BEFORE THE HEARINGS COMMITTEE

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

Response of Fleur Maseyk to Supplementary Evidence of Technical Experts for the Biodiversity Hearing

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EXECUTIVE SUMMARY

1. This document presents my response to supplementary evidence of the technical experts as I verbally presented to the Hearing Panel during the Biodiversity and Heritage Hearing on 20 November 2008. It also addresses evidence presented during the Hearings held on the 21 November, and the 1 and 2 December 2008. Further, I have responded to questions put to me by the Hearing Panel.

2. A redrafted Schedule (with track changes) is presented. This represents Version V[1] of Schedule E and incorporates suggestions from experts, submitters and the Hearing Panel as raised during the Hearings.

3. Halting indigenous biodiversity throughout the Region goes beyond the identification of sites of ecological significance (in the context of Section 6 of the RMA). The most effective mechanism for addressing the decline of indigenous biodiversity in this wider sense is the non-regulatory methods provided for in the POP, and through sound management decisions both in a regulatory and non-regulatory approach.

4. I have continued to caucus with the technical experts in regards the assessment criteria (Policy 12-7). Opinions differ amongst the experts on the content, presentation and intention of the assessment criteria, and alternatives have been suggested and the table of assessment criteria remains a work in progress.

5. To illustrate points discussed throughout the Hearing, or presented in my report I will present a short power-point presentation of photographs. This presentation is not attached here but will be pre-circulated to the Panel prior to the Hearing.

[1] The previous versions of Schedule E have been presented throughout the Hearing Process as follows:
V1 Proposed One Plan
V2 My Section 42A Report (Appendix 4)
V3 My Supplementary Hearing Report (Appendix 1)
V4 Presented during the Biodiversity and Heritage Hearing 20 November 2008

INTRODUCTION

6. I have summarised the issues raised by experts, my response, and my reasoning in Table 1. Some specific points or issues have been developed further since the adjournment of the Hearing. In such cases, I have presented here what I discussed at the Hearing as requested in the first instance, following on with the current recommendations or comment (presented in *italics*).

7. I have not reiterated areas of standing agreement or areas previously resolved and presented in other Hearing Reports.

8. Other issues requiring response are addressed within the body of the report.

9. I have addressed two areas where the recommended text appears in Helen Marr's report. Firstly, changes to the glossary has been addressed in this report as it previously sat within Schedule E, and the terms included are ecological terms. Secondly, the reworking of the assessment criteria (Policy 12-7) has been discussed here as the rationale for the changes are driven from ecological considerations. However, as the resultant table sits within a policy it is presented to the Panel within Helen Marr's report. Our two staff reports should be read in conjunction.

Table 1: Issues raised by technical experts by way of Supplementary Evidence that were verbally addressed during the Biodiversity Hearing 20 November 2008.

Reference	Issue Raised	Degree of agreement	Reasoning/ outcome
William Shaw (Wildland Consultants Ltd. for Mighty River Power)			
Paragraph 12	Rewording and restructuring of habitat type definitions.	Agree	• I consider these changes, in the most part, to be useful suggestions. • Table E.1 was changed accordingly as presented in Schedule E IV.
Paragraph 13	Reinstatement of definitions for terms describing vegetation structure (eg. 'forest', 'herbfield' etc.) in glossary.	Agree	• Definitions of these terms are needed. The glossary has been expanded to include these terms as presented in Schedule E IV. • *Schedule E definitions have since been removed from the Schedule and merged with the Plan glossary (Helen Marr's report) as reflected in Schedule E V*.
Paragraphs 14 & 41	Inclusion of additional exclusion criteria in Table E.2(b) to read: Dunelands and Sand Country xii Plantation forest on sand xiii Intensively grazed pasture dominated by exotic grasses and other exotic herbaceous species and lacking a significant indigenous element.	Neutral	• I do not consider the suggested addition of exclusions necessary as Schedule E refers to indigenous vegetation in the definition for duneland habitat. However, if it is considered that this suggestion will improve clarity I have no technical objection to it. • Further, Schedule E V has endeavoured to more explicitly refer to indigenous vegetation when that is intended.
Paragraph 16[1]	Scope of Objective 7-1	Agree	• Expanding the scope of Objective 7-1 would recognise that habitat types beyond those listed in Schedule E as Rare, Threatened or At Risk are subject to non-regulatory methods. The non-regulatory methods of the POP are a crucial component in the protection and halting the decline of indigenous biodiversity.

Reference	Issue Raised	Degree of agreement	Reasoning/ outcome
Paragraphs 18 - 21 & 24	Use of the word 'representative' in Objective 7-1 and Policy 7-4(a).	Agree	• I agree with William Shaw's reasoning for the removal of the word 'representative' for Objective 7-1 and Policy 7-4(a).
Paragraph 22	Moving the 6th bullet point in the criterion 'Ecological Context' to the criterion 'Representativeness'.	Agree	• I have no technical objection to this recommendation, as Mr Shaw's reasoning is sound. Equally, keeping this bullet point in its current position has merit if this removes any potential for confusion around the definition of 'representativeness' (particularly in regards to how it has been used to determine habitat type classifications in Schedule E). • *I expressed neutrality on this point during the Hearing (20 November 2008) for the reasons outlined above. Since the Hearing, the assessment criteria have been considerably reworked (see below). The suggested shift in position of the 6th bullet point is reflected in the track change version of Policy 12.7 as presented in Helen Marr's End of Hearing Report.*
Paragraphs 27 – 29	Use of the current New Zealand Threat Classification System and Lists.	Agree	• I have been advised by Helen Marr that reference to "current New Zealand Threat Classification Systems and Lists" (my emphasis) relates only to the currently existing lists. I am aware of the recent revision of the System, and the consequent development of the lists which will follow. Ideally, an assessment would work from the most recent versions of the System and Lists. However, the restraints allowing for only the currently existing System and Lists to be referred to still allow for protection of threatened species. This is because the current System and Lists are not "incorrect" and their use represents the best level of protection we can afford to threatened species at the current time. In my opinion this is

Reference	Issue Raised	Degree of agreement	Reasoning/ outcome
			appropriate for maintaining indigenous biodiversity in the Region. • *Full references relevant to the current New Zealand Threat Classification Systems and Lists have been moved to the Plan glossary (see Helen Marr's report).*
Paragraph 37 & 40	Insertion of subheading in Table E.2 for 'Treeland'.	Agree	• A 'Treeland' subheading in Table E.2 adds clarity and was presented in Schedule E Version IV. • There remained inconsistency in the use of the term 'treeland'. This has been addressed in Schedule E V.
Paragraph 38	Definition of Rare habitat types and Wetland habitat types.	Disagree	• I consider this suggestion unnecessary as a key purpose of Table E.1 is to provide definitions for the Rare habitat types and wetland habitat types. However, *generic* definitions of 'originally rare habitat type' and wetland habitat type might provide more certainty.
Paragraph 44[2]	Wording in definition of "indigenous vegetation" in Paragraph 2 of Schedule E.	Agree	• Table E.1 was changed in agreement with this submission as presented in Schedule E IV. • *Schedule E V has subsequently further reworked the front end of the Schedule.*
Amy Hawcroft (Department of Conservation)			
Paragraph 7	Type locality to be included as a criterion for assessing ecological value of a site.	Disagree	• This remains an area of disagreement for the reasons outlined in my Supplementary Hearing Report (paragraph 57).

[1] A response to this point was not presented as part of my verbal summary during the Hearing, but does relate to questioning from the Panel.

[2] There is a numbering error in William Shaw's report. Paragraph 44 appears as paragraph 35 (page 9).

OTHER MATTERS

Riparian Margin Protection Set-back distances

10. The inconsistency between riparian margin protection recommended in Schedule E and evidence presented during the Land Hearing have been noted. In preparing my response I have conferred with Allan Kirk regarding the provisions of the Land Chapter.

11. Habitat types listed in Schedule E are included explicitly for the protection of indigenous biodiversity, via the protection of areas of identified habitat. It is considered that an area of terrestrial woody vegetation 20 m wide (as described in Schedule E) is an integral dependent component of aquatic habitat. Recognition of the interdependence of the terrestrial and aquatic components of this habitat type provides protection of not just the habitat type itself but also the linkages and processes crucial to the protection of the area of habitat. It is considered that in areas of high ecological importance, such as Sites of Significance – Aquatic, a 20 m wide area of protection is adequate.

12. The riparian margin protection of 6 m provided for in the Land Chapter is targeted solely at soil protection. The 6 m set-back distance relates to an optimum zone of soil protection based on root tensile strength.

13. The two riparian margin provisions are targeted for explicitly different outcomes and thus the set-back distances are tailored accordingly. While the biodiversity driven riparian margin set-back will undoubtedly have some benefit to soil protection and vice versa, both were developed for a specific function and specific outcome which have different requirements.

14. Although a 20 m set-back may appear considerable, it only applies to a restricted area of the Region – at those areas classified to be Sites of Significance – Aquatic, and applies only to woody vegetation where it currently exists.

15. In order to quantify the ramifications of this provision of Schedule E, the area if Riparian margin (as per the Schedule E definition) present on private land within the Region was estimated.

16. There are a total of 142 SOS-A identified in Schedule D, although 42 of these are entirely within public conservation land administered by the Department of Conservation. A further 11 sites have been excluded from the totals as data is not available for these sites. These 11 sites are whio (blue duck) sites and the majority are entirely or partly within public conservation land. Therefore, estimates are based on a total of 89 SOS-A.

17. The full length of both banks of 37 of the 89 SOS-A sites are predominantly pasture (no woody vegetation) to the river margin. The remaining 52 sites comprise vegetation of varying composition, the majority of which would be captured by the Schedule E definition for Riparian margin habitat type. It is estimated that a total of 913 ha (9.13 km^2) of riparian margin present on private land will be captured by Schedule E (Table 2).

Table 2: Analysis of area of Riparian margin as per Schedule E definition present on private land within the Region

Composition of vegetation present throughout reach of SOS-A	Number of SOS-A	Estimated area of riparian margin (ha) on private land	Percentage (%) of vegetation captured by Schedule E definition?	Estimated area of riparian margin (ha) on private land captured by Schedule E
Both banks classed as predominantly pastoral (no woody vegetation) to the river margin	37	866	0	0
Both banks classed as predominantly vegetated (woody exotic or indigenous vegetation) to the river margin	20	330	100	330
Both banks classed as half predominantly vegetated (woody exotic or indigenous vegetation) to the river margin and half predominantly pastoral (no woody vegetation) to the river margin	10	210	50	105
One bank classed as predominantly pastoral (no woody vegetation) to the river margin; one bank classed as	2	44	50	22

Composition of vegetation present throughout reach of SOS-A	Number of SOS-A	Estimated area of riparian margin (ha) on private land	Percentage (%) of vegetation captured by Schedule E definition?	Estimated area of riparian margin (ha) on private land captured by Schedule E
predominantly vegetated (woody exotic or indigenous vegetation) to the river margin				
One bank classed as predominantly pastoral (no woody vegetation) to the river margin; one bank as half predominantly vegetated (woody exotic or indigenous vegetation) to the river margin and half predominantly pastoral (no woody vegetation) to the river margin	11	376	75	282
One bank classed as half predominantly vegetated (woody exotic or indigenous vegetation) to the river margin and half predominantly pastoral (no woody vegetation) to the river margin; one bank classed as predominantly vegetated (woody exotic or indigenous vegetation) to the river margin	9	230	75	174
Totals:	89	2 056	-	913

18. Considering the regional importance of the Sites of Significance – Aquatic, it is my opinion that an area of 9.13 km^2 throughout the Region falling under a Discretionary rule stream is not onerous on land-owners.

