BEFORE THE HEARINGS PANEL

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

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END OF HEARING REPORT OF
KATE MCARTHUR, JON ROYGARD, HELEN MARR, NATASHA JAMES, CLARE BARTON AND BARRY GILLILAND
ON BEHALF OF HORIZONS REGIONAL COUNCIL

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1. INTRODUCTION

1.1. Qualifications and experience

The following credentials are a summary, for full qualifications see the respective s42A reports.

1. Clare Barton

My name is Julie Clare Barton and I am a Senior Consultant Planner and Director of the consulting firm Environments by Design Limited (EBD). EBD consults predominantly in Palmerston North, Horowhenua, Taranaki and Wellington in relation to a range of resource management matters. I hold a Bachelor of Regional Planning degree with Honours from Massey University, Palmerston North.

2. Natasha James

My full name is Natasha Cacilia James. I have a Bachelor of Resource and Environmental Planning (specialisation in Geographic Information Systems (GIS)) with Honours from Massey University.

3. Barry Gilliland

My name is Barry William Gilliland. I am employed as a Policy Advisor in the Policy Team at Horizons Regional Council. I carried out the review, evaluation and made recommendations on Chapter 18: Financial Contributions. I hold a Bachelor of Technology degree in Biotechnology with honours and have 33 years experience at a Regional Council level.

4. Helen Marr

My full name is Helen Marie Marr. I have a Bachelor of Resource and Environmental Planning (specialisation in Environmental Science) with Honours from Massey University. I am also a qualified RMA decision maker under the 'Making Good Decisions' programme.

5. Kate McArthur

My full name is Kathryn Jane McArthur. I hold a Bachelor of Science degree with Honours in Ecology from Massey University. My area of post-graduate research was the influence of land use on freshwater macroinvertebrate communities in the Manawatu-Wanganui Region. I am currently enrolled as a Masterate candidate in Applied Science, majoring in Natural Resource Management. I have more than 7 years

post-graduate experience working in the field of freshwater sciences and I hold a diploma in Animal Science from the New Zealand Veterinary Association.

6. Jon Roygard

My full name is Jonathon Kelvin Fletcher Roygard. I have a Doctor of Philosophy degree (PhD in Natural Resources) specialising in soil science, from Massey University. My PhD involved measuring and modelling nutrient movement through soils in a land treatment research project. I hold a Bachelor of Science Degree with Honours (Zoology) also from Massey University. I have worked as a Post-Doctoral Scientist and Research Assistant Professor in the Department of Crop and Soil Environmental Science, at Virginia Polytechnic Institute and State University (Virginia Tech), in Blacksburg, Virginia, USA.

2. ISSUES IN CONTENTION

7. This section identifies the primary issues in contention at the Hearing. It presents a summary of the evidence presented in relation to each issue, and a recommendation as to the most appropriate way to resolve the issue.

2.1. Issue One: Appropriate placement of policies and schedules: in the RPS or the RP?

2.1.1. Summary of issue

8. Relocation of some of the policies in Part I – Regional Policy Statement into Part II – Regional Plan was sought by some submitters (eg. Territorial Authorities Jointly, Submitter 38). It was argued that some of the policies in Part I, Chapter 6 were framed as consent decision-making policies and appropriate relocation into Part II, Chapters 13, 15 and 16 would improve the clarity and user-friendliness of the Plan.

9. A second but related issue raised was the need for the Plan to provide certainty about whether the Schedules to the Plan formed part of the Regional Policy Statement or Regional Plan (eg. Mighty River Power, Submitter 359). It was argued that this was necessary to provide certainty about how future changes to a Schedule would be dealt with.

2.1.2. Legal issues

10. John Maassen has provided an analysis of the relevant legal principles in his report, beginning at page 35. In summary, he concludes that the question is ultimately a planning question that should be informed by the following:

"…it is considered that one would expect a decision of location of policies and schedules to be determined on the basis of which location most appropriately enables achievement of the purpose of the Act and HRC's ability to fulfil its statutory functions efficiently and effectively. Dimensions of effectiveness and efficiency include:

(a) *Finding assessment policies informing discretions under section 104 in the lowest document in the hierarchy; and*

(b) *The ability to adjust provisions relating to the management of particular resources by means of private plan change where this is intended to be possible. Thus standards should generally be in a regional plan as the recent Board of Inquiry on the RPS suggests (see E1) while resource inventories, methodologies and typologies can be in the RPS."*

2.1.3. Planning analysis

Schedule Placement

11. Mighty River Power (MRP) raised in legal submission that the schedules should only be referenced in the Regional Plan and not referenced in the Regional Policy Statement. The rationale given by MRP was that private individuals should be given the opportunity to initiate a change to the Schedules through the Private Plan Change process. An individual can request a change to a Regional Plan under clause 21(3) of the First Schedule RMA but only a Minister of the Crown or a territorial authority can request a change to a Regional Policy Statement.

12. The Schedules have the following functions:

(a) They support the rule framework being used in some places as standards for permitted activities and as guidance for the consideration of resource consent applications. (The issue of the use of Schedules as standards is discussed further in sections below).

(b) They support the policy framework of Part I, the Regional Policy Statement and Part II, the Regional Plan.

13. Recognising that the matters raised by Mighty River Power have some merit, and taking into consideration the important principles identified by Mr Maassen, it is considered appropriate that the Schedule placement be as follows: [for completeness recommendations are also made for the placement of Schedules that relate to other Chapters of the Plan in addition to the Water Chapters].

(a) Schedule B – Surface Water Quantity; Schedule C – Groundwater Quantity; and Schedule D – Surface Water Quality Standards should be included within Part II of the Proposed One Plan (POP), ie. they form part of the Regional Plan. New information may arise, eg. through future resource studies, that signals that a change may need to occur, eg. to core water allocation limits. It is appropriate that for such matters any party may seek a Plan Change.

(b) Schedule Ba – Water Management Zones and Associated Values should be included in Part I of the POP, ie. the Regional Policy Statement. These are 'resource inventories' as identified by Mr Maassen. The provisions of Schedule Ba underpin the policies and are integral to the policy framework set out in Part I of the Plan. Any changes to the Values that are included within the Plan framework would need to be carefully considered and it is considered appropriate that any changes to Schedule Ba be as a result of a Plan Change initiated by the Regional Council or as a result of a request from a Minister of the Crown.

(c) Parts A and B and Part C Tables H2 and H3 of Schedule H (Coastal Marine Area) should be placed in Part I, the Regional Policy Statement. And Part C Tables H 4 to H7 should be placed in Part II, the Regional Plan. The reasoning for this placement is given in points (a) and (b) above.

(d) If the Panel decides that Schedule A (Properties Containing Highly Erodible Land) should be retained then it is recommended that it be included in Part II, the Regional Plan.

(e) Schedule E (Indigenous Biological Diversity) should be included in Part I, Regional Policy Statement. While this Schedule is referred to in both the RPS and the Regional Plan, it represents both a resource inventory and/or methodology as identified by Mr Maassen.

(f) Schedule F (Regional Landscapes) should be included in Part I, Regional Policy Statement. Schedule F is only referred to in Part I of the Plan.

(g) Schedule G (Air Sheds) should be included in Part II, Regional Plan as the issues more closely align with the Plan provisions. It is noted that even if a Private Plan Change were proposed, the provisions regarding airsheds could not be altered.

(h) Schedule I (Natural Hazards) should be included in Part I, Regional Policy Statement. Schedule I is only referred to in Part I of the Plan.

14. MRP suggested that within Part I of the Plan, any reference to a particular Schedule should clarify where the Schedule sits, ie. the words "*in Schedule X to the Regional Plan*" should be inserted in the policies. It is recommended that this general wording be adopted but modified to make it consistent with references used elsewhere in the Plan. The recommended wording is "*in Schedule X to Part I – the Regional Policy Statement"* or *"in Schedule X to Part II – the Regional Plan".* In addition, it is recommended that each Schedule include a statement that signals whether the Schedule forms part of Part I or Part II of the Plan.

Policy Placement

15. The recommended relocation of a number of policies from Part I of the Plan to Part II was in response to matters raised by the Territorial Authority Collective. There has been much discussion during the Hearing process regarding the recommended shift, with parties being both for and against the relocation. Wellington Fish & Game specifically opposes the movement of provisions from the Regional Policy Statement (RPS) to the Plan as it considers the change would mean territorial authorities would not have to give effect to the provisions in their District Plans and any party could seek Private Plan Changes to change the provisions.

16. In relation to the requirements of territorial authorities and the first point raised by Fish & Game, the following points are noted:

(a) Section 75(3) RMA requires that in relation to the content of a District Plan, the District Plan should give effect to any Regional Policy Statement; and
(b) Section 75(4) requires that a District Plan must not be inconsistent with a Regional Plan for any matter specified in s30(1).

17. Certainly, the focus between the two sections in the RMA is different, with a District Plan being required to give effect to the provisions of an RPS and to not be inconsistent with the provisions of a Regional Plan. However, it is considered that the policies that have

been recommended to be relocated will not undermine the policy framework that needs to be given effect to in a District Plan. The higher level policy framework is still retained in the RPS and provides the guidance that is required for the development of a District Plan. The policies that are recommended to be relocated are detailed policies that more appropriately guide consent decision-making and are more specific in their purpose.

18. It is considered that the policies recommended to be relocated are not so fundamental that it would be inappropriate for these provisions to not be potentially open to a Private Plan Change request. Of course, any Private Plan Change application would have to demonstrate that the policy framework should be altered – and this is likely to be a difficult task in itself.

19. Two changes have been recommended in relation to the policy shift, which involves moving the content of Policy 6-8 (as notified) back into Chapter 6 from Chapter 13 and Policy 6-18 back into Chapter 6 from Chapter 15. Policy 6-8 deals with point source discharges to water and Policy 6-18 covers supplementary water allocation. It is considered after further assessment that these policies are better located in Part I, the Regional Policy Statement. No other change to the location of policies is recommended.

2.2. Issue Two: Common catchment expiry and review dates and priority on review

2.2.1. Summary of issue

20. Policy 15-5 provisions relating to common catchment expiry and review of resource consents were an issue raised by submitters (eg. Meridian Energy Limited, Submitter 363). The key concerns were that the provisions would restrain decision-makers from granting resource consents for long terms (35 years) and that Policy 15-5(b) would effectively set an order of priority for dealing with consent applications to take water that was inconsistent with the current practice of dealing with them on a "*first come, first served*" basis.

2.2.2. Legal issues

21. Mr Maassen has reviewed the various provision and legal opinions provided by submitters. This is provided in his separate legal report. In summary he concludes it is appropriate for the plan to provide for both common catchment expiry and review dates and a statement of priority of take to inform (rather than constrain) decision makers considerations under s104 RMA.

2.2.3. Technical analysis

22. The technical evidence in relation to common catchment expiry dates and how these relate to the proposed water management framework is provided in the evidence of Dr Roygard (pages 23 & 24).

23. The derivation of the dates for the common catchment expiry dates is outlined in Box 3 of Dr Roygard's evidence (page 24). Map A[1] from that evidence (shown below in Map 1) summarises the groupings of common catchment expiry dates for the various sub-zones. These dates were determined taking into account existing consent expiry dates in the various Water Management Zones, including use of currently implemented common catchment expiry dates (eg. from water resource assessments). No evidence was received in relation to altering the dates.

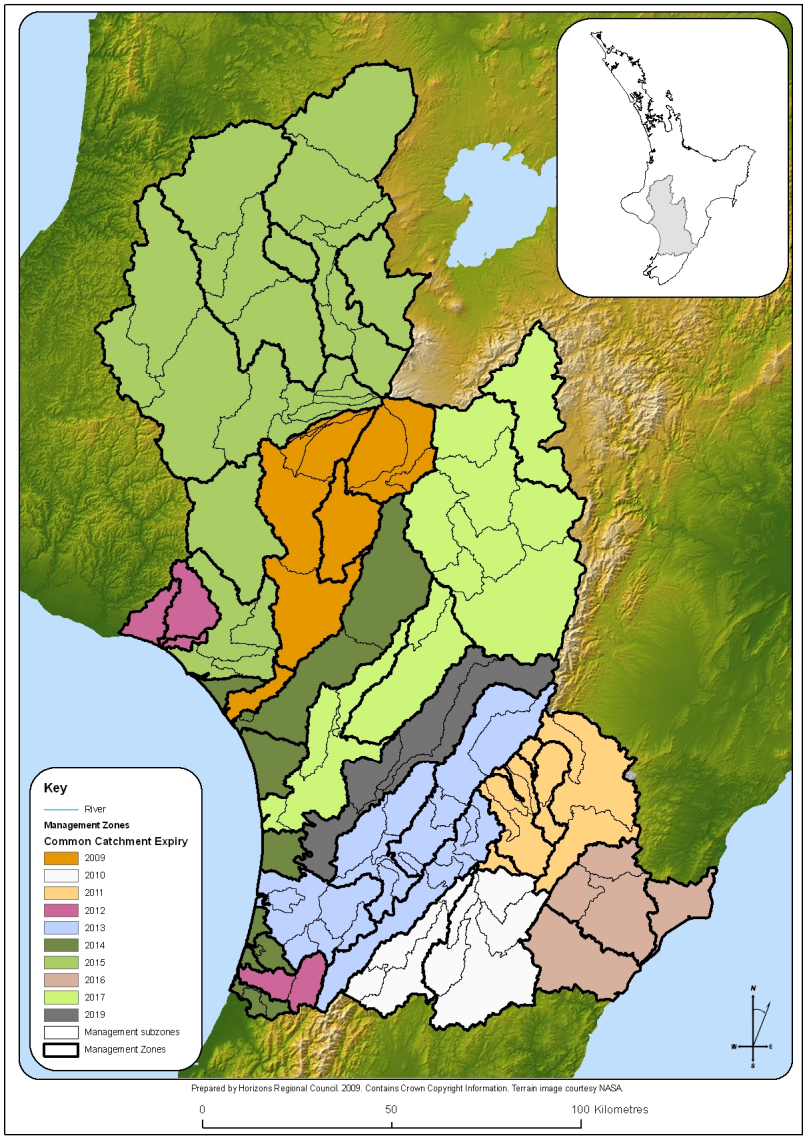
24. Dr Roygard's evidence outlined that common catchment expiry dates provide a way to programme monitoring and science assessment in a structured manner to inform decision-making. These technical assessments would be able to assess, for the particular water resource, the individual and cumulative adverse effects of the range of activities such as pressures of water allocation and discharges from point and diffuse sources. These assessments will be able to incorporate the findings from the information sourced from the various monitoring policies proposed in the Plan (for example from the consent monitoring requirements Policy 13-4 and Policy 15-4, which require monitoring in accordance with the combined State of the Environment (SoE) and discharge monitoring programme, and monitoring of actual water use). This information, along with other science and monitoring, can be compiled to:

- assess current state in comparison to thresholds that indicate likely adverse effects (eg. Horizons SoE Report 2005 and the WaterQualityMatters website);
- determine water quality trends, eg. Ballantine and Davies-Colley (2009b);
- calculate individual and cumulative contributions of particular activities (eg. Roygard & McArthur (2008), Clothier *et al.* (2007), Parfitt *et al.* (2007), WaterQualityMattters website;
- recommend minimum flows and core allocation limits, eg. Roygard & Carlyon (2004), Roygard *et al*. (2006), Hurndell *et al*. (2007), Hurndell *et al.* (2008);
- document current estimates of land use, eg. Clark & Roygard (2008);
- consider recent levels of intensification and future forecasts, eg. Neild & Rhodes (2010).

[1] The printing process lowered the resolution of Map A of Dr Roygard's evidence. An updated version was provided to the Hearing Panel during the Hearing process. For convenience this updated version is included in this report.

25. As outlined in Dr Roygard's evidence, common catchment expiry dates have been implemented via resource consent conditions for some time. Some alignment of Horizons' monitoring and research programmes with these dates has already been undertaken. One example of this is the upgrade of the combined State of the Environment and discharge monitoring programme.

26. In summary, the common catchment expiry dates provide an appropriate mechanism to assess the individual and cumulative adverse effects of combined activities in a particular area, at a time when all of these activities are able to be influenced through decision- making processes. This structured approach to addressing resource management issues in a particular area of the Region at one time enables efficiencies in preparing technical material.



Map 1: Proposed common catchment expiry dates for the Region.

2.2.4. Planning analysis

27. Meridian Energy submitted that the common catchment expiry policy framework fetters the discretion for allowing for consents with a term of up to 35 years. The Provisional Determinations for the General Hearing have confirmed the approach taken in the POP regarding common catchment expiry dates and consent duration. Policy 11A-5 was specifically amended by the Panel as a result of issues raised, to confirm that consent durations can be extended in 10 year increments beyond the common catchment expiry dates in Table 11A.1. The changes to the Policy also clarify that the common catchment expiry dates would only apply to s13, 14 and 15 matters and not s9 matters for which the RMA provides for an unlimited term. As outlined in the General Hearing s42A Report, common catchment expiry dates are:

(a) A mechanism by which the effects of the activities can be assessed holistically, ie. when consents expire at a common date the potential cumulative effects can be assessed together, including the impacts of water takes on dilution available for assimilation of treated waste. In practice, it is envisaged that the work on assessing potential adverse effects, both for discharges and water takes, would begin well before the common catchment expiry date to allow that holistic overview to occur, ie. well before any consent applications are lodged (which is likely to involve mainly renewals of existing consents). In addition, it will allow for consent conditions to be developed and made consistent across similar consents within the same catchment.

(b) A mechanism to guide appropriate consent terms. The mechanism allows for fairness among applicants as like applications can be treated in the same manner in relation to consent duration.

(c) The Regional Council can plan water resource assessments to coincide with the expiry dates.

28. Given the changes made to Policy 11A-5 it is not considered that the approach will fetter the Regional Council's discretion to allow for a greater term beyond the common catchment dates.

29. The issues raised during the Water Hearing regarding the common catchment expiry and review dates and priority on review is encapsulated in the comments from Meridian Energy. Meridian raises specific issues regarding Policy 15-5(b) and considers that it

sets a direction to decision-makers to set an *"order of priority"* for considering what otherwise might be competing applications. Meridian Energy considers that Policy 15-5(b) elevates certain activities over others and therefore that the Policy is contrary to the *"first-come-first-served"* concept. Meridian suggests the removal of the word *"priority"* from Policy 15-5 (b).) and has also raised the need for core allocation limits to be set aside for particular uses. Genesis seeks to have the common catchment expiry and review dates not apply to major infrastructure.

30. Policy 15-5(b) states, *"allow takes in the following order of priority"* ; a number of types of takes are then listed, starting with takes permitted under Rule 15-1 and ending with all other new resource consent applications based on the date of lodgement.

31. On reading the policy it does not appear that the intent was to usurp the *"first-come-first-served"* test and indeed the Policy could not do this. Policy 15-5(b):

a) Supports the policies that follow, including Policy 15-11 which apportions, restricts and suspends takes in times of minimum flow and identifies essential takes; and

b) Provides guidance when a resource consent is reviewed or expires regarding a hierarchy of takes, ie. from those that have to be provided for through the RMA, the need for public water supply, and essential takes through to other takes. For example, prior to a common catchment date being reached the policy guidance allows for the Regional Council to work with users within a catchment to achieve the most efficient outcome in terms of water allocation.

32. As an example of the way in which Policy 15-5(b) may be implemented in practice, in the last year Horowhenua District Council and the Regional Council worked together to enable water to be *"freed up"* within the Ohau catchment. This enabled water to be made available to other users where it would otherwise have not been made available.

33. Advice from Mr Maassen is that this type of policy is legally appropriate when considering competing applications and he proposes the following clause be added to clarify the application of the policy *'(b) takes account of the demand for the resource and the need to provide for that demand based on the following order of priority'*.

34. It is considered appropriate that the policy approach as set out in the Provisional Determinations regarding common catchment and review dates should apply consistently to all activities, including hydroelectricity activities.

35. Setting aside core allocation limits for particular uses as proposed by Meridian Energy would have to be done on a zone by zone basis and be included in Schedule B. The issue with this approach is that it potentially sets up a process which is inefficient and "locks" up water which may not be used and would potentially not be available for another use.

2.3. Issue Three: Provision for hydroelectricity in policies and rules

2.3.1. Summary of issue

36. There were a number of issues raised by companies that are dependant on generation of electricity from hydro energy resources (eg. Genesis Power Ltd, Submitter 268). In general terms the submitters were of a view that the Plan does not adequately recognise the benefits of energy generation from renewable sources because the activity status of consents for new projects or existing water use are too high.

2.3.2. Legal issues

37. An analysis of the legal provisions in relation to hydroelectricity takes is provided by Mr Maassen in his separate report.

2.3.3. Technical analysis

Overview of the overall water allocation framework

38. The water allocation framework proposed in the One Plan is documented in the evidence of Dr Roygard and Ms Hurndell.

Evidence in relation to the design of the framework

39. The basic components of a water allocation framework are outlined in Box 1. Important aspects of the framework include provision for environmental protection at low flows and through provision of flow variability, while providing for maximum levels of allocation and surety of supply for abstractors[2]. The minimum flow and core allocation limits specified in Schedule B are key components of the framework. The minimum flow provides a threshold to provide protection of instream health at low flows. The core allocation

[2] The detail relating to the design of the framework is set out in the s42A Report and Supplementary Evidence of Dr Roygard and the s42A Report of Ms Hurndell.

component of the allocation framework is where the greatest number of consents will likely be granted from. These consents will, in the majority of cases, be required to cease take at the minimum flow unless they qualify in the essential takes category. The essential takes category provides for some use below the minimum flow. Takes below the minimum flow are likely to impact on the life supporting capacity of the water body given the minimum flow threshold is defined to provide for environmental protection. The permitted takes category provides for small takes for stock water and other uses that are able to be abstracted at all flows including below minimum flow. The supplementary allocation takes provide for takes at higher flows (ie. above median flow) when the river can sustain further levels of abstraction without compromising a) the values of the water body, b) surety of supply for core allocation takes, or c) flow variability. The framework is built around existing hydroelectricity takes and recognises the existing hydroelectricity infrastructure, most of which has been in place for significant periods of time. This enables a customised allocation regime to be established around the existing hydroelectricity operations, which vary in their nature, scale and effects on water body values. The policy framework also includes provisions that relate to the takes from lakes and wetlands that ensure consistent linkages with other parts of the Plan, eg. the Biodiversity provisions.

40. To achieve effective water management, the proposed framework specifies limits for minimum flows and core allocation in relation to the ecologically relevant flow statistics identified by Dr Hayes. Dr Hayes outlines that the mean annual low flow (MALF) is ecologically relevant to trout carrying capacity and relevant to native fish species with generation cycles longer than one year (also discussed in the s42A report of Ms Jordan). The median flow is also identified as ecologically relevant to aquatic invertebrates for assessing the effects of flow regime change on aquatic invertebrates. The ecologically relevant flow statistics were not challenged in evidence.

41. Dr Hayes (page 14) outlines that the design of the framework is consistent with the Ministry for the Environment guidelines, which state: "…*that there are two critical factors of a flow regime that need to be prescribed to for sustaining instream values that are dependent on proper functioning of river systems: a minimum flow and flow variability*". Dr Hayes' evidence (page 14) further states: "*Minimum flows are usually required for maintaining instream habitat requirements but in some cases also for water quality. Provision of flow variability at a variety of scales is required for maintenance of channel form, sediment and periphyton flushing, benthic invertebrate productivity, fish and bird feeding opportunities and fishing opportunities.*"

42. The allocation framework was designed to maximise the use of water in relation to limits that provide for environmental protection and surety of supply for other users. To achieve this, levels of allocation were specified for various categories of allocation (see Box 1) having given consideration to the effects on minimum flows (including the frequency of these occurring) and the effects on flow variability. These effects have been considered in terms of the cumulative effects of the takes within that category of allocation of the framework and in the way the various categories of allocation are inherently linked. To avoid potential adverse effects on the environment and users, the allocations within some parts of the framework (eg. the supplementary take provisions) have to give consideration to effects on other parts of the framework (eg. surety of supply for other users) or matters that relate to providing for ecological requirements (eg. flow variability).

43. The framework includes provisions for takes outside the specific types of allocation in Box 1. Such takes would likely have potential adverse effects on the environment or other users due to the design of the framework to make the maximum level of allocation available within specified limits to provide environmental protection and surety of supply for other users.

Box 1 Water allocation framework as described in the s42A evidence of Dr Roygard (pp. 33 & 34, para. 48)

"*The proposed Water Allocation Framework uses the Water Management Zones (and Sub-zones) framework and the values of the water bodies as a method to establish six different categories of allocation takes and various flow thresholds where these takes can and cannot be abstracted. The proposed categories of allocation are:*

(i) ***Permitted Takes.*** *These are small takes that are permitted and can be taken at all flows. These are linked to Policy 6-19 and Rule 15-1 as a Permitted Activity.*

(ii) ***Core Allocation Takes.*** *These takes are proposed to be able to be taken at any time when the flow is above a minimum flow. These are linked to Policy 6-16 and Rule 15-5 as a Controlled Activity.*

(iii) ***Essential Takes****. The Essential Takes allocation provides for some consented takes to continue to below the minimum flow. These are linked to Policy 6-19.*

(iv) ***Supplementary Allocation Takes****. This is a supplementary allocation to provide for consented takes at above median flow for storage or use. The taking at high flows is limited to takes that do not compromise the values of the water body or the surety of supply for the core allocation users. These are provided for by Policy*

6-18 and Rule 15-6(b) as a Discretionary Activity.

(v) ***Existing Hydroelectricity Takes that are not included in the core allocations.*** *These are linked to Policy 6-16, Rule 15-6 and Rule 15-8 as a Discretionary Activity.*

(vi) ***Takes from lakes and wetlands****. These are linked to Policy 6-20 and Rule 15-5"* (and Rule 15-8)

44. The evidence of Ms Jordan and Dr Death on behalf of Wellington Fish & Game Council, and Mr Brown for the Department of Conservation supported the inclusion of minimum flow provisions and core allocation to manage water use in a way that is equitable to both the environment and instream values and to out-of-stream users (s42a reports of Ms Hurndell and Dr Roygard). Ms Jordan (para 9.12) also acknowledged the need for surety of supply for abstractors while providing for instream values. The inter-related limits that are designed to maintain instream flow variability were also supported by Ms Jordon and Mr Brown. Ms Jordon and Mr Brown identified that flow variability is important for the maintenance of instream health and that minimum flow and core allocation limits allow river flows that are under demand from abstraction to reflect the natural flow regime of the river (s42A reports of Ms Jordan, para. 9.1, and Mr Brown, page 42).

45. In summary, the experts supported the concept of specifying minimum flows and core allocation limits to maintain flow variability (to provide for life supporting capacity) and providing for maximum allocation of resource with consideration of surety of supply. Another key point is that takes outside the defined categories of allocation would likely have potential adverse effects on the environment or other users due to the design of the framework to make the maximum level of allocation available within specified limits to provide environmental protection and surety of supply for other users. Overall, the conceptual design of the water allocation framework is agreed by experts. However, some specific thresholds for setting minimum flows and providing for flow variability were debated as outlined in the following section.

Evidence relating to the specific core allocation and minimum flow values in Schedule B

46. The water allocation framework, including minimum flows and allocation limits set in Schedule B, were largely agreed by those who submitted 'expert evidence' (s42A reports of Dr Roygard, Ms Hurndell, Dr Hayes, Mr Hay, Ms Jordan, Dr Death, Mr Brown,

and Mr Male). The items where agreement was not reached are outlined in the sections below, which conclude the allocation limits and minimum flows are based on sound science and are recommended for inclusion in the One Plan as a part of the policy framework for management of water allocation

47. The methodology for the setting of core allocation limits and minimum flows was outlined in Dr Roygard's evidence. The zone by zone analysis of the recommended core allocation limits was provided by Ms Hurndell. Mr Hay provided information about the instream habitat assessments undertaken by Horizons to inform the setting of minimum flows. Dr Hayes provided evidence on environmental flow regimes, including the process by which these have been assessed and set in New Zealand in recent times. Dr Hayes concluded: "*The process and methods employed by Horizons for environmental flow assessment, minimum flow setting and water allocation in the proposed One Plan are consistent with the MfE Guidelines and the* [proposed] *National Ecological Flow Standards*". Dr Hayes also concluded that: "*In my opinion the Policies and Rules in the proposed One Plan governing minimum flows and water allocation will maintain instream values at levels similar to those currently occurring*."

48. Some further information requested by the Panel in relation to minimum flows and allocation limits has been provided to the Panel by way of appendices to the planning report.

49. Dr Death, on behalf of Wellington Fish & Game and Forest & Bird, was generally supportive of the recommended minimum flows of 90% of MALF (para. 45). Dr Death stated that clarity was needed as to whether the minimum flows are 90% of MALF or 90% of habitat at MALF. Schedule B includes minimum flows that were calculated using both the percentage of habitat at MALF mechanism and the percentage of MALF mechanism. In some cases the Instream Habitat Incremental Methodology (IFIM) studies used 90% of habitat retention at MALF to recommend minimum flows (Box 10 of Dr Roygard's evidence provides a summary of this). The reasons for this are outlined in the evidence of Dr Hayes and Mr Hay. For some other water allocation scenarios, the minimum flow recommendations were based on the relationship between the detailed IFIM studies and the MALF flow statistics. These scenarios used percentages of MALF (95%, 85% and 80%) dependent on the size of the rivers and streams. This is outlined in the evidence of Dr Roygard (pp. 46-48). Dr Death did not support any minimum flows below 90% of MALF set with IFIM and RHYHABSIM[3] as he does not believe the fundamental assumptions, eg. habitat limitation. Dr Death did not outline the specific

[3] RHYHABSIM is a component of the IFIM process. Refer to Dr Hayes' evidence for a full description.

methodology by which he came to the conclusion[4]: "*a minimum flow limit of 90% of MALF does however seem to be a suitable precautionary level that will allow for water abstraction and maintenance of ecological integrity*". Dr Death summarised his views as[5]: "*…although I do not support the methodology for establishing flow limits adoption of a precautionary principle has probably set the limits at the appropriate level."*

50. Wellington Fish & Game recommends that minimum flow standards below 90% of MALF be declined (Ms Jordan, paragraph 9.15). The reasoning for this conclusion has not been clearly defined in evidence, ie. why 90% of MALF was determined to be a suitable threshold has not been elaborated on in evidence.

