

**BEFORE THE HEARINGS PANEL**

**IN THE MATTER of hearings on submissions  
concerning the proposed  
One Plan notified by the  
Manawatu-Wanganui  
Regional Council**

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**End of Hearing Statement of Phillip Percy  
for the General (Natural Hazards) hearing**

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## **Introduction**

1. The purpose of this report is to answer questions raised by the Hearing Panel that were not addressed by the officers during the hearing and to respond to some matters raised by experts at the hearing.
2. Where changes are not proposed in this report, it should be assumed that my recommendations as presented at the hearing have not altered.

## **Matters raised during the hearing**

3. During the General hearing, several questions and points of clarification were raised by the Panel that were not responded to during the hearing. The following table addresses those matters. Also summarised in the table are responses to matters raised by submitters during the course of the hearing.
4. Of particular note are the recommended changes to Policy 10-2, which have been the subject of significant discussion prior to and during the hearing. The assistance of the Panel in providing some suggested rewording of Policy 10-2 has been of significant benefit in refining the policy, as has the continued contributions of Mr Blackwood (Horizons), Mr Philpott (Landlink) and Mr Murphy (Palmerston North City Council).

HP = Matters raised by the Hearing Panel, JP = John Philpot, DM = David Murphy

	Issue	Raised by	Discussion	Recommendation
Policy 10-2				
1	Provide additional feedback on scope for dealing with residual risk in Policy 10-2.	HP	<p>The Panel has received further advice from submitters during the hearing (primarily PNCC) as to the scope for the recommended changes to Policy 10-2. Mr Maassen has also provided a memo to the Panel confirming the position expressed in the joint memorandum provided by David Murphy and myself on the matter.</p> <p>The inclusion of the concept of residual risk has been drawn from PNCC's submission which sought a policy that reflected the resolution made by Horizons Regional Council. The resolution addressed residual risk in a similar manner to that proposed in the recommended Policy 10-2.</p>	See recommended wording of Policy 10-2 in Appendix 1.
2	Does Policy 10-2(b) currently capture intensification of farming and farming activities?	HP	As recommended in the notified and the officer's versions, intensification of farming and farming activities would be captured by Policy 10-2. Many of these activities will have little or no impact on flood flows. However	If the panel is of a mind to exclude structures or activities on production land, include an exclusion in Policy 10-2(b) subject to the effects of flooding on

			<p>some activities associated with farming such as building tracks and re-contouring land could cause changes to flood flows and affect other people or property. Therefore activities on production land (see discussion below) can be excluded from the policy provided they don't cause increased risk to others.</p> <p>I do note that most farming activities will have little impact on flood risk to others but risk does exist for farming activities themselves through loss of stock, infrastructure (fences, etc) and crops as a result of flooding. The Panel may wish to consider whether new farming activities or farm intensifications should be required to avoid or mitigate the flooding hazard in the same way as any other new structure or activity must.</p>	<p>others being avoided or mitigated (see recommended wording below).</p>
3	Consider including the annual return period (e.g. (1 in 200 year)) as well as the annual exceedence probability.	HP	Agree. This would assist readers who prefer using the annual return period terminology.	Add the annual return period reference in brackets to each reference to annual exceedence probability.
4	Should (ba) as included in the supplementary officers report relate to <u>all</u> structures or only to occupied structures (as currently		The purpose of (ba) was to provide a clear minimum standard for occupied structures or activities. This is to provide certainty,	See revised wording below.

	recommended)?		particularly in the case where structures or activities are allowed through the 'functional constraint/necessity' gateway, that risk to human life is avoided or mitigated. In the revised wording included with this report, a clause similar to (ba) is retained to ensure that exclusions provided for functional necessity and production land do not result in people being placed at higher risk than in other situations.	
5	How does (ba) as included in the supplementary officers report relate to rural activities?		As discussed in point 4 above, the revised wording included in this report applies the equivalent of (ba) to production land to ensure that if any occupied structure or activity (such as a dwelling, shearers quarters, etc) meets the gateway test, it must still be designed or located to avoid or mitigate the 0.5% AEP flood hazard.	See revised wording below.
6	What is the actual basis for the changes to Figure I3 (Taonui Basin map)?	HP	Mr Blackwood will discuss the reasons in more detail but the technical basis for the changes to the map is summarised in a separate section of this report.	See below