19. Another area of inconsistency between the Living Heritage and Land Chapters, that of wording regarding description of a waterway, has been addressed with the restructure of Table E.2 of Schedule E.

Assessment criteria (Policy 12-7)

20. The assessment criteria (Policy 12-7) have been reworked and are presented (changes tracked) in Helen Marr's report. These criteria are an important

component of the decision making process, as they are used to assess an area of habitat and the proposed activity after it has been determined that a resource consent is required. This assessment criteria are not intended to determine ecological significance. Ecological significance of an area of habitat will have previously been determined through application of Schedule E prior to applying the assessment criteria.

21. Just as an area of habitat can be determined to be ecologically significant by virtue of any of a range of reasons, so too can an area of habitat express ecological value for a number of reasons. The criteria listed in the table in Policy 12-7 represent these different values, any of which may be exhibited by a given area of habitat. Some areas of habitat will contain more than one ecological value, others will not.

22. The reworked table now reflects a three-step process that can be undertaken when assessing an area of habitat in relation to a proposed activity. That is:

a) determining specific ecological value(s);
b) determining whether there will be any adverse effects as a result of the proposed activity; and
c) determining the scale of any adverse effects.

The table now presents factors to consider at each step in the assessment for each of the three criteria; 'representativeness', 'rarity and distinctiveness' and 'ecological context'. This has resulted in the addition of two columns to the table.

23. One criterion 'previously assessed sites and legally protected sites' has been deleted. Assessments can become outdated, and values can change over time. Legally protected areas can be given legal protection for values other than biodiversity values. For these reasons, an area of habitat needed to also meet one of the other three criteria despite being previously assessed, or being legally protected. Therefore, the 'previously assessed sites and legally protected sites' criterion was redundant.

24. The first two columns have been merged for clarity. The criteria have been grouped under the value to which they contribute ('representativeness', 'rarity and distinctiveness' or 'ecological context').

25. Generic considerations of scale of impact (eg. the immediate and continuing severity and duration of the adverse effect, or the potential for invasive species to be introduced to the site) have been combined into the policy but are not stipulated within the table.

26. The consideration of long-term viability/ecological sustainability when assessing an area of habitat for value, or determining ecological significance, was raised by technical experts (Boffa Miskell representing Transpower and Meridian) and discussed during the Hearing. This remains a point of difference for the reasons outlined in my Supplementary Hearing Report.

27. 'Ecological sustainability' refers to ecological processes that function within an area of habitat, and the ability for these processes to be sustained long-term. Ecological processes are an important component of ecosystem function, and are addressed in the second bullet-point of the 'representativeness' criterion. It is appropriate that the likelihood of adverse effect, and the scale of adverse effect on ecological processes be determined during an assessment process. Consequently, the last two bullet-points of the second column and the last bullet-point of the three column have been added.

28. However, adverse effect on ecological processes should also be a factor considered for areas of habitat assessed to have value under other criteria. This is currently not reflected in the draft form of the table, and requires further consideration.

29. Further, it is useful to consider the inherent viability and long-term sustainability of an area of habitat when making management decisions. For example, such consideration can guide where to direct mitigation or restoration efforts.

30. I consider that it is in the guidance of management decisions that consideration of the long-term sustainability of ecological processes is most useful. In particular, where an activity is proposed to effect more than one area of indigenous biodiversity, large-scale activities where mitigation measures will be needed, or in cases where several scenarios can be chosen between.

REQUESTS FROM THE HEARING PANEL

Comparison of Schedule E habitat types occurring on private versus Crown land

31. It was requested that an analysis determining the occurrence of Schedule E habitat types on private land be conducted. As the habitat types were identified in different ways, this analysis is more robust for some habitat types than others. For some habitat types it is only possible with current information to provide estimations or informed assumptions.

32. For the habitat types where predicted distributional data was available (referred to as LPVT habitat types in previous reports), a high level of confidence in the analysis of the proportion of habitat present on private and Crown land was possible. The habitat types identified in Schedule E cover a total of 352,444 ha (excluding Riparian margin, tussockland below the treeline, snail habitat, or habitat types classified as Rare) within the Region. Of this 62% occurs on Crown land and 38% on private land. This analysis is presented in Table 3.

Table 3: Analysis of remaining area (ha) of each habitat type, the proportion of former extent, Schedule E classification and area occurring on private and Crown land. The habitat types included here are only those where predicted distributional data is available, it is not a full list of Schedule E habitat types.

Habitat Type Name	Predicted area (ha) of habitat type remaining	Proportion (%) of former cover remaining	Classification	Area (ha) of habitat type on Crown land* (percent of total area of habitat type in brackets)	Area (ha) of habitat type on private land (percent of total area of habitat type in brackets)
Hardwood/broadleaved forest	85	8	Threatened	28 (33)	57 (67)
Kahikatea-pukatea-tawa forest	1,633	2	Threatened	485 (30)	1,148 (70)
Podocarp forest	1,141	3	Threatened	161 (14)	980 (86)
Podocarp/broadleaf-fuchsia forest	91	15	Threatened	72 (79)	19 (21)
Podocarp/tawa-mahoe	2,098	2	Threatened	401 (19)	1,697 (81)

Habitat Type Name	Predicted area (ha) of habitat type remaining	Proportion (%) of former cover remaining	Classification	Area (ha) of habitat type on Crown land* (percent of total area of habitat type in brackets)	Area (ha) of habitat type on private land (percent of total area of habitat type in brackets)
forest					
Rimu/tawa-kamahi forest	226,960	19	Threatened	125,602 (55)	101,358 (45)
Podocarp/kamahi forest	65,047	32	At Risk	51,376 (79)	13,671 (21)
Hall's totara/broadleaf forest	21,069	30	At Risk	18,821 (89)	2,248 (11)
Podocarp/red beech-kamahi-tawa forest	172	18	Threatened	139 (81)	33 (19)
Podocarp/black beech/mountain beech forest	6,788	12	Threatened	3,876 (57)	2,912 (43)
Hall's totara/silver beech-kamahi forest	206	9	Threatened	136 (66)	70 (34)
Mountain beech forest	20,018	21	At Risk	14,322 (72)	5,695 (28)
Wetland (all wetland types)	7036	3	Threatened	2,927 (42)	4,110 (58)
Totals:	352,344	17	-	218,346 (62)	133,998 (38)

* Includes Department of Conservation, Defence Force, and TA owned land but excludes LINZ owned land.

33. Of the Riparian margin habitat that meets the Schedule E definition, an estimated 9.13 km^2 exists on private land (see above and Table 2).

34. For the habitat types that have been identified by expert opinion no spatial information at the property scale exists. However, these habitat types all have distinct geographical distributions or occur only on defined physical environments. The restricted distributions of these habitat types were mapped and presented in my Supplementary Hearing Report (Figures 2 - 5).

35. Further, these habitat types (excluding tussockland below the treeline) are essentially a subset of the LPVT predicted habitat types (Table 3) that were not differentiated and named separately during that analysis (as discussed in

my previous hearing reports). Therefore, these habitat types do not add to the total extent of indigenous biodiversity as presented in Table 3. The split between occurrence on Crown versus private land can reasonably be assumed to mirror the trend shown for the other habitat types presented in Table 3

36. Naturally uncommon habitat types classified as 'Rare' are all habitat types that by virtue of their definition are small in size and geographically restricted. The occurrence of these habitat types within the Region is not common. It can be assumed that regionally, the extent of these habitat types is not considerable.

Long term sustainability of small fragments

37. Stephen Fuller (Supplementary Evidence paragraph 3.4) draws attention to the relationship between size of an area of habitat and its viability or long term sustainability.

38. I agree with Mr Fuller that the smaller the fragment the higher the likelihood that its long term sustainability will be compromised as edge-to-area ratios increase. Without management intervention the smallest, most degraded sites are unlikely to persist through time.

39. However, this conclusion does not quantify at what rate fragments will disappear from the landscape. Factors such as what stage of the degradation cycle the fragment is in, what threats are present, what efforts at management are undertaken and recovery potential of the fragment will all contribute to the persistence or decline of a given fragment over (an undetermined) period of time.

40. In the interim these fragments continue to provide some (albeit compromised and often declining) ecological service by providing a food source, or habitat for fauna, maintaining seed banks in the landscape, maintaining soil health, and in areas of scarce indigenous vegetation cover providing valuable areas of refugia for indigenous plant species. These small and modified fragments are often the last relics of previous forest cover, and maintain strong affinities with pre-clearance forests.

41. Protection of even small and modified fragments allows for persistence (and continued ecological services) in the short-term and potential for management, enhancement and recovery in the medium to long-term.

42. The size criteria in Table E.2 have been recommended in light of classification of the habitat type, landscape connections and values that can be assumed be present. For example, Threatened habitats and areas of habitat supporting threatened species (such as divaricating plant or land snail species) have a small qualifying size threshold (0 – 0.5 ha). Areas of habitat that occur in association with other areas of habitat, also have a small qualifying size threshold (0.5 ha) as the value of such areas will be greater than those values contained within the site itself. It is my opinion that the recommended qualifying thresholds are appropriate as, for the areas of habitat that they are targeted at, it is more likely than not that such areas will posses some ecological value.

43. An alternative approach that has been discussed is a region-wide, assessment of individual fragments to determine value and thus justification for including in Schedule E. This processes, is expensive, time consuming, is never complete and the information becomes dated very quickly.

44. The recommended criteria presented in Table E.2 allows for a Regional approach to maintaining indigenous biodiversity in the absence of field survey, that leads with generic protection and follows with fragment-specific management decisions. It allows for sensible decisions to be made regards the size, condition and function of a given fragment. An important part of the Plan implementation is advice and free-of-charge field visits by Horizons staff. If an area of habitat that has tripped all the criteria in Schedule E truly has no value or function, this can be determined prior to a resource consent being applied for, and the associated costs incurred.

45. By way of example, Mr Fuller's paragraph 3.5 describes a situation that illustrates how an informed assessment and sound decision making can sensibly identify values of an area of habitat that require protection (or enhancement), and practically determine when it is appropriate to allow an activity to occur. The framework of Schedule E and Policy 12-7 combined would reach a similar outcome.

46. Schedule E criteria represents a conservative approach focussed on maintaining indigenous biodiversity across the Region, not on identifying the 'best quality' areas of habitat. I consider the regional benefit to outweigh the likely infrequent undue cost to the individual.