51. Dr Death commented that he: "*…had concerns over the methodology used* [to set allocation limits and minimum flows] *and the focus on water quantity rather than on pattern of water supply*". The effects of minimum flows and core allocation limits on flow variability were addressed in the evidence of Ms Hurndell (pp. 10-39 provide an overview). Flow variability and surety of supply or frequency of occurrence of the minimum flow was a major consideration in setting core allocation limits (see the evidence of Dr Roygard and Ms Hurndell). Dr Death did not comment on the material presented in relation to this.

Evidence on supplementary allocation and provision of hydrological variability

52. The supplementary allocation takes component of the water allocation framework specifies requirements to consider in relation to flow variability.

53. Dr Death stated (para. 51) that he "*…would like to see preservation of hydrological variability specifically addressed in the POP*". Dr Death's comments were not limited to the supplementary allocation components as outlined above; however, he did include specific comments about the supplementary allocation policy. Dr Death recommended specifying methodologies in the policy for determining changes to flow variability and identified two technical methods for this: Hydrological Variability Assessment (HVA) and Ecological Limits of Hydrologic Alteration (ELOHA). It is noted all of the experts are agreed on the importance of maintaining flow variability. The matter of contention is whether this should be done via a specified methodology in the policy framework. Mr Hay addressed this through his Supplementary Evidence and noted that the ELOHA and Indicators of Hydrologic Alteration (IHA) methods are closely related to the Range of

[4] Dr Death's evidence (page 10, para. 47).
[5] Dr Death's evidence (page 10, para. 51).

Variability Approach[6] (RVA) and that these three methods provide possible approaches to assessing "significant departure from the natural flow regime". About the three possible methods Mr Hay concluded:

- "*ELOHA has only recently been developed and has not been formally applied yet in New Zealand as far as I am aware.*"
- "S*o while the IHA and RVA provide a way to characterise the 'natural' flow regime, they do not explicitly provide a definition of what is considered a significant degree of change. This is still up to the user to specify and remains a policy issue, balancing risk of potential adverse effects with values and abstractive water use.*"

54. Mr Hay concluded (para. 26): "*There are several ways that the natural flow regime and departure from it can be assessed. However, I do not hold an opinion on which is likely to be the 'best' approach, since they all remain to be tested*".

55. The importance of maintaining flow variability to maintain the ecological values is agreed by the experts. However, the best methodology to determine how to achieve this remains a matter of debate. Therefore, from a technical perspective, it is recommended that the policy provides a reference to "no significant departure from the natural flow regime", but does not specify the methodology to determine what this is.

56. Mr Arthur Male on behalf of Mighty River Power raised some questions regarding technical methods used by Horizons within the water allocation framework. These comments were raised by Mighty River Power following circulation of Horizons' s42A report and had not been raised during the regular meetings between Horizons officers and Mighty River Power about the One Plan, which continued beyond those reports being released. Mighty River Power did not request any changes to Schedule B as a result of this evidence, as was confirmed in response to a question by the Hearing Panel to those presenting on behalf of Mighty River Power. As no changes were sought, Horizons did not respond to these comments in the Supplementary Evidence. Comments in relation to these matters have been provided in response to the Panel's request. These comments are located in Appendix 1.

Conclusion

57. The water allocation framework has been built in a manner that provides for environmental protection through use of ecologically relevant thresholds and provision of flow variability. The categories of allocation interrelate to provide for these factors while

[6] As discussed in Dr Hayes' s42A evidence (paras 73 & 74).

providing maximum levels of allocation that also provide for surety of supply for run-of-river abstractions. The minimum flow limits and core allocation limits that have been set, based on the evidence of Dr Roygard, Ms Hurndell, Dr Hayes and Mr Hay, clearly demonstrate the science undertaken to derive the minimum flows. These minimum flows provide for the instream values of water bodies (including trout populations) and the core allocation limits to provide for abstraction, environmental protection and surety of supply. The core allocation limits and minimum flows of Schedule B, as recommended in the End of Hearing report, are based on sound science and are recommended for inclusion in the One Plan as a part of the recommended policy framework for water allocation.

Hydroelectricity Consents

58. The existing consented hydroelectricity schemes in the Region are overviewed in the evidence of Dr Roygard (pp. 27 & 28). More specific detail for some schemes has been provided in evidence by submitters including:

- Jared Bowler for Genesis Energy (in relation to the Tongariro Power Scheme);
- William Armstrong for Todd Energy (in relation to the Mangahao Hydroelectric Power Scheme); and
- David Fincham for King Country Energy (in relation to the Mangahao Hydroelectric Power Scheme and the Piriaka Hydroelectric Power Scheme).

59. Hydroelectricity consents within the Region vary in scale and effects on water bodies. Some of the schemes include substantial infrastructure and abstract large volumes of water (including transferring this between catchments and Regions). Others are abstractive because they store water and alter the flow variability and natural flow regime of the river. At the other end of the scale, some use small amounts of infrastructure to generate electricity from water falling over waterfalls.

60. Establishing the core allocation volumes in the Proposed One Plan after providing for the existing hydroelectricity consents[7] reflects a pragmatic approach to determining remaining allocation after the effects of hydroelectricity consents (including abstraction) have been accounted for (Dr Roygard's evidence pp. 41 & 42). This approach recognises the existence of hydroelectricity infrastructure in the water bodies of the Region, many of which have been in place for significant periods of time. Further, it enables a customised allocation regime to be established around the existing infrastructure to provide for its varying nature and scale of. In some cases, it has been recommended there is no further abstraction beyond that of hydroelectricity, eg. the

[7] s42A Evidence of Dr Roygard (pp 41-42, points 68,69).

Moawhango River. In other Sub-zones, allocation beyond the abstraction by hydroelectricity has been set at existing consented allocation, eg. the upper Whanganui. In some Water Management Zones, further allocation has been provided for downstream of some hydroelectricity consents, eg. the Mangahao catchment.

61. Genesis Energy has sought provision for the abstraction and use of surface water for existing hydroelectricity consents as a controlled activity because these consents have been taken into account in setting the core allocation limits and minimum flows. Separating water used or abstracted by the existing hydroelectricity consents from the 'core allocation' takes, does not imply both parts of the water allocation framework have the same potential effects. The large scale existing hydroelectricity takes have considerable effects on the natural flow regimes of rivers and in many cases have been subject to considerable process in establishing the existing consents for these activities.

62. The scale and potential effects of hydroelectricity generation schemes are much greater in many cases, than the potential effects of the proposed core allocation regimes. This is summed up in the evidence of Dr Hayes[8]: "*Various features of the flow regime may need consideration depending on the degree of hydrological alteration. When the degree of hydrological alteration is large, such as occurs with damming, impoundment and flow regulation for hydro-power generation, the entire pattern of flow, including channel forming floods, flushing flows, flow recessions and minimum flows need attention. However, in most cases where small to medium levels of abstraction occur on a run-of-river basis, attention needs to given only to minimum flows and flow recessions. Water allocation as proposed in the Proposed One Plan for the majority of water management zones is of this nature.*".

63. Relating this to the allocation framework of the POP: core allocation regimes specify a fixed maximum daily volume over and above a minimum flow. Typically, core allocations are recommended to be in the order of 10-30 percent of MALF. By contrast, some hydroelectricity consents specify maximum volumes to abstract almost the entire river flow upstream of storage (eg. the hydroelectricity schemes in the Upper Moawhango River and Mangahao River).

64. Introducing new hydroelectricity schemes into the POP water allocation framework will require careful consideration of the potential effects of the activity, as outlined in the quote from Dr Hayes above. The potential effects of a new hydroelectricity scheme will depend on the type, scale and nature of the operation of the scheme and how this

[8] s42A Evidence of Dr Hayes (page 16, para. 66).

relates to the various parts of the framework and the mechanisms used for consenting such a take. Some new schemes could operate within the defined limits of the categories of the allocation framework as outlined in Box 1, or alternatively, a take outside these categories could provide a mechanism for some or all of the water for the scheme. As outlined in the description of the framework above, takes outside the categories of the framework are likely to require careful consideration of the potential adverse effects on the environment and other legitimate users.

2.3.4. Planning analysis

65. A number of issues have been raised by the hydroelectricity companies, each of which is addressed in the following sections.

Activity Status for New Hydroelectricity Generation Activities

Water Takes

66. Genesis Energy seeks to have the activity classification for new hydroelectricity schemes altered from non-complying to discretionary. Currently, any activity including hydroelectricity activities that are unable to comply with the core water allocation limits fall for consideration as non-complying activities under Rule 15-6. From a policy perspective there would need to be a specific reason why one activity should be treated differently from any other activity where the potential adverse effects would be similar. It is unclear from an effects perspective why hydroelectricity would be different to any other activity. Genesis contends that the provisions in the RMA and within the Proposed National Environmental Standard (NES) on Ecological Flows and Water Levels regarding the national benefits of renewable energy should then translate into ensuring that the consenting pathway for hydroelectricity generation should be provided for in as "easy a fashion" as possible. The energy companies consider that as s7(j) RMA requires that particular regard be given to the benefits to be derived from the use and development of renewable energy, this should provide for this easier pathway.

67. The Plan deliberately uses the non-complying activity category because of the potential adverse effects of over-abstraction resulting in less habitat for aquatic species and lower variability in flow, which causes adverse effects on aquatic ecosystem functioning. The policy framework on core allocation limits is strongly worded to ensure that existing life supporting capacity of water bodies is maintained or enhanced. The tests for a non-complying activity under s104D require that a consent authority may only grant consent

where it is satisfied that either the adverse effects will be minor or the activity is not contrary to the objectives and policies. The tests for a discretionary activity under s104 require the consent authority to have regard to the actual and potential adverse effects and any relevant provisions of a Regional Policy Statement or Plan. The tests are more onerous for a non-complying activity. It is considered appropriate that the tests be tougher for an activity that is likely to result in potentially significant adverse effects and for which those effects need to be carefully considered.

68. Genesis Energy seeks to have a further rule to provide for takes and uses of surface water not complying with core allocations from **existing** hydroelectricity schemes to be provided for as a controlled activity. Existing hydroelectricity schemes are specifically excluded from the allocation framework as the water associated with the scheme has been accounted for in setting the core allocation framework.

Discharges

69. Genesis also seeks to have discharges to land and water from existing hydroelectricity schemes managed through a controlled activity rule in Chapter 13. Discharges of water to water are a permitted activity under Rule 13-9. At paragraphs 6.3 and 6.4 of Mr Schofield's Evidence in Chief it is stated that discharges of water to water from hydroelectricity schemes unable to meet the conditions in Rule 13-9, particularly associated with sediment release and scouring, be provided for as a controlled activity. Rule 16-9 deals with Other Existing Damming of Water as a Controlled Activity. Within the Activity Column the taking, diversion or discharge of water into water that is part of the normal operation of the dam is listed. To clarify that the provisions of Rules 16-8 and 16-9 apply to the discharge of water to water from existing dams it is proposed that a cross reference be placed in Rule 13-9.

Exclusions for Transferring Water Permits Upstream of Hydroelectricity Scheme Intakes

70. Genesis Energy seeks to have an additional provision that would exclude the ability for water permits to be transferred to those parts of a zone upstream of the Tongariro Power Scheme intakes.

71. Policy 15-6 sets out the provisions relevant to a transfer of a water consent (permit) as provided in terms of s136(2)(b)(ii). Clause (d) as currently worded would require that there be no more than minor adverse effects on any other take or use of water, and this

would be considered through the resource consent process. As the POP does not specifically provide through the rules for a transfer to another person on another site or to another site in the same catchment s136(4) RMA would apply and would require an application for resource consent. Section 136(4) specifically requires that the effects of the transfer be considered.

72. In addition, it is recommended a statement be added to the end of Schedule B to state:

"Further restrictions on the cumulative core allocation limit. *The core allocation in the identified Water Management Sub-zones is only available in circumstances where:*

a) the point of take is downstream of the locations described in the table below (which identifies the location of infrastructure related to existing hydroelectricity generation schemes), or

b) the point of take is upstream of the locations described in the table below and the quantity of water is no more than that lawfully allocated to be taken upstream of those locations as at 31 May 2007."

73. The issues regarding cumulative core allocation and location of takes in relation to existing hydroelectricity are more appropriately linked to the rule framework. There is a need to link the provision to a table which specifies where the schemes are located, to ensure that any restriction on upstream takes is targeted to the location. The table specifying the locations of these schemes is somewhat large and the table was considered better located within the Schedule rather than adding a potentially cumbersome layer within the rule structure.

Policy Changes

74. A number of changes are sought to the policy framework to provide for and recognise the need for hydroelectricity generation. The reasons for making policy changes are summarised by Mr Schofield for Trustpower in his Evidence in Chief (paragraphs 5.24 and 5.25) which states:

"As I have outlined earlier in my evidence on the water provisions – and earlier Chapters of the Proposed One Plan to date – the Act contains numerous provisions which relate to renewable energy generation activities are in the regional or national interest: this is recognised by Chapter 23 of the Proposed One Plan. Moreover, where there is a significant resource management issue pertaining to a specific activity, then there is a

significant resource management issue pertaining to a specific activity, then there is justification for a specific policy(ies) to address such activity.

Accordingly, I consider it would be appropriate – and indeed consistent with the Act – for Policy 6-4 to provide for some instances, particularly in the case of regionally or nationally significant infrastructure, where the water quality standards outlined in Schedule D cannot be met."

75. Considering the reasoning put forward in submissions and as summarised above, each of the specific policy changes that are sought is dealt with in the following sections.

(1) Change sought: More explicit cross referencing to Chapter 3 and recognition of the national benefits of infrastructure and energy development.

Comment: The key issue in relation to the provisions within Part I of the Plan is that Chapter 3 covering renewable energy generation and Chapter 6 work in tandem. One section is not dominant over the other and both provisions need to be considered either in the development of a Plan or in considering a resource consent application. Additional cross referencing has been recommended to Chapter 3 within the various Water Chapters. No further change is recommended.

(2) Change sought: The addition of a clause to Policies 6-3, 6-4 and 6-5 stating that the policy does not apply to the effects on water quality of water discharges from the operation and maintenance of hydroelectricity generation infrastructure.

Comment: Rule 16-9 would require a consent for a controlled activity for the normal discharge of water associated with the operation of a dam, ie. a spillway. The use, maintenance and upgrade of existing hydroelectricity schemes is permitted under the rules in Section 16.4. Therefore, it is unnecessary to have the high level policies in Part I of the Plan specifically exclude operation and maintenance activities because:

(1) Permitted activities do not trigger a need to consider the policies.

(2) Approval would have to be granted to a controlled activity, meaning the policies in Part I of the Plan would not be something that would prevent consent being granted.

These broad level policies would not benefit from reference to specific activities. The intent of the policies is clear. These are not policies that should focus on a specific activity, even where that activity may be a *"significant resource management issue"* as signalled by Mr Schofield.

(3) Change sought: Seek the alteration of Policies 6-15, 6-16 and 6-17 to specify that existing hydroelectricity generation is not affected by any water allocation provided for in the Plan.

Comment: Policy 6-16 has been recommended to be altered to specifically state that the minimum flows and core allocations set out in Schedule B exclude and will continue to exclude any takes for hydroelectricity that are lawfully established.

In addition, it is recommended that there be an additional footnote within Schedule B which states: *"In accordance with Policy 6-16, the taking or diversion of water for hydroelectricity generation that was lawfully established as at 31 May 2007 falls outside the core allocations specified under Policy 6-16."*

Both of these provisions adequately address the matters raised by the submitter and no further change is recommended.

(4) Change sought: Policy 6-18 explicitly provides for supplementary allocation of water for existing hydroelectricity generation schemes.

Comment: The policy deals with supplementary allocation in a generic sense, ie. applying to any activity, and sets out the circumstances when a supplementary allocation may be provided. Specific provision for one activity is not necessary as the policy does not unduly restrict an application being made for a supplementary allocation for a hydroelectricity scheme.

(5) Change sought: Policy 6-19 specifically includes takes for existing and new hydroelectricity generation during minimum flow conditions. Consider adding further wording that existing hydroelectricity takes shall be allowed to continue subject to the minimum flow requirements outlined in consent conditions.

Comment: The issue of minimum flow conditions, and what an appropriate residual flow is, should be considered through the consent process. The path to the development of conditions that would sit within a consent decision will flow

from the policies, among other matters. The policies signal that consideration of minimum flow is important and this would guide conditions regarding residual flow conditions on a consent for a dam. No change is recommended.

(6) Change sought: Have a policy framework in relation to Schedules B and D that allows not only for the values within the Schedules but to also provides for consideration of an alternative minimum flow or allocation regime via a resource consent process.

Comment: The POP sets a clear policy framework for water quality and uses the provisions within Schedule Ba and D to support the policy. The Plan also sets a clear policy framework in relation to water allocation and minimum flows through links to Schedule B. The provisions within Schedules Ba and D are largely undisputed by the parties. These Schedules provide the factual basis which supports the policy framework. The Schedules and the policy work hand in hand and one without the other would result in a weakened policy framework with no clear and certain pathway.

The option of a Private Plan Change in the future is also available should a party be able to demonstrate that the provisions should be altered.

2.4. Issue Four: Permitted activity water takes

2.4.1. Summary of issue

76. A significant number of submitters sought changes to Rule 15-1 which allows minor takes and uses of surface water as a Permitted Activity. These submitters generally considered that the threshold for the Permitted Activity was too low and sought changes to the Rule to ensure that account was taken of the size of the property and the scale and intensity of the farming activity carried out on it.

2.4.2. Legal issues

77. Mr Maassen has provided his analysis of the law surrounding s14(3)(b) in his separate legal report. In summary he concludes that it is appropriate for a rule to specify when takes exceed the 'reasonable' and 'adverse effects' tests of that section, and that that section does not provide for takes for other than individual persons (not companies or other entities).

2.4.3. Technical analysis

What do the permitted take thresholds provide for?

78. The s42A evidence of Dr Roygard (pp 84-85) shows that the rates specified in the permitted activity rule of 15, 30 and 50 m^3/day provide for:

1. 50, 100 and 166 people respectively for household water supply using an allowance of 300 litres/head/day (ie. 50 l/h/day above the Ministry of Health guidelines of 250 l/h/day).
2. 0.3, 0.6, 1 hectare respectively for irrigation using a typical irrigation rate of 5 mm/day.
3. 214, 429, and 714 stock respectively for stock drinking water for the classes of stock with the highest peak daily demand (working horses and milking cows) at 70 l/h/day.
4. 107, 214, and 357 stock respectively for stock drinking water requirements of milking cows (70 l/h/day) and dairy shed washdown (70 l/h/day).

Potential effects of non-consented take regimes

79. The only technical evidence from submitters about the effects of non-consented takes on the environment or other users was that of Arthur Male for Mighty River Power. The potential effects identified were in relation to groundwater abstractions upstream of hydroelectricity storage dams, impacting on the total run-off that reaches the dam and on the generation capacity of power stations associated with that storage[9]. This comment is not limited to permitted activity takes but rather addresses overall groundwater takes, including permitted activity takes. Mighty River Power subsequently recommended an amendment to Rule 15.2 Permitted takes for groundwater (Andrew Collins, page 45, para. 6.21).

80. Non-consented takes are provided for as part of the permitted take category of the water allocation regime[10]. The use of the terminology “permitted takes” for this category reflects the permitted provisions of current Regional Plans incorporating all small takes of water for all purposes (including stock water use) and the carrying forward of that concept into the allocation framework.

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[9] Evidence in Chief of Arthur Male (para. 48).
[10] Dr Roygard s42A Evidence (pp 33 & 34 and Box 1 of this report).

81. Evidence in relation to the permitted activity regimes and their effects on the environment and other users is presented in Dr Roygard's supplementary evidence. The evidence outlines[11] the approach to providing for historic levels of permitted takes as:

"A*s the actual volumes and timing of non-consented takes is unknown, an alternate approach was used to develop the proposed core allocation limits for the POP. This approach assumed that the flow statistics generated for the catchment were measured after the abstraction, based on the historic level of any non-consented takes. In accounting for historic levels of abstraction for such purposes, the approach does not fully account for intensification in the catchment. In the absence of better information on the level of non-consented takes, this presents a pragmatic way to determine levels of core allocation with some consideration of the non-consented abstraction.*

Therefore, the proposed core allocation limits have accounted for historical levels of abstraction by takes outside of the consented regime. Any allocation above these historic levels is likely to reduce the surety of supply for consented users, ie. increase the frequency of minimum flows (see below). Any mechanism for maintaining non-consented takes close to these historic levels will not reduce the surety of supply for consented users. If allocation for non-consented takes increases over these historic levels, consideration should be given to reducing the core allocation limits in order to provide the same level of surety of supply to users."

82. A key point is that historic levels of permitted takes were accounted for in the water allocation framework and any increase in these levels will likely increase the overall abstraction pressure from these takes above the levels provided for in the framework. As discussed in the description of the framework (see the section above on evidence in relation to the design of the framework), takes outside of the levels provided for in the framework are likely to have adverse effects on the environment or other legitimate users. For example, an increase in non-consented takes could increase the frequency of the minimum flows occurring. Consequently, flows in the river would be below the threshold to provide for instream requirements more often and users would have a lower surety of supply.

83. The potential adverse effects of non-consented takes are particularly important as non-consented takes are able to be taken regardless of flow. Increases in non-consented takes below the minimum flows result in the abstractive pressure increasing at times when the flow river is lower than that required to provide for instream values. Therefore,

[11] Dr Roygard Supplementary Evidence (pp 20 & 21, paras 39 & 40).

increases in non-consented takes can potentially have significant adverse effects on the life supporting capacity of a water body. Dr Roygard identified that in assessing the effects of non-consented take regimes, consideration should be given to stream/river health at low flows at a range of scales including the local, subcatchment and catchment level. This included considering if a non-consented take regime would provide for some small streams to be dried up through cumulative non-consented takes[12].

84. In summary, increases in the levels of non-consented takes above those accounted for in the framework may have adverse effects and require the minimum flows and core allocation limits to be reassessed to ensure the framework provides for the instream values of water bodies. Further detail on this is provided in the Supplementary Evidence of Dr Roygard[13].

Scenario based analysis to determine relative effects of various regimes

85. Dr Roygard's supplementary evidence estimated the levels of non-consented takes provided for in the water allocation framework for two study catchments (the upper Manawatu upstream of the Hopelands monitoring site and the Mangatainoka catchment). These levels were estimated to be between 11 to 24% of the core allocation limits in these areas.

86. Dr Roygard's Supplementary Evidence[14] further assessed a range of scenarios for these study catchments based on alternate regimes recommended by submitters for allocation of non-consented takes. The scenarios were completed to determine how these related to the volumes provided for in setting the core allocation limits and minimum flows as a part of the overall water allocation framework. The report that documented these scenarios (Hurndell *et al.,* 2009) was provided as Appendix 1 of Dr Roygard's Supplementary Evidence and has subsequently been updated and provided to the Panel as a separate End of Hearing technical report. The updates include adding the scenario recommended by Federated Farmers after the POP hearings and a further scenario of a per hectare allocation up to a limit of 30 m^3/day. Other updates include removing the areas of forest park from the analysis and subsequent changes to the areas and number of properties in some tables. Further updates include increased resolution of the numbers in some tables to enable readers to determine how some values were calculated, and some correction of Values in the tables.

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12 Supplementary Evidence of Dr Roygard (para. 36).
13 Supplementary Evidence of Dr Roygard (paras 36, 39,40,44,45,46,47 & 48).
14 The Supplementary Evidence of Dr Roygard (pp 12, 19-27) and in Appendix 1 of that report.

87. The scenarios analysed provide some variations on the approaches recommended by submitters and can be broadly grouped as:

- a fixed volume per property approach, with extra volume provided for properties with animals. This relates to the originally notified permitted activity rule of the POP which was supported by a range of submissions (Scenarios 1 & 2);
- the per ha approach – as recommended by Chris Pepper of PNCC (Scenarios 7, 8, 9 & 10);
- the per ha approach with a cap based on property size – Horizons' recommended approach in Supplementary Evidence (Scenarios 11, 12, 13 & 18), and recommended by Federated Farmers following the POP hearings (Scenarios 16 & 17); and
- the per ha approach with a cap based on property size and allocation per hectare changing by sector. This relates to the rule proposed by Gerard Willis for Fonterra (Scenarios 14 & 15).

88. Further comparison of the key scenarios is provided in Table 1 below. It is noted that all of these key scenarios include volumes for stock water. Other scenarios excluding stock water have been also been modelled. However, to estimate the potential effects under a non-consented take regime, the full volume allocated under that allocation mechanism has to be considered. To determine this, stock water takes must be included in the analysis.

Table 1: Summary of Results from Scenario based Analysis (Hurndell *et al*., 2010).

Scenarios related to	Mechanism for allocation	Scenario	Includes stock water	Includes dairy shed washdown	Total allocation Upper Manawatu		Total allocation Mangatainoka	
					m^3/day	% of core allocation	m^3/day	% of core allocation
Amounts provided for in the setting of core allocation limits and minimum flows								
Estimation of current water use for stock water	Per ha allocation, by land use type and stocking rate	3	Yes	No	9,583	11	3,833	15
Estimation of current water use for stock water + washdown	Per ha allocation, by land use type and stocking rate + washdown	4	Yes	Yes	13,897	17	6,412	24
Amounts provided by various proposed non-consented take regimes								
Proposed One Plan rule & current rules	Per property Fixed volume	1	Permitted to take up to 15 m^3/day for any purpose		64,740	77	34,200	130
		2	Permitted to take up to 30 m^3/day for any purpose		129,480	155	68,400	260
PNCC	All hectares allocated volume required for dairy	8	Yes	Yes	54,265	65	16,940	64

Scenarios related to	Mechanism for allocation	Scenario	Includes stock water	Includes dairy shed washdown	Total allocation Upper Manawatu		Total allocation Mangatainoka	
					m^3/day	% of core allocation	m^3/day	% of core allocation
	stock water & washdown[15]							
Fonterra	Per ha allocation of permitted activity use by land use type; allocation differs per sector includes provision for some domestic use. Stock water included. Capped at 30 m^3/day above stock water requirements	15	Yes	Yes	23,819	28	11,818	45
Federated Farmers (adding in likely stock water use)	Per property allocation with volume provided per property changing with property size. Capped at 40 m^3/day above stock water requirements including totals plus stock water requirements	17	Yes	Yes	36,361	43	16,558	63
Horizons	All hectares allocated volume required for dairy stock water (200 l/ha/day) capped at 30 m^3/day per property.	18	Yes	No	18,201	22	8,560	32

Summary of scenario analysis

89. The various proposed mechanisms all use some form of a per property allocation mechanism. Scenarios 3 & 4 estimate the levels of core allocation provided for in the framework to be 11 to 24%. Comparing the key scenarios in Table 1 to the 24% of core allocation that is the highest percentage of core allocation volume provided for by the proposed framework for these two catchments, the key scenarios form into four main groups as shown below:

- The Horizons scenario (22 to 32% of core allocation) has ranges that overlap with the volumes provided for in the framework, with values that range up to 1.3 times the highest percentage of core allocation provided for in the framework.
- The Fonterra scenario (28 to 45% of core allocation) allocates approximately 1.2 to 1.9 times the highest percentage of core allocation provided for in the framework.
- The Federated Farmers (43 to 63% of core allocation) and PNCC scenarios (64 to 65% of core allocation) allocate approximately 1.9 to 2.7 times the highest percentage of core allocation provided for in the framework.

[15] 428 l/ha/day for Upper Manawatu and 392 l/ha/day for Mangatainoka. Note: calculated for average stocking rate. PNCC (Chris Pepper, recommended 440 l/ha/day).

- The proposed rule mechanism (77% to 260% of core allocation) allocates approximately 3.2 to 10.8 times greater volumes than the maximum percentage of core allocation provided for in the framework.

Recommendation

90. Of the four main groupings above only Horizons allocation mechanism is considered to have similar to slightly higher levels of allocation to that provided for in defining core allocation limits and minimum flows. Of the key scenarios this is the only one that could be considered to not require reconsideration of the minimum flows and allocation limits.

91. The inclusion of a cap on a per property basis for overall use (including stock water) is recommended to limit potential for individual or combined permitted activity takes to have an effect to the environment or other users. The scenarios that use a per hectare allocation basis without a cap on the volume taken have the potential to allocate large volumes for individual takes without assessment of the effects of such a take. This would also be the case if stock water takes were excluded from having a cap on the volume taken as would likely be the case if stock water takes were excluded from the permitted activity category of the water allocation framework.

92. The current Regional Plans cap permitted activity takes at 15 m^3/day. There have been some issues between permitted users during times of low flow[16] with caps at this level. Increasing that level of cap may increase the frequency of issues arising between users. However, this may well be offset by the use of the new definition of per property (ie. changing it from per certificate of title to per property, as described in the planning analysis section). Permitted activity rules that include stock water and have a cap on a per property basis is recommended.

