrastructure is required in the area, such as electricity substations, it must comply with the criteria in Policy 10-4 of the One Plan (Manawatu-Wanganui Regional Council).*

*The Flyers Line Floodway has been designated as a flood control channel by the Manawatu-Wanganui Regional Council. Development within the Flyers Line Floodway is to be strictly avoided, unless there is a functional necessity for an activity or structure to be located within the Floodway (such as infrastructure associated with flood mitigation). In this circumstance, the structure or activity must be designed to avoid or mitigate the adverse effects of a 0.5% AEP or (1 in 200 year) flood event on it, and/or designed so that any potential adverse effects on the environment and on the effective functioning of the Floodway arising from the structure or activity, during a flood event, are avoided or mitigated.*

*When considering applications for resource consent, the Council will have particular regard to expert flood hazard advice provided by Horizons.*

## R22.5.5 PROHIBITED ACTIVITIES

### 22.5.5.1 Prohibited Activities in the Air Noise Zone identified on Map 10.6.6.1

Any of the following activities occurring in the Air Noise Zone (as shown on Map 10.6.6.1) shall be a Prohibited Activity:

All new dwellings, new relocated dwellings, new dependent dwelling units, new education and early childhood facilities, new community homes, new accommodation motels, new motel conference centres, new training facilities, new hospitals, new retirement villages, new residential centres, new tourist facilities, and any other new buildings used for regular accommodation and communal activities.

These activities are expressly prohibited and no resource consent shall be granted.

#### **Explanation**

*The above-mentioned activities have been identified as being highly sensitive to the adverse effects of noise exposure associated with aircraft operations. The impact of aircraft noise has been assessed by New Zealand Standards 6805:1992 – Airport Noise Management and Land Use Planning, which recommends as one of the criteria for land use planning within any defined air noise boundary that noise sensitive activities, such as dwellings and schools, be prohibited. The purpose of this rule is to give effect to this recommended standard.*