7	Was it the intention that the current Policy 10-2(a) apply to the whole of the Taonui basin as mapped?	HP	The whole of the mapped area (in earlier recommendations) was intended to be covered by Policy 10-2(a). It is assumed that this was also the intention in the originally notified version because significant parts of the Taonui Basin are 'true' floodways but these were not individually mapped (as other floodways were). It therefore appears that the whole of the Taonui Basin was mapped as a floodway as a simple method for capturing those floodways within a single map.	See below
8	Is it desirable to distinguish between floodways and ponding areas in the Taonui Basin (technically and for planning purposes?)	HP	Notwithstanding the question of whether there is scope in submissions to do so, the floodway areas can be technically differentiated from the floodable areas within the Taonui Basin and mapped. From a planning perspective, this would be beneficial as it ensures that the floodway policy only applies to the portions of the Taonui Basin that are actually floodways. The remainder of the basin (outside of floodways) can be adequately managed via the policy controlling floodable areas. See further discussion below	See below
9	Which parts of the Taonui Basin should be covered by Policy 10-2(a) (floodways) and	HP	See discussion below.	If the Panel considers that there is scope in submissions and is of a

	Policy 10-2(b) (floodable areas).			mind to amend the Taonui Basin map in Schedule I, officers can prepare a replacement map 1:3 based on the maps attached in Appendix 1 of this.
10	As recommended in the supplementary officer's report, is there a circular reference in Policy 10-2(c) where it refers to adverse effects dealt with in Policy 10-2(bb)(ii)?	HP, DM	Agree. The circular reference should be removed. The revised wording attached to this report resolves this.	See recommended wording of Policy 10-2 in Appendix 1.
11	Should Policy 10-2(c)(ii) only refer to risk to 'other' activities?	HP	Yes. The risk to the structures and activities themselves is dealt with in clauses (a) and (b). The revised wording attached to this report resolves this.	See recommended wording of Policy 10-2 in Appendix 1.
12	Include a list of considerations to be 'taken into account' in Policy 10-2	DM	Mr Murphy provided additional information in relation to this matter via a memorandum to the Panel dated 14 July 2009. I discuss Mr Murphy's recommendations in detail below.	No changes recommended
13	What constitutes 'avoidance' and 'mitigation'?	DM	The recommended redrafting of the policy (as included with this report) differentiates between what is considered to be avoidance and what is considered to be mitigation for the purposes of the policy. This improves clarity.	See recommended changes to Policy 10-2 in Appendix 1.

Policy 10-4

14	Should 'remedied' be included in relation to managing debris trapped by infrastructure (Policy 10-4(b)(iii))?	HP	<p>Adding the word 'remedied' to Policy 10-4(b) would result in remedial action on all of the listed effects being appropriate. The intention of the policy is to avoid or mitigate course changes, erosion and scouring around the structure, and restrictions in flows, and to prevent or minimise debris entrapment (primarily through design) – remedying these effects would not manage the hazard.</p> <p>Policy 10-4(b) is also a clarification of Policy 10-4(a) which relates to the 'design' of the infrastructure.</p> <p>Removing debris build up during or after flood events to protect the asset would most likely be an activity that the critical infrastructure owner would do as a matter of course due to the importance and value of such assets.</p>	No changes recommended
15	Should the effect of increased erosion and scouring during flood events be limited only to	HP	Not necessarily. A structure may result in increased erosion and scouring nearby as a	No changes recommended



areas around the critical infrastructure (Policy 10-4(b)(iv))?

result of redirection of water.