93. From a technical perspective there are good reasons for permitted takes regimes to include stock water to limit the increase of the use under non consented take provisions to greater than that allowed for in setting the core allocation limits and minimum flows and to enable characterisation of effects in assessing other applications. Exclusion of stock water from the Rule would provide for uncapped size of take and increases in allocation without consideration of effects.

[16] Supplementary evidence of Dr Roygard (para. 48).

2.4.4. Planning analysis

94. It is not proposed to deal with the issue any further here because, as outlined in the legal analysis above, a Plan can restrict the taking of water and the permitted activity rule approach is an appropriate method of doing this. The following sections assess what is an appropriate limit for a permitted activity take and whether the limits should be based on a per property approach or some other approach.

Approaches proposed by submitters

95. A number of submitters sought to alter the permitted activity rules regarding surface water takes. The following provides a summary of the main issues raised by specific submitters in relation to permitted activity surface water takes:

(1) Palmerston North City Council considered the rule should be based on a per hectare approach to water takes rather than a per property basis.

(2) Federated Farmers considered there should be a per hectare approach to water takes rather than a per property basis with a maximum of 40m^3 per day for properties 50 hectares or greater.

(3) Fonterra Co-Operative Group Ltd sought to have Rule 15-1 altered to have different volumes of water per day depending on the activity or the size of the property. Fonterra's proposed approach involves providing for all water required in terms of s14(3)(b) takes. Rule 15-1 would then provide for:
   (a) 15 cubic metres per day for market gardening, cropping, intensive sheep and beef farming and the keeping of pigs or poultry.
   (b) 1 cubic metre per day for every 5 hectares of land used for dairy farming up to a maximum of 30 cubic metres per day.
   (c) 5 cubic metres per day for properties greater than 4 hectares not used for the activities identified in (a) and (b).
   (d) 1.5 cubic metres per day from all properties less than 4 hectares in size and not used for market gardening, cropping, intensive sheep and beef farming and the keeping of pigs or poultry.

96. Further caucusing has been undertaken with both Federated Farmers and Fonterra but there has been no agreement on an approach to dealing with permitted activity surface water takes.

Operative plan provisions

97. The Operative Land and Water Regional Plan provides for the abstraction of up to 15 cubic metres per day as a Permitted Activity under SW Rule 4. The rule is qualified by only providing for one abstraction point in any one particular certificate of title. This approach compares with the proposed rule which has a rate of take of 30m^3/d for stock and domestic needs plus 15m^3/d for any other use and restricts the take to a property which could include a number of certificates of title.

Technical assessment summary

98. A number of scenarios have been worked through in further detail by Dr Roygard considering, in particular, the avoidance of adverse effects on surface water quantity. The scenarios that work best from a technical perspective are those that include stock water and have a cap applied on a per property basis. The reasoning for having maximum limits for properties over a certain size includes:

(1) A cap on total allocation provides control on surety of supply for consented users.

(2) Stability in levels of allocation to enable defining of core allocation limits.

(3) A fixed volume to consider the effects of takes at low flows at a catchment level.

Options

A. A per property or area based approach (including a cap)

(1) Simple to understand and operate within.
(2) Appropriate subject to recognising that the definition of property (ie. being one certificate of title or many) can have significant effects on the volume that is then allocated through the allocation regime.
(3) Allocating a fixed volume per catchment which cannot change and therefore can be factored into an assessment of the potential effects of this level of allocation in relation to effects on the environment.
(4) Setting a cap on the take allowing for a reduction in the overall volume allocated and increasing the volume available for those applying for consent in areas where the water is needed. That is, the catchment would then potentially not be fully allocated, leaving water available for people to apply to use.

B. Land based or sector based approach

(1) Provides for water amounts to be specified for various typical use scenarios and provides for this as a permitted activity.

(2) There is the potential for inequity with this approach. Different catchments would result in different demands for water depending upon what sectors were located within those catchments. There is the potential for over allocation in particular catchments.

(3) The permitted activity rule structure would be cumbersome, with a number of tiers required for various activities.

C. Use an average stocking rate approach as part of the rule

(1) An average stocking rate type figure works well at a catchment level but does not deal with potential intensification within any particular catchment.

(2) The permitted activity rule structure would be cumbersome, with a number of standards for various stock and this would not assist in ease of use. Compliance would be difficult in terms of determining the average stocking rate.

99. The technical evidence presented suggests that there needs to be a cap on the maximum take that can be taken as a permitted activity. It is accepted by the submitters that there needs to also be a maximum cap with a number between $15m^3$ and $40m^3$, being proposed. It is considered that the caps included in the POP as notified are appropriate given the technical evidence presented. It is also recommended that there be a cut off on a per hectare basis where the maximum rate of take would apply. The recommended approach is: to provide for permitted activity takes of 200 l per hectare up to a maximum of $30m^3/d$.

2.5. Issue Five: Water quality standards

2.5.1. Summary of issue

100. There were submissions and evidence about the standards proposed in Schedule D. These can be summarised as:

(i) technical submissions and evidence seeking review and amendment of some numerical values specified for some parameters in Schedule D (eg., Palmerston North City Council, Submitter 241; Winstone Pulp International Ltd, Submitter 288;

Fish & Game New Zealand – Wellington Region, Submitter 417; and Fonterra Co-operative Group Limited, Submitter 398)

(ii) planning submissions and evidence seeking clarification of the status of the standards specified in Schedule D (Palmerston North City Council, Submitter 241). The key issue of contention was the need to establish and clarify whether the standards were standards for the purpose of s69 RMA or not and how that might affect their use as activity thresholds in the Plan.

2.5.2. Legal issues

101. An analysis of this issue is provided by Mr Maassen in his separate legal report. In summary he concludes that s69 of the RMA is not triggered by the provisions in the plan, and that it is appropriate to use the word standards to describe the provisions that the plan does contain.

2.5.3. Technical analysis

102. Issues in contention relating to the proposed water quality standards were largely general in nature. For example, several submissions asked broadly that the water quality standards be deleted, clarified, or revised to use the best available science and that the standards be more site specific and/or better reflect the existing water quality of the Region's waters (see Appendices III and IV of the Report on scope for water chapter recommendations). The timeframes for current consent holders to meet the standards, and the nature of the standards as bottom-line standards, targets or guidelines, were also general issues of contention. These issues are not addressed in this section.

103. Recommended changes to the numeric standards were circulated along with s42A evidence prior to the Hearing. These changes reflected the review and revision of the standards by a number of leading experts in the field of water quality; see Table 10 in the s42A report of Dr Jon Roygard (page 111) for a summary of the expert evidence providers and the subjects covered on behalf of Horizons. The experts were asked to review and if necessary revise the standards to: 1) meet the general concerns raised in submissions (detailed above); 2) take into account the pre-submission work of Mr Hamill (Appendix 2); 3) account for the Horizons' submission to the Plan; and 4) to appropriately revise the estuary and seawater standards as a consequence of the relocation of these waters from Schedule D into Schedule H following the Provisional Determination on Coast.

104. Following the circulation of s42A evidence and the recommended changes to the water quality standards resulting from the expert revision, four parties provided submitter expert evidence that specifically commented on the numeric details of the water quality standards. Those parties were PNCC (Keith Hamill), Winston Pulp International (WPI) (Paul Kennedy), Fish & Game and Forest and Bird (Assoc. Prof. Death), and Fonterra (Dr Scarsbrook). Two expert caucuses were held to resolve outstanding issues prior to the commencement of hearings. The first caucus was held with Keith Hamill, Paul Kennedy and experts on behalf of Horizons (report entitled Meeting of Experts: water quality standards, 10 November 2009). The second was held between Associate Professor Death and Kate McArthur (report entitled Meeting of Experts: re Russell Death's evidence on water quality, 16 November 2009). Table 2 of the Supplementary Evidence of Kate McArthur (page 4) details most of the matters raised by these submitters and the agreement and resolution (or otherwise) resulting from this evidence and the resulting caucuses. These changes were reflected in the Track Changes (pink pages) version of the water quality standards presented at the Hearing and further detail is not repeated here.

105. The s42A evidence (Table 11, page 98; Table 12, page 115 and Table 13, page 134). and supplementary evidence (Table 2, page 4 and page 13, paragraphs 12, 13 and 14) of Kate McArthur details the recommended changes to the numeric water quality standards and the explanation for these changes in relation to Horizons' expert evidence, submitter evidence and expert caucus on water quality standards. Scope for the recommended changes can be found in Appendices III and IV of the Report on scope for water chapter recommendations and is not discussed here.

106. At the conclusion of submitter evidence to the Hearing there were six key issues regarding water quality standards remaining in contention between the expert evidence provided to the Panel (Table 2). These issues were: a) the standards for the reduction in QMCI as a result of point source discharges; b) the inclusion of a deposited sediment standard; c) which faecal indicator should be used for the standards in estuary sub-zones; d) the minimum visual clarity standards for estuaries and shallow lakes; e) the removal of the cyanobacterial toxin standard for lakes; and f) the appropriateness of the use of the ANZECC Guidelines as toxicity standards.

Table 2: Summary of technical issues relating to water quality standards outstanding at the conclusion of submitter evidence to the Hearing.

Issue	Evidence provided by:	Outcome / Recommendation
a. QMCI 20% percent or statistically significant reduction	Keith Hamill (suppl. evidence paras 3.4-3.7) Assoc. Prof. Russell Death (EIC para 34) Kate McArthur (suppl. evidence Table 2, page 11)	No agreement reached between experts. **Recommendation:** The reference to "statistically significant" is removed from the QMCI change standard and 20% reduction is used instead.
b. Deposited sediment standard	Assoc. Prof. Russell Death (EIC paras28-30)	No change is recommended. An appropriate numerical standard is not available at this time for inclusion in Schedule D. Horizons continues to support the national programme to develop measurement tools and scientifically robust guidelines with the intention of utilising the guidelines once completed for assessing the impact of activities on deposited sediment.
c. Faecal indicator bacteria standard – estuary sub-zones (*E. coli* or enterococci)	Dr Rob Davies-Colley (s42A report, para 61, page 17) Graham McBride (verbal evidence) Dr John Zeldis (s42 A report para 35 and 37, page 7)	*E. coli* has been agreed as the best indicator on which to base a water quality standard for estuaries. The standard should remain as proposed in the pink Track Changes version. Memo of agreement appended as Appendix 3.
d. Visual clarity in estuary sub-zones and lakes	Dr Rob Davies-Colley (s42 A report para 38, page 10) Max Gibbs (s42 A report para 14, point x, page 7) Dr John Zeldis (s42 A report para 42, page 7)	The minimum visual clarity standard for estuary sub-zones and shallow lakes shall be amended to be 1.2 metres and 2.1 metres for deep lakes. All references to the use of Secchi depth to monitor estuary sub-zones, the Seawater management zone or shallow and deep lakes should be removed in favour of a black disc measurement that is relevant to the standards agreed. Memo of agreement appended as Appendix 3.
e. Removal of cyanobacterial toxin standards – lakes	Max Gibbs (s42 A report para 14, point xiv, page 8) Kate McArthur (s42 A report Table 12, page 118)	All references to standards for cyanobacterial toxicity should be removed from the Plan. Memo of agreement appended as Appendix 3.
f. Inappropriate use of the ANZECC toxicity guidelines	Paul Kennedy (Suppl. Evidence para 14)	**Recommendation:** the standards should remain as written in the pink Track Changes version (see below).

107. After caucusing with various experts on the QMCI standard (see above) and in considering the Supplementary Evidence provided by Keith Hamill (paragraphs 3.4-3.9), Horizons requested further advice from an independent expert, Dr John Stark. Dr Stark, who was responsible for the development of the MCI and QMCI, was provided with the evidence of Keith Hamill, Associate Professor Death and Kate McArthur and to advise Horizons on a change in QMCI standard which was ecologically meaningful and with a defensible statistical basis. Dr Stark's advice is appended (Appendix 4).

108. Given the advice of Dr Stark, and the compelling case for retaining the 20% reduction rather than statistical significance as the threshold for determining adverse effect on QMCI as a result of discharges to water that was presented by Keith Hamill, Horizons Senior Scientist Kate McArthur is now in agreement with Mr Hamill. However, after reading the advice submitted by Dr Stark, Associate Professor Death remains unconvinced that the 20% reduction standard is anything other than arbitrary so a complete agreement among the experts involved in this matter is still outstanding at this time.

109. On balance, given the advice received on the matter and the expert evidence and Supplementary Evidence from submitters, Horizons staff recommend that the wording of the QMCI standard is reverted back to reflect the 20% reduction between upstream and downstream rather than using the term "statistically significant'.

110. The ANZECC (2000) toxicity guidelines are proposed as standards in the POP for either 95 or 99% species level protection depending on the Water Management Zone. Paul Kennedy gave written and verbal evidence to the Panel (on behalf of Winston Pulp International (Supplementary Evidence of Paul Kennedy, paragraph 14, page 3) that there were errors in the figures used within the ANZECC Table 3.4.1 and he did not consider the use of the guidelines in the Plan to be appropriate.

111. The toxicity standards within the POP serve two purposes. Firstly, they apply as a standard for permitted activities under Rule 13-9 in terms of discharges of water to water for temperature, and Rule 13-24 regarding discharges of contaminants to water. The ANZECC trigger values are appropriate as permitted activity thresholds because they define the limit at which further investigation is required, this is consistent with the ANZECC framework mentioned in Mr Kennedy's Supplementary Evidence (paragraph 19, bullet 3). If the level of a toxicant is under the trigger value, the activity can continue with very low risk of any environmental effect. If the trigger value is exceeded, further work is required to ascertain if adverse effects will result. In the RMA context that

further assessment is provided by the discretionary resource consent process. Requiring the more site-specific or local approach preferred by the ANZECC guidelines (Figure 3.1.2) is unnecessarily onerous for a permitted activity threshold. Paragraph 9 in the matters agreed on Schedule D (caucusing report of 10 November 2009) and paragraph 17 of Mr Kennedy's report, detail the expert agreement on the use of the ANZECC guidelines as triggers for permitted activities and targets for discretionary activities (in the manner described above).

112. Secondly, the default trigger values are applied as policy standards for discretionary activities. Using the philosophy of the ANZECC Guidelines outlined in Figure 3.1.2 of the guidelines (reproduced in Appendix 1 of the s42A evidence of Kate McArthur) if an activity were to cause the discharge of a contaminant to water which exceeded the default trigger value (or POP standard) then the guidelines suggest that the next step is to collect site-specific information on the likely ecological effects, based on the biology of the receiving environment, and then to utilise local background reference data to determine if effects on the biology are likely, given the site information collected. This is a process which is commonly undertaken as part of the preparation of an Assessment of Environmental Effects (AEE) for a consent application. Within an AEE, information on further research related to the toxicity values within the guidelines could be discussed and used to establish the degree of effect or more appropriate standards that are site and consent specific (ie. the research cited by Mr Kennedy in relation to zinc toxicity).

113. It is recommended that the toxicity standard and the Rules linked to that standard remain as proposed with only the minor amendments agreed with Mr Hamill regarding the inclusion of wording related to adjustment for hardness and measurement of soluble/dissolved fractions of toxicants suggested in the pink Track Changes version of the POP.

2.5.4. Planning analysis

114. Mr Bashford, for the Palmerston North City Council, summarises the issues that have been raised in relation to Schedules Ba and D and whether the standards act as standards or targets. In his Supplementary Evidence (paragraph 8) Mr Bashford states:

"It appears that the intention is for the Schedule Ba and Schedule D standards to apply as standards in relation to activities that are permitted. In the event that an activity does not meet the standards, the activity would require a resource consent. Some controlled and restricted discretionary rules retain control or discretion that relate to the water

quality standards. It is unclear whether discretionary or non-complying activities need to comply with the standards or whether the standards are to be used as targets against which an application is assessed."

115. Mr Bashford also states (paragraph 15):

"My second concern is that in the absence of clarity it remains open for future argument that these are standards for the purpose of section 69. That would then allow argument that the rules must require the observance of the standards with no exceptions. That is, it could be argued that the rules must be amended to prohibit discharges which do not meet the standards. That was clearly not what was intended but given the loose wording surrounding the standards that is an argument which others may mount."

116. It is the intention that the provisions within the Schedules will act as standards in relation to a permitted activity and as guidelines or targets for resource consent applications. The provisions are not standards for the purposes of s69 RMA but are targets that will be considered at the time any application is considered.

117. The Chapter 13 permitted activity rules that refer to the Schedules are Rules 13-9, 13-24 and 13-26. The Chapter 13 controlled and restricted discretionary activity rules that refer to the Schedules are Rules 13-17 and 13-21.

118. As referred to in the technical assessment, the application of the Schedule D standards will work effectively in relation to the permitted activity rules. There was some discussion at the Hearing concerning permitted activity stormwater discharges and, as noted, these rules are not referenced to Schedule D standards. The issue really is how the provisions of Schedules Ba and D apply in relation to a consideration of a resource consent application. The factors that need to be considered are:

(1) Is the use of the word 'standard' within the Schedules problematic? Should an alternative word be used?

(2) Do the references to the standards within the Schedules in the policy framework need to alter to better reflect that the standards are standards in relation to permitted activities but targets for resource consent applications?

119. The policy framework contained in Part I guides plans and will be considered in relation to a resource consent application. The policy framework in Part II also will be considered in relation to resource consent applications. If the problem is approached from the basis of using a common term throughout the Plan then the word 'target' would

be useful if the word 'standard' is considered undesirable. The word 'target' is defined as "*a fixed goal or objective*" and implies that it is something that is being worked towards, which is what the Schedules seek to do as part of the policy suite.

120. Other words that have been considered instead of 'target 'are:

(a) Guideline. Means a principle put forward to set standards or determine a course of action. The schedules are more than a principle put forward to set standards.

(b) Goal. Means an aim or purpose. Aim means the action of directing something. Purpose means the reason for which anything is done. While 'aim' may be appropriate the term 'purpose' is not particularly relevant in the context of the Schedules.

(c) Objective. Means an aim or purpose. The word 'objective' could be considered to conflict with the use of the term Objective in the policy framework.

121. In relation to an activity that requires consent the following terminology is used in the rule: *"measures to manage effects on surface water bodies including maintaining the values and water quality standards set out in Schedule D"*. The use of the term 'standard' here is not necessarily problematic if a guidance note is added to Schedule D. It is recommended that additional wording be included in Section 6.7 Explanation and Principal Reasons to clarify that the standards included in Schedule D are not standards in terms of s69 RMA.

122. The permitted activity rules include the word 'standard' and state: *"…breach the water quality standards for that water body set out in Schedule D".* In the context of the permitted activities it is considered that the use of the word 'standard' is appropriate and reflects what the standards seek to do.

2.6. Issue Six: Intensive agriculture

2.6.1. Summary of issue

123. Policy provisions seeking to manage the effects of intensive farming activities by controlling nutrients, faecal contaminants and sediment were not supported by many submitters. A significant amount of evidence, some of it conflicting, was presented about these policy provisions. This generally covered matters such as:

(i) the current state of water quality in the Region, including water quality trends and their interpretation
(ii) links between nutrients, periphyton growth and ecosystem health
(iii) sources of nutrients in water bodies
(iv) levels of intensification of the dairy farming sector
(v) targeting of intensive farming activities versus all land use activities
(vi) the use of land use capability to derive nitrogen loss limits
(vii) The costs to intensive farming activities versus the environmental benefits from implementing the policy provisions

2.6.2. Technical analysis

Water quality state

124. The water quality standards defined in Schedule D provide for the Values of water bodies. These standards give a benchmark against which to compare the state of water quality to determine if it is sufficient to provide for the Values, and assess whether or not life supporting capacity is being compromised. Where the state of water quality is worse than the water quality standards set out in Schedule D, there are likely to be adverse effects on the Values. The evidence in relation to the water standards is presented in an earlier section of this report and these standards are largely agreed by Experts.

125. Dr Roygard's evidence (pp. 98-101) overviewed the state of water quality in the Region. This evidence, based on Horizons' State of the Environment Report (Horizons, 2005a), identified that water quality issues in the Region can be broken down to four main issues that relate to the Values of water bodies. These main issues are:

1. **Levels of sediment, water clarity and turbidity** that impact on Aesthetic values, Life Supporting Capacity (eg. the ability of fish to feed), and Contact Recreation values.
2. **Physiochemical characteristics** (eg. the presence of chemical conditions or toxic substances that compromise the life supporting capacity of the water body, including parameters such as dissolved oxygen, temperature, pH (acidity or alkalinity of the water) and Biochemical Oxygen Demand (BOD) (demand for oxygen for breakdown of organic material)).
3. **Bacterial and/or faecal contamination,** which can compromise the water's recreational quality, or suitability for human and/or stock drinking water.

4. **Nutrient enrichment**, which can cause accelerated growth of nuisance plant material and can compromise recreational, consumptive use and life supporting capacity values.

126. The evidence presented on state of water quality showed that water quality in the Region varies spatially and temporally. The spatial and temporal variation of water quality was demonstrated in Dr Roygard's Supplementary Evidence, which included a video demonstrating how bacteria (*E. coli*) levels varied in relation to standards from sampling event to sampling event in the Manawatu catchment. The evidence on state contains many references to the variation in state at particular sites determined by calculating the percentage of time that a site meets the standard, and by using box plots which demonstrated the range of sampled values compared to the standard. Such indicators show that at some times a site may meet the standard and at others it may not.

127. Dr Davies-Colley (s42a Report, para. 107-112) showed that, in the least disturbed catchments (ie. upland rivers flowing out of forest park), water quality is generally good. Elsewhere in the Region, such as the Manawatu River and its tributaries, water quality is appreciably degraded when compared to sites from around New Zealand. Concentrations of nitrogen and phosphorus in the Manawatu River are among the highest nationally, and visual clarity across the Region is low compared to the rest of New Zealand. Faecal indicators frequently exceed safe swimming and shellfish gathering guidelines in fresh and marine waters respectively. Nitrogen, phosphorus, sediment and faecal bacteria are the four key contaminants impacting on water body values in the region (s42A Report of Dr Roygard, para. 190). Poor water quality is largely correlated with dairying, sheep and beef farming, and point source discharges – all of which contribute to degraded 'hot-spots' in some rivers (s42A Report of Mrs McArthur, pp. 138-152).

128. Aquatic ecosystems also reflect degradation at some sites in the Manawatu-Wanganui Region. Dr Quinn (s42A report of Dr Quinn, para. 47 & 50) commented on the poor state of periphyton and macroinvertebrate communities at some sites in the Region and noted that: "*there is ample scope for improvement in river ecosystem health in Horizon's Region*".

129. Periphyton monitoring data exceed guidelines at sites in target Water Management Zones and downstream of point source discharges (Supplementary Evidence of Mrs McArthur, pp. 31-34). Modelling undertaken by Dr Biggs (End of Hearing Report, para. 17) predicts the current state of the Manawatu at Hopelands to be eutrophic, with

prolonged periods of nuisance periphyton slimes and, at times, a low quality macroinvertebrate community. This modelling is supported by measured periphyton and macroinvertebrate community index (MCI) data (Supplementary Evidence of Mrs McArthur Figure 9, p. 32; s42A report of Mrs McArthur, Figure 34, p. 192 & Appendix 2). The state of the river is unlikely to support healthy communities of native fish or trout, implying an impaired life supporting capacity at Hopelands.

130. Dr Roger Young's analysis of functional indicators shows that at some sites, ecosystem metabolism indicates poor health in the summer and for the Manawatu at Hopelands ecosystem health is poor most of the time. Dissolved oxygen saturation is regularly below POP limits that are designed to protect the life supporting capacity of rivers in the Upper Manawatu and Mangatainoka Rivers (s42A report of Dr Young, para. 34-36).

131. Many dune lakes in the Region are hypertrophic or supertrophic (s42A report of Dr Gibbs, para. 12) and cyanobacterial blooms are common at many lakes (s42A report of Mr Gilliland, para. 47-62 and Appendix 5). Lower reaches of rivers and estuaries have some of the highest concentrations of nutrients nationally with the potential for significant adverse effects if physical circumstances change (s42A report of Dr Zeldis, para. 47 & 53-59).

132. The conclusion from the evidence presented regarding the state of water quality is that in some areas, aquatic ecosystems indicate water is moderately to severely polluted at many sites, and nutrient enrichment is moderately to highly eutrophic (ie. showing nutrient enrichment and the effects of this on the Values). In some rivers and lakes, periphyton and macrophyte growth often reach nuisance levels and cyanobacterial blooms are common. Life supporting capacity is moderately to severely compromised in many water bodies, particularly in the target zones identified in the proposed Rule 13-1, and there are significant adverse effects on ecosystem, and recreational and cultural Values at numerous sites. The poor state of water quality in these rivers is largely accepted and is not an issue of contention.

Water quality trends

National water quality trends

133. National water quality trends show steady increases in nitrogen and weak increases in phosphorus (Scarsbrook, 2006). An update was provided by Ballantine and Davies-Colley (2009a), who found strengthened increasing trends in nitrogen and phosphorus that they attributed to expansion and intensification of pastoral agriculture. There were

national scale improvements in visual clarity, although improvements were negatively associated with pastoral development. Ballantine and Davies-Colley's (2009a) analysis supported the findings of Scarsbrook (2006), stating that: "*environmental gains in terms of reduced 'point' pollution of waters in New Zealand are being overshadowed by increasing 'diffuse' pollution*".

Trends analyses for Horizons Region

134. Trends analyses for the Horizons Region were overviewed in the s42A Evidence of Dr Roygard, summarised in the s42A reports of Ms McArthur and Dr Davies-Colley, and mapped and further summarised in the Supplementary Evidence of Ms McArthur. Dr Scarsbrook (for Fonterra) and Dr McBride (for Horizons) also provided evidence on trends. A summary of the trends was provided by Dr Davies-Colley (as quoted by Dr Roygard in Box 30 of his s42A Evidence):

"*There are few significant trends in water quality across the region. Trend analysis of 2001-2008 water quality data revealed no significant trends in DRP concentrations (either increasing or decreasing), 6 meaningful decreasing trends in SIN concentrations* [note 1]*, 4 meaningful decreasing trends in E. coli* [note 1] *and 4 meaningful decreasing trends in turbidity* [note 1]*. These trends are in sharp contrast to the longer term trends (1989 to 2007) for the NRWQN sites where meaningful increases were observed for NO_x-N at the 3 NRWQN sites on the Manawatu* [note 1]*. This suggests the longer term (19-yr) trend of worsening water quality in the Manawatu has been slowing or even reversing more recently (ie., water quality has been improving)*.

Note 1: Higher values for this indicator indicate poorer water quality.

Note 2: Lower values for this indicator indicate poorer water quality."[17]

135. The analysis and results of the water quality trend information was not an issue of contention. The issue of contention about water quality trends was related to the causes of the trends and inference of what the trends meant.

Meaning of the water quality trends

136. Dr Scarsbrook states: "The lack of deteriorating trends in key water quality parameters, and the presence of a number of improving trends (see below) suggests that the environmental imperative to control non-point source pollution in the Region has lessened since the POP was first notified" (para. 46). To support this statement, Dr

[17] The abstract from the Ballantine and Davies-Colley report is correctly quoted. However, the abstract incorrectly stated four meaningful decreasing trends in turbidity; this should correctly read three meaningful decreasing trends in turbidity.

Scarsbrook presented water quality trends for the seven NIWA water quality sites in the Region (Table 3)[18]. These show, for five out of seven of the sites, that there are no trends for nitrate over this shorter period, and for two sites in the lower Manawatu River, nitrate has improved in the shorter term. These lower Manawatu sites are not target zones for the proposed rules around intensive farming. Dr Scarsbrook's table contains one improving trend for nitrogen related parameters in a target zone. This is at a single site and is for NH4-N, which is more typically associated with direct discharges of effluent to water.

137. It is concluded that Dr Scarsbrook's assertions, that short-term improvements are a reason not to control agriculture, are not supported by the data set on which he based these conclusions. The data set he used contained only two sites that were in the zones targeted by the proposed Rule 13-1, and the one improving trend was for a parameter more often associated with direct discharges to water bodies. Further, the lack of deteriorating trends demonstrated does not imply that relative contributions of nutrient loads from agriculture are not increasing. The lack of trends could be attributable to similar conclusions to those by (Scarsbrook, 2006, and Ballantine and Davies-Colley, 2009a) regarding national water quality trends (ie. that gains in management of point sources are being overshadowed by increasing inputs from diffuse sources). However, a detailed analysis of the cause of underlying reasons for trends has not been undertaken.

Table 3: Trends at seven National Rivers Water Quality Network sites in the Manawatu-Wanganui Region over the last 10 years (1999-2008). The arrows show the direction of change in each parameter (median sen slope for flow-adjusted data), with statistically significant trends (P<0.05; Seasonal Kendall Trend test on flow-adjusted data) shown as arrows. Green arrows indicate improving trends. "NS" = not statistically significant. Trend analysis carried out in TimeTrends 2.0 (www.niwa.co.nz). Modified from the Evidence in Chief of Dr Scarsbrook (Table 1, page 20) with highlighting to show sites in target catchments.

Site	Turbidity (NTU)	Clarity (m)*	DRP (mg/m^3 P)	TP (mg/m3 P)	NOx-N (mg/m3 N)	NH4-N (mg/m3 N)	TN (mg/m3 N)
Whanganui @ Te Maire	↓	NS	↓	NS	NS	NS	NS
Whanganui @ Paetawa	↓	NS	NS	NS	NS	NS	NS
Rangitikei @ Mangaweka	NS	NS	↓	NS	NS	↓	NS
Rangitikei @ Kakariki	NS	NS	↓	NS	NS	↓	NS

[18] Presented in a modified format to clearly show zones that are targeted by the proposed nutrient management rule.