## R22.5.6 RULES: NOISE

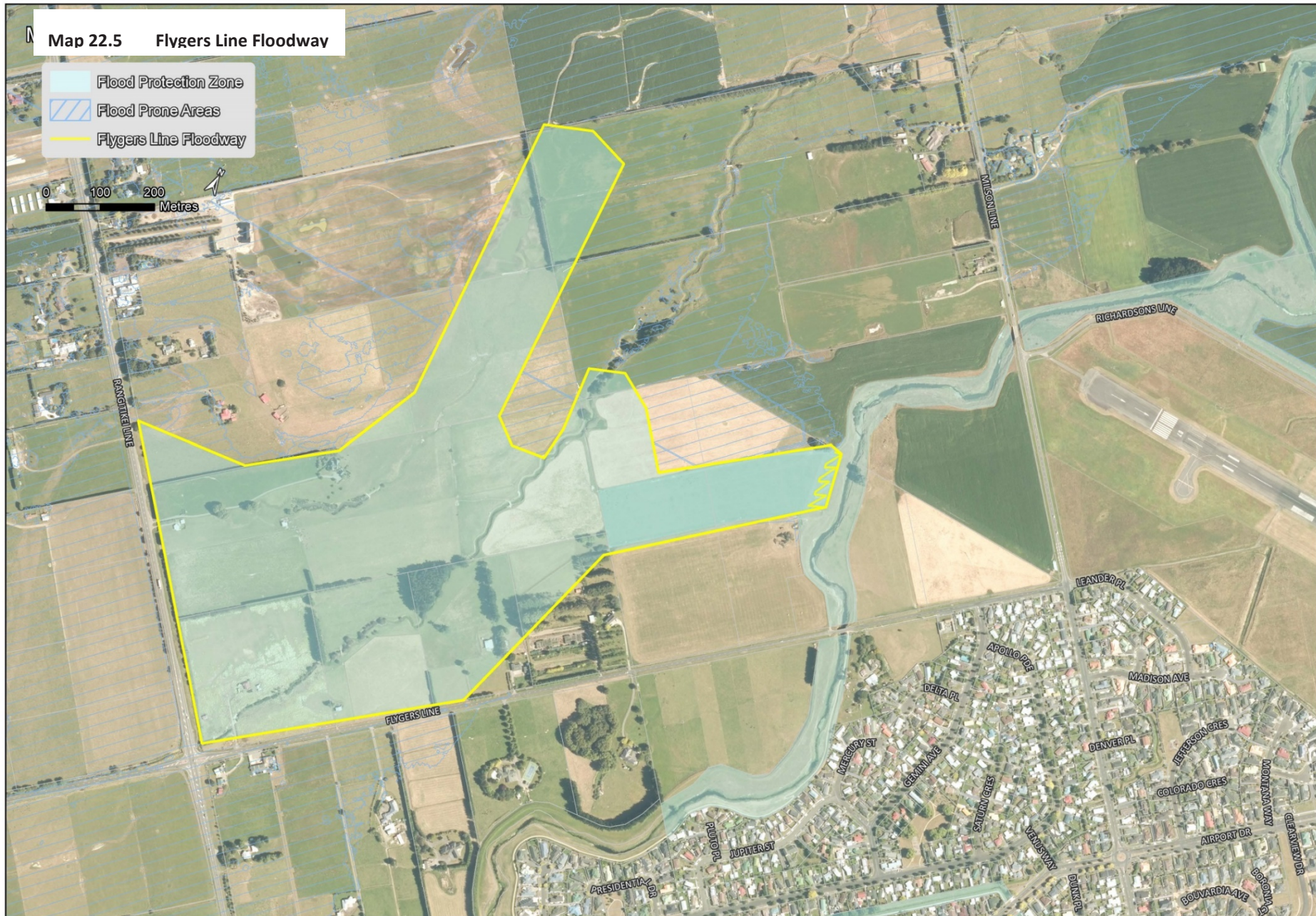
### 22.5.6.1 Noise

Sound emissions from any activity in the Flood Protection Zone when measured at any point within any land zoned for residential purposes or at any point within any land in the Rural Zone (other than the site from which the noise is emitted or a road) shall not exceed the following:

7:00am to 7:00pm	50dB $L_{Aeq(15mins)}$
7.00pm to 10pm	45dB $L_{Aeq(15mins)}$
10:00pm to 7:00am	40dB $L_{Aeq(15mins)}$
Night-time $L_{max}$ 10:00pm – 7:00am	70dB $L_{max}$

#### **Explanation**

*These rules are intended to provide for permitted agricultural activities while controlling noise from a range of other activities which may also occur in the Flood Protection Zone, e.g. Recreation and Quarrying. This Rule does not control certain rural activities carried on in the Flood Protection Areas, nor does it control some soil conservation and river control works. Reference should be made to Section 6 for those activities that are excluded from the above controls and for further general information on noise.*



## 22.6 Flood Prone Areas

### **NOTE TO PLAN USERS**

The rules in Section 22.8 apply to Network Utilities and should be considered in addition to those in Section 23 of the Plan.

### **22.6.1 RULES: PERMITTED ACTIVITIES**

#### **R22.6.1.1 Permitted Activity**

- (i) Non-habitable structures or network utilities (excluding network utilities that are also critical infrastructure) on production land provided they are:
  - a. No wider than 0.65m in width across the overland flow path if located within 5m of an existing habitable structure;
  - b. No wider than 1m in width across the overland flow path if located between 5m and 20m of an existing habitable structure;
  - c. No wider than 15m in width across the overland flow path if located more than 20m from an existing habitable structure;
- (ii) The operation and maintenance of existing network utilities or critical infrastructure on production land.
- (iii) Minor upgrading of network utilities (excluding critical infrastructure) on production land provided it is consistent with (i)(a), (i)(b) and (i)(c) of this rule.
- (iv) Installation of underground network utilities (excluding critical infrastructure) on production land.