Consideration of condensing of criteria in Table E.2(a)

47. It was suggested that the criteria in Table E.2(a) might be condensed. Although the suggested merging has not necessarily been adopted, Table E.2 has been considerably reworked. This is discussed further below.

Inclusion of photographs of habitat types in Schedule E

48. A suggestion of including photographs of each habitat type in Schedule E was tabled. I agree photographs will be extremely useful in contributing to the understanding and interpretation of Schedule E. However, many of the habitat types will be difficult to informatively illustrate with a single image. A more appropriate location for photographs (and other interpretative information) would be Plan support documents (eg. booklets, brochures or CDs). Such material holds the potential to carry a number of photographs and information in a more end-user friendly format than the Schedule can. I think that such material will enhance the implementation of the Plan greatly.

REDRAFTED SCHEDULE E

49. Schedule E has undergone further considerable revision. Version V of Schedule E (showing tracked changes) is presented in Appendix 1. The changes recommended for Schedule E build on previous revisions (Versions I – IV) and are a combination of advice from experts, hearing evidence, submissions to the Schedule, and requests from the Panel. The recommended changes are summarised in Table 4.

Table 4: Summary of changes made to Schedule E Vas presented in Appendix 1.

Area of Change	Recommended changes
General editing (grammar and corrections) and rewording for simplicity, clarity and legality	• Throughout the Schedule as required.
Use of the word 'indigenous'	• 'Indigenous' removed from the definition of Rare, Threatened, and At Risk habitat types (front-end of the Schedule) to afford confusion with Riparian margin habitat definition (which includes exotic vegetation). • Added 'indigenous' throughout Schedule E as necessary.
Definition of 'indigenous vegetation'	• Deleted from the front-end of the Schedule (this was a consequential change to removing 'indigenous' from the definition of Rare, Threatened, and At Risk habitat types). • Indigenous vegetation defined in explanation at front-end of Table E.1.
Interpreting Schedule E - text and flow diagram	• Minor text changes • Stipulation that consent requirement refers to Schedule E provisions only.
Sub-headings in Table E.1	• Plural added (habitat types) • Vegetation structure (eg. scrub, treeland) has been more explicitly stated. • Wording within sub-headings has been brought into line with Table E.2 • Riparian margin habitat has been merged with the other 'At Risk' habitat types, and no longer has its own sub-heading. • The sub-heading previously reading 'Rare Habitat Types' has been renamed 'Naturally Uncommon Habitat Types Classified as Rare' as this is both more informative and consistent with other sub-headings within the Schedule.
Riparian margin habitat type	• The definition of Riparian margin has been reworded to refer to only woody vegetation where it occurs within 20 m of an area classified as a Site of Significance – Aquatic.
Organisation of habitat types in Table E.1	• Rearranged Table E.1 to group habitat types by vegetation structure and by classification.
References	• References have been deleted from Schedule E, and footnote references removed. • Note at front-end of Schedule referring to availability of references has been removed.
Wetland habitat type definitions and descriptions	• Definitions have been expanded to provide more clarity and to include reference to indigenous wetland vegetation (previously in the 'Further description' column). • Detail on water table, nutrient status and pH have been moved from the 'Definition' to the 'Further description' column in response to submitters

Area of Change	Recommended changes
	comments regarding this was not information readily digested. • Descriptions have been expanded where required to assist easier differentiation between types of wetland habitat. • One wetland type (Marsh wetland) has been added (with Swamp wetland) to provide clarification between swamp and marsh wetland.
Naturally uncommon habitat types classified as Rare	• Fauna information added to 'Further description' column where appropriate. • Clarity provided to detail the importance of 'bare substrate' as a component of Rare habitat types as necessary.
Table E.2	• Editing of subheadings for consistency between Table E.1 and Table E.2. • Reordering criteria (as a consequential change to edits made to the subheadings). • A number of criteria have been condensed or combined where possible. • Deletion of criteria where other criteria, or provisions elsewhere in the Plan provide adequate cover. • Removal of reference to Figure E.1 from all criteria in Table E.1.
Figure E.1	• Figure E.1 has been deleted from the Schedule. The figure was causing confusion and ambiguity and failed to deliver the information it was intended to.
Glossary	• Added definitions for 'continuous', 'discontinuous', and 'canopy', to the glossary. • Schedule E glossary definitions moved to Plan glossary (and edited accordingly). • Asterisks added to all occurrences of words that appear in the glossary.

Fleur Maseyk
16 January 2009

APPENDIX 1

Schedule E: Indigenous Biological Diversity

Rare, Threatened and At Risk habitat types are areas of ~~indigenous~~ vegetation ~~and/or~~ or physical substrate ~~of a type~~ which; a) is identified in Table E1 as being "Rare", "Threatened" or "At Risk~~" respectively~~, and ~~which~~ b) meets ~~the~~ one of the criteria ~~described~~ in Table E2(a) for the relevant habitat type, ~~determining whether an area of indigenous vegetation and/or physical substrate constitutes a "habitat" for the purposes of this Plan~~ and c) is not excluded by one of the criteria in Table E2(b).

~~***Indigenous vegetation*** *refers to an assemblage of species that co-exist together and which provide resources for other species. Indigenous vegetation is vegetation comprised primarily of indigenous species, but which can include exotic species.*~~

It is recommended that a suitably qualified expert is engaged for assistance with implementing Schedule E. This could be:

a) a consultant ecologist
b) Horizons staff (who will provide this service, including advice and a site visit where required in the first instance. It may be that following this initial provision of information, the proposal will require an Assessment of Ecological Effects to be provided as a component of the consent application. In such instances it is recommended that a consultant ecologist be engaged to conduct the assessment).

Horizons can in all cases, provide any spatial data and existing site information where available as relevant to the site and the proposed activity. ~~References referred to in this schedule are available on the internet or from Horizons on request.~~

Interpreting Schedule E:

Q.1 Do I need a resource consent?

YES IF:

A. The area of vegetation ~~and/or~~ or physical substrate is determined to be habitat type classified as 'Rare', 'Threatened' or 'At Risk' as described in Table E.1 **AND** meets any criteria in ~~section (a) of~~ Table E.2(a).

NO IF:

A. The area of vegetation ~~and/or~~ or physical substrate is determined to be habitat type that is not classified in Table E.1

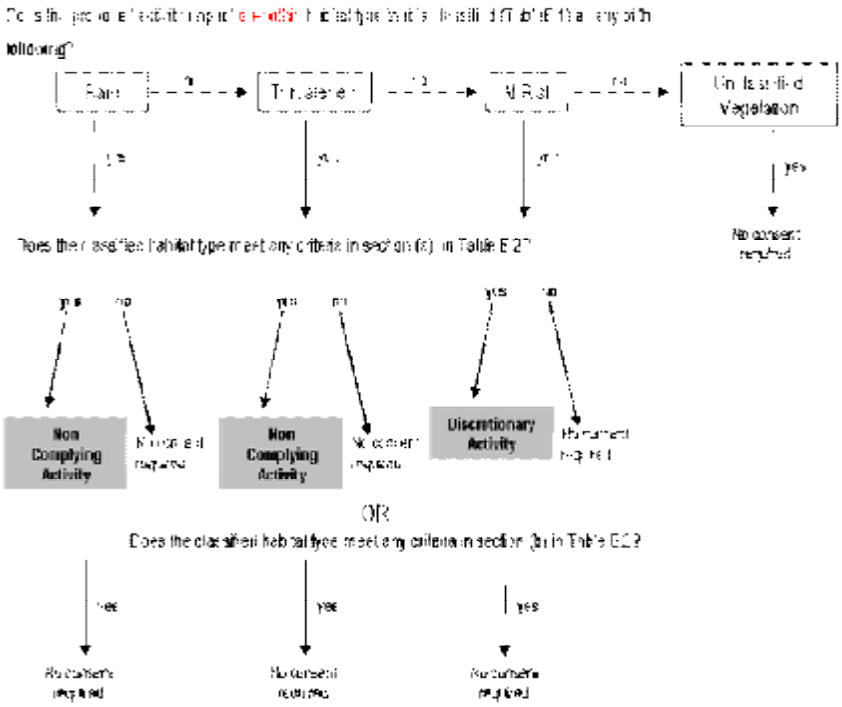
OR

B. The area of vegetation ~~and/or~~ or physical substrate is determined to be habitat type classified as 'Rare', 'Threatened' or 'At Risk' in Table E.1 but **does not** meet any criteria in ~~section (a) of~~ Table E.2(a) ~~or does meet any criteria in section (b) of Table E.2~~(b).

OR

C. The area of vegetation or physical substrate meets any criteria in Table E.2(b).

Q.2 What rule stream classification will my proposal be assessed under?



NB: A consent may be required by rules in this plan that do not rely on Schedule E.

Table E.1:

NOTE: This table describes characteristics of habitat types as they are expressed at the regional scale. The definitions are ecologically accurate and verifiable. ~~Patches of any given habitat type may not exhibit all elements considered characteristic of that habitat type.~~ The 'Further Descriptions' ~~descriptions~~ are ~~not exhaustive~~ to assist plan users and not definitive. Patches of any given habitat type may not exhibit all elements considered characteristic of that habitat type. Some species listed may not be present, or be present in different abundances than indicated. Other species not listed here can also be present. Sites of the same habitat type can exhibit differences to each other. Further, there will likely be differences in predicted composition and actual composition on the ground, particularly as a result of site modification and pest impacts. Unless otherwise stated, the habitat types listed in Table E.1 comprise indigenous vegetation. Indigenous vegetation means an assemblage of indigenous species that co-exist, and that is comprised primarily of indigenous species, but which can include exotic species.

~~The first twelve habitat type names listed in Table E.1 have been taken from Leathwick et al., 2004[1], although some names have been modified for clarity and applicability to the Manawatu-Wanganui Region.~~

Water Management Zones and Sub-zones are described in Schedule D and mapped in Figure E.1. Words followed by an asterisk (*) are defined in the glossary. ~~at the end of the Schedule.~~

Habitat Type Name	Defined As	Classification	Further Description
Forest* and Treeland* Habitat Types Classified as Threatened			
Hardwood/broadleaved forest	Tawa forest* in association* with other indigenous broadleaved* species, or tawa dominated* treeland* ~~Hardwood/broadleaved forest is described as Kauri/taraire-kohekohe-tawa forest in Leathwick et al. 2004[1]~~ ~~NB: kauri, taraire and do not occur naturally in the region.~~	Threatened	Kamahi, hinau and black maire are likely to be common*. Podocarp* species such as kahikatea, rimu or totara may be emergent. Titoki, rewarewa or northern rata may also be a feature. The subcanopy is likely to comprise common* indigenous broadleaved* species. This habitat type is found in hill country north of Wanganui and the east coast at elevations of 0 - 150 m asl.