Site	Turbidity (NTU)	Clarity (m)*	DRP (mg/m^3 P)	TP (mg/m3 P)	NOx-N (mg/m3 N)	NH4-N (mg/m3 N)	TN (mg/m3 N)
Manawatu @ Weber Rd	NS	NS	↓	↓	NS	NS	NS
Manawatu @ Teachers College	NS	NS	↓	NS	↓	↓	↓
Manawatu @ Opiki	NS	NS	↓	NS	↓	NS	↓

138. A more complete description of long-term and short-term trends was provided by the broader water quality data set analysed by Ballantine and Davies-Colley (2009b)[19], which was summarised in Mrs McArthur's corrected supplementary evidence Table 3 (and Table 4 below[20]).

139. Ballantine and Davies-Colley (2009b) trend analysis for SIN and DRP reported no trend at the majority of sites, regardless of whether the site was in or out of a target catchment, or analysed over long-term or short-term. The implication of no trend results is that water quality has neither improved nor degraded over the period analysed. In the target catchments, one significant degrading SIN trend was detected, at the Manawatu at the Weber Road site; however, the short-term trend analysis at that site showed no trend.

140. In the target zones, the Ballantine and Davies-Colley (2009b) analysis showed four sites with improving trends for SIN for the short-term analysis. One of these sites, Mangawhero at Department of Conservation Headwaters, is a reference site in a national park and shows significant improving trends for SIN over both the long-term and short-term record. The other three sites with improving trends over the short-term all have no trend over the long-term. This indicates water quality has not changed over the approximately 19 year period, despite more recent trends showing improvement.

[19] As summarised in Mrs McArthur's corrected Table 3 (supplementary evidence) and provided in a modified format to clearly show zones that are targeted by the proposed nutrient management rule.

[20] Provided in a modified format in Table 4 to clearly show zones that are targeted by the proposed nutrient management rule.

Table 4: Summary of the trend analysis results for DRP and SIN at Horizon's SoE monitoring sites and National Rivers Water Quality Network (NRWQN) sites (NIWA client report by Ballantine and Davies-Colley, June 2009b). Modified from Corrected Table 3 provided to the Panel by Mrs McArthur. The modification is the highlighting of sites in target catchments for Rule 13-1. Upwards arrows indicate degrading water quality while downwards arrows indicate improving water quality.

Site Name	Easting	Northing	Long term trend		Short term trend		Catchment	Rule 13.1 Target catchment
			DRP	SIN	DRP	SIN		
Whanganui @ Cherry Grove	2705700	6254500	No trend	No trend	No trend	↓	Cherry Grove	No
Whanganui @ Te Maire	2699812	6248985	↑	No trend	No trend	No trend	Te Maire	No
Whanganui d/s Retaruke	2688300	6230500	No trend	No trend	No trend	No trend	Middle Whanganui	No
Whanganui @ Pipiriki	2685800	6189600	No trend	↓	No trend	No trend	Pipiriki	No
Whanganui @ Paetawa	2693722	6156603	No trend	No trend	No trend	No trend	Paetawa	No
Mangawhero @ DOC HQ	2717762	6197545	No trend	↓	No trend	↓	Upper Mangawhero	Yes
Hautapu u/s Rangitikei	2753000	6157400	No trend	↓	No trend	↓	Lower Hautapu	No
Rangitikei @ Mangaweka	2750370	6151340	No trend	No trend	No trend	No trend	Pukeokahu-Mangaweka	No
Rangitikei @ Kakariki	2718305	6117218	↑	No trend	↓	↓	Coastal Rangitikei	Yes
Tamaki @ Reserve	2768300	6116200	No trend	No trend	No trend	No trend	Upper Tamaki	Yes
Tamaki @ SH2	2771200	6104000	No trend	No trend	No trend	No trend	Lower Tamaki	Yes
Manawatu @ Weber	2775061	6102713	↑	↑	No trend	No trend	Upper Manawatu	Yes
Manawatu @ Hopelands	2761500	6089800	No trend	No trend	No trend	No trend	Tamaki-Hopelands	Yes
Makuri @ Tuscan Hills	2758300	6071600	No trend	No trend	No trend	No trend	Makuri	No
Mangatainoka @ SH2	2752800	6083100	No trend	No trend	No trend	↓	Lower Mangatainoka	Yes
Manawatu @ Upper Gorge	2749400	6092700	No trend	No trend	No trend	↓	Upper Gorge	Yes
Manawatu @ Teachers College	2733100	6089200	No trend	↑	No trend	↓	Middle Manawatu	No
Manawatu @ Opiki	2719420	6082710	↓	↑	↓	↓	Lower Manawatu	No
Oroua @ Almadale	2735600	6111300	No trend	No trend	No trend	No trend	Upper Oroua	No
Oroua @ Awahuri	2724300	6100300	No trend	↓	No trend	No trend	Middle Oroua	No
Manawatu @ Whirokino	2702200	6074700	No trend	No trend	No trend	↓	Coastal Manawatu	No
Lake Horowhenua	2700500	6063500	No trend	No trend	No trend	No trend	Lake Horowhenua	Yes
Ohau @ Rongomatane	2707600	6057700	No trend	No trend	No trend	No trend	Rongomatane	No

Note: Sites in bold are NRWQN sites

141. Dr Scarsbrook submitted (para. 17) that analysis of water quality state is just a snapshot in time and analysis of trends is more informative for resource managers. Dr Roygard outlined that water quality trends are informative tools when combined with information on the state of water quality (Supplementary Evidence of Dr Roygard, page 14). It is concluded that state of water quality is the most important tool for resource managers as it reflects the physical and chemical conditions in the water body that influence the Values of the water body. Where the state is not meeting the standards prescribed to provide for Values such as life supporting capacity, these Values are likely subject to adverse effects. Therefore, while the trends of water quality provide a useful indicator for resource managers, the state of water quality and how this is impacting on Values is more important. One example of this is the Mangatainoka catchment, which is a target catchment for the proposed Rule 13-1. Water quality for the Mangatainoka at S.H.2 site over the long-term shows no trends, however the short-term trend (approx 8 years) shows improving water quality. The state of water quality in the Mangatainoka at the S.H.2 site is typically approximately 2.5 times the proposed standard and rarely meets or is below the standard (Figure 1 below).

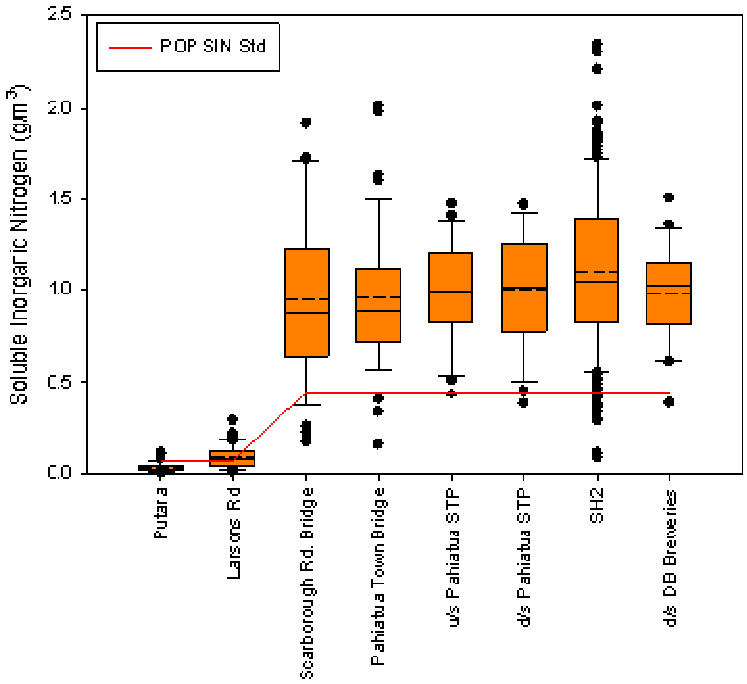

Figure 1: Soluble inorganic nitrogen (SIN) concentration at State of the Environment monitoring sites within the Upper, Middle and Lower Mangatainoka Water Management Sub-zones collected over various timeframes since 1989. Sourced from Figure 4 of the Supplementary Evidence of Mrs McArthur.

142. The suggestion that the trends information has reduced the imperative to control non-point pollution would only be supported if water quality had significantly improved in relation to the standards, to a point where the state was determined to no longer require improvement. Mr McBride (para. 24) stated:

"… *while trends appear to be downward in certain rivers, they are coming from a rather high plateau — a condition of degraded water quality. For attainment of good environmental conditions, meeting environmental standards, such trends do need to continue, as foreshadowed in my para. 21. So a statement in Dr Scarsbrook's para. 54 — that the imperative for region-wide controls on diffuse nutrient inputs to streams has reduced — is not an inference I would support. In that regard I also note that in the recent trend analysis by Ballantine and Davies-Colley (2009b),*[21] *decreasing soluble inorganic nitrogen trends were found at a reference site not influenced by modified land use — the Mangawhero River at DoC Headquarters. Those authors speculated that*

climate change could be a contributory cause, as is also generally recognised by Dr Scarsbrook (at para. 52 of his evidence). However, this was the only trend seen at reference sites".

143. Mr McBride (para. 14) also cautioned that "trend analyses from short periods of data can be misleading" and noted that "Modern trend analysis methods take account of seasonality and a number of other features of water quality data, such as missing values, the role of floods in modifying concentrations, and climate change effects[22], that would otherwise make it more difficult to discern trends. A key point is that the period of record analysed should be "long enough" to be able to discern and account for seasonality and, if necessary, serial correlation." Mr McBride commented that it is not necessary to account for serial correlation if one is interested only in making inferences about trends within the period of record, and not trying to either extrapolate beyond that period, or to make inferences about the processes occurring within that period.

144. In summary, long-term degrading trends are observed for some parameters at some sites in target zones. Some sites in target zones show short-term improvements, particularly in SIN concentrations. Trend information should be used in conjunction with both water quality state information and desired state thresholds when making decisions about catchment management. Aquatic ecosystems are influenced by state of water quality more than by trends.

Links between nutrient and periphyton growth

145. The relationship between nutrients and periphyton growth in the Region has been an issue of contention between Dr Scarsbrook and other experts on behalf of Horizons (ie. Drs Biggs, Quinn and Wilcock) and submitters (Assoc. Prof. Dr Death). Dr Scarsbrook's concerns have been directly addressed in the Supplementary Evidence of Mrs McArthur (Table 2, p. 4-5), Dr Biggs (Table 2, p. 5) and Dr Quinn (para. 6-9), and in the End of Hearing technical report of Dr Biggs (para. 35). The issues raised and conclusions drawn in relation to these are outlined in the paragraphs below.

146. During the verbal presentation of his evidence to the Hearing Panel, Dr Biggs discussed the key factors governing the variation in periphyton biomass as being 60% related to the flow regime and 40% related to nutrients (see diagram by Dr Biggs dated

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[21] Ballantine, D.J., Davies-Colley, R.J. (2009b). Water Quality State and Trends in the Horizons region. NIWA Client Report HAM 2009-090 for Horizons Regional Council, June 2009. 47 p.

[22] Scarsbrook, M.R.; McBride, C.G.; McBride, G.B.; Bryers, G.G. (2003). Effects of climate variability on rivers: consequences for long term water quality datasets. *Journal of the American Water Resources Association 39(6)*: 1435–1447 [errata in vol. 40(2): 544].

10-12- 2009). Examples presented by Dr Scarsbrook in his Supplementary Evidence (Figures 1 & 2) to illustrate a 'lack of relationship between nutrients and periphyton/phytoplankton' did not account for flow, thereby excluding a key factor that has a high degree of influence over periphyton biomass. Dr Biggs (para. 35 of his End of Hearing technical report) and Associate Professor Death (speaking notes for power point slide 20) both address the use of data in Dr Scarsbrook's Supplementary Evidence figures and conclude that this is inappropriate.

147. In summary, reducing the nitrogen and phosphorous loads in river will increase the percentage of time that nitrogen and phosphorous are limiting, ie. will slow growth of periphyton. Slowing growth of periphyton has the advantage of increasing the length of the period for periphyton to accrue to nuisance levels at which it will compromise the river's values. This enables flushing flows to more efficiently control periphyton biomass, as periphyton accumulation will generally be lower when flushing flows occur, and the levels of residual algal material that re-colonise are also likely to be reduced.

Links between nutrients, periphyton growth and ecosystem health

148. Periphyton cover and flow relationships for several nutrient enriched sites (Supplementary Evidence of Mrs McArthur pp 32 & 33) and examples of periphyton and nutrient relationships from national network sites within the Manawatu-Wanganui Region (Supplementary Evidence of Dr Quinn paragraphs 6-9) provide regionally relevant illustrations of the relationship between nutrients and periphyton. The figures presented in the evidence of Dr Roygard (s42A report, Box 35, pp 118-119) show examples of how nitrogen and phosphorus limitation can vary between parts of a catchment on the same day, as well as at a particular site over time and with changes in flow. All of these examples validate the recommendations of the limiting nutrients work undertaken by Dr Wilcock and others (s42A report, paragraphs 33-46) to control both nitrogen and phosphorus; and the model used by Dr Biggs in his s42A Evidence. Research findings on the clear relationship between nutrients (both nitrogen and phosphorus) and macroinvertebrate health at sites in the Region were provided by Associate Professor Death (Evidence in Chief, Figure 5). These examples counter the contention of Dr Scarsbrook that regional data linking periphyton, nutrients and ecosystem health is not available.

149. In summary, the links between periphyton, flow and nutrients are well established and supported by regional examples. Evidence of the relationships between nutrients (both nitrogen and phosphorus) and ecosystem health have also been provided from sites in

the Region. Reducing nutrient loads, and thereby concentrations, will increase the proportion of time periphyton is limited by nitrogen, phosphorus or flow and increase the life supporting capacity of compromised aquatic ecosystems through improving macroinvertebrate and fish communities (Dr Biggs' End of Hearing Report paragraphs 16-25).

Sources of nutrients

Relative contributions from point and non-point sources

150. The relative contributions from various sources to water quality state have been documented throughout the evidence and are not issues in contention. In summary, Dr Roygard's s42A Evidence (pp 130-132) identified that point sources are important contributors at low flows. However, across all flows nutrients are sourced predominantly from diffuse or non-point sources[23]. A summary of the predominant source of nutrients and bacteria from non-point sources and point sources for the Water Management Sub-zones of the Region is provided in Appendix 2 of Mrs McArthur's s42A Evidence along with information on how the life supporting capacity of these zones is impacted by the contaminants. As an example of the relative contributions, Dr Roygard's s42A report (para. 235) shows that in the upper Manawatu and Mangatainoka target zones, more than 97% of the nitrogen load and 80-85% of the phosphorus load comes from non-point source (diffuse) sources.

151. Dr Scarsbrook contended that the calculation of nutrient loads used by Roygard and McArthur (2008)[24] did not follow a method recognised by experts and was not peer reviewed (s42A report, para. 62). However, this method was reviewed by Dr Biggs in his s42A report (para. 55) and found to be a logical framework with clear individual steps. Dr Quinn (s42A report, para. 24) compared the overall framework with the Total Maximum Daily Load (TMDL) process used in the United States. No other evidence was presented by other submitters in relation to alternative methods for the calculation of loads, and it is considered that the framework that has been used is appropriate.

Relative contributions from various land uses

152. The relative contributions of different land uses to the non-point source proportion of total nutrient loads have been documented in the s42A report of Dr Clothier for nitrogen

[23] Based on studies in the Upper Manawatu and Mangatainoka Rivers.
[24] As presented in the s42A report of Dr Roygard (pages 121 to 132, and Appendix 2 of that report).

(paragraphs 89-101) and Dr Parfitt for phosphorus (paragraphs 18-26 & 49-71). These studies determined relative contributions from all land uses, including inputs from forested areas. The modelling within these studies determined that the proportional contributions from some types of farms exceeded those of others. For example, Clothier *et al.* (2007) showed that dairying, which comprised 16% of the upper Manawatu catchment land use, contributed approximately half of the overall nitrogen loading in the river; sheep and beef farming, which comprised approximately 80% of the catchment, contributed a similar amount. Further, Clothier *et al.* (2007) modelled various scenarios of intensification and implementation of 'best practice', and demonstrated that total nitrogen loads for the Upper Manawatu catchment were most sensitive to management of dairy farming. For example, Clothier *et al.* (2007) modelled intensified production on the existing dairy farms between the Weber Road and Hopelands monitoring sites. This modelling predicted that if per hectare production was increased from an average of 1,000 to 1,200 kilograms of milk solids/hectare (kg MS/ha), the nitrogen loading from that part of the catchment would increase by 33%. Similarly, if 'best practice' was implemented on these farms, catchment loadings from this part of the catchment would decrease by 18.3% (see s42A report of Dr Roygard, para. 292). It is noted, that the study catchment contained only small areas of cropping and horticulture.

153. In summary, the relative contribution of agriculture to water quality outcomes is not a matter of contention. From the evidence on relative contributions of nutrients to water bodies, it can be concluded that if the objective is to maintain or enhance water quality state, then a multi-pronged approach will be required. Addressing inputs from point sources at low flow will be key to meeting the standards at such flows. Management of losses from non-point sources will also be required, as non-point sources contribute the predominant proportion of the overall nutrient loads to water bodies (80-85% of DRP and over 97% of SIN in the study catchments). Study of the relative contributions to these non-point sources showed that dairy farming contributed a high proportion (approximately half) of the total loads of nitrogen for the catchment, despite only making up a small proportion of the land use in the catchment (16%). Further, levels of nitrogen loadings in a water body were most sensitive to management of dairy farming in this study catchment.

Levels of intensification of the dairy sector

154. Evidence relating to the projections of growth in the dairy sector is provided by Neild and Rhodes (2009, 2010[25]) and by the evidence of Mr Newman for Fonterra. Mr Newman presented three scenarios of growth that: "*provide a realistic range of what could occur*" (Mr Newman para. 32). Mr Newman concluded: "*it is my opinion that growth at the same rate as the previous decade (Scenario 2) is a more likely outcome than the fast growth rate (Scenario 3)*". Neild and Rhodes (2010) provided further detail on future growth scenarios based on growth over the last decade. The Neild and Rhodes (2010) analysis included a comparison with the findings of Mr Newman's Scenario 2. These two studies are compared below and are generally agreed about the levels of historic growth and future growth scenarios.

What growth has occurred over the past 10 years?

155. Growth of dairy sector over the past 10 years was reported by Neild and Rhodes (2009 & 2010) and in the evidence of Mr Newman for Fonterra and by Mr Hoggard for Federated Farmers.

156. Federated Farmers presented figures for one component of the growth of the dairy sector over the past decade, the change in number of cows. Using the same source of figures as presented in Neild and Rhodes (2010), Mr Hoggard's calculations assessed the percentage change as the change in number of cows divided by the number of cows at the end of the decade, giving a 15.1% increase. Correctly calculated as the proportional change from the beginning of the period, the numbers show a 17.8% increase over the 10 year period as shown in Neild & Rhodes (2010).

157. The evidence of Mr Newman and Neild and Rhodes (2010) present an overall assessment of growth that includes cow numbers and a range of other factors that characterise the growth in the dairy sector for the period of 1997-1998 to 2008-2009 (Table 5).

158. In summary, these two studies present slightly different time periods and show similar growth for the increase in the area of land in dairy farms of (9 to 11%) and the increase in cow numbers (16.6 to 17.8%). The studies also both report similar changes in herd

size (an increase of 45 to 47%) and a 20% overall decrease in the number of herds. The studies differ in terms of numbers for milk solid solids production, with Mr Newman documenting an increase from 76 to 94 million kg/year (23% increase) and Neild and Rhodes reporting an increase from 68 to 99.8 million kg/year (47% increase). The differences likely reflect the influence of the drought years on the reporting (Mr Newman's analysis starts with a 'more normal' year, 1997-98, and end with a 'drought' year (2007-08); Neild and Rhodes (2010) analysis starts with a 'drought' year 1998-99 and ends with a 'more normal' year. The production of milk solids at the end of the decade provides an indication of 'recent levels' of production. The estimates by Mr Newman (94 million kg MS/year) and Neild and Rhodes (99.8 million kg MS/year) differ by approximately 6%. The production numbers for 2008-09 reported by Neild and Rhodes (2010) are likely provide a better estimate of recent levels of production in a 'normal year'.

Table 5: Comparison of dairy sector growth over a recent decade for the Manawatu-Wanganui Region presented by Mr Newman and Neild and Rhodes (2010).

	Newman/Fonterra Estimate (Scenario 2)			Neild and Rhodes (2010)			
	Year 1997	Year 2007 (a)	% change	Year 1998/99	Year 2008/09 (b)	% change	Percent difference* a & b
Area (ha)	95,400	105,500	11%	101,565	110,288	9%	5%
Cows	247,000	287,900	16.6%	256,426	302,083	17.8%	5%
Milk Solids (million kgs)	76	94	23%	68	99.8	47%	6%
MS/cow	308	326	6%	264	330	25%	1%
MS/ha	798	889	11%	666	905	36%	2%
Cows/ha	2.59	3.00	16%	2.52	2.74	9%	-9%
Cows/herd	229	332	45%	235	347	47%	5%
herds	1079	866	-20%	1089	870	-20%	0%

*Percent difference between Mr Newman's 2007 value and Neild and Rhodes 2010 value for 2008-09

What is growth projected to be by 2030?

159. The growth of the dairy sector in the Manawatu-Wanganui Region over the past decade was described as modest compared to that nationally (Mr Newman para. 31, Neild and Rhodes 2010, page 13). After accounting for drought years in their analysis, the experts agree the annual compound rate of growth of milk solids production of between 3% and 15% per annum over nine years (Mr Newman paras 30 & 3). The evidence of Mr

[25] Neild and Rhodes 2010 is an update to the 2009 report. This update was prepared for the End of Hearing report and has been provided as an additional technical report to the Panel.

Newman notes: "*This is faster than the annual milk solids growth for the North Island of 2.4% but less than the growth rate for new Zealand of 4.2% over the same period*."

160. Neild and Rhodes outline that the area in dairy farming in the Region has increased by 8.6% compared to 16.2% nationally, and the number of cows in the Region has increased by 17.8% over the last decade compared to 29.3% for New Zealand. Some other regions have had considerably higher rates of dairy expansion, ie. Southland with almost a 2.5-fold increase in land area in dairying (from 63,000 ha in 1998-99 to 155,000 ha in 2008-09), and an increase in cow numbers (from 170,000 to 418,000) in the last 10 years (Dr Mackay, End of Hearing Report).

161. It is agreed that suitable land exists in the Region for the expansion of dairy farming (Mr Newman para. 31, Dr Mackay Figure 2b, Dr Roygard s42A Evidence pp. 97-98). Mr Newman presents alternative scenarios (slowing growth, continued average growth and fast growth) to provide a sensitivity test of the size of dairy industry in 2030. Mr Newman's growth Scenario 2 assumes continuing average growth; similarly Neild and Rhodes use their estimate of historic growth as an indicator of future growth. These scenarios are agreed by the Experts as the most likely future growth pattern.

162. In summary, that the dairy sector will continue to grow in the Region is not an issue of contention. The Experts agree that future growth scenarios should be based on historic levels of growth. The Experts' predictions for the dairy sector in 2030 are quite similar for a range of variables, with estimates for milk solids/ha, stocking rate within 2% of each other, and within 10% of each other for other variables (ie. total land area in dairy, total cow numbers, and total regional production). The estimates for the Manawatu-Wanganui Region (Table 6) predict 11-18% more land in dairy and that cow numbers will increase by 26.9 to 38.7%. Milk solids production per hectare will increase by 46 to 60% to a production level of 1,415 to 1,446 kg MS/ha. This reflects a 446 to 514 kg MS/ha increase in production. Stocking rates will increase by 14 to 17% to a rate of 3.17 to 3.21 stock per ha.

Table 6: Comparison of future dairy sector growth scenarios the Manawatu-Wanganui Region presented by Mr Newman and Neild and Rhodes (2010).

	Newman/Fonterra Estimate (scenario 2)			Neild and Rhodes (2010)			
	Year 2010	Year 2030 (a)	% change	Year 2008/09	Year 2030 (b)	% change	Percent difference* a & b
Area (ha)	108,700	121,200	11%	110,288	130,631	18%	8%
Cows	302,300	383,700	26.9%	302,083	419,058	38.7%	9%
Milk Solids (million kgs)	105.3	171.6	63%	99.8	189	89%	10%
MS/cow	348	447	28%	330	451	37%	1%
MS/ha	969	1,415	46%	905	1,446	60%	2%
Cows/ha	2.78	3.17	14%	2.74	3.21	17%	1%
Cows/herd	364	608	67%	347			
herds	831	631	-24%	870			

*Percent difference between Mr Newman's 2030 value and Neild and Rhodes (2010) value for 2030.

Summary of technical evidence related to targeted zones in Table 13.1

163. Table 13.1 of the POP identifies target catchments where management of intensive land use activities is to be specifically controlled (by proposed Rule 13-1). Table 13.1 identifies seven river catchments of varying sizes, and six zones associated with coastal lakes and wetlands. Each catchment area, in most cases, encompasses Multiple Water Management Sub-zones. The target catchments were selected using a number of criteria (overviewed in Dr Roygard's s42A Evidence pp. 171-173) including:

- catchments that have water quality issues where non-point source was identified to be a major contributor; and
- catchments that are at risk of further degradation from intensive agriculture and are more sensitive to nutrient inputs eg. the Coastal Rangitikei Water Management Zone (WMZ).

164. Some sites with poor water quality were not selected because point source discharges were known to be major contributors to the water quality in the catchment (s42A report of Dr Roygard, para. 311). Some catchments with predominately turbidity, sediment and phosphorus related water quality issues related to hill country erosion were not included, as these were selected to be addressed by Horizons' Sustainable Land Use Initiative (s42A report of Dr Roygard, paras 312, 313).

165. Evidence on the state, land uses and values of each of these target zones can be found in the evidence of Mrs McArthur and other Experts on behalf of Horizons (Table 7). Tim Matthews (Federated Farmers – Wanganui Branch), Euan Hodges (431) and Bruce and Pamela Hodges (436) made verbal submissions concerning the removal of target zone status from the Whanganui area and Mowhanau catchment respectively. However, none of these submitters provided evidence on the land use, state of water quality, sources of pollution or aquatic ecosystem health in the target water management zones in order to justify their exclusion. Dr Roygard and Mrs McArthur's s42A reports did provide evidence on the justification for excluding the Mowhanau catchment and that recommendation is supported.

Table 7: Summary of evidence presented for each target zone, state of water quality and aquatic ecosystem health and recommendations for each zone.

Target Zone	Evidence reference	Recommendation
Mangapapa	Mrs McArthur s42A pages 155-160	Retain as a Rule 13-1 target zone
Mowhanau	Mrs McArthur s42A pages 161-170 Dr Davies-Colley s42A para 102 Barry Gilliland s42A para 37	Remove from Table 13.1
Mangatainoka	Mrs McArthur s42A pages 170-183 and suppl. evidence paras 23-25 & 29-32 Dr Clothier s42A paras 93-108 Dr Mackay s42A para 151 Dr Biggs s42A paras 62 & 63 Dr Young paras 13, 32, & 34	Retain as a Rule 13-1 target zone
Upper Manawatu	Mrs McArthur s42A pages 183-197 and suppl. evidence paras 23-25 & 29-32 Dr Clothier s42A paras 93-108 Dr Mackay s42A paras 68-72, 78, 101, 102, 116-120, 128 & 148-151 Dr Parfitt s42A paras 18-26 & 49-71 Dr Biggs s42A paras 62 & 63 Dr Young s42A paras 13, 30, 31 & 34 Dr Quinn s42A paras 16, 47 & 50	Retain as a Rule 13-1 target zone
Lake Horowhenua	Mrs McArthur s42A pages 197-205 & 103-114 Barry Gilliland s42A paras 11, 12 & 47-62 Max Gibbs s42A paras 38-50, 62, 70, 73, 134 & 135	Retain as a Rule 13-1 target zone
Waikawa	Mrs McArthur s42A pages 205-212	Retain as a Rule 13-1 target zone
Manawatu above Gorge	Mrs McArthur s42A pages 212-219	Retain as a Rule 13-1 target zone
Waitarere	Mrs McArthur s42A pages 219-222 Max Gibbs s42A para132	Retain as a Rule 13-1 target zone
Papaitonga	Mrs McArthur s42A pages 222-225	Retain as a Rule 13-1 target zone
Kaitoke Lakes	Mrs McArthur s42A pages 225-227 Max Gibbs s42A paras 102 & 129 Barry Gilliland s42A paras 47-62	Retain as a Rule 13-1 target zone

Target Zone	Evidence reference	Recommendation
Southern Whanganui Lakes	Mrs McArthur s42A pages 227-229 Max Gibbs s42A paras 98 & 129 Barry Gilliland s42A paras 47-62	Retain as a 13-1 target zone
Northern Manawatu Lakes	Mrs McArthur s42A pages 230-233 Max Gibbs s42A para132	Retain as a Rule 13-1 target zone
Coastal Rangitikei	Mrs McArthur s42A pages 234-248 and suppl. evidence paras 23-25 & 29-32 Dr Young paras 11, 24 & 33 Dr Quinn s42A paras 47 & 50	Retain as a Rule 13-1 target zone
Mangawhero and Makotuku	Mrs McArthur s42A pages 248-259	Retain as a Rule 13-1 target zone

Targeting of intensive land use

166. A key part of Rule 13-1 is the management of contaminant losses from intensive land uses. Particular types of intensive land uses are targeted because of their relative contaminant contributions and the ability to reduce inputs from each land use via 'best practice'. The selection of targeted farming types was related to a literature review of losses from farming types[26], modelling of catchment outcomes with and without best practice[27] and knowledge of leaching losses from studies undertaken within the Region[28]. The selection of targeted land use types is discussed by Dr Roygard (s42A report, pp 169-171).