#### **Explanation**

*Non-habitable structures on production land are permitted within Flood Prone Areas provided they are more than 20m away from existing habitable structures which they could divert the flow of water into.*

### **NOTE TO PLAN USERS**

1. Refer to Section 4 – Definitions, for the meaning of Non-Habitable (not occupied) Structures and 'production land'.
2. Plan users are encouraged to check with the Manawatu-Wanganui Regional Council if any consents will be required from the Regional Council.

### **R22.6.2 RULES: RESTRICTED DISCRETIONARY ACTIVITIES**

#### **22.6.2.1 Restricted Discretionary Activity**

- (1) Non-habitable structures on production land that do not comply with R22.8.1.1(i)(a), (i)(b) and (i)(c) shall be a restricted discretionary activity.

The matters over which the council restricts its discretion for the purpose of assessments are:

- The extent to which the location and design of the structure will impede or divert the flow of flood waters, especially as it relates to nearby existing structures and activities.
- (2) Except as permitted by R22.6.1.1, any new habitable structure or activity, including new critical infrastructure, or any increase in the scale of any existing habitable structure, critical infrastructure or activity, within a Flood Prone Area identified on the Planning Maps are a Restricted Discretionary Activity with regard to:
    - Flood Hazard Avoidance or Mitigation
    - Functional Necessity
    - Placement of New Critical Infrastructure

Provided it complies with the following Performance Standards:

## Performance Standards

### Flood Hazard Avoidance or Mitigation

- (a) Building sites for habitable structures must have a finished floor or ground level, which includes a reasonable freeboard, above the 0.5% AEP or (1 in 200 year) flood level.
- (b) Access between habitable structures and an identified safe area, where safe evacuation may be carried out (preferably ground that will not be flooded), must be a safe wading zone in a 0.5% AEP or (“1 in 200 year”) flood event.

### Determination Clause

In determining whether to grant consent and what conditions if any to impose, Council will in addition to the City View objectives in Section 2 and the Natural Hazard objectives and policies, assess any application in terms of the following assessment criteria:

### Assessment Criteria

- (a) Flood Hazard Avoidance or Mitigation
  - (i) The extent to which flood hazard avoidance has been investigated as a preference to flood hazard mitigation;
  - (ii) The extent to which specific flood control measures or flood hazard mitigation measures will address the hazard for the site in a 0.5% AEP(1 in 200 year) flood event;
  - (iii) Whether the proposed ownership of, and responsibility for maintenance of, the flood hazard mitigation measures, including the certainty of the maintenance regime, will achieve protection for the site in a 0.5% AEP (1 in 200 year) flood event;
  - (iv) The likelihood and consequences of the proposed flood hazard mitigation measures failing;
  - (v) The extent to which any more than minor adverse effects on the effectiveness of existing flood hazard avoidance or mitigation measures, including works and structures within River and Drainage Schemes operated by the Manawatu-Wanganui Regional Council, natural landforms that protect against inundation, and overland stormwater flow paths, are avoided;
  - (vi) The extent to which adverse effects on any existing structures and activities are avoided or mitigated;
  - (vii) The extent to which any new habitable structure achieves compliance with NZS 4404: 2010 Land Development and Subdivision Infrastructure, in terms of flood clearance levels;
  - (viii) The extent to which the requirements of R22.6.3.1 Performance Standard (b), above, are achieved, and any consequential effects; including but not limited to, landscape and natural character, urban design, and the displacement of flood waters onto adjoining properties.
- (b) Functional Necessity
  - (i) The extent to which alternative locations for new habitable structures or activities have been considered;
  - (ii) The extent to which new habitable structures or activities cannot be reasonably located in an alternative location;
  - (iii) The extent to which there is a functional necessity to locate habitable structures or activities within a Flood Prone Area.
- (c) Placement of New Critical Infrastructure
  - (i) The extent to which new critical infrastructure will not be adversely affected by floodwaters or any other type of natural hazard or cause a significant increase in the scale or intensity of natural hazard events;
  - (ii) The extent to which new critical infrastructure will not cause any adverse effects on the environment in the event of a flood or any other type of natural hazard;



- (iii) The extent to which new critical infrastructure cannot be reasonably located in an alternative location.