Habitat Type Name	Defined As	Classification	Further Description
Kahikatea-pukatea-tawa forest	Kahikatea dominated* forest* or treeland* on lowland alluvium and floodplains commonly found in association* with pukatea and tawa. ~~Kahikatea-pukatea-tawa forest is described in Leathwick et al. 2004[1]~~	Threatened	This habitat type is likely to be characterised by the presence of the swamp forest species kahikatea and pukatea. Tawa will be common* on the drier, better drained or raised areas. Matai, rimu and totara can be present but are restricted to areas of better-drained soils. Titoki is also likely to be common*. Kahikatea-pukatea-tawa forest is found on alluvial soils throughout the Region predominantly at elevations between 0 – 350 m but also up to 650 m asl.
Podocarp forest	Podocarp* forest* or treeland* dominated* by matai, kahikatea or totara. ~~Podocarp forest is described as Matai-kahikatea-totara forest in Leathwick et al., 2004[1]~~	Threatened	The dominance of any of these species is dependent on the drainage capability of the soil and history of past disturbance. Totara and matai are likely to be more abundant* on free-draining soils, with kahikatea likely to be dominant* on poorly-drained soils. Indigenous Bbroadleaved* species (for example titoki, tawa, maire and fuchsia) are likely to be found in association* with the podocarp* species, but will be less abundant* than the podocarp* species. Podocarp forest is mostly confined to the Wanganui, Rangitikei and Ruapehu Districts from sea level to 900 m asl.

Habitat Type Name	Defined As	Classification	Further Description
Podocarp/broadleaf-fuchsia forest	~~Dominated* by~~ Ppodocarp~~* species (matai, totara, kahikatea or rimu, at varying levels of abundance)~~ dominated* forest* over a subcanopy of broadleaf and fuchsia, or podocarp* dominated* treeland*. The podocarp* species matai, totara, kahikatea or rimu, will be present at varying levels of abundance*. ~~Podocarp/broadleaf-fuchsia forest is described as Matai-totara-kahikatea-rimu/broadleaf-fuchsia forest in Leathwick et al., 2004[1]~~	Threatened	This habitat type tends to favour adequately drained and reasonably fertile soils. Although typically a feature of this habitat type, fuchsia is favoured by possums and may be uncommon in many areas. Broadleaf (*Griselinia*), and indigenous climbers and epiphytes are also likely to be common*. Kamahi may also be present but typical indigenous broadleaved* species may be lacking. This habitat is largely confined to small isolated areas in high rainfall areas of the hill country in Ruapehu, Wanganui, Tararua and Manawatu Districts from 400 – 900 m asl.
Podocarp/tawa-mahoe forest	Tawa and mahoe dominated* forest* or treeland* with scattered* emergent podocarp* species. ~~Podocarp/tawa-mahoe forest is described as Kahikatea-matai/tawa-mahoe forest in Leathwick et al., 2004[1]~~	Threatened	Kahikatea ~~and/or~~ or matai trees are likely to be present in the canopy or as emergent trees. Rimu and totara may also be present in low numbers. Titoki, hinau, mairie or pukatea may also be present. The subcanopy is likely to comprise common* indigenous broadleaved* species. This habitat type is found on dry dune land and low hill country (from sea level to 750 m asl)

Habitat Type Name	Defined As	Classification	Further Description
Rimu/tawa-kamahi forest	Tawa and kamahi dominated* forest* or treeland*,with scattered* emergent rimu. ~~Rimu/tawa-kamahi forest is described in Leathwick et al., 2004[1].~~	*Threatened*	Hinau, rewarewa or mahoe are likely to be common*. Rimu may be a feature of this habitat type, although its frequency will be dependent on the history of disturbance of the site. Miro and totara may also be present with kahikatea and matai likely to be less common*. Pukatea is commonly likely to be present, particularly in valleys. Black beech may be locally common* on dry ridges in hill country (eg. inland from Wanganui). Common* indigenous broadleaved* species are also likely to be present in the understorey. Rimu/tawa-kamahi forest can be found in all Districts of the Region from sea level to 800 m asl.
Podocarp/red beech-kamahi-tawa forest	Red beech, kamahi and tawa dominated* forest* or treeland* occurring ~~in mid-altitudinal zones~~ between 400 – 700 m asl. ~~Podocarp/red beech-kamahi-tawa forest is described as Rimu-miro/tawari-red beech-kamahi-tawa forest in Leathwick et al., 2004[1]~~	Threatened	Podocarp* species such as rimu, Hall's totara, and miro may be present scattered* through the canopy, or as emergent trees. Indigenous broadleaved* species may also be present in the subcanopy and understorey. At the higher altitudes of the range of this habitat type, silver beech becomes increasingly dominant*. Podocarp/red beech-kamahi-tawa forest is largely confined to the Rang 2b Water Management Sub-zone.

Habitat Type Name	Defined As	Classification	Further Description
Podocarp/black beech/mountain beech forest	Black beech and mountain beech dominated* forest* or treeland* occurring ~~at mid-altitudinal zones~~ between 400 – 1250 m asl. ~~Podocarp/black beech/mountain beech forest is described as Matai-totara/black beech/mountain beech forest in Leathwick et al., 2004[1]~~	Threatened	Emergent podocarp* species (eg. matai, totara, kahikatea, rimu or miro) can be present as emergent trees, but are not dominant*. Small indigenous broadleaf trees are also likely to be present. This habitat type is found in dry climates, on free draining, relatively fertile soils.
Hall's totara/silver beech-kamahi forest	Silver beech dominant* forest* or treeland* in association* with abundant* kamahi occurring between 750 – 1400 m asl. ~~Hall's totara/silver beech-kamahi forest is described as Hall's totara/silver beech-kamahi-southern rata forest in Leathwick et al. 2004[1]~~	Threatened	Podocarp*species such as Hall's totara, pahautea, totara, rimu and miro are likely to be emergent at lower elevations where silver beech is less dominant*. Northern rata may be scattered* throughout, although its relative abundance is strongly influenced by the effects (current or historic) of possum. This habitat type is found in the montane areas of the Rangitikei and Manawatu Districts.

Habitat Type Name	Defined As	Classification	Further Description
Kowhai-broadleaved forest	*Forest* or treeland* dominated* by kowhai growing on river terraces, river risers or cliffs and bluffs associated with rivers.*	*Threatened*	Kowhai-broadleaf forest is typically low-growing forest* or treeland*, often with a mixture of small tree species and shrubs including lacebark, ribbonwood, kanuka and indigenous divaricating shrubs. The absence of a dense canopy of tawa or kamahi from this habitat type is notable. This habitat type is found in the central area of the Region, within the following Water Management Sub-zones: Akit_1a, Akit_1b, Akit_1c, Mana_1a, Mana_1b, Mana_1c, Mana_7a, Mana_7b, Mana_7c, Mana_7d, Mana_12d, Rang_2b, Rang_2e, Rang_2f, Rang_2g, Rang_3a, Rang_3b, Rang_4c, Whai_6, Whai_7a, Whai_7c, Whai_7d, Whau_2, Whau_3a, Whau_3e, Tura_1a, Tura_1b.
Kanuka forest	*Kanuka forest* or treeland* is dominated* by almost pure stands of well-developed kanuka. This habitat type ~~can be~~ is differentiated from kanuka scrub* by size (greater than 4.5 m tall or 20 cm diameter (taken at diameter at breast height (dbh)).*	*Threatened*	Manuka and typical indigenous broadleaved* species can also be present scattered* through the canopy or understorey but will not be dominant*.
Forest*, Treeland*, Scrub* of Shrubland* Habitat Types Classified as At Risk			

Habitat Type Name	Defined As	Classification	Further Description
Podocarp/kamahi forest	*Podocarp* forest* or treeland* dominated* by rimu, miro, kahikatea, matai or totara in varying dominance over abundant* kamahi.* ~~*Podocarp/kamahi forest is described as Rimu-matai-miro-totara/kamahi forest and Rimu-miro-totara/kamahi forest in Leathwick et al., 2004*~~[1]	*At Risk*	The degree of dominance of each of the podocarp* species will be dependent on soil drainage and past disturbance history. Totara, miro and matai are likely to be more abundant* on free-draining soils, with kahikatea likely to be dominant* on poorly-drained soils. Rimu will likely dominant* in areas of high rainfall. Tawa, northern rata, hinau, black and white mairie, fuchsia and/or mahoe may also be present. Podocarp/kamahi forest can be found throughout the region, excluding the western lowland area, predominately at elevations between 150 – 900 m asl. However, Podocarp/kamahi forest can also be found between 50 – 1100 m asl.

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Habitat Type Name	Defined As	Classification	Further Description
Hall's totara/broadleaf forest	Hall's totara and broadleaf dominant* forest* or treeland* in montane sites lacking beech. ~~Hall's totara/broadleaf forest is described in Leathwick et al., 2004[1]~~	*At Risk*	Pahautea can be co-dominant* in this habitat type, but is absent from the northern Tararua Ranges, where mountain toatoa is likely to be locally common*. Matai and miro can be present at the lower altitudes in this habitat type. Kamahi can also be a component of this habitat type, and will be more common* in wetter climates. Rimu is not a feature of this habitat type as Hall's totara/broadleaf forest is mostly found above the altitudinal limit of rimu. Hall's totara/broadleaf forest is the dominant* habitat type above 800 m asl where beech is absent, but can also be found to elevations as low as 450 m asl.
~~*Podocarp/red beech-kamahi-tawa forest*~~	~~Red beech, kamahi and tawa dominated* forest* found in mid-altitudinal zones (400 – 700 m asl).~~ ~~Podocarp/red-beech-kamahi-tawa forest is described as Rimu-miro/tawari-red beech-kamahi-tawa forest* in Leathwick et al., 2004[1]~~	~~Threatened~~	~~Podocarp* species such as rimu, Hall's totara, and miro may be present scattered* through the canopy, or as emergent trees. Broadleaved* species may also be present in the subcanopy and understorey. At the higher altitudes of the range of this habitat type, silver beech becomes increasingly dominant*.~~ ~~Podocarp*/red beech-kamahi-tawa forest* is largely confined to the Rang_2b Water Management Sub-zone and can be found from 400 – 700 m asl.~~

Habitat Type Name	Defined As	Classification	Further Description
Podocarp/black beech/mountain beech forest	Black beech and mountain beech dominated* forest* found at mid-altitudinal zones (400 – 1250 m asl). Podocarp/black beech/mountain beech forest is described as Matai-totara/black beech/mountain beech forest in Leathwick et al., 2004[1]	Threatened	Emergent podocarp* species (eg. matai, totara, kahikatea, rimu or miro) can be present as emergent trees, but are not dominant*. Small broadleaf trees are also likely to be present. This habitat type can be found mostly at mid-altitudinal zones, (with a range of between 400 – 1250 m asl) in dry climates, on free draining, relatively fertile soils.
Hall's totara/silver beech-kamahi forest	Silver beech dominant* forest* commonly in association* with abundant* kamahi. Hall's totara/silver beech-kamahi forest is described as Hall's totara/silver beech-kamahi-southern rata forest in Leathwick et al. 2004[1]	Threatened	Podocarp* species such as Hall's totara, pahautea, totara, rimu and miro are likely to be emergent at lower elevations where silver beech is less dominant*. Northern rata may be scattered* throughout, although its relative abundance is strongly influenced by the effects (current and/or historic) of possum. This habitat type is found at high elevations (750 – 1400 m asl) in the montane areas of the Rangitikei and Manawatu Districts.