167. Table 8 provides a summary of the loss values for various farming types identified by Clothier *et al.* (2007).

Table 8: Intensive forms of farming and their likely losses of nitrogen and phosphorus (reproduced from Clothier *et al.,* 2007). Sourced from Dr Roygard's s42A evidence Box 56, page 159)**.**

Ranked Nitrogen Loss		Ranked Phosphorus Loss	
Market Gardening	(100-300 kg-N ha^{-1} yr^{-1})	Market Gardening	
Cropping	(10-140 kg-N ha^{-1} yr^{-1})	Cropping	
Dairying	(15-115 kg-N ha^{-1} yr^{-1})	Dairying	(0.2- 1.0 kg-P ha^{-1} yr^{-1})
Sheep/beef	(6-60 kg-N ha^{-1} yr^{-1})	Sheep/beef	(0.1-1.6 kg-P ha^{-1} yr^{-1})

[26] As presented in Clothier *et al.* (2007) and referenced in the evidence of Dr Roygard.
[27] Clothier *et al*. (2007) and Parfitt *et al.* (2007) as shown in the evidence of Dr Clothier and Dr Parfitt respectively and overviewed in the evidence of Dr Roygard.
[28] As presented by Dr Clothier; and the test FARM Strategy projects overviewed by Mr Taylor and presented in detail by Dr Manderson, Dr Shepherd and Mr Grant.

168. Which land uses should be included the proposed Rule 13-1 was an issue of contention identified through the hearing

- The inclusion of irrigated sheep and beef farms was questioned by Federated Farmers (Tessa Mills, para. 19.4). Clothier *et al.* (2007) (Table 8 above) identified likely losses from sheep and beef farms to be 6 to 60 Kg N/ha/yr. Dr Roygard (para. 308) identified that the provision of irrigation on farms increases the risk of contaminant losses from these farms. Dr Clothier (paras 49-51) presents some modelling scenarios that show relative losses under different irrigation scenarios. In these scenarios it was shown that:
  - normal irrigation resulted in a reduction of nitrate leaching; and
  - excessive irrigation significantly increased losses.

  However, in this modelling, the scenarios did not adjust fertiliser use or stocking rate, and the reality is that land is irrigated to increase production – whether that is crop, milk or meat. Dr Mackay, in his End of Hearing Report, shows that increased irrigation is generally accompanied by increased fertiliser use and stocking rate. A comparison of irrigated and non-irrigated blocks of the Farmer Applied Resource Management Strategy (FARMS) test farms showed N-loss off the irrigated blocks was greater than the non-irrigated blocks (Table 9), despite fertiliser nitrogen inputs to the respective blocks being the same. The one exception was one block that was cropped where the nitrogen removed was considerably more off the irrigated block. It is concluded that irrigation is a good indicator of intensification of sheep and beef farming.

Table 9: Comparison of nitrogen leached off non-irrigated and irrigated farm blocks.

Farm	Soil type	Non-irrigated N-loss (kg N/ha/yr)	Irrigated N-loss (kg N/ha/yr)	% increase(+) % decrease(-)
Oringi – irrigated sheep/beef		12	15	+25
Johnston – dairy	Pukepuke	20	25	+25
	Waitarere	30	38	+27
	Himatangi	29	36	+24
Whirokino – dairy	Pukepuke medium	10	22	+120
	Pukepuke heavy*	19	13	-32
	Waitarere	10	18	+80

- The inclusion of horticulture as an intensive land use relates to the high level of losses predicted from these production systems. Clothier *et al.* (2007) (Table 8 above) identified likely losses from market gardening to be 100 to 300 Kg N/ha/yr. The evidence presented in Clothier *et al.* (2007) above shows nutrient losses in the order of 100 to 300 kg of nitrogen per hectare. One study near Levin showed substantial N-loss from vegetable crops (Snow *et al.*, 2004). Over two years and crops of silver beet, lettuce (2), spring onions (2) and oats, a cumulative 662 kg of nitrogen per hectare was unaccounted for and presumably leached. Two of these crops, (silver beet and spring onion crops) had 680 kg hectare more nitrogen applied than was taken up by the crops; they contributed to a large proportion of the N lost. Two other crops (lettuces and oats) used nearly as much nitrogen as was applied, with little leaching. Results from the fictitious FARM strategy (Landvision, 2009) and the Pencoed FARM Strategy test farm (AgResearch, 2009), showed N-loss from potatoes to be about 58 and 56 kg N/ha/yr, root crops (carrots, parsnips) 18-19 kg N/ha/yr, and brussel sprouts 30 kg N/ha/yr. These losses are similar to those for other intensive farming types.
- The contribution of cropping to N-loss is variable, depending on the crop type. Clothier *et al.* (2007) (Table 8) identified likely losses from cropping to be 100 to 140 Kg N/ha/yr. Data from the Pencoed FARM Strategy test farm shows winter wheat, spring wheat and maize to leach nitrogen at 67, 8, and 29 kg/ha/yr respectively. Maize grown for maize silage on a number of the FARM Strategy test farms show nitrogen leaching losses at 99, 132, 46, and 85 kg/ha/yr. As shown in Table 8 and by the above data, cropping can leach a significant amount of nitrogen and the amount will depend on crop type, time of year it is grown, and its occurrence in rotation.
- Dairy farming has been shown to contribute a relatively high proportion of overall nitrogen loads in-river (as outlined in the sections above). Clothier *et al.* (2007) (Table 8) identified likely losses from dairy farming to be 15 to 115 Kg N/ha/yr. The FARM Strategy test farms leach between 13 and 35 kg N/ha/yr (evidence of Mr Taylor). Fonterra evidence (D. Smeaton Evidence in Chief, para. 27,) stated that Ravensdown data showed the average dairy farm leached 26-27 kg N/ha/yr. These data are derived using Overseer, which assumes 'best practice'. The FARM Strategy test farms could reduce their N-loss, on average, by 7 kg N/ha/yr by implementing highly cost-effective mitigation options. A further reduction of 4 kg N/ha/yr could be achieved by employing medium cost-effective mitigation options (Mr Taylor s42A Evidence, Table 9).

169. Mr Andrew Day, a sheep and beef farmer, submitted that all land uses within target catchments should be included (Evidence of Mr Day, page 7).

170. These intensive farming types with high levels of proportional losses have been demonstrated to have a significant contribution to overall loadings in catchments, eg. the work of Clothier *et al*. (2007) showed the 16.3% of the catchment in dairy farming in the Upper Manawatu catchment has been demonstrated to contribute approximately half of the total annual nitrogen load to river.

171. Farming types with proportionally high losses of nitrogen per hectare can contribute significant loads at the catchment scale compared to extensive land uses. For example, if one hectare of sheep and beef farm has losses of 8 kg/ha/year, a farming system losing 32 kg/ha is contributing four times that amount per hectare. If the intensive land use is 25% of the area of the sheep and beef area then the two land uses will be having an equal contribution. A farming system such as some of the cropping and horticultural systems may be leaching more than 10 times the level of the sheep and beef farm. If 1% of the catchment is in these land uses and leaching at these rates, then this 1% may contribute the equivalent of 10% of the catchment in sheep and beef farming. The implication is that a small proportional increase in these farming systems with high losses can significantly change loadings in catchments.

172. In summary, submitters have presented information questioning the inclusion of various farming types in the proposed Rule 13-1. The evidence clearly shows these farming types have higher relative inputs than extensive farms. Losses from these types of intensive agriculture have been determined through literature review and studies completed within the Region. These types of farming systems have been demonstrated to have the potential to significantly influence catchment water quality loadings and are recommended for inclusion in Rule 13-1.

Land use capability

173. Nitrogen loss limits based on the soil's natural capital by Land Use Capability (LUC) class, were proposed in Table 13.2 as one aspect of the combined contaminant management approach in the POP. The approach was based on the SLURI group's findings (Clothier *et al.* 2007) and the research of Dr Mackay (s42A report, paras 106-146 and Mackay *et al.,* 2008). Dr Mackay and Ms Helen Marr in their evidence discuss various allocation mechanisms and their advantages and disadvantages.

174. The Natural Capital approach is based on the ability of the soil to sustain a legume-based pasture fixing N biologically under optimum management, before the introduction of additional inputs or technologies (Dr Mackay s42A Evidence; page 36, para. 115) (eg. N fertiliser, supplements, irrigation etc). Technical advantages of the approach include:

- the LUC approach has a link with the mechanism of nutrient loss from soils. For example, the LUC class system characterises several properties of land that relate to potential for nutrient loss for example slope, depth of soil and texture of soil[29].
- The mechanism is based on outputs rather than inputs (Dr Mackay s42A Evidence; page 10, para. 38) so farm management can be customised to achieve the output loss limit in any manner.
- The allocation mechanism is based on the productive potential of the underlying land resource and includes allocation for every hectare in the catchment providing land with similar underlying resources with equal loss limits regardless of current land use and providing for future land use options by allocating amounts irrespective of current land use (Dr Mackay s42A Evidence; page 10, para. 38)
- The allocation mechanism is able to be linked to the water quality outcome (in terms of nitrogen loading) Dr Mackay s42A Evidence; page 10, para. 38).

175. Federated Farmers acknowledged: "*The use of land use capability (LUC) is a well established method to effectively rank the productive capacity of the land in New Zealand*" (Dr Mills, para. 34). Dr Roberts' evidence (for Ravensdown Cooperative) raised concerns about the "*…inadequacy of the LUC system to correctly assign productivity to farm systems where technology improvements have been implemented, and hence equitably assign fair permitted N loss*". This is consistent of some farmer submitters' views (eg. Mr Grant Barber, para. 18) that productivity levels and subsequently, calculated nitrogen losses, were not reflective of their current production levels and the levels of nitrogen losses from some current farming operations.

176. The reason for the differences in outputs from productivity estimates between LUC and some current farming operations is due to the additional inputs and activities introduced to increase on-farm productivity. This is demonstrated in the End of Hearing Report of Dr Mackay (pp. 3-9). Dr Mackay confirms in this report (based on review of literature), that the productivity potential estimates of the LUC extended legend are accurate for a legume based pasture, excluding inputs from additional technologies, and have not dated as implied by Ravensdown Cooperative (Mr Hansen, para. 18 and Dr Roberts

when presenting to the panel). Further, Dr Mackay demonstrates for a range of the FARM Strategy test farms the relative contributions of various inputs and farming practices to overall productivity gains. Dr Mackay noted that many of the inputs associated with increased productivity generally increase the nutrient losses. Figure 6 of Dr MacKay's s42A Evidence provides pictorial representation of this (included below as Figure 2).

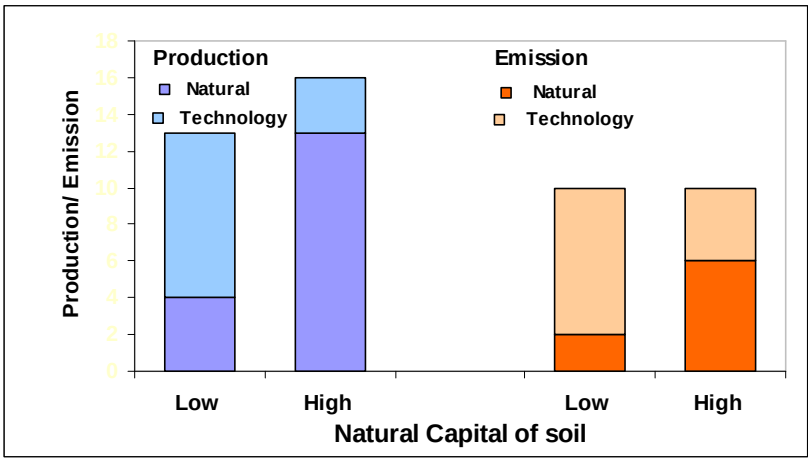

Figure 2: Production and emissions from a well managed legume pasture top dressed with P and sulphur fertiliser, before the introduction of production technologies (eg. irrigation) on soils of low and high natural capital (Ballantine & Mackay, 2008).

177. Recognising the potential productivity increases on various LUC classes is a possibility in setting nitrogen loss limits. Allocation in this manner would be a form of benchmarking whereby the productivity achievable on a particular LUC class could be used to determine the N loss limit for that LUC class. The outcome of such a mechanism would likely be greater N loss limits per LUC class and therefore increased nitrogen loadings in-river. The predicted water quality loading outcomes for a benchmarking scenario are discussed in the next section.

178. As stated above, the N loss limits from the LUC Natural Capital approach have been calculated based on a legume-based pasture fixing N biologically under optimum management, before the introduction of additional inputs or technologies. Dr Mackay identifies that increases productivity typically increase the losses of nutrient from the farming system. Technologies and farm practices are available that reduce N losses.

[29] Higher slopes have greater potential for run-off and shallow or coarse textured soils will likely have higher leaching losses than deeper of finer textured soil. This linkage between levels of loss and land use capability is identified by Dr Mackay in para. 49 of his s42A Evidence.

These have been referred to as mitigation options, best management practices or good environmental practice within the evidence and presented throughout evidence including that of Dr Monaghan, Dr Houlbrooke, and Clothier *et al.* (2007). The FARM Strategy test farm projects (as overviewed by Peter Taylor and presented by Dr Manderson, Dr Shepherd and Mr Grant) have shown that some farming operations currently use mitigation technologies. Further, the test farm projects identify that with the introduction of mitigation technologies, the N loss limits of Table 13.2 as notified are typically achievable by the majority of farms in the target zones. The exceptions to this were identified to be some farms with high proportions of Class 4 to 8 land and high rainfall (s42A Evidence of Peter Taylor, paragraphs 30 and 31).

179. The N loss limits based on production without the addition of technologies do not prevent the continued use of technologies to increase productivity on-farm. However, these limits do provide a framework where any additional N loss increases associated with increasing productivity require to be offset by an equivalent reduction in N loss via a mitigation technology.

Alternative nitrogen loss limit mechanisms

180. A range of submitters recommended alternative nitrogen loss allocation mechanisms, including:

1. No Limits (Federated Farmers, in material provided following the Hearing. Horticulture New Zealand, in evidence of Mr Keenan re water quality, page 51).
2. Grand-parenting with customised reduction targets per farm (evidence of Federated Farmers, Dr Mills, para. 35 & 36; Ravensdown, Dr Roberts, para. 23; and Fonterra, Mr Willis.
3. Benchmarking (Mr Sneath for Fertiliser Research, para. 16).
4. Alternative N loss targets based on LUC (Mr Day, page 10; Fonterra, Mr Willis, page 43) as discussed further in a section below.

181. The alternative allocation mechanisms outlined for grand-parenting and benchmarking are not specific in evidence of how they would deal with intensification (eg. new conversions). Further, the alternative allocation mechanisms recommended by various submitters have not been accompanied by technical material to assess the economic or environmental outcomes of their proposed approaches. Some information in relation the economic and environmental outcomes of the alternative proposed approaches has been completed by Horizons, as presented in the sections below. The relative merits or

otherwise of various allocation mechanisms are discussed in the s42A Evidence of Dr MacKay (pages 23 to 40) and Ms Marr (pages 18 to 25).

Nitrogen loss limits based on LUC

182. The LUC approach allocates nitrogen in a way that provides allocation for all hectares in the catchment and allocates irrespective of current land use, based on the underlying natural capital of the land resource to preserve future land use options. A key component of the framework is that land which is inherently able to produce more has been provided greater N loss limits, as with these greater levels of production this land inherently leaches more. In relation to this, Dr Mackay concluded: "*If the goal of policy is to encourage efficient land resource use with the least environmental impact, the N leaching loss limit should be weighted towards those soils with the greatest natural capital. If an imperative of policy is to retain land use options on soils with little natural capital, the weighting of the N leaching loss limit would need to be increased on these soils. These options could be explored in further analysis."* (Mackay *et al*., 2008)[30].

183. Submitters, including Mr Sneath for Fertiliser Research, stated: "The allowable N loss set for each land class while scientifically informed, are none-the-less inexact and give rise to somewhat arbitrary N loss targets." Naturally, policy setting takes into account other factors beyond science, as outlined in the evidence of Ms Marr (pp. 26-30). Technical aspects considered in the setting of proposed limits included the work of Dr Mackay on leaching losses at various levels of productive potential, benchmarking against current losses in the catchment from some farms (Ms Marr paragraphs 79 & 82) and the variation in levels of available mitigations on various land use classes (Ms Marr, para. 95). Further information on available mitigations on various land use classes are detailed in the s42A Evidence of Dr MacKay (paragraphs 143 & 146 & Figure 7).

Determining the water quality outcome from the various allocation mechanisms

184. Any allocation mechanism for non-point source nitrogen that results in reduced nitrogen loadings in the river compared to the current state will require some current land users to reduce their relative inputs to the river system. These required reductions will be greater if the mechanism achieves the same reduction in nitrogen loading (compared to the current state loading) and provides for future intensification (increased losses from some areas in the catchment).

[30] Mackay *et al*. (2008). As quoted by Dr Roygard's s42A Evidence, para. 338. Dr MacKay paragraphs 145 and 146 makes similar statements.

Suggested Values for Table 13.2 Nitrogen loss limits based on Land Use Capability

185. The conversion of the LUC loss limits to in-river nitrogen loadings proposed was documented in the s42A Evidence of Dr Roygard (Section 7.5) and Mrs McArthur (Chapter 9) for the target zones for Rule 13-1.

186. Alternative numbers for Table 13.2 were recommended by:

- Fonterra (evidence of Mr Willis, page 43). These recommendations included two forms of loss limits, termed Value A and Value B. The Value A limits provided alternative higher N loss limits for year 1, year 5 and year 10 and the same limits as the POP in year 20. The alternative values (Value B) used a value "n" defined as "the average kg of N lost ha/year on the subject property over the period 1 January 2006 to 31 December 2009". The nitrogen loading estimate for the Value A component of the proposed Rule from Fonterra was shown for the upper Manawatu and the Mangatainoka catchments in the Supplementary Evidence of Dr Roygard.
- Dr Mackay (as summarised in the evidence of Ms Marr, Table 3, page 27). These values were based on the proportions of the productive potential of the land.
- Mr Day's approach effectively moved the POP recommended higher limits for year 1 and moved year 1 limits to year 5, year 5 limits to year 10, year 10 limits to year 15, and year 20 stayed as notified.

187. All recommended approaches align to the year 20 targets as notified in the POP. Table 10 below compares the various proposed LUC loss limits using the Upper Manawatu as a case study, assuming all hectares are losing the amounts recommended to be specified in Table 13.2. The potential year 1 nitrogen loadings range from 768 tonnes/year for the 0.75 of potential scenario, to 859 tonnes/year for the values specified in the POP, to 1,080 tonnes/year for the values recommended by Fonterra.

Table 10: In-river nitrogen loading rates calculated for the Manawatu at Hopelands site using recommended Year 1 N loss limits for Table 13.2 to calculate losses from all hectares in the catchment.

	LUC I	LUC II	LUC III	LUC IV	LUC V	LUC VI	LUC VII	LUC VIII	Total
	kg N/ha/yr	kg N/ha/yr	kg N/ha/yr	kg N/ha/yr	kg N/ha/yr	kg N/ha/yr	kg N/ha/yr	kg N/ha/yr	
Overseer modelled based on potential production	30	27.4	23.5	17.5	16.3	14.5	8.3	0	
0.9 potential	27	24.7	21.1	15.8	14.7	13.1	7.5	0	
0.75 potential	23	20.6	17.6	13.1	12.3	10.9	6.2	0	
Fonterra – Yr 1	32	29	25	19	18	16	6	2	
A Day -Yr 1	36	32	24	18	15	12	7	2	
Table 13.2 value - Yr 1	32	29	22	16	13	10	6	2	
Table 13.2 value - Yr 20	25	21	18	13	12	10	6	2	
Upper Manawatu (ha)	0	12424	20257	11508	907	57254	22108	5180	129638
In-river load	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr	Tonnes/ yr
Overseer modelled based on potential production	0	170	238	101	7	415	92	0	1023
0.9 potential	0	153	214	91	7	375	83	0	923
0.75 potential	0	128	178	75	6	312	69	0	768
Fonterra – Yr 1	0	180	253	109	8	458	66	5	1080
A Day -Yr 1	0	199	243	104	7	344	77	5	978
POP Table 13.2 value - Yr 1	0	180	223	92	6	286	66	5	859
All - Yr 20	0	130	182	75	5	286	66	5	751
Target (tonnes/year)									358
Current state (PS+NPS) (tonnes/year)									762
Current state (NPS) (tonnes/year)									746

188. Determining the outcome under the various proposed limits of the POP requires consideration of the effects of the nitrogen loads over the period of 20 years. All of the alternative recommended nitrogen loss limits for Table 13.2 have the same N loss limits for year 20; however, the rate at which these are arrived at varies. Table 11 applies the various recommended nitrogen loss limits to estimate loadings with the current land use mix. The resulting loads for year 1 range from 535 to 602 tonnes N/year in year 1[31]. The approaches of Mr Day, Fonterra, the notified POP numbers, and the numbers based on full potential productivity of Dr Mackay vary from 580 to 604 tonnes/year in year 1. All scenarios converge on loads of 536 tonnes in year 20 POP.

[31] These estimates use the land use information of Clark and Roygard (2008) and do not account for intensification between the period of collection of the land use data and year 1 of the proposed approach.

Table 11: In-river nitrogen loading rates calculated for the Manawatu at Hopelands site assuming no land use change, and using recommended Year 1 - N loss limits for Table 13.2 to calculate losses from intensive farms.

	POP as notified	Fonterra	A Day	potential	0.9* potential	0.75 * potential
yr 1 total	580	604	602	590	568	535
yr 5 total	564	594	580			
yr 10 total	544	578	564			
Yr 15 total			544			
yr 20 total	536	536	536			

189. In summary, the proposed LUC approach enables calculation of nitrogen loading outcomes. Two submitters (Mr Day and Fonterra) have proposed alternate LUC loss limits. These proposed limits all converge on the same numbers as proposed in the notified POP for year 20. The alternative proposed limits differ in the rate at which these targets are achieved. The proposed limits for year 1, based on current land use configuration, have been compared. These comparisons show estimated loadings under the various scenarios will all be similar (580 to 602 tonnes) and are lower than the current state for the study catchment of 744 tonnes. The environmental outcomes of various submitted nitrogen loadings in the Upper Manawatu catchment are discussed in the sections below.

Assessment of costs of Rule 13-1

190. The alternative N loss limits recommended in various evidence have implications for the economic assessment of the POP approach. As well as the revised LUC targets, Fonterra requested setting back the timing of the requirements to meet the limits by five years (Mr Willis for Fonterra, para. 86.1). Neild and Rhodes (2010) completed further economic analysis, including assessing the use of the alternative LUC loss limit values recommended by submitters (Fonterra and Mr Day) and Dr Mackay's values for full potential production.

191. Compared to the values recommended in the POP:

- Delaying the implementation of the Dairying and Clean Stream Accord type obligations from 2012 to 2013 had a minimal overall impact of $0.5 million or an average of $1,022 per farm.
- The limits recommended Dr Mackay increased the overall net present costs of the proposed rule by the order of $5.5 million, a 9% increase. The increase is due to farms containing class 1 and 2 soils being required to take action to reduce losses

earlier than proposed under the recommended limits of the notified POP. The environmental benefits of such an approach would also occur earlier.

- The limits recommended by Fonterra decreased the overall net present costs of the proposed rule by approximately $20 million. This is a 35% decrease of the net present costs associated with Rule 13-1 and a 24% decrease in net present costs of compliance with Dairying and Clean Stream Accord type obligations, Rule 13-1 and compliance with current consent conditions. The decrease is due to farms being required to take action to reduce losses later than proposed under the recommended limits of the notified POP. The environmental benefits of such an approach would also be delayed.
- Adopting Fonterra's proposed limits and deferring implementation by a further 3 years would reduce costs by a further $6.5 million (8%) decrease of net present costs of compliance with Dairying and Clean Stream Accord type obligations, Rule 13-1 and compliance with current consent conditions.

192. Neild and Rhodes (2010) noted that: "*Deferring the cost would also provide the option of developing more cost effective technologies to reduce N loss. However, the environmental benefits from earlier reduction in N loss to the environment would be forgone.*"

Modelling environmental outcomes of the proposed Rule 13-1

193. The Hearing Panel requested further information regarding the environmental benefits of proposed Rule 13-1. In order to provide an effective answer to the Panel's question, the catchment outcomes of a number of nutrient load / land use scenarios for the Upper Manawatu case study were completed. These intensification and nutrient reduction scenarios (Box 2 and Appendix 6) were the basis for further modelling work by Dr Biggs to determine the instream benefits in terms of periphyton growth and macroinvertebrate community health as indicators of life supporting capacity. The nutrient reduction scenarios include some reductions of phosphorus, recognising the combined approach to nutrient management of the POP. The intensification scenarios maintain concentrations of phosphorus at current levels, under the assumption that the benefits of some approaches of the POP to phosphorus management will be offset by increased losses of phosphorus due to intensification of agriculture. The four key intensification scenarios with regard to environmental outcomes are scenarios ii, iii, v, and vi detailed in Box 2 below.

Box 2: Scenarios of nutrient reduction completed for the Upper Manawatu catchment to demonstrate the environmental benefits of Rule 13-1.

Intensification scenarios:

i. **Fonterra Year 1 load**[32] – annual N load calculated from year 1 of Fonterra's proposed N loss limits for Table 13.2.). This scenario models a load of 1,080 tonnes N/year.

ii. **1.200 kg MS/ha load and LUC expansion load** – annual load calculated by Clothier *et al*. (2007) using N loss limits predicted from intensification of land currently in dairying (increasing production from an average of 1,000 to 1,200 kg MS/ha) and the annual load using N losses predicted from expansion of dairying onto all LUC Class 3 or better land under current management practices. To simulate the catchment load under the combined effect of these scenarios a nitrogen load of 1.009 tonnes/year.

iii. **1.200 kg MS/ha load or LUC expansion load** – Combined annual load calculated by Clothier *et al*. (2007) using N loss limits predicted from intensification of land currently in dairying (increasing production from an average of 1.000 to 1,200 kg MS/ha). Or annual load calculated by Clothier *et al*. (2007) using N losses predicted from expansion of dairying onto all LUC class 3 or better land under current management practices. As per the modelling of Clothier *et al.* (2007) above combining both scenarios. For either of these scenarios the appropriate load to model is 877 tonnes/year.

iv. **Rule 13-1 Year 20 load** – annual load calculated by Roygard and McArthur (2008) using full allocation of N loss limits proposed in the proposed Rule 13-1 year 20 requirements. This model assumes every hectare in the catchment is leaching at the full loss rates (Year 20) from Table 13.2. This scenario models a load of 751 tonnes N/year.

v. **Current state** – measured annual load based on the calculation of Roygard & McArthur (2008). This scenario models a load of 745 tonnes N/year.

Nutrient reduction scenarios:

vi. **Rule 13-1 no land use change** – implementation of proposed Rule 13-1 year 20 nitrogen loads for all existing intensive land uses depending on LUC class (dairy, cropping and horticulture). This scenario models a load of 536 tonnes N/year.

vii. **1/3 reduction** – annual load based on assumed 1/3 reduction from current state (both dairying and sheep and beef) using potential mitigation options as described by Clothier *et al.* (2007) for N, Parfitt *et al.* (2007) for P, and Roygard & McArthur (2008) for point source BMP (best management practice) reductions. This model assumes no change in land use or intensity. This scenario models a load of 490 tonnes N/year.

viii. **Standard load limit** – annual load calculated from POP standards for SIN (444 mg/m^3) and DRP (10 mg/m^3) using the calculation methods of Roygard & McArthur (2008). This scenario models a load of 358 tonnes N/year.

ix. **Ideal load** – annual load calculated from my recommended nutrient standards for SIN (110 mg/m^3) and DRP (10 g/m^3) using the load calculation methods of Roygard & McArthur (2008). This scenario models a load of 89 tonnes N/year.

194. The alternative nutrient allocation approaches proposed by submitters, and the nutrient load scenarios that relate to them, are summarised as:

[32] Evidence of Mr Willis, attachment 4, page 43 (Table 13-2, Year 1 Value A).

- The No Limits allocation mechanism (Federated Farmers, in material provided following the Hearing, and Horticulture New Zealand, in evidence of Mr Keenan on water quality, page 51).
    - Year 1 of this approach is best modelled by the current state scenario (Scenario v) but will likely be higher than this given some intensification between calculation of current state and the "year 1" of the approach.
    - By year 20 the likely loading will grow from the current state to greater than 920-950 tonnes by 2030. This has been determined by combining the steady growth scenario of Mr Newman and Neild & Rhodes (2010) with specific steady growth data for the Tararua[33] and the evidence of Clothier *et al.* (2007) on catchment load modelling (as shown in Appendix 7).
    - In summary, the No Limits approach is predicted to increase loads from the current state scenario to greater than the 1,200 kg MS/ha load or LUC expansion load (Scenario iii) and may reach close to the 1,200 kg MS/ha load and LUC expansion load (Scenario ii) by 2030.

- Grand-parenting with customised reduction targets per farm (Federated Farmers; Dr Mills paragraphs 35 & 36; Ravensdown, Dr Roberts, paragraph 23; and Fonterra, Mr Willis).
    - Year 1 of this approach is best estimated by the current state scenario (Scenario v) but will likely be higher than this given some intensification between calculation of current state and the "year 1" of the approach.
    - Year 20 outcomes are not able to be estimated as the submissions are not specific on how intensification would be managed or what levels of reduction will be achieved. Therefore, outcomes in terms of N loads are unable to be determined.