#### Anticipated Environmental Results

16	Should the bullet point referring to district planning maps in the Indicator column of the AERs be included for both AERs?	HP	Yes. District planning maps are a method for increasing awareness of the risks of natural hazard events.	Add "District plans incorporating hazardous areas on planning maps and associated regulation of land use in those areas." to the second row of the Indicator column in the Anticipated Environmental Results table.
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#### Schedule I

17	Amend notation in Figure I:3 to replace '1' with 'l'.	HP	Agree. This was a typographical error.	Amend notation on Figure I:3 by changing '1' to 'l'.
18	Change orientation of location diagram on Map I:5	HP	Due to the orientation of the floodway, the map is in landscape (the location diagram is orientated to be consistent with the orientation of the map). Rotating the map to portrait would require the scale of the map to be shrunk which may make it more difficult to read.	No changes recommended

## Hearing Panel's provisional redrafting

5. The Panel provided two provisional redrafting versions of Policy 10-2 subsequent to the presentation by reporting officers at the beginning of the hearing. Version 1 of the provisional redrafting was helpful in refining the structure and wording of Policy 10-2, in particular the breaking up of policy into clear sections addressing avoidance and mitigation measures.
6. Referring firstly to version 1 of the Panel's provisional redrafting, I note the following:
  - a. In relation to replacing 'functional constraint' with 'functional necessity', I am comfortable with either term. However I note that the Panel is considering the use of the term 'functional constraints' in relation to Chapter 3. Depending on the outcomes of those considerations, it may be appropriate to reflect the preferred terminology in Chapter 10 also.
  - b. I agree with Mr Philpott that using the word 'naturally' when referring to the potential for an area to be flooded may create difficulties given the extensive modifications to landforms and river corridors that have occurred over time. The intention of this part of the policy is to capture all areas that would flood regardless of whether there are avoidance or mitigation measures in place. I have therefore recommended replacing 'would naturally be inundated' with 'with or without flood avoidance or mitigation measures would be inundated'. This prompts policy readers to test each site against both scenarios regardless of what, if any, mitigation measures are in place. The test is necessary to allow the policy to apply to existing and proposed mitigation measures that may not be adequate.
  - c. Resolving the circular reference in clause (c)(i) of the most recent officer's recommendation is supported.
  - d. The previously recommended clauses (c)(ii) and (c)(iii), while subject to refinement, need to be included in the policy in a way such that they apply to all structures and activities allowed by the policy (via both clause (a) and (b)). Any increase in flood risk in other areas or reduction in the effectiveness of existing flood management works should be avoided or mitigated for all structures and activities. To achieve this using

the structure of Version 1, a subclause to that effect would need to be added to each of clauses (a) and (b)(i) to (b)(iv). I consider that this can be more tidily achieved by retaining those requirements as a standalone clause and making clauses (a) and (b) subject to it. See clause (d) in the revised wording in Appendix 1.

- e. The policy needs to ensure that there is a minimum level of protection for occupied structures and activities (to manage risk to human life) across all scenarios where development may be allowed. This includes development in floodways and development in floodable areas that may be allowed due to functional necessity or because it involves production land. This could be achieved by adding a subclause into each of the relevant clauses, but I consider that this is more tidily achieved by including the requirement as a standalone clause. See clause (c) in the revised wording in Appendix 1.
- f. Separating the policy so that each 'gateway' for development is dealt with in a separate subclause is supported. This significantly improves the readability of the policy. This approach also allows specific measures to be treated as avoidance or mitigation measures for the purposes of the POP. Listing the examples of avoidance measures and mitigation measures provides clarity for POP users. See clause (b) in the revised wording in Appendix 1.
- g. Use of the term 'production land' from the RMA is supported. The term is defined as:

*(a) means any land and auxiliary buildings used for the production (but not processing) of primary products (including agricultural, pastoral, horticultural, and forestry products):*

*(b) does not include land or auxiliary buildings used or associated with prospecting, exploration, or mining for minerals—*

*and production has a corresponding meaning*

The term 'auxiliary buildings' is not defined in the RMA, nor is 'building'. 'Building' as defined in the Building Act 2004 is:

*a) means a temporary or permanent movable or immovable structure (including a structure intended for occupation by people, animals, machinery, or chattels)...*

Somewhat unhelpfully, the Building Act 2004 doesn't define 'structure', but the RMA does:

*structure means any building, equipment, device, or other facility made by people and which is fixed to land; and includes any raft*

Based on these definitions, the term 'production land' would seem to include typical primary production activities, and would also include auxiliary buildings such as dairy sheds, fences, effluent ponds and haysheds. The definition of 'structure' would also seem to extend to farm tracks, races as these are facilities made by people and fixed to the land. Several of these auxiliary activities have the potential to cause flood waters to be dammed or diverted and therefore have the potential to increase risk to others and reduce the effectiveness of existing flood control works. Therefore I consider it appropriate to provide a 'gateway' for structures and activities on production land provided that any increased risk to other areas and to existing flood control works is avoided or mitigated.