Habitat Type Name	Defined As	Classification	Further Description
Mountain beech forest	Mountain beech dominated forest* or treeland*. ~~often occuring without many other tree species.~~ ~~Mountain beech forest is described in Leathwick et al, 2004[1]~~	*At Risk*	This habitat type often occurs without many other tree species, although upland conifers (eg. Hall's totara, pahautea, and mountain toatoa) and other species (eg. silver beech, broadleaf) may be present (but not common*) in places, especially at lower elevations or where rainfall is higher. The understorey of mountain beech forest is typically sparse. Mountain beech can tolerate cold temperatures, dry winds, and thin, low fertility soils. Mountain beech forest can ~~dominant*~~ be the predominant habitat type at higher altitudes (650 – 1450 m asl), especially on eastern sites and in areas with harsh (stress-prone) environmental conditions.

Habitat Type Name	Defined As	Classification	Further Description
Kowhai broadleaved forest	*Forest* dominated* by kowhai growing on river terraces, river risers or cliffs and bluffs associated with rivers.*	*Threatened*	Kowhai broadleaf forest is typically low-growing forest* often with a mixture of small tree species and shrubs including lacebark, ribbonwood, kanuka and divaricating shrubs. The absence of a dense canopy of tawa or kamahi from these forest* is notable. This habitat type is found in the central area of the Region, within the following Water Management Sub-zones: Akit_1a, Akit_1b, Akit_1c, Mana_1a, Mana_1b, Mana_1c, Mana_7a, Mana_7b, Mana_7c, Mana_7d, Mana_12d, Rang_2b, Rang_2e, Rang_2f, Rang_2g, Rang_3a, Rang_3b, Rang_4c, Whai_6, Whai_7a, Whai_7c, Whai_7d, Whau_2, Whau_3a, Whau_3e, Tura_1a, Tura_1b.
*Kanuka forest**	*Kanuka forest* is dominated* by almost pure stands of well-developed kanuka. Kanuka forest* can be differentiated from kanuka scrub* by size (greater than 4.5 m tall or 20 cm diameter (taken at diameter at breast height (dbh)).*	*Threatened*	Manuka and common* broadleaved* species can also be present scattered* through the canopy or understorey but will not be dominant*.

Habitat Type Name	Defined As	Classification	Further Description
Indigenous ~~F~~forest or scrub* ~~habitat~~ on alluvial terrace, floodplains, shingle fans or sand dunes supporting divaricating plant species*	*Indigenous ~~F~~forest*, treeland*, or scrub* on alluvial terraces or floodplains in areas prone to summer drought, and water-logging and frost during winter that provides habitat for any of the following:* Gardners tree daisy (*Olearia gardnerii*), heart-leaved kohuhu (*Pittosporum obcordatum*), *Coprosma obconica,* *Coprosma wallii*, *Melicytus flexuosus*, fierce lancewood (*Pseudopanax ferox*), OR *Indigenous ~~F~~forest*, treeland*, or scrub* on freely draining shingle fans, river terraces and sand dunes that provides habitat for matagouri (*Discaria toumatou*).*	*At Risk*	This habitat type supports threatened or regionally uncommon divaricating plant species. This habitat type may be disturbed (naturally or human induced), contain exotic species, or other indigenous divaricating species than those listed here, or be found in association* with another habitat type (eg. Podocarp-broadleaf forest). Although these species may occur together or in isolation throughout the Region, this habitat type is mostly found in the Middle Rangitikei Water Management Zone (Rang_2), with matagouri mostly found on sand country of the west coast of the Region, the East Coast Management Zone (East_1) and the Upper Whangaehu (Whau_1).

Habitat Type Name	Defined As	Classification	Further Description
Indigenous forest*, treeland* or scrub* supporting *Powelliphanta* land snails	Indigenous forest*, treeland* or scrub* supporting either Powelliphanta traversi traversi or Powelliphanta traversi tararuaensis land snails. *This habitat type is found in Lake Papaitonga (West 8), Lake Horowhenua (Hoki 1a), Kahuterawa (Mana 11c), and Mangaore (Mana 13d) Water Management Sub-zones.*	*At Risk*	*Powelliphanta traversi traversi* may be found under leaf litter of forest* or treeland* on the Horowhenua Plains comprising pukatea, kahikatea and maire tawake in wet sites, and tawa, kohekohe, karaka, and totara in drier sites. *Powelliphanta traversi tararuaensis* may be found under leaf litter and bush rice grass in forest* or treeland* comprising rimu and miro with rewarewa and pigeonwood in sites with seepages, and where fertile alluvial soils or litter have accumulated, or scrub* dominated by wheki. Either species of land snail may be present in even small and modified fragments of this habitat type.
~~*Lowland forest* supporting Powelliphanta land snails*~~	~~*Lowland forests* on deep moist soils of the Horowhenua Plains containing land snails (Powelliphanta traversi traversi). This forest* is dominated* by pukatea, kahikatea, and maire tawake in wet areas, and tawa, kohekohe, karaka, and totara in drier areas.*~~ ~~*This habitat type is described in Walker, 2003*[2]~~	~~*At Risk*~~	~~This habitat type supports the threatened land snail *(Powelliphanta traversi traversi)* which can be found under leaf litter.~~ ~~This species of land snail is known from the Lake Papaitonga (West_8) and Lake Horowhenua (Hoki_1a) Water Management Sub-zones, and may be present in even small and modified fragments of this habitat type.~~

Habitat Type Name	Defined As	Classification	Further Description
~~*Mid-altitudinal forest* supporting Powelliphanta land snails*~~	~~*Mid-altitudinal (460-610 m asl) forest* dominated* by rimu and miro with rewarewa and pigeonwood, OR low-growing scrub* dominated* by the tree fern wheki that contains land snails (Powelliphanta traversi tararuaensis).*~~ ~~*This habitat type is described in Walker, 2003*~~[2]	~~*At Risk*~~	~~*This habitat supports the threatened land snail (Powelliphanta traversi tararuaensis), which can be found under leaf litter and bush rice grass in areas where seepages are common* and fertile alluvial soils or litter have accumulated.*~~ ~~This species of land snail occurs in the Kahuterawa (Mana_11c) and Mangaore (Mana_13d) Water Management Sub-zones, and may be present in even small and modified fragments of this habitat type.~~
~~*Riparian Habitat Type*~~			
Riparian margin	*Any* *woody* *vegetation (forest*, treeland*, scrub*, or shrubland*),* ~~*whether*~~ *indigenous or* ~~*not*~~ *exotic, and including that classified elsewhere in Schedule E~~)*, within 20 m of a*~~*n area site as*~~ *identified in Schedule D as being a Site of Significance-Aquatic.*	*At Risk*	*Riparian margin vegetation* ~~*can*~~ *comprises woody indigenous vegetation, woody exotic vegetation, or a combination of both woody indigenous and exotic vegetation.* ~~*and of any structure*~~[3]~~.~~ *This habitat type varies greatly between* ~~*patches*~~ *sites in both structure and composition, and might be highly modified, contain artificial assemblages of species or include deliberately planted woody species (indigenous or exotic).*
Tussockland* Habitat Type Classified as At Risk			

Habitat Type Name	Defined As	Classification	Further Description
Indigenous ~~T~~tussockland below the treeline*	Red tussock dominated* tussockland*~~3~~ below the treeline in areas with frequent natural or human induced disturbance regimes ~~that may be natural or human induced~~, high water tables ~~and/or~~ or temperature inversions.	*At Risk*	Red tussock is particularly dominant* in humid climates on moist soils. Other tussock species that can be present include silver tussock and blue tussock. Silver tussock ~~(although common*)~~ will be more important on higher fertility, frequently disturbed areas. Blue tussock may be uncommonly present as an inter-tussock species amongst red tussock. ~~Native~~ Indigenous and exotic woody species (eg. heather, monoao, Hebe, manuka and kanuka) are likely to be increasingly present ~~abundant*~~ as natural successional processes advance. This habitat type can be found in Rang_1, Rang_2a, Rang_2b, Rang_2c, Rang_2d, Rang_2e, and Rang_2f, Water Management Sub-zones.
Wetland Habitat Types Classified as Rare or Threatened			
Dune slack wetland	*Dune slack wetlands support low-growing indigenous herbfield* and occur in ~~areas~~ topographically low sites where wind has eroded hollows or depressions in raw sand, or ~~a topographically low areas~~ where water is permanently or seasonally ponded. ~~As per Johnson & Gerbeaux, 2006[4] and Williams et al., 2006 & Williams et al., 2007[5]~~	*Rare*[6]	~~Dune slack wetlands typically support low growing herbfields*~~[3]. Dune slack wetlands are found close to the sea on sand country, and can comprise a mosaic of indigenous vegetation and bare sand. Exotic species are frequently present.

Habitat Type Name	Defined As	Classification	Further Description
Ephemeral wetland	*Ephemeral wetlands* support indigenous turf (<3 cm tall) species, indigenous rushland* and indigenous scrub*, *are ~~usually of moderate fertility, and neutral pH,~~* most frequently found in depressions lacking a surface outlet, and are *characterised by a marked seasonal ~~high water table,~~ ponding and drying. ~~Change in water levels can be very dramatic to the point of complete drying and fluctuations between aquatic and terrestrial plant species can occur. Ephemeral wetlands are feed by ground water or a adjacent water body.~~* ~~*As per*~~ ~~*Johnson & Gerbeaux, 2006*~~[4] ~~*and*~~ ~~*Williams et al., 2006 & Williams et al., 2007*~~[5]	*Rare*~~[6]~~	~~Ephemeral wetlands typically support turf habitat (generally < 3 cm tall). Turf habitat contains 62% of New Zealand's threatened or uncommon plants. Ephemeral wetlands can also support rushland*~~[2]~~ and scrub*.~~ Ephemeral wetlands are of moderate fertility, neutral pH and fed by ground water or an adjacent water body. Seasonal variations in rainfall and evaporation result in seasonal variation in water level. Ephemeral wetlands may experience complete drying in summer months or dry years. Ephemeral wetlands are found on sand country (although they also occur elsewhere), and may comprise a mosaic of indigenous vegetation and bare sand. Fluctuations between aquatic and terrestrial plant species often occur and exotic species are frequently present.