- Benchmarking (Mr Sneath for Fert Research, paragraph 16)
    - Year 1 of this approach is estimated by the current state scenario (Scenario v) but will likely be higher than this given some intensification between calculation of current state and the "year 1" of the approach.
    - Year 20 outcomes are not able to be estimated as the submissions are not specific on how intensification would be managed or what levels of reduction will be achieved. Therefore, outcomes in terms of N loads are unable to be determined.

[33] From Neild and Rhodes (2010).

- Alternative N loss targets based on LUC (Mr Day, page 10; Fonterra via Mr Willis page 43).
    - Year 1 of these scenarios are predicted to have loads between 580 to 602 tonnes/year in year 1 (Table 8). The modelled scenario closest to this is the Rule 13-1 No Land Use Change scenario (Scenario vi).
    - In year 20, the outcome is most likely to be between the Rule 13-1 No Land Use Change (Scenario vi) and the Year 20 Rule 13-1 Full Allocation Load (Scenario iv). Where the outcome lies within the range between these scenarios will depend on the level of intensification and presence or absence of a nitrogen trading regime (and levels of uptake of a trading regime if one is in place).

195. In conclusion, notwithstanding the lack of detail on some of the approaches, four scenarios out of the nine scenarios are important in comparing the environmental outcomes of the proposed allocation mechanisms. These four scenarios are Rule 13-1 No Land Use Change (Scenario vi), Current State (Scenario v), 1,200 kg MS/ha load or LUC expansion load (Scenario iii) and the 1,200 kg MS/ha load and LUC expansion load (Scenario ii).

Effects of nutrient loadings on concentrations in the river.

196. The two key factors influencing periphyton biomass are river flow and nutrient concentration. Reducing nutrient concentrations reduces the frequency and duration of nuisance periphyton blooms over a range of flow conditions. Below certain nutrient concentration thresholds, periphyton can be limited by nitrogen, phosphorus or both, thereby limiting nuisance growths and keeping periphyton within acceptable biomasses more often[34].

197. Modelling of average nutrient concentrations under various flow and nutrient management scenarios (Figure 3 and Figure 4) shows that the Rule 13-1 With No Land Use Change scenario (Figure 4b) will bring nutrient concentrations closer to nutrient standards, particularly at low flows, when compared with the intensification scenarios or the current state. This means the potential for nitrogen to be limiting more often under this scenario is increased, reducing the frequency and duration of nuisance blooms.

198. As these modelled concentrations represent average nutrient and flow conditions, actual measured concentrations will range above and below the average for each flow decile

[34] s42A report of Dr Roygard, Box 35, pages 118-119.

(ie. Figure 4f shows the full variation in measured concentrations compared to the values for the deciles). The closer the average is to the standard, the more often actual concentrations would be likely to fall within the standards.

199. Figure 5 shows the differences between the average predicted nutrient concentrations in flow decile for the four key nutrient reduction and intensification scenarios and the current state. Each plot shows the relationships between the scenarios under different flow regimes. Figure 5a shows the predicted concentrations under the lowest 20% of flows (< 80th flow exceedance percentile). It is under these flows that the greatest benefits in terms of nutrient reduction will occur, although across all flows the standard load and Rule 13-1 With No Land Use Change scenarios still have considerably lower nutrient concentrations, when compared with the current state or nutrient intensification scenarios.

200. The key message from these analyses is that lowering nutrient loads will mean the average concentrations of nitrogen and phosphorus are within or near the standards more often and that the environmental benefits of lower nutrient concentrations will also occur more often or for a longer duration.

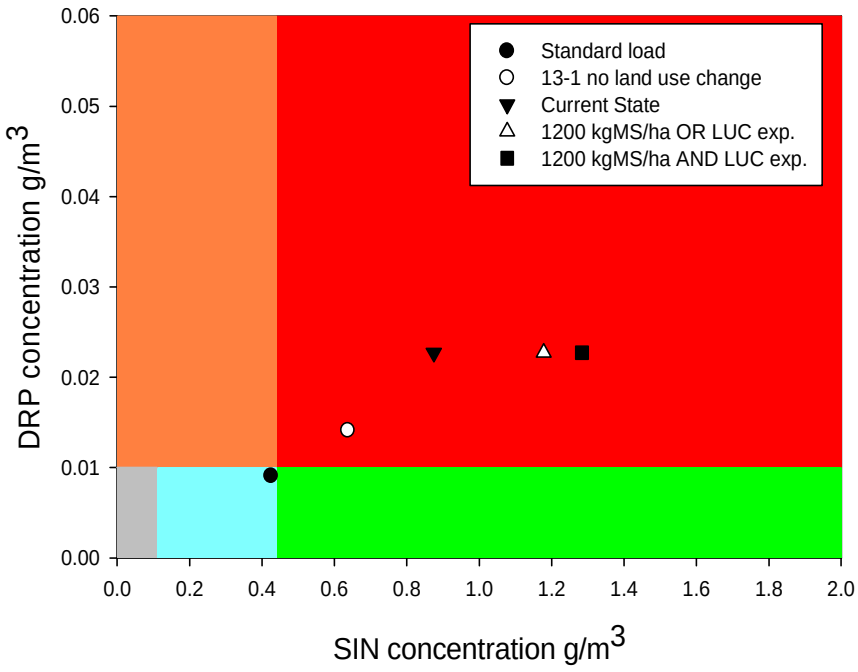

Figure 3: Average concentrations of soluble inorganic nitrogen (SIN) and dissolved reactive phosphorus (DRP) for flows less than the 80th percentile for a number of nutrient intensification and reduction scenarios for the Manawatu at Hopelands site.

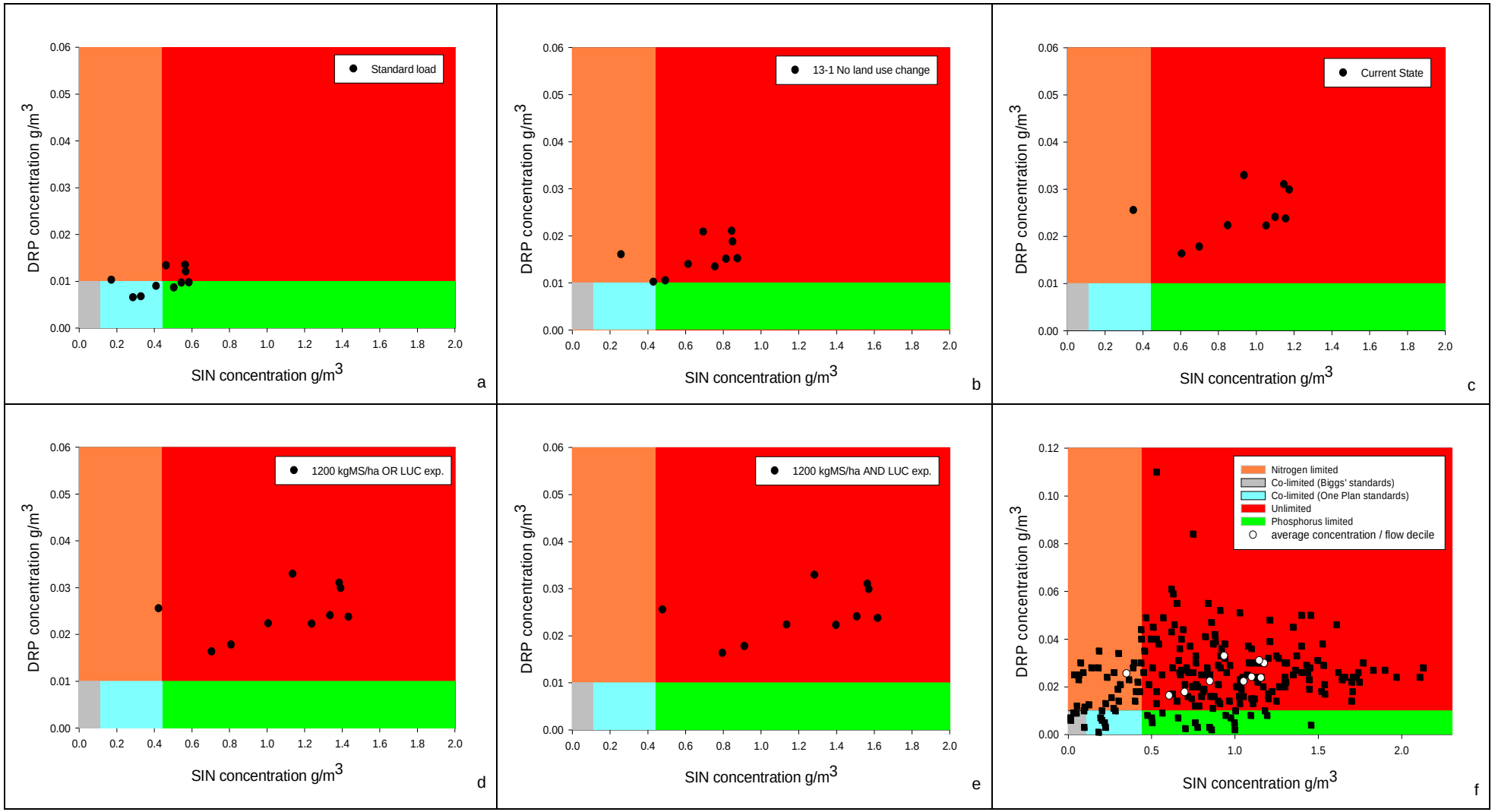

Figure 4: Average soluble inorganic nitrogen (SIN) and dissolved reactive phosphorus (DRP) concentration for each flow decile for a number of nutrient intensification and reduction scenarios for the Manawatu at Hopelands site (plots a-e) and actual nutrient concentration measurements with average concentrations per flow decile (plot f).

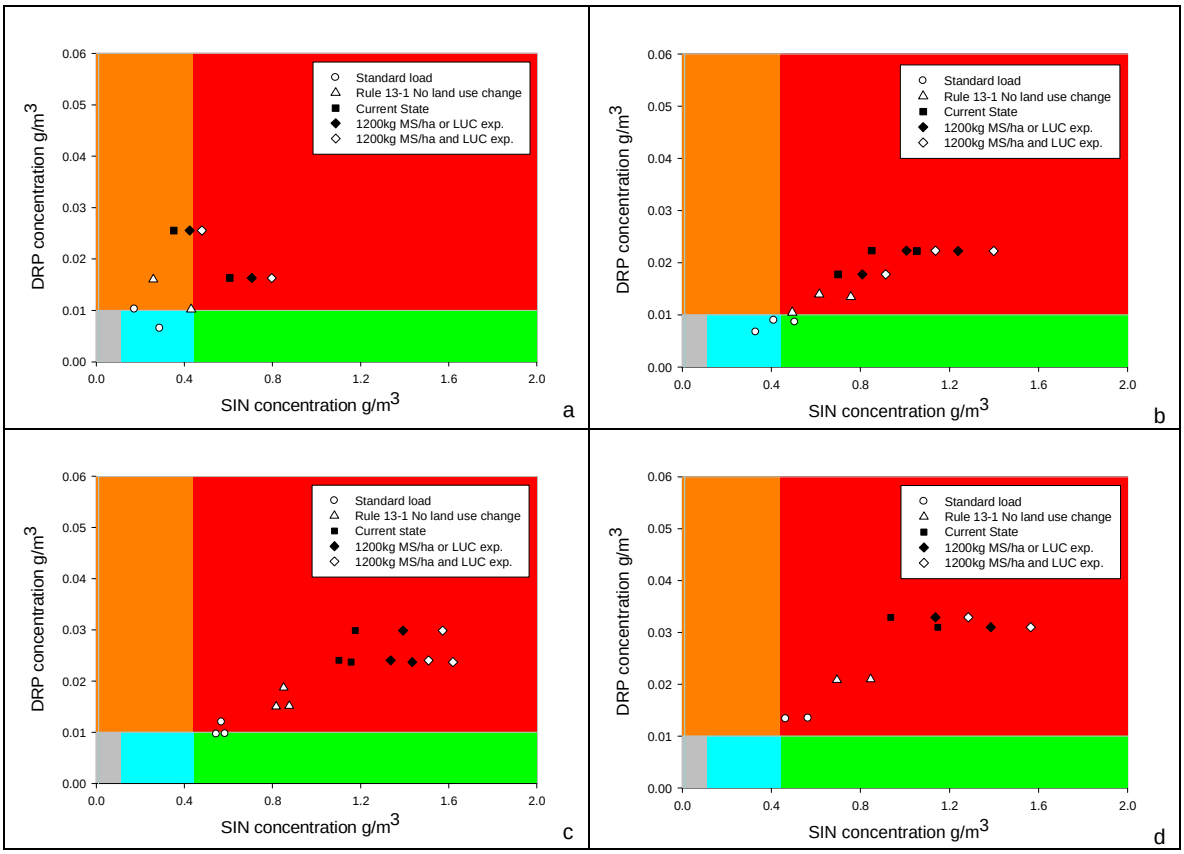

Figure 5: Average predicted soluble inorganic nitrogen (SIN) and dissolved reactive phosphorus (DRP) in each flow decile for a number of nutrient intensification and reduction scenarios for the Manawatu at Hopelands site. Plot a = low flows (flows < 80th exceedence percentile), b = below median (flows between the 80th and 50th percentiles), c = above median (flows between the 50th and 20th percentiles) and d = high flows (flows > 20th percentile).

Translation of nutrient loadings to environmental outcomes

201. Dr Biggs was asked to model the potential instream outcomes of various nutrient intensification and reduction scenarios against the current state for the Manawatu at Hopelands. In his assessment Dr Biggs focuses on the potential adverse effects and benefits of these scenarios on periphyton and macroinvertebrate communities.

202. Dr Biggs finds that under the current state the Manawatu River at Hopelands is already significantly enriched (eutrophic) and accruing significant periphyton biomass which will exceed the periphyton standards, degrade macroinvertebrate communities and be visually conspicuous. Under all intensification scenarios (described in Box 2 above) periphyton growth in the Manawatu River is likely to increase moderately to greatly,

reaching levels that are hyper-eutrophic and aesthetically undesirable, and which reduce the quality and diversity of macroinvertebrate communities and fish.

203. Nutrient reduction scenarios (including the "Proposed Rule 13-1 With No Land Use Change" scenario) will all result in significantly lower periphyton biomass and a reduction in the duration of events which exceed periphyton standards.

204. As discussed in the verbal evidence to the Panel of Drs Quinn and Biggs, nutrient reduction scenarios will be effective at increasing the diversity and quality of macroinvertebrate communities (and thereby fish); with greater gains being accrued the more nutrient concentrations in the river are reduced. Figure 6 shows (via symbol A) that all of the intensification scenarios and the current state scenario predict QMCI scores that are close to 4, which is the threshold between fair and poor water quality. Symbol B on the graph is the predicted outcome of the Rule 13-1 No Land Use Change scenario (a load of 536 tonnes/year). The load for this scenario predicts QMCI values of 5.5, which is in the range defined as good. The lack of difference between the QMCI scores of the Current State and nutrient intensification scenarios in the example graph below (Figure 6) are due to the inability to predict phosphorus loads under these scenarios. Paragraphs 17-19 of Dr Biggs' End of Hearing technical report provide a clearer picture of the predicted differences in aquatic invertebrate communities between Current State and intensification scenarios.

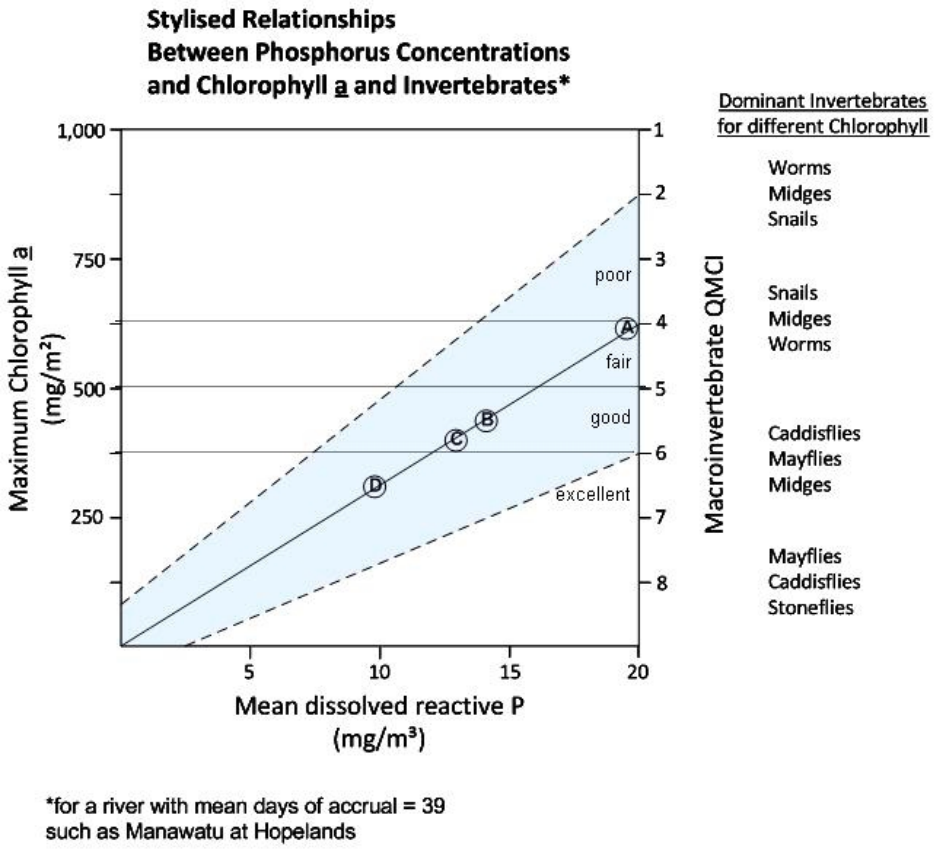

Figure 6: A *stylised* summary of the response of maximum reach-scale periphyton biomass to mean monthly concentrations of dissolved reactive P (based on P being the growth limiting nutrient), and associated benthic invertebrate communities, based on calculations for the Manawatu River at Hopelands. The outcomes of different upstream catchment management scenarios are depicted in terms of chlorophyll *a* on the chart. Key to scenarios: A = All 'Intensification scenarios', including 'Current State' (scenarios i-v); B = 'Rule 13-1 Year 20 load – with no land use change' (scenario vi); C = '1/3 reduction' (scenario iii); D = 'Standard load limit' (scenario ii) and 'Ideal load' (scenario i). The shaded area gives the approximate 95% Confidence Intervals on the predictions. QMCI categories (excellent-poor) determined from Stark and Maxted (2007).

205. Dr Biggs' model uses an average number of days between three times median flow events (mean days of accrual). The time between such high flow events varies greatly from year to year and site to site. Some accrual periods are substantially greater than the mean and in the case of the Manawatu at Hopelands there may not be a flushing flow event for more than 150 days in some years. During events with longer accrual times than the mean, the health of aquatic communities can be worse than the modelling predicts. Appendix 8 shows more detail on the range of days of accrual for the Manawatu at Hopelands site.

Effects of nutrient allocation mechanisms on aquatic ecosystem health

206. The difference in ecosystem health between the Current State and the nutrient intensification scenarios is a change from eutrophic to hyper-eutrophic conditions. In simple terms, the shift to a hyper-eutrophic state means whenever flow events are not intense or frequent enough to control periphyton growth, biomass will be extremely high for prolonged periods (ie. greater than 8 weeks) in most years, with midges and worms being the only aquatic invertebrate taxa able to survive. Table 12 below relates the range of suggested nutrient allocation mechanisms to load scenarios and instream outcomes.

207. Using N loss limits determined by LUC class as the nitrogen allocation mechanism will confer immediate nitrogen load and instream benefits, with good to excellent aquatic ecosystem health (according to predicted QMCI). Depending on the degree of intensification or the implementation of a nitrogen trading regime, Year 20 instream outcomes are predicted to continue to reduce from this level to somewhere closer to the Current State.

208. The most likely outcome of the combined POP nutrient management approach in year 20 will be close to the Current State in terms of nutrient loads. This implies that although farming will have intensified, the environmental footprint will be similar to or lower than the Current State.

209. An important difference in year 20 results of the One Plan combined approach will be the interaction between the nitrogen load reductions and the likely lower phosphorus loads. Phosphorus loads are likely to be lower than the Current State (through efforts to control point-source, farm dairy effluent hot spots, stock access and erosion inputs over the next 20 years). This will confer even greater instream benefits, especially combined with an increased frequency of nitrogen limited conditions. The lower the nutrient loads (both nitrogen and phosphorus) greater and more frequent instream benefits will be realised.

Table 12: Environmental outcomes of nutrient allocation mechanisms and scenarios.

Allocation mechanism	Year	Closest nutrient scenario	Nitrogen load (t/y)	Predicted instream outcome[35]
No limits allocation mechanism	Year 1	Current State	~ 745	Eutrophic QMCI < 5-6 (fair to good)[36]
	Year 20	Between the 1200 kg MS/ha or LUC exp. & 1200 kg MS/ha and LUC exp.	920 - 950	Hyper-eutrophic QMCI < 4 (poor)
Grand-parenting	Year 1	Current State	~ 745	Eutrophic QMCI < 5-6 (fair to good)
	Year 20	Unknown	Unknown	Unknown
Benchmarking	Year 1	Current State	~ 745	Eutrophic QMCI < 5-6 (fair to good)
	Year 20	Unknown	Unknown	Unknown
Alternative N loss targets by LUC	Year 1	Rule 13-1 No Land Use Change	580-602	Eutrophic QMCI > 5-7 (good to excellent)
	Year 20 – with full utilisation	Current State	~ 745	Eutrophic QMCI < 5-6 (fair to good)

Transferability of the assessment of ecological benefits

210. In Dr Biggs' opinion, the benefits are directly transferable to other target zones in the Region and are likely to have greater environmental benefits in zones that do not have the long accrual periods experienced at Hopelands. Dr Biggs goes on to suggest that the combined nutrient management approach in the POP would provide the most significant benefits to small streams (such as the tributaries of the Manawatu) because of the close physical connection between the land and water in these catchments and because of the nature of the combined provisions, including good farm dairy effluent management, controls over nitrogen 'hot-spots', and fencing of streams. These benefits will be realised at the paddock scale, providing improvements to small streams which often have higher ecological values (see Supplementary Evidence of Mrs McArthur, paragraphs 33-36, and the Supplementary Evidence of Dr Joy, paragraph 2.17).

[35] Dr Biggs' End of Hearing report paragraphs 17 to 19.
[36] NB: Measured QMCI under the Current State indicates water quality for the Manawatu at Hopelands is fair to poor.

Additional environmental benefits of the approach

Control of macrophytes

211. An additional adverse effect of nutrient enrichment which is common in small to medium sized streams and rivers within targets zones (Appendix 9) is the proliferation of macrophytes (weeds) which choke small to medium sized waterways reducing aquatic ecosystem health by smothering the stream bed, decreasing water velocity, and reducing dissolved oxygen at night. Weed-choked water bodies also provide little recreational opportunity for river users and decrease the available habitat and spawning environment for fish.

212. Evidence suggests specific reductions in nitrogen reduce the growth of nuisance macrophytes (Appendix 10; Soziak, 2002). Dr Biggs mentions (paragraphs 9 and 26 of his End of Hearing report) that the environmental benefits of contaminant management in small stream catchments will be greater due to the close connectivity between land and water. This is equally true of nuisance macrophyte growth in small streams which would benefit most from increased stream shading, reduced sediment inputs and reduced soluble nitrogen concentrations.

Environmental benefits: Lakes

213. Cyanobacteria are also nuisance biological growths with adverse effects on aquatic ecosystem health and recreational values in coastal dune lakes and wetlands (s42A evidence of Mr Gilliland and Mr Gibbs). Appendix 5 contains further information on the current effect of cyanobacterial blooms in lake target zones.

214. The expected changes in cyanobacterial bloom frequency and duration resulting from proposed Rule 13-1 cannot be modelled with the existing data. Any reductions in nutrient load arising from Rule 13-1 will in all likelihood reduce the frequency and duration of cyanobacterial blooms over time, reducing the negative effects on values such as Life Supporting Capacity, improving water clarity, and slowing lake eutrophication. Although the timeframe and degree of benefit cannot be established with certainty, monitoring of Current State indicates that change in a positive direction is needed.

Trout and periphyton

215. Dr Scarsbrook and Mr Barrow mentioned the potential impact of trophic cascades in relation to the presence of trout and periphyton biomass. Briefly, the theory underpinning a trophic cascade of this type is that an abundance of trout will reduce grazing invertebrates by eating them, to the point where controls on periphyton from grazers are suppressed and periphyton increases.

216. The research tabled by Mr Barrow (Simon *et al.,* 2004) of which Dr Biggs was a co-author, was undertaken in two low-nutrient Otago Streams. Under these circumstances, trout have been shown to increase periphyton by consuming grazing invertebrates. However, these findings are not relevant to the high-nutrient rivers of the target zones in the Region. In moderate to high-nutrient river systems, periphyton can be elevated regardless of predation of grazing invertebrates by trout. The periphyton model used by Dr Biggs for the process of determining periphyton standards was developed from river systems with trout present. Therefore, the management approach developed by Horizons accounts for any effects of trophic cascades caused by trout and further consideration of this issue is not warranted.

217. Additional information on the relationship between trout and periphyton can be found in the End of Hearing report of Dr Biggs (paragraphs 30 to 34) and was presented at the Hearing by Associate Professor Death.

2.6.3. Planning analysis

218. At the end of the Hearing there were three main issues in contention remaining in relation to the proposed framework for intensive farming. In summary, these were:

- What the targets or standards for nitrogen leaching in any regulatory framework should be, including what the method for allocating nitrogen leaching, if any, should be.
- What the activity status of any Rule should be.
- What the timeframe for achieving compliance should be.

219. Other issues that were raised are largely subsets of the above and are dealt with in the technical section. Another subset of issues related to implementation questions. These are dealt with separately in Appendix 11.

220. Horizons Regional Council, Fonterra, Federated Farmers, Forest and Bird, Fish & Game and Department of Conservation engaged in a further round of conversations following the adjournment of the Hearing. All parties made a significant commitment in time and resources to endeavour to identify and resolve differences relating to this and the water allocation framework. Despite the best intentions of all those involved, we were unable to reach an agreed position to put forward to the Hearing Panel.

221. What follows is Horizons' planning analysis of the issues and evidence put forward. It endeavours to acknowledge and consider all of the points of view put forward by other parties at the hearing, but ultimately may not reflect the views of any or all other parties.

222. In considering the evidence, the judgement in the Carter Holt Harvey Limited v Waikato Regional Council [A123/08] case has been drawn on extensively. That case identified a number of tests which are relevant to the consideration of the intensive farming regime in this Plan, and they are identified and considered in more detail in the sections that follow where they are relevant. The Court in that case also identified [at para 112 of its decision] the relevant tests for all Regional Rules as below, and I have drawn on that in the analysis also:

[112] Under the Act relevant tests for regional rules are:

a) Policies are to implement the objectives and rules are to implement the policies [fn 48 Sections 67(1)c and 68(1) of the Act..].

b) Each method (including each rule) is to be examined, having regard to its efficiency and effectiveness, as to whether it is the most appropriate method of achieving the objectives [fn 49 Section 32(3)(b) of the Act.] taking into account:

(i) The benefits and costs of the rule; and

(ii) The risk of acting or not acting if there is uncertain or insufficient information about the subject matter [fn 50 Section 32(4) of the Act.].

c) In making a rule the regional council must have regard to the actual or potential effect of activities on the environment, including, in particular, any adverse effect [fn 51 Section 68(3) of the Act.].

d) At the general level there is a requirement that a regional plan (change/variation) should be designed to accord with [fn 52 Section 66(1) of the Act.], and assist the regional council to carry out its functions [fn 53 Section 68(1) of the Act.] so as to achieve the purpose of the Act [fn 54 Sections 63(1) and 66(1).].

- What the goals/standards/targets of any Rule should be.
- Four alternative methods of setting targets for maximum nitrogen leaching were put forward in material presented to the Panel.

- Federated Farmers, in evidence submitted following the Hearing, proposed a Rule with no standards or targets, just provision of information on what modelled N leaching was for each farm. At the Hearing Federated Farmers also mentioned use of 'benchmarked' targets, but provided no evidence on what these targets might be.

223. Horticulture New Zealand proposed no targets until a Plan Change was initiated. A further option was also included in Mr Willis's proposal was a 'grand-parented' target whereby the target is based on the average historical leaching between 1 January 2006 and 31 December 2009 and this reduces over time.

224. The final type of option was the Natural Capital nitrogen allocation put forward in the POP which allocates nitrogen on a per hectare basis with more nitrogen being allocated to land which has a higher Natural Capital (in this case a higher LUC class) and the allocation reducing over time. This approach was supported by Fish & Game, Forest and Bird and the Minister of Conservation. A modified version of this was put forward by Mr Willis for Fonterra, with higher targets in the first 15 years for less 'capable' land but the same year 20 target.

225. The various proposals for N leaching targets can be summarised as:
- No targets in this plan (Federated Farmers, Horticulture New Zealand[37])
- Benchmarking (Federated Farmers)
- Grand-parenting (Fonterra)
- Natural Capital or modified Natural Capital (Horizons, Fonterra, Fish & Game, Forest and Bird, Minister of Conservation).

226. Using the tests set out in the section above it is appropriate to analyse each option to ascertain:
- Which is the most appropriate way to achieve the Objectives and Policies of the Plan, taking into account its efficiency, effectiveness and its costs and benefits?

What are the Objectives and Policies of the Plan?