- h. As mentioned by Mr Philpott and Mr Murphy during the hearing, the gateway for the area protected from flooding in Palmerston North City should be confined to only that area that is afforded protection from the 0.2% AEP flood. It is only this section of the Lower Manawatu River Flood Control Scheme that Mr Blackwood has indicated has a low risk of failure.
7. To summarise in relation to Version 1 of the Panels provisional redrafting of Policy 10-2, the structural change has largely been adopted in the attached recommendations, with the primary modification of specifying a common list of 'conditions' that must be applied in all circumstances where structures or activities are allowed.
8. Version 2 as provided by the Panel is not supported. The addition of the requirement to take into account proposed flood avoidance or mitigation measures does not resolve the high level of attainment set by the requirement not to cause the listed effects. As Mr Murphy explained in his supplementary evidence (para 56), even with mitigation measures in place,

most development will result in some increased risk to human life, property or infrastructure. Particularly in the case of establishing mitigation measures such as stopbanks, these measures can themselves cause an increased risk due to the potential for failure or overtopping in an overdesign flood event.

9. Related to the previous point, careful consideration of residual risk needs to occur when proposing development in conjunction with mitigation measures. Simply enabling mitigation to be put in place without an associated requirement to address residual risk may increase the risk to lives and property and would therefore be contrary to the intent of the policy. Defining when the residual risk needs to be considered has contributed to the recommended Policy 10-2 being redrafted so extensively.

### **Mr Murphy's recommended wording**

10. Mr Murphy, in his supplementary evidence indicates that he is generally comfortable with either Version 1 of the Panel's provisional redrafting or the version included in the officer's report dated 20 May 2009. However Mr Murphy offered an alternative version which included some suggested rewording but also proposed a list of other matters that should be taken into account when considering the appropriateness of proposed avoidance or mitigation measures.
11. I consider that the listed points are either already addressed within the body of the policy, should be more strongly provided for, or are more appropriately addressed outside of a flood hazard policy, as discussed below:
  - a. Points (a) and (b) relate to managing residual risk. Demoting residual risk to a level where 'account' has to be taken of it reduces the importance it plays when considering hazard mitigation. Managing residual risk is a fundamental backstop for mitigation measures and it needs to be a requirement rather than a matter that can be taken into account but dismissed.
  - b. Point (c) in relation to consequential effects of avoidance or mitigation measures on flooding is sufficiently well addressed by requiring effects on other areas and on existing flood control works to be avoided or mitigated. Mr Murphy provided an additional written response to the Panel in a memorandum dated 14 July 2009 in

which he identifies other envisaged consequential effects of landscape and urban design effects. As discussed further below, these matters are outside of the scope of a natural hazards policy. They are individual matters that should be considered when a development proposal is put forward to a territorial authority in the same way as natural hazards is. Each of those matters should be considered and a decision made on the appropriateness of the development as a whole. If the consent authority decides that addressing the natural hazard issues will not achieve the desired landscape or urban design outcomes, the proposal can be rejected. However the consideration of the natural hazard matters should not be clouded by consideration of other matters – the landscape effects of a development should not influence whether or not the natural hazards are properly managed, they should influence whether the development as a whole is appropriate. Therefore I do not support the inclusion of 'non-natural hazard' issues in Policy 10-2.

- c. Points (d),(e) and (g) are matters that will already be integral components of a proposed mitigation measure. For mitigation measures to be effective, they need to mitigate the hazard for a period of time and therefore their location, design, maintenance requirements, relationship with existing flood mitigation measures and ownership structures are defining considerations in whether they will actually mitigate the hazard. I do not consider that these matters need to be spelled out in Policy 10-2.
- d. Point (f) is redundant as the flood hazard is to be avoided or mitigated to the same level for all structures and activities (0.5% AEP). The 'residual inundation' approach allows for the residual depth and velocity to be adjusted where circumstances dictate.
- e. Point (h) relates to recommendations of comprehensive land use strategies prepared by territorial authorities. Comprehensive land use strategies should be developed taking into account the requirements of all of the individual land use issues to be managed (such as natural hazards, landscapes, transport networks, utility services, etc). Land uses strategies should not be used in reverse to influence the proper management of individual issues. Therefore I do not support the inclusion of land use strategies as a consideration when managing natural hazards.