Habitat Type Name	Defined As	Classification	Further Description
Bog and fen wetland	~~*These wetland classes are often found in association* with each other.*~~ *Bog wetlands support indigenous mosses, lichens, cushion plants, sedges, grasses, restiads, ferns, shrubs and trees and are formed on peat with rainwater the only source of water. ~~Bogs are nutrient poor, poorly drained and aerated and usually acid. The water table is usually close to or just above the ground surface.~~* *Fen wetlands support indigenous restiads, sedges, ferns, tall herbs, tussock grasses and scrub* and are ~~wetlands of low to moderate acidity and fertility with a substrate~~ formed ~~of~~ on predominantly peat. Fen wetlands ~~R~~receive~~s~~ inputs from ground water and nutrients from adjacent mineral soils. ~~The water table is usually close to or just below the surface.~~* ~~*As per*~~ ~~*Johnson & Gerbeaux, 2006[4]*~~	*Threatened*	*Bog wetlands can be found on relatively level or gently sloping ground including hill crests, basins, terraces and within other wetland classes. Bogs are nutrient poor, poorly drained and aerated, and usually acid. The water table is often close to or just above the ground surface. ~~Bogs can support mosses, lichens, cushion plants, sedges, grasses, restiads, ferns, shrubs and trees.~~* *Fen wetlands can be found on slight slopes (eg. fans), toes of hillsides, or on level ground where peat hasn't accumulated much. Fen wetlands can grade into swamp wetland. ~~Fens support restiads, sedges, ferns, tall herbs, tussock grasses and scrub*~~. Fens are of low to moderate acidity and fertility and the water table is usually close to or just below the surface.* Bogs and fens are often found in association* with each other, and are dominated by indigenous species but exotic species can also be present.

Habitat Type Name	Defined As	Classification	Further Description
Pakihi wetland	*Pakihi wetlands support indigenous restiads, sedges, fernland*, shrubland* and heathland*. Pakihi wetlands are rain-fed systems on mineral or sometimes peat, ~~substrate~~ or mature, skeletal soils. ~~of very low fertility and low pH and can be seasonally dry.~~* ~~*As per Johnson & Gerbeaux, 2006[4] and Williams et al., 2006 & Williams et al., 2007[5]*~~	*Rare*~~[6]~~	*Pakihi wetlands can be found on level to rolling or sloping land in areas of high rainfall ~~and old soils~~. Pakihi wetlands are of very low fertility and low pH and are frequently saturated but can be seasonally dry.* ~~Pakihi can support restiads, sedges, fernland*, shrubland*[3] and heathland*[7].~~ Pakihi wetlands are often found in association* with bog~~s~~ and fen wetlands. Exotic species can also be present.

Habitat Type Name	Defined As	Classification	Further Description
Seepage and spring wetland	*Seepage wetlands support indigenous sedgeland*, cushionfield*, mossfield* or scrub*, occur on slopes, and are feed by groundwater.* *A spring wetland occurs at the point that an underground stream emerges at a point source.* ~~*Wetlands that occur in association* with areas of water that have percolated to the surface, with the volume of water present at seepages being less than that at springs. Substrates, nutrient levels and pH can vary from site to site.*~~ ~~*As per*~~ ~~*Johnson & Gerbeaux, 2006*[4]~~ ~~*and*~~ ~~*Williams et al., 2006 & Williams et al., 2007*~~[5]	*Rare*[6]	Seepage and spring wetlands can be found at the point of change of slopes and places where the water table is raised. Seepage wetlands are often also feed by surface water including where groundwater has percolated to the surface. Substrates (ranging from raw or well-developed mineral soil to peat), nutrient levels and pH varies from site to site. ~~These wetlands can support sedgeland*, cushionfield*, mossfield* or scrub*.~~[3] Seepages and spring wetlands are often small and can occur as isolated systems or in association* with other wetland types. The volume of water within a seepage system is less than that within a spring system. Seepage and spring wetlands are dominated by indigenous species but exotic species can also be present.

Habitat Type Name	Defined As	Classification	Further Description
Swamp and marsh wetland	*Swamp and marsh Wwetlands support indigenous sedges, rushes, reeds, flaxland*, tall herbs, herbfield*, shrubs, scrub* and forest*.* *Swamp wetlands are of generally high fertility, receiving nutrients and sediment from surface water runoff and groundwater. Substrates are generally a combination of peat and mineral. Standing water and surface channels are often present, with the water table either permanently, or periodically, above much of the ground surface.* *Marsh wetlands are mineral wetlands with good to moderate drainage that are mainly groundwater or surface water fed and characterised by fluctuation of the water table.* *As per Johnson & Gerbeaux, 2006[4]*	*Threatened*	*Swamp and marsh wetlands can usually be found on plains, valley floors and basins. Swamps can support sedges, rushes, reeds, flaxland*, tall herbs, shrubs scrub* and forest*[3].* Substrates within swamp and marsh wetlands are generally a combination of peat and mineral substrates. Standing water and surface channels are often present, with the water table either permanently, or periodically, above much of the ground surface. Swamp and marsh wetlands can usually be found on plains, valley floors and basins. Marsh wetlands can be differentiated from swamp wetlands by having better drainage, generally a lower water table and usually a more mineral substrate and higher pH. Exotic species are frequently present in both wetland types.
Saltmarsh wetland	*Saltmarsh wetlands support herbfield*, rushland* and scrub*, form within areas of tidal intertidal zones, and are fed from groundwater and estuary waters. Saltmarsh wetlands occur in association* with mudflats. within areas of tidal and saline influences (tidal and inter-tidal zones). Water sources come from ground water and adjacent saline or brackish waters.* *As per Johnson & Gerbeaux, 2006[4]*	*Threatened*	*Saltmarsh can support herbfield*, rushland* and scrub*[3] and occur in association* with mudflats.* *Water within a saltmarsh wetland can be saline or brackish. Substrates are typically mineral.* *Saltmarsh wetland can comprise a mosaic of indigenous species and bare substrate(mudflats). Exotic species can be present. In some places the mudflats can be extensive and are characteristic of estuarine wetland systems.*

Habitat Type Name	Defined As	Classification	Further Description
Lakes and lagoons and their margins ~~(including dune lakes)~~	*Lakes and lagoons support indigenous aquatic plants (emergent, floating, submerged or rafted), and indigenous rushes, reeds, sedges, sedgeland*, flaxland*, reedland* turf (< 3 cm tall), herbfield*, scrub* and shrubs on the margins. Indigenous terrestrial vegetation (such as scrub*, shrub species, shrubland*, treeland* and forest*) can also be found in association* with lake and lagoon margins.* *Lakes are areas of standing (non-flowing) water. Lagoons are shallow lakes, connected to, or independent of, a river, lake or the sea.* *~~Lakes in the Manawatu-Wanganui Region are associated with dune, river (including ox-bow lakes) and volcanic landforms.~~* *~~As per Johnson & Gerbeaux, 2006[5]~~*	*Threatened*	*Lakes and lagoons in the Manawatu-Wanganui Region are associated with dune, river, and volcanic landforms and include dune lakes, ox-bow lakes and tarns.* *Lakes and lagoons can exist in isolation, or entirely within ~~a swamp~~, or have elements of, other wetland habitat type. ~~on the lake margins. Lakes can also have terrestrial habitat on the lake margins.~~* *Exotic species (aquatic, wetland or terrestrial) may also be present.*
Naturally ~~Rare~~ Uncommon Habitat Types Classified as Rare			

Habitat Type Name	Defined As	Classification	Further Description
Cliffs, scarps and tors	*Where bare substrate, indigenous lichenfield*, tussockland*, herbfield*, shrubland* or scrub*~~3~~ occurs on cliffs (including coastal cliffs), scarps or tors of any rock type.* *OR* *Where bare substrate or herbfield*~~3~~ dominated* by indigenous species occurs on flat land at the top of coastal cliffs.* ~~*As per Williams et al., 2006 & Williams et al., 2007*~~~~5~~	*Rare*	Vegetation types typically found in this habitat include indigenous lichen species, non-woody or low-growing semi-woody herbs, tussocks, shrubs and scrub*. Species characteristic of these vegetation types include, for example, *Pimelea*, sea primrose, *Selliera*, *Myosotis*, shore puha, flax, toetoe, *Astelia*, *Hebe*, daisy species, kawakawa, mahoe and broadleaf. Exotic species may also be present.
Karst systems	*Bare substrate, indigenous shrubland*, tussockland*, flaxland*, or herbfield*~~3~~, occurring in sinkholes, cave entrances, caves and cracks in karst systems.* ~~*As per Williams et al., 2006 & Williams et al., 2007*~~~~5~~	*Rare*	Karst systems ~~can be~~ are found on limestone, marble, dolomite or calcareous rock, and be subterranean or semi-subterranean. Karst systems provide habitat for highly specialised indigenous species (often endemic) that are adapted to subterranean environments. Karst systems are known in the Region from the Whanganui and Pohangina Valleys.

Habitat Type Name	Defined As	Classification	Further Description
*Screes and boulderfields**	*Bare substrate, indigenous lichenfield*, shrubland*, scrub* or forest*[3] occurring on screes or boulderfields* of any rock type.* ~~*As per Williams et al., 2006 & Williams et al., 2007*[5]~~	*Rare*	Includes slopes covered in shingle, cobbles or rock (of any rock type) which may or may not support vegetation. Bare substrate is a characteristic ~~dominant*~~ feature of this habitat type. Screes and boulderfields* are often found associated with a larger cliff or slope. They provide habitat for lizards including the threatened small scaled skink (*Oligosomia microlepis*) which is endemic to the Region. Exotic species may also be present.
*Active duneland**	*Indigenous ~~G~~grassland* or sedgeland*[3] occurring on active duneland* formed on raw coastal sand.* ~~*As per Williams et al., 2006 & Williams et al., 2007*[5]~~	*Rare*	Active duneland* is characterised by unstable sands. This continual instability of sand prevents the formation of soil and therefore the vegetation type that an active duneland* can support is limited. Examples are Spinifex grassland* and pingao sedgeland*. Other indigenous species can also be present eg. sand convolvulus and sand Carex. Exotic species will also be present. The instability of the sand provides constant disturbance and therefore creates environments within which species can establish. Continual change of the mosaic of bare sand and vegetation is an important component of active duneland.

Habitat Type Name	Defined As	Classification	Further Description
*Stable duneland**	*Indigenous ~~G~~grassland*, tussockland*, herbfield*~~[3]~~ (including* Pimelea actea *and* P. arenaria*), or shrubland*~~[3]~~ occurring on stable duneland* formed on recent coastal sand. ~~*As per*~~ ~~*Williams et al., 2006 & Williams et al., 2007*~~~~[5]~~	*Rare*	Vegetation types typically occuring on stable duneland* include; tussocks, low-growing or semi-woody herbs and shrubs. These vegetation types characteristically support, for example, toetoe, *Selliera rotundifolia*, sand Gunnera, native spinach, sand Coprosma, sand daphne, coastal tree daisy, pohuehue, tauhinu, Coprosma species and hangehange. Exotic invasive species are also a feature of stable duneland*. The threatened species *Pimelea actea* is known from the Tura_1b, West_5, and Whau_4 Water Management Zones.
*Inland duneland**	*Indigenous ~~S~~scrub*, tussockland*, herbfield* or forest*~~[3]~~ occurring on inland duneland* formed on raw or recent sands inland. ~~*As per*~~ ~~*Williams et al., 2006 & Williams et al., 2007*~~~~[5]~~	*Rare*	Vegetation types typically found on inland duneland* include; tussock, low-growing or semi-woody herbs, shrubs, and tall trees and trees. These vegetation types characteristically support, for example, toetoe, flax, native spinach, manuka, kanuka, mahoe, lancewood, five-finger, hangehange, cabbage trees; titoki, akeake, ngaio, tawa, pigeonwood and mahoe. Exotic species may also be present.