**Explanation**

*Development within Flood Prone Areas in the City is to be avoided unless there are specific flood control measures or mitigations put in place for habitable structures and places where people work, to avoid exacerbating flood hazard risks. Hazard avoidance is preferred over hazard mitigation due to the risks to human life, communities, property, infrastructure and the natural environment.*

*It is recognised that some activities have a functional necessity to be located in Flood Prone Areas, for example infrastructure associated with flood mitigation, or there may be new critical infrastructure which is required to be provided in a Flood Prone Area, such as roading or electricity supplies. Allowance has been made for these specific circumstances in R22.8.32.1, and assessment, on a case-by-case basis.*

**NOTE TO PLAN USERS**

1. When considering applications for resource consent, the Council will have particular regard to expert flood hazard advice provided by Horizons.
2. Refer to Section 4 – Definitions, for the meaning of Non-Habitable (not occupied) Structures.\
3. Refer also to NZS4404: 2010 Land Development and Subdivision Infrastructure for guidance on flood clearance levels for a Habitable Structure.

## **R22.6.3 RULES: NON-COMPLYING ACTIVITIES**

### **22.6.3.1 Non-Complying Activities**

- (1) Any new habitable structure or activity or any increase in the scale of any existing habitable structure or activity within a Flood Prone Area identified on the Planning Maps that does not comply with the Restricted Discretionary Activity Performance Standards in R22.6.2.1, shall be a Non-Complying Activity.