- f. Point (i), which relates to effects of avoidance or mitigation measures on overland stormwater flow paths, should be a requirement to be considered (where diverted or displaced stormwater would increase flood risk to others) rather than simply 'taken into account'.

In terms of how avoidance or mitigation measures influence finished contours and fall within sites in relation to the ability to construct stormwater management infrastructure, these are matters that should be addressed as part of considering a proposal in its entirety rather than when considering the effectiveness of the natural hazard mitigation measures. Territorial authorities have requirements in their district plans to ensure that developments provide for stormwater management. If flood hazard avoidance or mitigation cannot be achieved in conjunction with providing for the management of stormwater from the development, then the development would not be viable.

12. Overall, I do not consider that the policy would benefit from the matters listed in clause (v) of Mr Murphy's suggested wording. The matters listed are either addressed already in the recommended version or relate to matters outside the scope of a natural hazards policy.

## **Taonui Basin maps in Schedule I**

13. The Panel asked that officers provide further advice on whether the Taonui Basin floodable area could be separated into those areas that are true floodways and those areas that are floodable areas. As a result of significant amounts of considerations by officers, with the involvement of Mr Philpott as directed by the Panel, it has been confirmed that the Taonui Basin can be mapped to differentiate between true floodways and floodable areas. To this end, maps are attached to this report which would be used as the basis for mapping those areas that are regarded as true floodways and which the Panel, if it is satisfied that there is scope in submissions and is of a mind to amend the Taonui Basin maps, could request officers to prepare a new Taonui floodway map for inclusion in Schedule I.

14. Mr Blackwood will provide further explanation of these maps. To assist in this explanation, Mr Blackwood will refer to detailed maps (attached) of the 0.5% AEP flood showing:

- Maximum flood depth;
- Maximum water level;
- Maximum flood speed;
- Maximum flood hazard.

15. These are from the dossier of plans attached to the report entitled "*Mangaone Stream and Taonui Basin Floodplain Hazard Assessment: Hydraulic Modelling and Mapping*", Final Report October 2006, DHI Water and Environment.

16. In relation to the above maps, the following should be noted:

- (a) These maps include the impact of the Oroua River stopbanking and Kopane Bridge upgrade. This raises the 1% AEP design water level in the lower Taonui Basin by 0.43m from RL 9.46m to RL 9.89m. The maps referred to above give a close guide on the various flooding parameters;
- (b) The maps do not include a very small piece of land in the lower SW corner, this area is easily included in the final maps (this piece of land is shown in the updated maps included in Horizons submission);
- (c) The low hazard areas are set out exactly in terms of the NSW classification referred to in Mr Blackwood's original evidence Figure L2 (with the medium and high hazard areas exceeding the constraints in his evidence).

17. In relation to a possible map of the Taonui Basin, floodways in terms of both functionality and medium to high hazard should be defined by the following:

- (a) The Kopane Spillway and immediately downstream floodway from the Oroua River to Oroua Road (refer hatched area on the attached flood hazard map). Note part of this floodway is constrained by stopbanks and the area to Oroua Road should not be



developed, in order to maintain the hydraulic capacity of the floodway without obstruction and thus maintain the floodway function;

- (b) The Mangaone Spillway and immediately downstream floodway area (refer hatched area on the attached flood hazard map). Note part of this flowpath is constrained by stopbanks and there is also an area where there is interaction of flows with those of local drainage to the west - and the floodway flows may well flow up this drain for a period. The boundary of the floodway is set to incorporate this area. Again this area should not be developed, in order to maintain the hydraulic capacity of the floodway without obstruction and thus maintain the floodway function
- (c) If the residual risk is based on the 0.5% AEP flood, then all land below RL 11.0m in the ponding area - this is the 0.5% AEP flood level inclusive of 0.5m freeboard; If the residual flood risk is based on the 0.2% AEP flood with one breach as forecast in the Manawatu River stopbanks, then all land below RL 11.3m and if a second breach in the Manawatu River occurs in that flood then all land below RL 11.8. Horizons cannot be precise on the relative probability of one or two breaches (and the exact potential locations), however there is a roughly equal chance of either case. We will be providing a map showing these ground contours. Please note the area encompassed is slightly greater than the area in map I:3 of the updated maps - as these do not include freeboard. It is important to include all this land (or as a minimum all parts of that land in the updated maps) as this is the area where the floodway has significant ponding depths, in order to perform its flood detention function.
- (d) The Rangiotu and Hamiltons line portion of the floodway are already incorporated in the ponding area.