~~[1] Leathwick, J., McGlone, M., Walker, S. and Briggs, C. 2004. *Predicted Potential Natural Vegetation of New Zealand* (poster). Landcare Research Ltd. Lincoln New Zealand.~~

~~[2] Walker, K.J. 2003. Recovery plans for *Powelliphanta* land snails 2003 – 2013. *Threatened Species Recovery Plan 49*. Department of Conservation, Wellington.~~

~~[3] Vegetation structure is defined as per Atkinson, I.A.E. 1985. Derivation of vegetation mapping units for an ecological survey of Tongariro National Park, North Island, New Zealand. *New Zealand Journal of Botany 23:361-378* and detailed in the glossary.~~

~~[4] Johnson, P. & Gerbeaux, P. 2004. *Wetland Types in New Zealand*. Department of Conservation, Wellington.~~

[5] Williams. P.A., Wiser, S., Clarkson, B., Stanley, M. 2006. A physical and physiognomic framework for defining and naming originally rare terrestrial ecosystems: first approximation. *Landcare Research Internal Report: LCO506/185.* Landcare Research New Zealand Ltd.

Williams. P.A., Wiser, S., Clarkson, B., Stanley, M. 2007. New Zealand's historically rare terrestrial ecosystems set in a physical and physiognomic framework. *New Zealand Journal of Ecology 31(2): 119-128.*

[6] Wetland habitat found on active, stable or inland duneland* have been identified as Rare habitat type according to Williams *et al.*, 2006.

[7] Definition follows Johnson, P. & Gerbeaux, P. 2004. *Wetland Types in New Zealand.* Department of Conservation, Wellington and is defined in the glossary.

Table E.2:

(a) An area of any habitat type described in Table E.1, ~~is also required to meet any~~ must meet at least one of the following criteria ~~to be considered~~ that apply to the relevant habitat type before it qualifies as a Rare, Threatened or At Risk habitat for the purposes of this plan:

Forest*, Treeland*, Scrub* or Shrubland* Habitat Types Classified as Threatened or At Risk

i. Areas of continuous* indigenous vegetation where:
   - a) if it is habitat type classified as Threatened then the habitat must cover at least 0.25 ha, or
   - b) if it is habitat type classified as At Risk then the habitat must cover at least 0.5 ha where:
     - it supports indigenous understorey vegetation, or
     - it is present within a gully system, or
     - where one or more other areas of indigenous vegetation (covering at least 0.5 ha) is present up to 500 m away. Or
   - c) if it is habitat type classified as At Risk the habitat must cover at least 1 ha unless b) above applies. Or

ii. Areas of discontinuous* indigenous vegetation where:
   - a) if it is habitat type classified as Threatened where it occurs as treeland* it covers at least 1 ha, or
   - b) if it is habitat type classified as At Risk where it occurs as treeland* it covers at least 2 ha, or
   - c) if it is habitat type classified as either Threatened or At Risk it covers at least 1 ha and where it is present within 50 m of an area of continuous* indigenous vegetation it covers at least 0.5 ha. Or

~~iii. covering at least 0.25 ha within any Water Management Sub-zone coded red (Figure E.1). Or~~

~~iv. Areas of continuous* indigenous vegetation covering at least 1 ha within any Water Management Sub-zone coded orange or yellow (Figure E.1). Or~~

~~v. Areas of continuous* indigenous vegetation covering at least 0.5 ha, where one or more other areas of indigenous habitat (covering at least 0.5 ha), is present up to 500 m away. Or~~

~~vi. Areas of continuous* indigenous vegetation covering at least 0.5 ha that support indigenous understorey vegetation. Or~~

~~vii. Discontinuous* indigenous vegetation covering at least 1 ha present within 50 m of an area of continuous* indigenous vegetation covering at least 0.5 ha. Or~~

~~viii. Areas of indigenous vegetation covering at least 0.5 ha in gully systems. Or~~

~~ix. Areas of continuous* indigenous vegetation within 5 m of a river bed and covering at least 0.1 ha and~~

~~extending at least 100 m along the length of the river. Or~~

x. Areas containing *Olearia gardnerii, Pittosporum obcordatum, Coprosma obconica, Coprosma wallii, Melicytus flexuosus, Pseudopanax ferox* or *Discaria toumatou* covering at least 0.1 ha. Or

xi. An area of indigenous vegetation of any size containing *Powelliphanta* land snails. Or

xii. An area of vegetation of any size or species composition (including exotic vegetation) within 20 m of an area identified in Schedule D as being a Site of Significance – Aquatic. Or

xiii. Areas of indigenous vegetation that have been established for the purpose of habitat manipulation including habitat creation, restoration and buffering, where such an area covers at least 1 ha as a discrete site or at least 0.5 ha where it is adjacent to an existing area of indigenous habitat. Or

~~Treeland* Habitat Type Classified as Threatened or At Risk~~

~~xiv. Areas of habitat type classified as Threatened were it occurs as treeland* over at least 1 ha. Or~~

~~xv. Areas of treeland* over at least 1 ha within any Water Management Sub-zone coded red (Figure E.1) Or~~

~~xvi. Areas of treeland* over at least 2 ha within any Water Management Sub-zone coded orange or yellow (Figure E.1) Or~~

~~Riparian Habitat Type Classified as At Risk~~

~~xvii. An area of vegetation of any size or species composition (including exotic vegetation) within 20 m of an area identified in Schedule D as being a Site of Significance – Aquatic. Or~~

~~Grassland~~ Tussockland* Habitat Type Classified as At Risk

xviii. An area of ~~grassland~~ indigenous tussockland* covering at least 0.5 ha. Or

Wetland Habitat Types Classified as Threatened

xix. ~~Open water associated with wetland habitat, excluding stock ponds, less than 0.5 ha in area. Or~~

xx. Areas of naturally occuring indigenous wetland habitat ~~either in association* with open water (fresh or estuarine), or excluding open water~~, covering at least 0.1 ha. Or

xxi. Areas of indigenous vegetation that have been established in the course of wetland habitat restoration. Or

xxii. Areas of artificially created wetland habitat covering at least 0.5 ha excepting areas that met any criteria in Table E.2(b). ~~(b)vi, (b)vii, (b)viii or (b)ix.~~ Or

Naturally ~~Rare~~ Uncommon Habitat Types and Wetland Habitat Types Classified as 'Rare'

xxiii. ~~Areas of indigenous vegetation and/or naturally occuring bare substrate that form part of a re~~ Habitat type that is classified as Rare that covers at least 0.05 ha. Or

xxiv. Areas of indigenous habitat created at some time in the course of dune habitat restoration (including dune stabilisation).

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(b) An area of any habitat type described in Table E.1, and which meets any of the criteria in Table E.2(a), will nonetheless not qualify as Rare, Threatened or At Risk habitat for the purposes of this plan if it meets any of the criteria below: ~~is also required to meet any of the following criteria to not be considered habitat for the purposes of this plan:~~

Forest*, Treeland*, Scrub*, or Shrubland* Habitat Types Classified as Threatened or At Risk

~~i. Areas of treeland* excluding sites~~ areas of treeland* ~~that meet any of the criteria (a) xi (a) xii, or (a) xiii of~~ in ~~Table E.2~~(a). ~~Or~~

ii. ~~Woodlots~~ Areas of indigenous tree species planted for the purposes of timber harvest. Or

iii. Indigenous vegetation planted for landscaping, horticultural (including shelter belts), ~~or~~ private gardening or amenity purposes.

Wetland Habitat Types Classified as Rare or Threatened

iv. Damp gully heads, or paddocks subject to regular ponding, dominated* by pasture or exotic species in association* with wetland sedge and rush species. Or

v. Ditches or drains supporting raupo, flax or other wetland species (eg. *Carex* sp., *Isolepis* sp.), or ~~areas~~ populations of these species in drains or slumps associated with road reserves or rail corridors. Or

vi. Areas of wetland habitat specifically designed, installed and maintained for any of the following purposes:

a) stock watering (including stock ponds), or

b) water storage for the purposes of irrigation (including old gravel pits), or

c) treatment of animal effluent (including pond or barrier ditch systems), or

d) waste water treatment, or

e) sediment control, or

f) any hydroelectric power generation scheme. Or

~~vii. Areas of open water created for the purposes of stock watering, or water storage for the purposes of irrigation, including old gravel pits (but excluding lakes and areas of open water associated with indigenous wetland habitat, or wetland habitat that meets Criterion (a) xix). Or~~

~~viii. A pond and/or barrier ditch system specifically designed and installed for the treatment of animal effluent Or~~

~~ix. Habitat created and maintained for the purposes of waste water treatment. Or~~

~~x. Habitat created and maintained for the purposes of sediment control. Or~~

~~xi. Habitat created and maintained in association* or as part of any hydroelectric power generation scheme, or in relation to the implementation of any resource consent conditions or agreements relating to the operation of any hydroelectric power scheme. Or~~

xii. Areas of wetland habitat maintained in relation to the implementation of any resource consent conditions or agreements relating to the operation of any hydroelectric power scheme currently lawfully established. Or

xiii. Open water and associated vegetation created for landscaping purposes or amenity values where the planted vegetation is predominately exotic, or includes assemblages of species not naturally found in association* with each other, on the particular landform, or at the geographical location of the created site.