227. Because of the nature of the One Plan being a composite Regional Policy Statement (RPS) and Regional Plan, the objectives within the Regional Plan section direct us to consideration of the Objectives and Policies in the RPS. The Objectives which do this in

[37] No targets in this plan (Federated Farmers) or targets introduced by a Plan Change at some future and as yet unknown date (Horticulture New Zealand) are considered to amount to the same thing for the purpose of analysing these alternatives.

the Regional Plan are Objective 11-1 (which was considered by the General Hearing Panel and requires 'regulation of activities in a manner that gives effect to the provisions of Part I of this Plan, the Regional Policy Statement') and the recommended Objective 13-1 (which requires activities to be "controlled in a manner that a) recognises and provides for the water management values set out in Schedule Ba; and b) recognises and provides for the Objectives and Policies of Chapter 6 as they relate to surface water and groundwater quality". Other than minor wording issues, the Objectives are not in contention. Because of the strong directive nature of these Objectives to consider the provisions in the RPS, those Objectives and Policies that are the most relevant to consider any targets against.

The Objectives and Policies of the RPS

228. The first relevant Objectives of the RPS is Objective 6-1 which states (as recommended):

*"Water bodies** are managed in a manner which safeguards their life supporting capacity and recognises and provides for the values set out in Schedule Ba to Part I – the Regional Policy Statement."

229. This Objective is then supported by three more specific Objectives which deal with water quality, quantity and the beds of rivers and lakes. The water quality Objective (6-2) is most relevant to this analysis, and states (as relevant):

"(a) Surface *water*^ quality is managed to ensure that:
(i) *Water*^ quality is maintained or enhanced in those *water bodies** to a level which supports the values of the river *water bodies** set out in Schedule Ba to Part I – the Regional Policy Statement.
(ii) accelerated eutrophication and sedimentation of *lakes*^ in the Region is prevented or minimised…".

230. Minor wording issues relating to the Objectives were discussed at the Hearing, including the insertion of a timeframe by which this is to be achieved. This is discussed further in the provision by provision analysis. However, in the main it is not in contention that a) the values are an appropriate management objective for water bodies; b) life supporting capacity should be safeguarded; and c) that the water quality standards set out in

Schedule D are appropriate, in that if they are achieved they will provide for the values and life supporting capacity[38].

231. The key policies in the RPS which set out how the water quality objectives will be achieved are Policies 6-3 to 6-5. These set out a hierarchy of management whereby if the water quality standards are currently achieved then the management focus should be on maintaining the water quality at those standards, and where the standards are not achieved the management focus should be on enhancing water quality to meet those standards.

232. Whether or not these Policies should also acknowledge the 'maintenance' of water quality where it does not meet the standards is an issue in contention which is covered in more detail in the provision by provision analysis. However, it can be stated that the agreed goal of the policies is for water quality to not decline to levels below the standards and, where possible, to improve degraded water quality to achieve the standards where it currently does not do this.

233. Policy 6-7 clarifies this further in respect of the contribution to water quality of farming activities (A number of other policies do a similar job in respect of point source discharges and other activities). Policy 6-7 requires that intensive farming in catchments where the intensive farms are the predominant cause of pollution, that they be required to prepare and implement plans to reduce pollution. Federated Farmers and Fonterra have both sought changes to this Policy. Fonterra would like the Policy to acknowledge that regulation is only necessary if non-regulatory methods prove inadequate. Federated Farmers would like the policy reworded to only refer to dairy farming (not other intensive land uses) and that the Policy refer to a non-regulated approach. These matters in contention notwithstanding, there is no contention that it is appropriate for the Policy to identify that farming may have an adverse effect on water quality in some Water Management Zones and that changes in practice are appropriate to address that effect.

234. In summary (and the substance is largely uncontested): the Objectives and Policies of the POP seek to manage land use in targeted catchments, along with other activities specified in other policies, in order to ensure that water quality does not decline and if possible that water quality is improved to a standard where the values are provided for and life supporting capacity is safeguarded.

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[38] The standards are their utility are discussed in more detail in section 2.5 of this report.

How effective and efficient would the alternative proposed targets be in achieving the Objectives and Policies of the Plan?

235. The various options put forward at the Hearing by submitters for alternative nitrogen loss limits are summarised in the technical section (1.7.2). In that section, where possible, the environmental outcomes and economic costs are analysed. A summary of that information and an analysis of whether or not the Objectives and Policies would be achieved are presented here.

1. <u>No Limits</u>

   The evidence shows that a 'no limits' approach (ie. no upper limit to nitrogen leaching or land use change) coupled with the realistic projected growth scenarios would lead to a significant degradation in water quality from the Current State. Life supporting capacity (as measured by QMCI) would not be safeguarded and other values of the water bodies (for example contact recreation and trout fishery values) would be compromised as a result of increased proliferations of periphyton and other algal growths. The parties who put forward this approach would no doubt argue that nutrient reductions would be achieved by means outside of the Plan; however, they presented no evidence as to what reductions would be achieved, by when or how.

   There would be no economic costs resulting to the farming industry as a result of this approach (NB economic costs to the rest of the economy as a result of degraded water quality were not modelled).

   A regime that does not reduce nutrient loss to the environment would not achieve the Objectives and Policies of the Plan or achieve the purpose of the RMA.

2. <u>Grand-parenting with customised reduction targets per farm and benchmarking</u>

   It is not possible to predict the environmental outcomes or economic costs of grand-parenting or benchmarking approach. The best estimate of environmental outcomes is that it is likely to be the same or slightly worse (depending on intensification between the Current State modelling and the Rule coming into force) than the Current State. The evidence shows that the Current State of the water bodies in targeted catchments means that at times the values are not provided for and that life supporting capacity is often compromised. Because the submitters were not clear on what if any reduction targets should be applied, it is not clear how much or how quickly any improvements would be seen. Because of

this it is not possible to conclude that the regime would achieve the Policies and Objectives in the Plan under this approach.

Because submitters where not clear on what reductions would be applied where, and how quickly, it is also difficult to estimate economic costs. However, Neild and Rhodes stated in their original evidence (p27) that grand-parenting has a number of limitations that the LUC mechanism overcomes in terms of recognising existing investment in mitigations amongst other things. They also state the the LUC allocation mechanism provides 'great transparency, certainty and equity' than grandparenting. This means the approach would not be the most efficient way to achieve the Objectives and Policies of the Plan.

3. Alternative N loss targets based on LUC

Alternative targets that rely on and modify the LUC-based allocation presented in the POP were put forward by Mr Willis on behalf of Fonterra, and Mr Day. The Panel also expressed an interest in the outcomes if Dr Mackay's originally modelled numbers were used.

The validity of using LUC as an allocation mechanism was questioned by some submitters, including Federated Farmers and some fertiliser companies. The reasons for their disagreement are addressed in the technical section above, and it is considered that using LUC as a proxy for Natural Capital to allocate nitrogen loss entitlements is robust and technically sound.

The environmental outcomes for each of the proposed LUC mechanisms are set out in the technical section above. In summary, because the proposed alternatives all adopt the same 20 year target, the 20 year in river outcome is the same for all options. Depending on the level of intensification in the catchment, for the Upper Manawatu after 20 years the river would be between its Current State in a worst case scenario (which from a life supporting capacity point of view based on predicted QMCI scores is fair to good) to an improvement to a QMCI of good to excellent under a no or modest growth scenario. It is difficult to predict where in this continuum the actual result would fall, but it can be concluded that the water quality would be at least maintained and in all likelihood improved. This type of outcome would achieve the Policies and Objectives in the Plan.

The variations in economic costs have been analysed in the most recent report of Neild and Rhodes. No other experts gave an economic analysis of their

recommended regime. Neild and Rhodes estimate that by adopting Mr Willis's proposed numbers, net present costs of the overall approach will be reduced by approximately 24% compared to the proposed targets. Adopting the original year 1 targets proposed by Dr Mackay would increase costs by 9%.

Mr Willis's targets delay environmental benefits (by providing higher numbers in the first few time periods) but consequently reduce costs and still achieve the same long term benefits. Because of this it could be considered that this balance between environmental benefits and economic costs is more appropriate than the proposed targets and that they should be adopted.

Should the activity status be permitted or controlled for existing land use?

236. The Court considered in detail the appropriate activity status for farming activities in the Carter Holt Harvey case.

"[113] The Act provides [fn 55 Section 77A.] for local authorities to make rules describing activities in the terms specified in section 77B as permitted, controlled, restricted discretionary, discretionary, non-complying and prohibited. These "labels" present as an hierarchy in terms of achieving the objectives and policies of the plan and the purpose of the Act. The least restrictive permitted activities are anticipated to occur, indeed they could be described as "desirable". Whereas at the other end of the continuum, prohibited activities are so "unwanted" that they are not provided for at all and no resource consent can be applied for nor granted.

[114] The issue being considered here is whether Rule 3.10.5.3 should be described as a permitted or a controlled activity. We consider that the relevant tests can be encapsulated by the following questions:

a) Which type of activity is the most appropriate way to achieve the objectives and policies of the plan?

b) Which type of activity would better assist the Council to carry out its functions so as to achieve the purpose of the Act?"

237. At the Hearing, the Panel asked all the parties considering the issue of activity status to consider the reasoning of the Court in the Carter Holt Harvey decision and to explain how the potential challenges considered by the Court in that case were resolved in any proposed Rule framework.

238. Fonterra provided its permitted activity drafting prior to the Hearing commencing and did not provide any further information following the Hearing addressing the challenges of a permitted activity Rule. Federated Farmers provided a permitted activity Rule following the Hearing, but did not address the challenges relating to activity status. Horticulture New Zealand provided a permitted activity Rule prior to the Hearing, but did not address these issues in their evidence and did not provide any additional information following the Hearing. Fish & Game and Forest and Bird, and the Minister of Conservation, all considered some of the challenges identified in the Carter Holt Harvey case, in particular the need for clarity and certainty in material provided after the Hearing, and concluded that a controlled activity was most appropriate.

239. Below is a summary of the challenges considered in the Carter Holt Harvey case in relation to activity status and an analysis of those challenges in the context of the matters before this Hearing Panel.

240. There are some key differences between the proposal that was before the Environment Court in Carter Holt Harvey and those before this Hearing Panel:

- The Taupo approach focused solely on nitrogen. The contaminants of concern in the Horizons' Region are nitrogen, phosphorous, faecal contamination, and sediment.
- The Taupo approach focused on all land uses within the targeted catchment. Horizons' approach focuses on the most intensive land uses, dairy farming, cropping, market gardening, and irrigated sheep and beef.
- In the Taupo case the initial allocation of nitrogen was made by ascertaining past nitrogen leaching using historical records of land use. In Horizons' case the nitrogen is allocated on a per hectare basis, with land with higher natural capital receiving a higher allocation.

241. These differences mean it may be appropriate for the Hearing Panel to reach a different conclusion than those reached by the Court in Carter Holt Harvey. Where I believe this to be the case I have highlighted it. However, I believe that there are enough similarities between the cases (and the fact that they are being considered under the same law) that many of the conclusions are equally as valid to this case as they were to the Taupo example.

242. Three main issues were highlighted to the Court by the parties as being of concern in deciding whether a permitted activity or controlled activity was most appropriate in the

Carter Holt Harvey case: a) certainty, objectivity, comprehensibility; b) public records; and c) cost recovery.

a) Certainty, Objectivity and Comprehensibility

243. The Court noted [para 120] in the Carter Holt Harvey (Taupo case) the need for a permitted activity Rule to meet the necessary tests, which in that case were agreed to be that a permitted activity rule must:

- be clear and certain
- not contain subjective terms
- be capable of consistent interpretation and implementation by lay people without reference to council officers
- not retain later discretions (decision-making) to council officers.

244. The Court noted in that case [at para 121] the comments of Mr van Voorthuysen in relation to the utility of permitted activities

"Permitted activity rules can play a useful resource management purpose for authorising simple activities that are undertaken on a routine and frequent basis and where the effects of those activities are demonstrably minor and the risks to the environment if they are misused are small."

245. I agree with the statements of Mr van Voorthuysen and would add a further qualifier, that permitted activities are appropriate when each activity can be carried out to achieve minor effects and low risk with essentially the same conditions on each occasion. Therefore, it is most appropriate to provide for permitted activities when the activity is essentially the same in every instance, but less appropriate where there is a high degree of variation between the instances where the activity is undertaken. It was not in contention that each farm is unique, that the assemblage of activities on each farm is unique, and that the particular best management practices that are applicable and effective on each farm are unique. This requires a case by case assessment of each farm and its effects, and the effectiveness of any mitigation techniques. This is much more difficult to achieve in a rigidly worded permitted activity than it is in a controlled activity.

246. Any Rule which seeks to control nitrogen losses to the environment relies on the use of Overseer to model nitrogen leaching. It was not in contention that when properly used by appropriately qualified persons, Overseer is capable of producing accurate estimates

of nitrogen leaching, even between different operators. Defining the appropriate qualification is easily done, and a suggestion put forward by Mr Sneath on behalf of Fertiliser Research is considered appropriate. Defining "properly used" would require reference to a detailed set of protocols. Within a controlled activity this could be achieved by the Regional Council retaining control over the methods used to calculate the nitrogen leaching and any disagreements over inputs into Overseer resolved through the resource consent process, as is already set out in the RMA.

247. If the Natural Capital nitrogen allocation mechanism is used, and used at a farm scale, it relies on the assessment of the LUC of the land (if regional scale LUC mapping is used then no assessment is required). Some submitters raised questions as to whether LUC assessments are made subjectively or if *"…different people can reach different conclusions*." (*Fonterra, S. Newland, para 111.1, EIC*). Evidence presented by Grant Douglas and Alec Mackay shows that LUC is a well established methodology with clear and consistent outcomes between suitably qualified users. Dr Mackay's End Of Hearing evidence deals specifically with this point (para 33) and states that it is very unlikely that there would be any dispute between appropriately qualified persons at the LUC class level, and that any differences would arise at the Sub-class or unit level, which are not utilised in the Natural Capital approach as proposed. As with Overseer, assessment of LUC class is consistently achievable by appropriately qualified persons. Mr Maassen notes in his legal submissions that this type of expert judgement is appropriate in the planning framework. Any areas where differences are likely to occur (such as scale or boundaries between classes on a particular farm map) could be dealt with by detailed protocols within or incorporated into the Plan, but this would be more efficiently dealt with through the controlled activity process already set out in the RMA.

b) Public records

248. The second issue of concern in the Carterholt Harvey case was the need for a way of publicly recording the nitrogen discharge allowance (NDA) and nutrient management plan (NMP) for each farm. This was considered necessary to provide certainty for farmers and the Regional Council and to enable a nutrient trading regime (including offsets and purchase) to operate. Because the method of nitrogen allocation proposed in the One Plan is based on land capability, not modelling based on historical land use, the first part of this issue (NDA) is not relevant to this Plan as the initial allocation is readily ascertainable from public records (the Land Resource Inventory) without the need for reference to historical records held by individuals. Mr Willis did propose a

'grand-parented' nitrogen allowance which is similar to the Taupo example; however, he proposed a controlled activity status in that case.

249. It is vital for the Regional Council to have accurate records of the information found in a nutrient management plan in order to ascertain compliance. This could be adequately provided for in a permitted activity condition which requires information to be submitted to the Regional Council. Accurate records would be vitally important if a nitrogen trading regime is incorporated, as suggested by both Horizons officers and Mr Willis on behalf of Fonterra. In the Taupo case the Court found other suggested mechanisms for recording nitrogen leaching (such as Certificates of Compliance and consent notices against a title) to be 'cumbersome' [para 135] and favoured the resource consent process:

> "[137] In these circumstances, we consider that the mandatory record keeping requirements under the Act [fn 74 Section 35 of the Act] that apply to a controlled activity, being a resource consent, already exist, and are well tested and understood by the Council and the community, such that they are clearly the more efficient and effective."

250. In the case of trading or offsets, I believe the circumstances between the Taupo and Horizons case to be sufficiently similar that the same reasoning would hold true if nitrogen trading is to be included in the regime.

c) Cost Recovery

251. The third issue of concern in the Taupo case was the issue of cost recovery. The Regional Council needs to be able to efficiently cover the costs of administering and monitoring the Rules. The Regional Council recovers the costs of monitoring resource consents largely by applying charges under s36 RMA. However, that section does not provide a mechanism for recovering costs of monitoring a permitted activity.

252. The Court considered a number of other cost recovery mechanisms put forward (including targeted rates, financial contributions and new regulations) and concluded (at para 140) that:

"there is already a comprehensive regime provided under section 36 of the Act that can be applied to a controlled activity as a resource consent. We consider it to be more

efficient and effective to use that, rather than to devise alternative one-off systems which are not already in place nor familiar to the local community."

Conclusion on activity status

253. In my opinion, based on all the information received and a consideration of the challenges posed in Carter Holt Harvey, it is possible to draft a permitted activity Rule which passes the first test (certainty) but that to do so could lead to a rigidity in the Rule which would not necessarily be compatible with the variable business of farming or desirable in achieving best outcomes. It is possible to draft a permitted activity Rule which adequately provides for provision of information, but not if the regime includes trading of allocated nitrogen. The issue of cost recovery remains unresolved but I do not think that that alone is reason to not consider the permitted activity status.

254. Therefore, a permitted activity can work, but only in a fairly narrow set of circumstances (the 'vanilla dairy farm' described by Mr Maassen, although I would argue that it also applies to other 'vanilla' intensive land uses). Those circumstances would be when the activity uses the Land Resource Inventory, existing information to determine its nitrogen allocation, can demonstrate that the nitrogen leaching targets are met (through a nutrient management plan prepared by a qualified person), does not rely on trading nitrogen loss entitlements and achieves compliance with other stringently worded conditions (in this case stock exclusion). This type of Rule would technically be correct, and it would provide for a low level of regulation for those existing farms who are meeting or who alter the farming system to meet the Plan's environmental expectations.

255. A permitted activity of this type would not provide the type of flexibility or case by case assessment of exceptions that is considered desirable by both the Regional Council and farming interests. To remedy this, it is proposed that default controlled activity for existing uses should be provided. This Rule would apply to existing farms which did not wish to stay within the tightly worded conditions of the permitted activity Rule. This would provide for on-farm mapping (if desired), trading or off-setting of N across support blocks or other property, and a case by case assessment of the cost effectiveness of any identified mitigation measures. Because a controlled activity consent must be granted it also provides the type of certainty of continued operation for existing farmers that they spoke so strongly about at the Hearing.

256. A permitted activity with clear and certain conditions, with a default controlled activity for existing farms supported by policy which identifies what the expectations are and when

exceptions may be made (as suggested by Mr Maassen), is an appropriate mechanism to achieve the Objectives and Policies of the Plan, and draft wording is proposed in the Track Changes version.

257. For new changes of land use to intensive farming it is considered appropriate that a different regime apply. New conversions do not enjoy the same 'expectation' of operation that existing farmers do. There are also not the legacy issues of existing consents to complicate matters. It is considered appropriate that new operations gain a resource consent and that that resource consent reflects the integration of the various activities in the way that the originally proposed Rule 13-1 contemplated.

258. If the operations can demonstrate that they meet the performance standards set out in the Plan then this could be a controlled activity. If the new operation does not meet the performance conditions, that is they will breach the nitrogen leaching targets and/or allow cattle to enter streams regularly, then it is considered that potentially significant cumulative and individual adverse effects will arise from the operation.

259. Addition of more farming operations that breach the nitrogen leaching targets will cumulatively lead to an increase in nitrogen reaching the river and an adverse effect on the values of that river, including life supporting capacity. This would not achieve the water quality objectives of the Plan. Therefore, it is considered that the conclusion reached by the Court in the Carter Holt Harvey case, *"…that categorising an activity as non-complying sends a signal that the activity is not generally condoned and that a strong case needs to be made to support it."* [para 162], is relevant to this situation and a non-complying activity status for new activities that do not meet the standards is recommended in the Track Changes version.

What should the timeframe for compliance be?

260. Fonterra and others recommended delaying the implementation of the Rule for 5 years. Because of the staged roll-out of each catchment coming into force, this would mean that some catchments would remain unregulated for up to 10 years. The advantages of a staged roll-out is discussed in the s42A report of Helen Marr.

261. Regional Plan provisions are required to be reviewed at least every 10 years. A delay of the magnitude recommended by Fonterra would mean that any improvements in water quality as a result of the Rule would only begin to be seen in the catchments with the earliest implementation and would not even have begun in the latest catchments. This

would mean that measuring the effectiveness of the Policies and Rules would be a difficult, if not impossible, task and make the review and any subsequent Plan Changes inefficient.

262. Delaying implementation of the Rules would delay the environmental benefits. Such a delay may even allow (as a result of normal growth and intensification) a degradation of water quality in the interim period. As the evidence clearly shows that current water quality is at times not achieving the Objectives or Policies of the Plan, or the purpose of the RMA, allowing that situation to continue and potentially worsen would not be appropriate.

263. The economic implications of delaying implementation are analysed in the most recent report by Neild and Rhodes (2010). In that report they estimate that delaying implementation would only reduce the discounted costs by 8%.

264. Given the potential environmental costs and the small economic benefits of delaying implementation of the Rules relating to intensive farming, delaying implementation is not considered an appropriate way to achieve the Objectives and Policies of the Plan or the purpose of the RMA.

Conclusion

265. After considering the evidence presented by all parties it is considered appropriate to impose controls on intensive farming in targeted catchments to reduce nitrogen, phosphorous, faecal contamination and sediment entering water bodies. However, some changes to the notified regime are recommended, in the main to:

- Provide for a permitted activity so that those existing farms with demonstrated good practice and low impact can continue without the need for a resource consent.
- Provide for a controlled activity for existing farms that do not meet the (necessarily) strict criteria of the permitted activity. This will allow a case by case assessment of mitigations, costs and benefits, but still provide certainty of the ability to continue to operate their business.
- Provide a policy framework for consideration of each case considered as a controlled activity so that unduly onerous mitigations are not required as a part of the process

- Provide for new intensive land uses which meet strict environmental criteria to convert as a controlled activity with a full integrated assessment of their farming operations
- Clearly signal that new intensive land uses which do not meet the criteria may have cumulative adverse effects on the environment that are not contemplated by the Plan, by providing for consideration of them as a non-complying activity.

266. This type of framework is considered an appropriate balance between achieving the water quality Objectives and Policies of the Plan, and providing a regime which recognises the necessity for farming to continue in order to provide for the economic and social well-being of the community within those limits.

3. PROVISION BY PROVISION

267. The following sections provide details of:
- The main issues in contention raised by submitters
- Recommendations on the issues with the recommended changes being shown in the Track Changes document.

268. The scope for recommendations on changes to the provisions are contained in a separate document named 'Report on Scope for Water Chapter Recommendations' and associated appendices. Scope is also footnoted in the Track Changes document.

269. Answers to specific questions asked by the Panel are contained in a separate document named 'Responses to Hearing Panel Questions'.

270. The focus in this section is on the issues in contention that remained for each provision following the adjournment of the hearing. Where there weren't any outstanding issues in contention identified then the then original analysis and recommendations of the original s42A and supplementary reports remains and is not repeated here.

3.1. Chapter 6 Water

3.1.1. Paragraph 6.1 through to Paragraph 6.1.2

271. Submitters did not raise these provisions as an issue in contention at the Hearing.

272. A consequential amendment is recommended to Paragraph 6.1.1 Scope – Water Quality as a result of a recommendation to include enhancement of groundwater quality in clause (a) of Policy 6-6 Maintenance of Groundwater quality. The amendment is detailed in Track Changes.

3.1.2. Paragraph 6.1.3 Water Quantity – Ground and Surface Water Allocation

273. The Panel asked that Table 6.1 be amended to revert to the format included in the POP as notified with amended figures. This change is included in the Track Changes document. As a result of updating the figures there is no longer an increase shown in Table 6.1 for public water supply. This is a result of work being undertaken with territorial authorities to reduce the amount of water allocated to them through their consents but which was not being used. As a consequential change it is recommended that the words "towns growing" that appear in the paragraph immediately above the table be deleted.

274. In addition, the Minister of Conservation sought the wording "as important as" rather than "even more important than the volume of water abstracted" within the provisions on page 6-3. It is agreed that this wording better reflects the intent of the paragraph. This change is included in the Track Changes document.

3.1.3. Paragraph 6.1.4 and Paragraph 6.1.5

275. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.1.4. Issue 6-1 and Issue 6-2

276. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purpose of consistency and clarity - the original recommendation remains.

3.2. Issue 6-3 River and lake beds – River and Lake Beds

277. Higgins Group requested that wording referring to the beneficial effects of gravel extraction in terms of flood mitigation be included. It is recommended that the wording be altered to saying beneficial effects may occur.

3.3. Objective 6-1 Water management values – Water Quality

278. Wellington Fish & Game and the Department of Conservation do not support the recommended inclusion of the 2030 date within Objective 6-1. The submitters consider that if timeframes by which standards are to be met are specified, then interim standards and timelines would need to be established.

279. The inclusion of the 2030 date within the Objective was in response to other submissions, including from the territorial authorities, which sought to clarify that the standards would be worked towards over a period of time, ie. they would not be achieved from day one and would be a target for achievement.

280. It is acknowledged that there is a potential risk that the inclusion of a date will be seen as a target in itself and therefore activities that occur before that date will not need to achieve the standards or even work towards achieving those standards. This was certainly not the intent in recommending the inclusion of the date.

281. The Objective refers to the values contained in Schedule Ba and not the standards in Schedule. The values always exist and are always achieved, ie. they are not progressed towards over time. This is in contrast to the Standards, which are not always achieved but are to be worked towards. Policies 6-3 to 6-5 set out how water quality will be managed to achieve the standards in more detail. Therefore, after further consideration, it is recommended that the date be removed from this Objective. If the Panel felt that inclusion of a timeframe for achievement of the standards was desirable then a more appropriate place to do this would be Policy 6-4.

3.4. Objective 6-2 Water quality – Water Quality

282. The Territorial Authority Collective seeks the inclusion of the year 2030 date within Objective 6-2. It supports the inclusion of a date as it is considered consistent with the proposed National Policy Statement for Freshwater Management and signals progress over time. For the reasons outlined in section 3.3 above it is recommended that a date not be inserted in Objective 6-2.

283. Note that consequential amendment is recommended to Objective 6-2(b) as a result of a recommendation to include enhancement of groundwater quality in clause (a) of Policy 6-6 Maintenance of Groundwater quality. The amendment is detailed in Track Changes.

3.5. Objective 6-3 Water quantity and allocation – Ground and Surface Water Allocation

284. Horticulture New Zealand seeks changes to Objective 6-3 to make clear what is encompassed by efficient use of water. Objective 6-3 is supported by the policies that sit within Chapter 6 and also by the provisions in the relevant chapters within the Plan. Policy 6-13 (now recommended to be Policy 15-3 see appendix 12 for a summary table of policy shifts) provides specific guidance regarding efficient use of water. No further change is recommended.

3.6. Objective 6-4 – River and lake beds

285. Submitters did not raise these provisions as an issue in contention at the Hearing. Minor changes for the purposes of consistency and clarity are recommended. These include removing the last part of the sentence because with the clarification of the first part it becomes repetitious and unnecessary.

3.7. Policy – General - Ground and surface water allocation

286. Meridian Energy Limited and a number of other submitters seek to have Chapter 6 provide for alternative minimum flows to those in Schedule B and provide specific policy guidance on this.

287. Policy 6-16 covers core water allocation and minimum flows. It states that the taking of water must be managed in accordance with the minimum flows and core allocations set in Schedule B. Policy 6-17 deals with the approach to setting minimum flows and states that where good hydrological data is available, this information shall be used for the flows in Schedule B and where the information is not available, the minimum flow in Schedule B shall be equal to an estimated or calculated one day mean annual low flow.

288. Where a take is not in accordance with the minimum flows and core allocations, it is likely that adverse effects on the environment and other water users will result. This is explained in more detail in section 2.3.3 Having the minimum flows and core allocations set out clearly in the Plan provides for certainty for all users and is more efficient (for the Regional Council, applicants and submitters) than re-assessing the provisions during a consent application process. The more appropriate method for re-setting minimum flows or core allocations would be a Plan Change process. This would allow for full consideration of the framework and the effects and for full consultation with

all parties who have an interest. This approach is supported by the legal submissions of Mr Maassen. The location of Schedule B in the Plan section of the One Plan has been clarified and will allow for a Plan Change process to occur as anticipated above if necessary.

3.8. Policy 6-1 Water management zones and values

289. The Panel raised some concerns regarding the clarity of Policy 6-1. It is considered that the revised policy sets out the policy framework and the Schedules that support that framework more clearly than the proposed Policy 6-1. The change was proposed in earlier recommendations to deal with concerns raised by submitters that the framework and the way the Schedules related to it were unclear. It has been noted that the previous reference to Table 6.2, which sets out the Water Management Values and Purposes, has been omitted from the recommended changed policy. It has been recommended to include the reference to Table 6.2 back within the policy.

3.9. Policy 6-2 – Water quality standards

290. Submitters did not raise these provisions as an issue in contention at the Hearing. It continues to be the recommendation that this Policy be deleted as its content is now incorporated into the revised recommended Policy 6-1.

3.10. Policy 6-3 Ongoing compliance where water quality standards are met

291. The Territorial Authority Collective seeks to have Policies 6-3 and 6-4 add guidance as to how data is to be interpreted, including the number of data points required to determine if water quality standards are met and the way in which outlier data will be interpreted. The suggested wording from the submitter is:

"Note: For the avoidance of doubt, a minimum of 20 data points over a two year period are required to assess compliance with water quality standards. If this is not achieved, Policy 6-5 applies."