**Determination Clause**

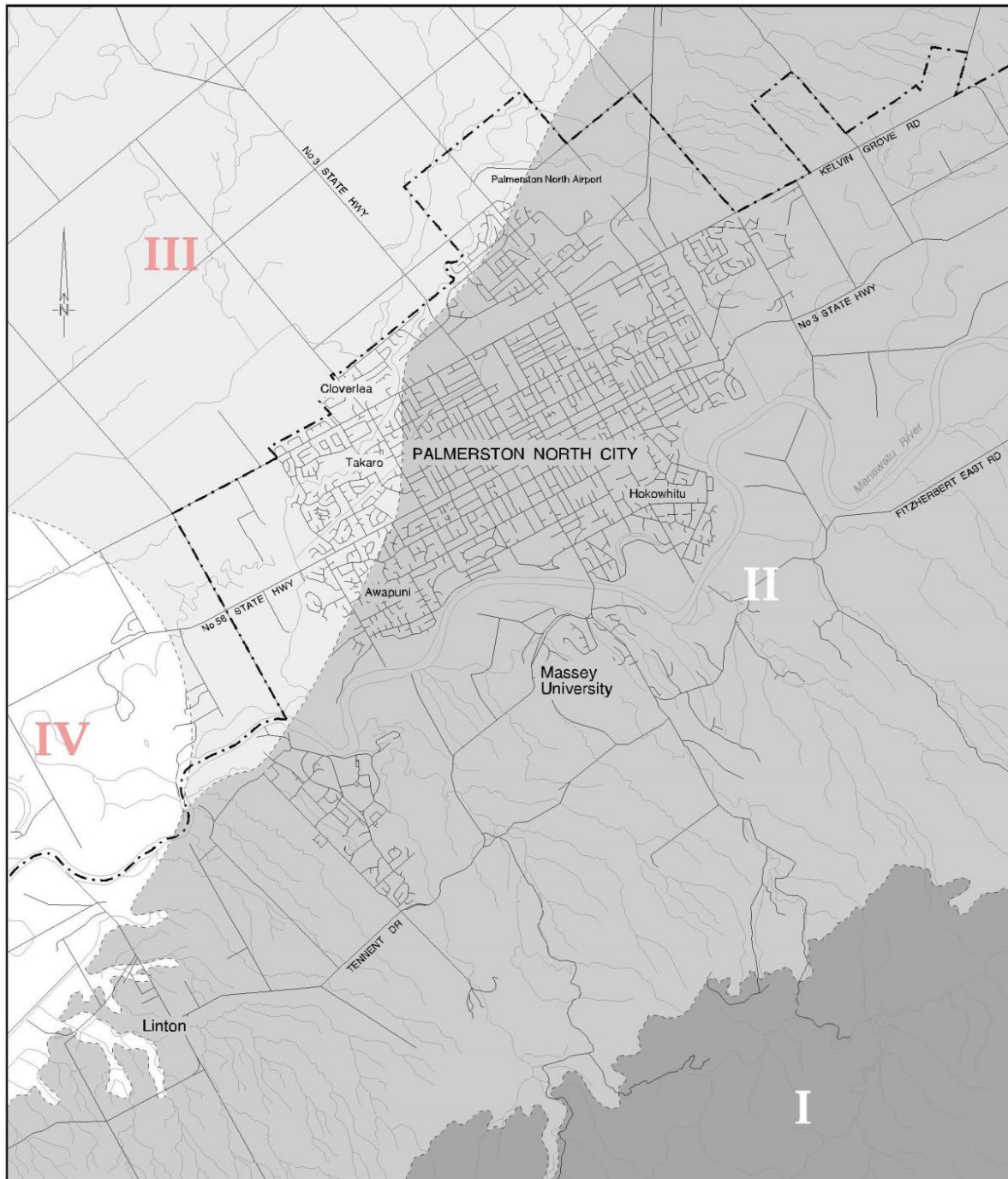
The assessment criteria contained within R22.6.2.1 and the One Plan, Policy 10-2(b) and (d)(ia) – (iii) and Policy 10-4, will be considered by the Council in addition to the City View and Natural Hazards Objectives and Policies in determining whether to grant consent and what conditions to impose, if any, in relation to any application for a Non-Complying Activity.

**Explanation**

*Development within Flood Prone Areas is to be avoided unless specific flood control measures are put in place for dwellings and other activities which achieve protection for the site in a 0.5% AEP or (1 in 200 year) flood event and avoid exacerbating flood risks. Hazard avoidance is preferred over hazard mitigation due to the risks to human life, communities, property, infrastructure and the natural environment.*

*When considering applications for resource consent, the Council will have particular regard to expert flood hazard advice provided by Horizons.*

**MAP 22.6.1 GROUND SHAKING HAZARD MAP FOR PALMERSTON NORTH CITY**



THIS MAP IS INDICATIVE ONLY

Map Production: **LandInfo**  
City Enterprises  
P.N.C.C. Dec 2000

- I** Zone I - Zone within which little or no amplification of ground shaking is expected
- II** Zone II - Zone within which no significant amplification of ground shaking is expected
- III** Zone III - Zone within which moderate amplification of ground shaking is expected
- IV** Zone IV - Zone within which high amplification of ground shaking is expected

- Road
- River
- - - Palmerston North City Boundary

0 1 2 3 km  
SCALE 1:60,000

Source: Berryman, K.R.; Taber, J.J.; Townsend, T.D.; Cousins, W.J.; 1994 "Ground Shaking Hazard Assessment for Urban Centres of the Manawatu-Wanganui Region"; Manawatu-Wanganui Regional Council "Hazard Analysis Manual - Vol II Seismic Hazard".

**MAP 22.6.2 LIQUEFACTION GROUND DAMAGE POTENTIAL PALMERSTON NORTH CITY**