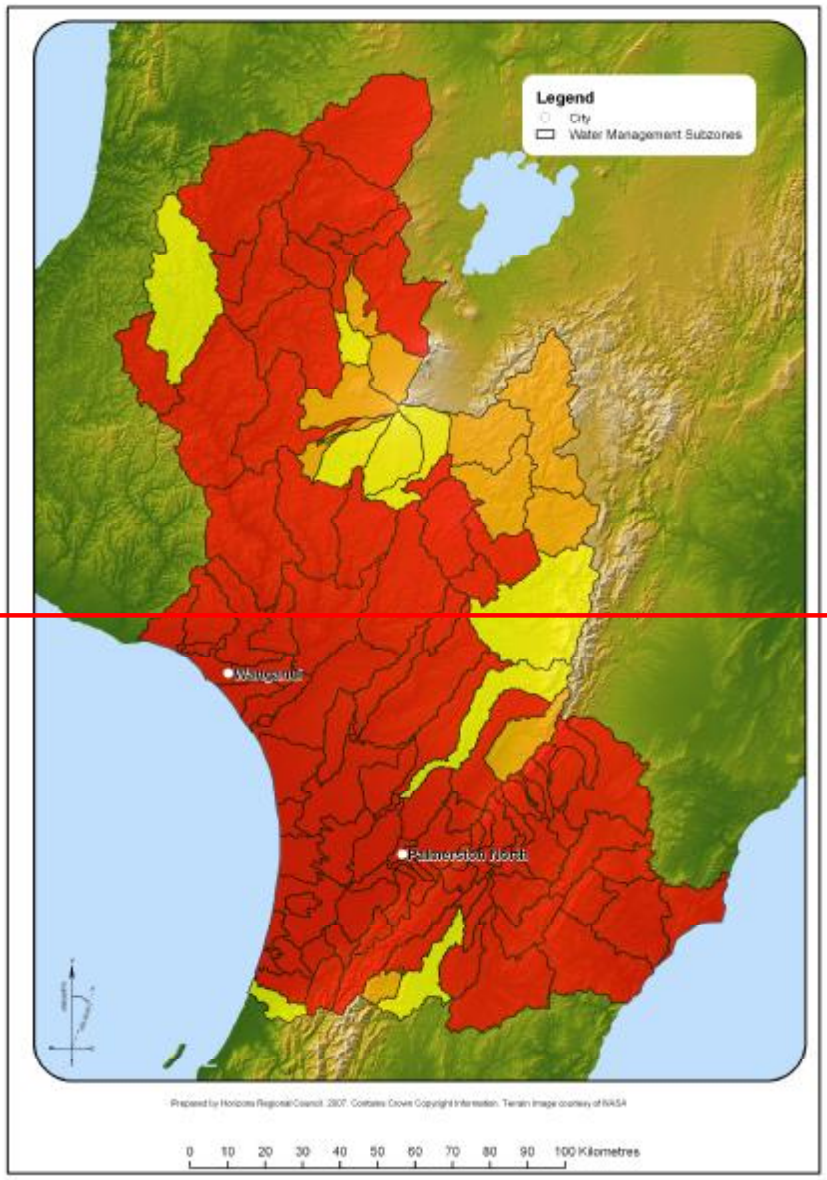

Figure E.1: Map of the Manawatu-Wanganui Region with Water Management Sub-zones coloured according to habitat type classification. Red coloured WMS indicate that where habitat exists within that WMS it is predominately Threatened habitat type. Orange coloured WMS indicate that where habitat exists within that WMS it is predominately Threatened or At Risk habitat type. Yellow coloured WMS indicate that where habitat exists within that WMS it is predominately vegetation not classified by this Schedule. This map is to be read in conjunction with criteria in Table E.2.

Glossary

Abundant*[1]	Species are considered to be abundant* when they contribute more than most other species to the composition of an area of interest, but are not the dominant* species.
Association*	A species, or group of species, landform or soil type occuring in space together. Such association*s can be observed in geographical pattern across the landscape, or in distinctive community groupings.
Boulderfield*[3]	Land in which the area of unconsolidated bare boulders (> 200 mm diam.) exceeds the area covered by any one class of plant growth form. Boulderfield*s are named from the leading plant species when plant cover is ≥ 1%.
Broadleaved* species	A generic term referring to a wide range of flowering species excluding the beech and conifer species, which can also be applied to dominant* hardwood species (eg. tawa). Common* examples of species referred to as broadleaved* species include (but are not restricted to) kamahi, titoki, fuchsia, maire, hinau, tawa, mahoe, and *Coprosma* species. The term 'broadleaf' is specific and refers to *Griselina littoralis* or *Griselina lucida*.
Common*[1]	Species are considered to be common* when they contribute more than other species, but less than still other species to the composition of an area of interest. Species that are common* contribute less to the composition of an area of interest than species which are abundant* or dominant*.
Cushionfield*[3]	Vegetation in which the cover of cushion plants in the canopy is 20-100% and in which the cushion-plant cover exceeds that of any other growth form or bare ground. Cushion plants include herbaceous, semi-woody and woody plants with short densely packed branches and closely spaced leaves that together form dense hemispherical cushions. The growth form occurs in all species of *Donatia*, *Gaimardia*, *Hectorella*, *Oreobolus*, and *Phyllachne* as well as in some species of *Achiphylla*, *Celmisia*, *Centrolepis*, *Chionohebe*, *Colobanthus*, *Dracophyllum*, *Kelleria*, *Haastia*, *Leucogenes*, *Luzula*, *Myosotis*, *Poa*, *Raoulia*, and *Scleranthus*.
Dominated* / dominant*[1]	Species are considered to be dominant* (or to dominate) when they contribute more than any other species to the composition of an area of interest. Dominant* species can be considered the most characteristic species of the area of interest (eg. habitat type).
Duneland*	Refers to areas where the landform is characterised by sand dunes (active or stable). Duneland* is found in the sand country*.
Fernland*[3]	Vegetation in which the cover of ferns in the canopy is 20-100% and in which the fern cover exceeds the cover of any other growth form or bare ground. Tree ferns ≥ 10 cm diameter at breast height (dbh) are excluded as trees.

Flaxland*[3]	A subclass of tussockland* where species of *Phormium* are dominant*.
Forest*[3]	Woody vegetation in which the canopy cover of trees and shrubs is more than 80% and in which tree cover exceeds shrub cover. Trees are woody plants with a diameter at breast height (dbh) of more than 10 centimetres. Tree ferns with a dbh of more than 10 cm are treated as trees.
Grassland*[3]	Vegetation in which the cover of grass in the canopy is 20-100% and in which grass cover exceeds the cover of any other growth form or bare ground. Tussock grasses are excluded from the grass growth form.
Heathland*[4]	A combination of several vegetation structural classes. Heath plants are trees, shrubs or dwarf shrubs, typically slow-growing and often stunted, with small, hard, scale-like or needle-like leaves with a thick waxy cuticle. The foliage tends to be flammable, resistant to decay and produces acid litter. Heathland* which occurs on wet substrates (eg. pakihi) usually comprise a mixture of shrubland* or treeland* with rush-like species, wire rush and ferns.
Herbfield**[3]	Vegetation in which the cover of herbs in the canopy is 20-100% and in which the herb cover exceeds the cover of any other growth form or bare ground. Herbs include all herbaceous species.
Lichenfield*[3]	Vegetation in which the cover of lichens in the canopy is 20-100% and in which the lichen cover exceeds the cover of any other growth form or bare ground.
Lowland*[2]	Typically, lowland* refers to the elevation between sea level and approximately 300 m asl. However, characteristics of lowland* forest* (eg. species presence, species composition, diversity) can exhibit itself at higher altitudes (eg. Whanganui National Park comprises lowland* forest* at elevations greater than 300 m asl).
Hill country*	Refers to land where the landform is characterised by rolling to steep hills.
Mid-altitudinal*[2]	Refers in general to the areas of land between elevations supporting characteristically lowland* vegetation and elevations supporting characteristically montane vegetation. Typically, mid-altitudinal* elevations will be in the order of between 400 – 950 m asl, although some variance can be expected.
Mossfield*[3]	Vegetation in which the cover of mosses in the canopy is 20-100% and in which the moss cover exceeds the cover of any other growth form or bare ground.
Occasional*[1]	Species are considered to be occasional* when they contribute more than scattered* species, but less than most species to the composition of an area of interest. Species that are occasional* contribute considerably less to the composition to an area of interest than species which are common*, abundant* or dominant* and can be expected to be encountered infrequently within the area of

interest.

Podocarp*	Southern hemisphere conifer which has cones modified into fleshy berry-like structures but do not have flowers. Podocarp* species include the totara species, matai, miro, kahikatea and rimu.
Rushland*[3]	Vegetation in which the cover of rushes in the canopy is 20-100% and in which the rush cover exceeds the cover of any other growth form or bare ground. Included in the rush growth form are some species of *Juncus*, *Apodasmia*, and all species of *Sporadanthus* and *Empodisma*. Tussock rushes are excluded.
Sand country*	Land where the dominate substrate is sand (improved or unimproved). In the Manawatu-Wanganui Region, the sand country* is defined by the boundaries of the Foxton Ecological District.
Scattered*[1]	Species are considered to be scattered* when they contribute less than most other species to the composition of an area of interest. Species that are scattered* contribute considerably less to the composition to an area of interest than species which are occasional*, common*, abundant* or dominant* and can be expected to be encountered infrequently, and with a sparse distribution within the area of interest.
Scrub*[3]	Woody vegetation in which the cover of shrubs and trees in the canopy is > 80% and in which shrub cover exceeds that of trees. Shrubs are woody plants <10 cm diameter at breast height (dbh).
Sedgeland*[3]	Vegetation in which the cover of sedges in the canopy is 20-100% and in which the sedge cover exceeds that of any other growth form or bare ground. Included in the sedge growth form are many species of *Carex*, *Uncinia* and *Bolboschoenus*. Tussock-sedges and reed forming sedges are excluded.
Shrubland*[3]	Woody vegetation in which the cover of shrubs in the canopy is 20-80% and in which the shrub cover exceeds the cover of any other growth form or bare ground.
Treeland*[3]	Vegetation in which the cover of trees in the canopy is 20-80%, with tree cover exceeding the cover of any other growth form, and in which the trees form a discontinuous** upper canopy above either a lower canopy of predominant*ly non-woody vegetation or bare ground. (Note: vegetation consisting of trees above shrubs is classified as either forest* or scrub* depending on the proportion of trees and shrubs in the canopy).
Tussockland*[3]	Vegetation in which the cover of tussocks in the canopy is 20-100% and in which the tussock cover exceeds the cover of any other growth form or bare ground. Tussocks include all grasses, sedges, rushes and other herbaceous plants with

linear leaves (or linear non-woody stems) that are densely clumped and are greater than 10 cm in height. Examples of the growth form occur in all species of *Cortaderia*, *Gahnia* and *Phormium* (see also Flaxland*) and in some species of *Chinochloa*, *Poa*, *Festuca*, *Rytidosperma*, *Cyperus*, *Carex*, *Uncinia*, *Juncus*, *Astelia*, *Aciphylla* and *Celmisia*.

[1] This is a measure of the importance of a species in relation to other species in the same area of interest (eg. the same habitat type or forest* tier), and is not simply a frequency count (biomass as well as density contribute to the importance of any given species to the area of interest).

[2] Altitudinal zonations are not fixed and the elevation at the point of change between any two zonations will exhibit variance across the landscape. There are obvious patterns in vegetation cover along an altitudinal gradient, with the change in climatic conditions as altitude increases being reflected in a change in vegetation cover. Specifically, a change in species composition, growth form (eg. trees to shrubs to tussocks) and stature (eg. decreasing in height, or prostrate) is noticeable. Thus, the shift between altitudinal zonations is more defined by the change in vegetation type (eg. lowland* forest* to montane forest*) than it is by elevation.

[3] As per Atkinson, I.A.E. 1985. Derivation of vegetation mapping units for an ecological survey of Tongariro National Park, North Island, New Zealand. *New Zealand Journal of Botany 23:361-378*.

[4] Defined in Johnson, P. & Gerbeaux, P. 2004. *Wetland Types in New Zealand*. Department of Conservation, Wellington.