Phillip Percy

4 August 2009

## Appendix 1 – Recommended wording for Policy 10-2

Policy 10-2: Development in *floodways*\* and other areas prone to flooding

(a) The Regional Council and *territorial authorities*<sup>^</sup> shall not allow the establishment of any new *structure*<sup>^</sup> or activity, or an increase in the scale of any existing *structure*<sup>^</sup> or activity, within a *floodway*\* mapped in Schedule I unless, subject to (c) and (d),

(i) there is a functional necessity to locate the *structure*<sup>^</sup> or activity within such an area, provided that the *structure*<sup>^</sup> or activity is designed so that the adverse effects of flood events on it are avoided or mitigated —

in which case the *structure*<sup>^</sup> or activity may be allowed.

(b) Outside of a *floodway*\* mapped in Schedule I, the Regional Council and *territorial authorities*<sup>^</sup> shall not allow the establishment of any new *structure*<sup>^</sup> or activity, or an increase in the scale of any existing *structure*<sup>^</sup> or activity, within any area that, with or without flood avoidance or mitigation measures, would be inundated by a 0.5% annual exceedence probability (1 in 200 year) flood event unless, subject to (c) and (d), either—

(i) the effects of the 0.5% annual exceedence probability (1 in 200 year) flood event are avoided by measures including but not limited to:

1. protection by the Lower Manawatu Flood Control Scheme from the 0.2% annual exceedence probability (1 in 500 year) flood event; or
2. ground levels raised to a level above the 0.5% annual exceedence probability (1 in 200 year) flood level plus freeboard; or
3. flood control measures that provide protection from the 0.5% annual exceedence probability (1 in 200 year) flood event and that are soundly designed and constructed such that there is minimal risk of the measures failing;

or

(ii) the effects of the 0.5% annual exceedence probability (1 in 200 year) flood event are mitigated by measures, including but not limited to existing flood mitigation measures that may not be soundly designed or constructed, provided that:

1. in the event of a failure of any flood mitigation measures or during a 0.2% annual exceedence probability (1 in 500 year) flood event, inundation of occupied *structures*<sup>^</sup> and access from occupied *structures*<sup>^</sup> will be no deeper than 0.5m above finished ground level with a maximum water velocity of

1.0m/s, or some other combination of water depth and velocity that can be shown to result in no greater risk to human life, *infrastructure*<sup>^</sup> or property.

Or

(iii) The *structure*<sup>^</sup> or activity involves *production land*<sup>^</sup>;

Or

(iv) There is a functional necessity to locate the *structure*<sup>^</sup> or activity in such an area, provided that the *structure*<sup>^</sup> or activity is designed so that the adverse effects of the 0.5% annual exceedence probability (1 in 200 year) flood event on it are avoided or mitigated.

- (c) Avoidance or mitigation of the 0.5% annual exceedence probability flood event shall be the minimum level of protection for any new occupied *structure*<sup>^</sup> or activity, or an increase in the scale of any existing occupied *structure*<sup>^</sup> or activity.
- (d) In circumstances where a *structure*<sup>^</sup> or activity is allowed in accordance with clause (a) or clause (b), the following *effects*<sup>^</sup> shall be avoided or mitigated:
- (i) any increase in risk to human life, infrastructure or property in other areas as a result of the structure or activity or any associated avoidance or mitigation measures; and
  - (ii) any reduction in the effectiveness of existing works or *structures*<sup>^</sup>, including works and *structures*<sup>^</sup> within river and drainage schemes, or natural landforms for avoiding or mitigating the effects of flood hazard events.
- (e) This Policy does not apply to new *critical infrastructure*<sup>\*</sup>.

This Policy relates to Issue 10-1 and Objective 10-1.

## Appendix 2 – Taonui Basin maps