292. Because it is the Regional Rouncil's responsibility to collect State of the Environment monitoring information the task of collecting sufficient information and deciding whether the information is sufficient will generally fall on the Regional Council. It is the Regional Council's preference that the amount of data not be specified in any of the policies. The frequency of the collection of samples should be considered on case by case basis so it

is relevant to the discharge environment, the type of contaminants discharged and the potential effects, and it is not possible for a policy to specify all the potential variations. If the Panel does not agree, then the most appropriate minimum data requirement to insert would be a minimum of 12 monthly samples.

293. The Palmerston North City Council seeks to have policies (6-3, 6-4, 6-5 and 6-8) refer to *"water quality targets"*. This issue has been addressed in section 2.5 above, and continued use of the word standards is recommended by Horizons' experts.

294. Mighty River Power seeks to have the words as *"as far as reasonably practicable"* added to the policy framework. . These provisions sit within Part I of the Plan (the Regional Policy Statement (RPS)) and need to set a clear policy framework for Part II of the Plan and signal what the Region seeks to achieve over the life of the Plan. Any circumstances where it might be appropriate to deviate from the standards or the policy guidance in the RPS are clearly set out in the more activity-specific policies that follow (for example Policy 6-8).

295. The inclusion of the word *'maintains'* in conjunction with enhancement within the policy framework signals that targets will be worked towards and it may not be possible to enhance water quality in every situation. This provides for more flexibility in the policy framework while still setting a clear policy intent.

3.11. Policy 6-4 Enhancement where water quality standards are not met

296. Submitters did not raise these provisions as an issue in contention at the Hearing. Minor changes for the purposes of consistency and clarity are recommended.

3.12. Policy 6-5 Management of activities in areas where existing water quality is unknown

297. Wellington Fish & Game consider that the inclusion of the word 'maintains' in Policy 6-5 derogates from the intent of the policy which is enhancement.

298. It is recommended that the word 'maintains' is also included along with enhancement within Policy 6-5. The Policy signals that where the water quality cannot be enhanced it must be maintained. As outlined in evidence at the Hearing there are rivers, or reaches of rivers, where the water quality is degraded and even with all the "will in the world" it may not be truly enhanced. It is considered appropriate that the policy framework covers both enhancement and maintenance.

3.13. Policy 6-6 Maintenance of groundwater quality

299. The Panel raised an issue whether Policy 6-6 should also refer to enhancement of groundwater quality as both Mr Callander and Mr Zarour indicated at the Hearing that it was possible for groundwater quality to be enhanced. It is recommended that the following clause be added to the end of Policy 6-6… "or enhanced over time where groundwater quality is degraded"

3.14. Policy 6-7 Land-use activities affecting surface water quality

300. Submitters (Fonterra and Federated Farmers) asked for changes to Policy 6-7 to reflect a more non-regulatory approach to controlling land use. As the approach recommended in the rules does not reflect that type of approach (as set out in section 2.6 only minor changes to Policy 6-7 are recommended.

3.15. Policy 6-8 Point source discharges of water

301. It is now recommended that Policy 6-8 in its entirety be retained in Part I of the Plan as it provides higher level policy guidance in relation to point source discharges to water.

3.16. Policy 6-9 Point source discharges to land

302. Policy 6-9 is now recommended to be Policy 13-6.

303. Submitters did not raise these provisions as an issue in contention at the Hearing. No further change is recommended.

3.17. Policy 6-10 Options for discharges to surface water and land

304. The Territorial Authority Collective seeks to have Policy 6-10 (now recommended to be Policy 13-2) amended to read: *"discharging contaminants onto land ~~rather than~~ <u>as an alternative</u> to discharging contaminants into water".*

305. Policy 13-2 (original Policy 6-10) as notified had the following wording within clause (a): *"discharging contaminants onto land in preference to discharging contaminants to water"*. The wording *"in preference to"* is recommended to be changed to *"rather than"* in the Track Changes document to strengthen the intent of the policy that there is a clear signal that discharges of contaminants be to land rather than water. The inclusion of the wording *"as an alternative"*, meaning that discharges to land can be considered as a

alternative to water, completely alters the intent of the Policy and 'waters down' the emphasis within the Policy. The change is not supported by the Officers.

3.18. Policy 6-11 Human sewage discharges

306. Submitters did not raise these provisions as an issue in contention at the Hearing. No further change is recommended.

3.19. Policy 6-12 Reasonable and justifiable need for water

307. The Territorial Authority Collective seeks to have a controlled activity rule for takes and uses of water for public water supplies and to have Policies 6-12, 6-13, 6-14 and 6-19 (now recommended to be Policies 15-2, 15-3, 15-7 and 15-8)altered to reflect this change. The Collective also questions whether, in relation to Policy 6-12 (now recommended to be 15-2), there is an appropriate balance between social/economic matters and values.

308. Where public water supply takes comply with core allocations they would be considered as a controlled activity under Rule 15-5. This rule also specifies that public water supplies predominantly for domestic use may continue below minimum flow subject to not exceeding the maximum takes set out in Policy 6-19 (now recommended to be 15-8). This is considered to be an adequate recognition of the social well-being importance of public water supplies and an appropriate balance with minimising adverse effects on the environment (as described in section 2.3.3. Because of the potential adverse effects on flow variability and surety of supply for other users, it is not considered appropriate to provide for further takes above the core allocation as a controlled activity. In setting the core allocation limits, existing public water supply takes are provided for within the core allocation so it is unlikely that this issue will arise in the future.

309. The changes proposed to Policy 6-12 (now recommended to be 15-2) seek to specify that the Regional Council will, in consultation with the relevant territorial authority, establish a timeframe by which an existing allocation will be reduced to the calculated amount or to some other amount agreed. This policy change seeks to recognise the investment made in the infrastructure and the need for water for public water supplies. It is therefore considered that Policy 15-2 provides an appropriate balance between economic, social and environmental matters.

310. The Minister of Conservation seeks to have Policy 15-2 amended as follows:

"surface water, use will be restricted ~~during times of low flow~~ when the river drops to or below its minimum flow and in order to maintain flow variability. Consideration must be given to reasonably available alternative water sources."

311. The changes are generally considered appropriate and consistent with other changes which refer to minimum flow rather than low flow. Policy 15-2 has been amended in the Track Changes document. It is not recommended to include the words "in order to maintain flow variability" as this is not the purpose of minimum flow but rather is the purpose of core allocation limits. The wording therefore does not work in the context of the Policy. Consideration of alternative water sources is covered by Policy 6-14(now recommended to be Policy 15-7) and repetition of that in Policy 15-2 is not recommended.

312. Horticulture New Zealand seeks to have Policy 6-12 (now recommended to be Policy 15-2) include a reasonable use test but notes that it does not include a suitable mechanism for assessing horticultural crops. Policy 15-2 (a) details the aspects that will be considered in relation to irrigation and reasonable use. Crops are included within clause (a). It is considered that the policy provides guidance but will provide for the specifics to be assessed through the consent application process. No change is recommended.

313. It is considered that the provisions of Policy 15-2 dealing with takes and allocations need to specifically include what would be reasonable in the context of animal drinking and dairy shed washdown requirements where these require a resource consent. This is missing from the policy framework currently. It is therefore recommended that the following be added to Policy 15-2:

(aa) For animal drinking and wash down water for dairy sheds the following shall be considered as reasonable:

(i) 70 litres per animal per day for stock drinking water;

(ii) 70 litres per day for dairy shed wash down."

3.20. Policy 6-13 Efficient use of water

314. The Territorial Authority Collective seeks changes to Policy 6-13 (now recommended to be 15-3) to add a further clause which states:

"For community water supplies, use of water within reticulated community water supply systems shall be assessed as efficient if it meets current best practice when benchmarked against comparable systems using current national industry standards or guidelines."

315. Policy 15-3 links into Policy 15-2 (was notified as 6-12) which specifies what is efficient in terms of public water supplies by specifying the reasonable amount of leakage equal to 15% of the total of the other clauses within the policy is used. If the changes sought by the submitter were included there is then the potential for the two policies to conflict. No change is recommended.

3.21. Policy 6-14 Consideration of alternative water sources

316. It is recommended that the word *"water"* be added before "harvesting" within Policy 6-14 (now recommended to be 15-7) to clarify the wording. Meridian Energy sought a change to Policy 6-13(now recommended to be Policy 15-3) to refer to recycling of water. It is considered that reference to recycling of water is better placed in Policy 15-7, which deals with alternative water sources. Wording changes are included in the Track Changes document.

3.22. Policy 6-15 Overall approach for surface water allocation

317. It is recommended that clause (d) in the policy be amended to delete the following phrase, *"being allocations in excess of core allocations".* Policy 6-15 refers to Policy 6-18, which provides specific detail regarding supplementary water allocation and clarifies that supplementary allocations may be made in addition to the core allocations. The words being deleted did not achieve consistency with the wording in Policy 6-18 and therefore should be deleted. References within the policy to low flow are also recommended to be altered to be consistent with the words *"when the river is at or below minimum flow"* used elsewhere.

3.23. Policy 6-16 Core water allocation and minimum flows

318. The references to *"at the time the Plan becomes operative"* have been recommended to be changed to the date that the Plan became operative, ie. 31 May 2007. This will be easier for Plan users as they will know the actual date on reading Policy 6-16 without needing to cross reference elsewhere. The matter of inserting the date was raised by the Panel.

3.24. Policy 6-17 Approach to setting minimum flows and core allocations

319. While submitters did raise issues regarding the setting of minimum flows and core allocations in a policy sense, these matters are dealt with in section 2.3.3 of this report. No further change is recommended.

3.25. Policy 6-18 Supplementary water allocation

320. It is recommended that Policy 6-18 be retained in Part I of the Plan so that the description of the water allocation framework is complete within the RPS.

321. The earlier recommended change from 10% to 20% of the natural flow in the river has been recommended to be changed back to 10%. This was on the basis that the change should not have been made and the technical evidence supports 10%. Dr Hayes discusses this in paragraphs 116 to 117 in his s42A Evidence and Joe Hay discusses this in his Supplementary Evidence at paragraph 6.

322. It is recommended that the wording within the Policy be, *"naturalised median flow"* as this is consistent with the recognition that median flow is an ecologically relevant flow statistic (refer to Dr Hayes' evidence). Dr Hayes also states that naturalised flow statistics are the correct version to consider.

323. In addition, it is recommended that Policy 6-18 be amended to clarify that the supplementary take is only above median as this was somewhat unclear in the policy as proposed and the change clarifies the intent.

3.26. Policy 6-19 Apportioning, restricting and suspending takes in times of low flow

324. Meridian Energy Limited notes that in relation to Policy 6-19 (now recommended to be 15-8) the definition of *"operation of industries"* excludes water abstraction through the Glossary definition of 'operation' and the policy on apportioning takes in times of low flow will not allow any consideration of abstraction of water.

325. The definition of 'operation' in the Plan does specifically exclude abstraction of water and therefore the intent of Policy 15-8could not be provided for. It is recommended that the words "*operation of*" be deleted from Policy 15-8.

326. Horticulture New Zealand seeks to have Policy 15-8 altered where it deals with apportioning, restricting and suspending takes in times of minimum flow to ensure that crop failure does not result.

327. Policy 15-8 identifies irrigation for crops as a non-essential take and specifies that takes shall be required to cease when the river drops to or below minimum flow. Evidence has been presented to the Hearing Panel regarding the number of days that water takes have had to cease over the last few years. There is the potential risk that in a dry summer, crops may not be able to be irrigated for a period of time and may fail as a result. The issue is one of who should be provided with water in critical periods and the Plan clearly articulates the appropriate priority for turning off, or imposing restrictions on, takes during low flow conditions. Unrestricted access to a scarce resource in dry periods is not possible given the long term effects on river systems and other users described in section 2.3.3 above. The needs of crops can be provided for through water storage, which is provided for in the Plan. No change is recommended.

3.27. Policy 6-20 Surface water allocation – lakes

328. Submitters did not raise these provisions as an issue in contention at the Hearing. No further change is recommended.

3.28. Policy 6-21 Overall approach for bore management and groundwater

329. Submitters did not raise this provision as an issue in contention at the Hearing. No further change is recommended.

3.29. Policy 6-22 Bore development and management

330. The Panel raised as an issue the consistency of terminology and what the words *"seasonally lowest groundwater levels"* mean. It is recommended to change the wording to "the lowest groundwater levels in any year".

3.30. Policy 6-23 Groundwater management zones

331. Submitters did not raise these provisions as an issue in contention at the Hearing. No further change is recommended.

3.31. Policy 6-24 Effects of groundwater takes on other groundwater takes

332. Wording changes are recommended to clarify the intent of the Policy.

3.32. Policy 6-25 Effects of groundwater takes on surface water bodies

333. The policy reference to the Guidelines document is now specifically to Environment Canterbury as the author.

334. Mr Callander had the last row in Table 6.2a split in two with 'low' forming one row and 'negligible' forming the last row. Essentially, both of these rows reach the same point in terms of management approach, ie. that there be no surface water management rules for these categories. It is not considered necessary, from the policy perspective, to split them into two rows.

3.33. Policy 6-26 Saltwater intrusion

335. Horticulture New Zealand considers that Policy 6-26 (now recommended to be Policy 15-13), which covers the control of seawater intrusion within 5 km of the coast, is not effects based. However, Mr Callander (at paragraph 79 of his s42A Evidence) concludes that the definition of a 5 km zone appears reasonable based on the extent of drawdown effects that can occur in some coastal aquifers with low storage coefficients. No change is recommended.

336. A minor change to the wording within clause (a) is recommended to refer to "*consent applications*" to make the wording consistent with Policy 15-15. Also, the last sentence within clause (d) is recommended to be deleted as it does not assist in clarifying the intent of the Policy.

3.34. Policy 6-27 General management of river and lake beds

337. The Minister of Conservation seeks the insertion of an additional clause within Policy 6-27 (Policy 6-27 (b), (e), (f), (g) and (h) are now recommended to be moved to Policy 16-3) to state: *"has particular regard to the objectives and policies in Chapter 7 relating to natural character".* It was earlier recommended to add text to Policy 16-3(c) around natural character to provide guidance on how natural character is to be identified and assessed.

338. After further consideration, the matters dealing with natural character are more appropriately located in the higher order policies within Part I of the Plan. Changes are recommended to Policy 6-27 to include reference to natural character and the provisions of Policy 16-3(c) will be amended to only refer to natural character in its broader sense.

339. Cross references are recommended for Chapter 7, for inclusion in clause (g) of Policy 16-1.

340. The Minister of Conservation wants a new sub clause added to Policy 16-3 to cover managing the effects on public access in accordance with the relevant policies in Chapter 7. Policy 16-3 does not specifically include a provision regarding public access while activities are occurring in, on, under or over the beds of rivers and lakes. It is recommended that an additional clause (g) be added.

3.35. Policy 6-28 Activities in water bodies with a value of Natural State, Sites of Significance - Cultural, or Sites of Significance – Aquatic

341. Mighty River Power seeks to include provisions which focus on avoiding effects 'as far as reasonably practicable or otherwise remedied or mitigated'. Currently the Policy states *"avoids or mitigates adverse effects on these values"*. The inclusion of the words *"as far as reasonably practicable"* introduces uncertainty. Given the high values attributed to these river reaches, by virtue of providing habitat for indigenous species, providing for high levels of natural character and Māori cultural values, (as described in the evidence of Mrs McArthur and others) a high level of protection is warranted. and allows for "wriggle room" in terms of stating an activity. No change is recommended.

342. An additional clause (c) is recommended to be added to cross reference to Chapter Ba so the values associated with Sites of Significance – Cultural are recognised.

3.36. Policy 6-29 Activities in water bodies within a flood control or drainage scheme - Rivers and Lake Beds

343. The removal words *"Water Management Sub-zones"* are recommended to be replaced with "reaches of water bodies" as it is particular reaches where these values are of importance.

344. The rules also restrict activities alongside beds of rivers or lakes valued for flood control and drainage. Therefore, the policy needs to recognise the restrictions alongside the

bed and additional words are recommended in the Track Changes document to deal with this matter.

3.37. Chapter 6 – Policy 6-30 Activities in water bodies with other values - River and Lake Beds

345. Submitters did not raise these provisions as an issue in contention at the Hearing. The changes are to make the Policy consistent with the approach taken elsewhere, eg. being specific that the values are Schedule Ba values.

3.38. Chapter 6 – Policy 6-31 Essential and beneficial activities - River and Lake Beds

346. Policy 6-32 (now recommended to be Policy 16-7) has been amended to remove the recommended word *"existing"* and revert back to the word *"essential"* that was contained in the POP as notified. On review, there does not appear to be scope for the change from essential to existing. It is recommended to change the word *"existing"* in (a) to lawfully established which is consistent with the rules.

3.39. Chapter 6 – Policy 6-32 Gravel extraction – River and Lake Beds

347. Higgins Group wants a more strategic management framework for the Region's gravel resource to be provided through a policy under Policy 16-8 to state:

"The Regional Council and territorial authorities shall, in relation to the use of the region's gravel resource, recognise and provide for the benefits derived from the final use of the gravel, such as its use for infrastructure and/or energy development."

348. Issue 6-3 River and Lake Beds is recommended to be changed to note that gravel extraction may have beneficial effects in terms of flood mitigation.

349. The policy framework within Chapter 16 deals with the resource management issues in relation to the beds of rivers and lakes, ie. what are the effects on the bed from undertaking certain activities. The policy framework should not focus on strategic issues associated with the end use of gravel. These strategic issues are more appropriately dealt with outside of the Plan framework. The provisions of Chapter 3, which recognise the benefits of infrastructure and would include projects that rely on gravel such as

roads, do enable benefits to be considered through the resource consent process. No further change is recommended.

3.40. Chapter 6 – Table 6.2 Water management zones and values – Water Quality

350. Meridian Energy Limited wants Table 6.2 to specifically state that Industrial Abstraction covers hydroelectricity. After further consideration it is now clear that it would not be appropriate to include hydroelectricity within the Industrial Abstraction value in Table 6.2 for the following reasons:

(a) When the Industrial Abstraction value was applied within Schedule Ba it covered physical abstractions associated with activities such as meatworks, gravel takes and vegetable washing.

(b) The industrial abstraction value is applied in Schedule Ba in sub-zones that do not apply to existing hydroelectricity schemes.

351. Values associated with hydroelectricity generation are already provided for within the existing Plan structure, specifically through a number of provisions including:

(a) The diversion of water for hydroelectricity generation lawfully established at 31 May 2007 falls outside of the core allocations as the allocations within Schedule B recognise these takes. This is noted within Schedule B.

(b) Policy 6-16 dealing with core water allocation and minimum flows states that hydroelectricity generation is excluded from these provisions.

(c) Rule 15-8 provides for the continued operation of existing hydroelectricity takes as a discretionary activity (rather than a non-complying activity).

352. If the Panel considers that it is necessary to provide further recognition for existing hydroelectricity generation, a specific value could be added for existing hydroelectricity schemes within Table 6.2 under the social and economic category, and then reflected as a column within Schedule Ba. This would recognise the value of existing hydroelectricity schemes in a similar manner to the value for existing infrastructure.

353. It is not considered appropriate to include a value for new hydroelectricity schemes as it is not known where this value would apply and it is not known what the management objective would be (ie. how would management of the resource change in order to ensure it was suitable for a future unknown hydroelectricity take?)

3.41. Chapter 6 – Table 6.3 Annual allocable volumes of gravel - certain allocations – River and Lake Beds

354. Table 6.3 has been recommended to be deleted as a result of the recommendations in the Evidence in Chief.

3.42. Chapter 6 – Table 6.4 Annual allocable volumes of gravel – estimated allocations – River and Lake Beds

355. Ms Jordon from Wellington Fish and Game noted in her evidence that there had been a substantial jump in the figures for gravel extraction in the Manawatu River in Table 6.4 (now recommended to be Table 16-1a).

356. On review I note that the figures given by Peter Blackwood are a maximum take over a 20 year period (rather than an annual average). The amounts have been revised so that they are now consistent with the rest of the table in that they are an average volume which is taken on an annual basis.

3.43. Chapter 6 – Methods and Anticipated Environmental Results

357. Submitters did not raise these provisions as an issue in contention at the Hearing. No further changes are recommended.

3.44. Chapter 6 – Explanations and Principal Reasons – Water Quality

358. The wording under the heading 6.5 Methods refers to the use of rules to control a number of matters. Land use activities has inadvertently been missed from the list and needs to be included as the methods cover land use activities. In relation to the other above matters submitters did not raise these provisions as an issue in contention at the Hearing. No further change is recommended.

3.45. Chapter 13 – Policy 13-1 Consent decision making for discharges to water – Water Quality

359. Submitters did not raise this provision as an issue in contention at the Hearing. No further change is recommended.

3.46. Chapter 13 – Policy 13-2 Consent decision making discharges to land– Water Quality

360. The Oil Companies want Policies 13-1 to 13-4 amended to refer to industry standards and code of practice in lines with the provisions in Policies 12-1(c) and 12-2 and specifically the MfE Guidelines (Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand (1988)).

361. Additional clauses have been recommended to be included within Policies 13-1 and 13-2 to refer to any industry standard that is relevant to the activity in accordance with Policy 13-5. The reference to industry standards in a general sense will allow any relevant standard to be considered, including petroleum industry standards. Policy 13-3 covers the management of discharges of domestic wastewater and Policy 13-4 deals with monitoring requirements for consent holders. Both these policies are more specific and it is not considered necessary to refer to other industry standards. Policy 13-5 would in a general sense allow for industry based standards to be considered. No further change is recommended.

3.47. Chapter 13 – Policy 13-3 Management of discharges of domestic wastewater – Water Quality

362. It is recommended that the term *"stormwater drains"* be replaced with *"artificial watercourses"* to be consistent with the approach taken elsewhere. In addition, it is recommended that clause (ca) be altered. Currently the clause states that an area of land equal to the disposal area shall be set aside as a reserve area. The On-site wastewater manual that the policy refers to accepts a 50% reserve area for some systems. The current wording makes the policy not consistent with the Manual. It is recommended that clause (ca) be altered to require that an adequate area of land be set aside as a reserve land application area.

3.48. Chapter 13 – Policy 13-4 Monitoring requirements for consent holders – Water Quality

363. The wording has been changed within clause (b) to clarify that clause (b) applies where it is 100 m^3 per day or greater, which provides for a distinction between when clause (a) applies and when clause (b) applies.

364. Clause (d) is recommended to be altered to include the words *"at the point of discharge"* as it assists in clarifying the intent of the provision.

3.49. Chapter 13 – Policy 13-10 and 13-11

365. This issue is discussed in detail in section 2.6 and a redrafted Policy is recommended for inclusion to cover the issues raised in that section.

3.50. Tables 13.1 and 13.2

366. This issue is discussed in detail in section 2.6 and a redrafted Policy is recommended for inclusion to cover the issues raised in that section.

3.51. Chapter 13 – Rule 13-1 Dairy farming, cropping, market gardening and intensive sheep and beef farming and associated activities – Water Quality

367. This issue is discussed in detail in section 2.6 and a redrafted suite of Rules is recommended for inclusion to cover the issues raised in that section.

3.52. Chapter 13 – Rule 13-2 Fertiliser – Water Quality

368. The conditions or standards that require the discharge to not result in any objectionable or offensive odour beyond the boundary have been recommended to be altered in a number of places to make the provisions consistent and remove the words *"to the extent that causes an adverse effect"*. This ensures it is consistent with the Provisional Determination for the Air chapter.

369. Greg Sneath for NZ Fertiliser Manufacturers' Research Association (Fert Research) set out at page 10 of his Supplementary Evidence suggested changes to Rule 13-2 covering fertiliser. Mr Sneath sought to change clause (a) to state: *"all reasonable measures should be taken to avoid discharge to any waterbody including the possible use of placement technologies"*. It would be appropriate to include wording similar to the agrichemical rules in the Provisional Determination for Air to apply to aerial discharges of fertiliser where it is possible that, despite all precautions, some fertiliser may enter a water body.

370. Mr Sneath sought to change clause (d) to include a threshold of 200 kg N/ha/yr for an individual block on a farm. It is considered appropriate that this additional threshold be included. However, the other changes sought regarding the nutrient budget being valid

for a minimum of three years unless there is a significant change in farm practice are not recommended to be included as the wording would be uncertain in the context of a permitted activity. Instead, the requirement would be for an annual nutrient budget and that this be provided to the Regional Council if requested.

371. Mr Sneath also sought to delete clause (e), which covers the discharge not resulting in any objectionable odour or fertiliser drift beyond the property boundary. Mr Sneath considered that this was adequately covered by the requirement to comply with the Code of Practice for Nutrient Management. However, that Code does not provide sufficiently certain standards in relation to these matters to enable it to be relied upon to manage adverse effect. The standard 'offensive and objectionable' standard is considered more appropriate.

3.53. Chapter 13 – Rule 13-3 Stock feed including feed pads – Water Quality

372. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.54. Chapter 13 – Rule 13-4 Biosolids and soil conditioners – Water Quality

373. CPG NZ Ltd seeks to establish an additional rule for Grade Ab, Ba or Bb biosolids as a restricted discretionary activity. Currently, any other biosolids would be considered under the catch-all rule (Rule 13-27) as a discretionary activity. It is considered appropriate that a specific rule be developed for Grade Ab, Ba or Bb biosolids as a restricted discretionary activity. A proposed additional rule is included in the Track Changes document.

374. CPG NZ Ltd seeks to amended standards in Rule 13-4, including:

(a) The deletion of clause (b) regarding no ponding of material on the soil surface.

(b) Delete clause (c) regarding the material not containing human or animal pathogens and instead refer to the guidelines for the safe application of biosolids and include an additional clause (ea) regarding the activity being undertaken in accordance with the best management practices in the guidelines.

(c) Remove clause (d), which specifies separation distances.

(d) Delete clause (g) regarding record keeping.

375. It is recommended that it could be useful to separately define grade Aa biosolids from biosolids in general. An additional Glossary definition has been recommended in the Track Changes document.

376. The Guidelines for the Safe Application of Biosolids to Land in New Zealand (NZWWA, August 2003) provide an introduction to what biosolids are and specifically notes that biosolids do not include animal manures. It is considered appropriate that the definition of biosolids in the Plan specifically excludes animal manures. This in part deals with the issues raised by NZ Pork as to how animal manure is dealt with in relation to various definitions including fertiliser.

377. It is recommended that clause (b) within Rule 13-4 covering no ponding of material and no surface run-off be retained. In response to questions asked by the Panel, CPG NZ Ltd signalled that this clause was not required as the matter was dealt with in clause (a). Clause (a) covers the matter of there being no direct discharge to water. The two clauses cover different matters and both need to be retained.

378. It is accepted that clause (c), which requires that the material shall not contain any human or animal pathogens, should not apply to Grade Aa biosolids as they will contain some pathogens. Table 4.1 in the Guidelines for the Safe Application of Biosolids to Land in New Zealand sets out the stabilisation requirements for Grade Aa biosolids. Table 4.2 sets out the soil limits and biosolids classification by contaminant levels. It is recommended that an additional clause be added to refer to the specific relevant provisions of the Guidelines as follows:

(a) Volume 1, Chapter 4 covering the biosolids grading system;
(b) Volume 1 Chapter 7 covering quality assurance;
(c) Volume 2 Chapter 8 covering monitoring and quality assurance; and
(d) Volume 2 Chapter 9 dealing with sampling procedures.

379. Consideration has been given to whether clause (c) should be retained to cover soil conditioners. The definition for soil conditioners specifically excludes any substance or mix of substances derived from animal tissue, bone or blood whether processed or not; therefore it will not contain any human or animal pathogens. However, it is important that any soil conditioner not contain any hazardous substance. Therefore, it is considered appropriate to retain clause (c) specifically for soil conditioners.

380. Clause (d) covers separation distances to sensitive activities. It is recommended that sub-clauses (d)(i) and (ii) be deleted and the other sub-clauses be retained.

381. An additional clause is recommended to be added to cover Grade Aa biosolids and a maximum application rate of N per year. This is consistent with the provisions of the Guidelines.

382. It is not recommended that clause (g) regarding record keeping be deleted. Record keeping is useful not just for the Regional Council to check compliance but for the landowner to demonstrate compliance, particularly if a complaint is lodged.

383. Federated Farmers seeks the exclusion of lime and gypsum from Rule 13-4. The submission from Federated Farmers sought that the definition for soil conditioner be reworded to include those substances for which there are concerns, rather than the current catch-all approach. However, if lime and gypsum are removed from the permitted activity rule then they will require a resource consent as they may be considered contaminants. The changes recommended above (including removal of setback distances) should ensure that these minor activities can occur in a permissive way which adequately deals with the adverse effects.

3.55. Chapter 13 – Rule 13-5 Offal holes and farm dumps – Water Quality

384. Clause (e)(iv) originally specified a separation distance of 100 metres for an offal hole or farm dump from a bore etc. In the section 42A report it was recommended that this be changed to 10 metres as it was a typographical error. The Panel has asked whether there is consistency between the various setback rules, eg. Rule 13-4 states a distance of 20 metres. The potential effects of an offal hole on a bore could be worse than the application of a Grade Aa biosolid, which requires a separation distance of 20 metres. It is recommended that the distance be altered to 20 metres to make it consistent with other activities.

385. It is recommended that the wording of clause (f) be amended to revert to the wording in the Plan as notified which on further reading is clearer than the changes recommended as a result of the s42A report.

3.56. Chapter 13 – Rule 13-6 Farm animal effluent including dairy sheds, poultry farms and existing piggeries – Water Quality

386. New Zealand Pork seeks a permitted activity rule to address the matters in Rule 13-6. DL Rule 4 in the Land and Water Regional Plan provides as a controlled activity for any discharge onto or into land of wastewater and/or sludge from dairy sheds, piggeries or

feedlots, sludge from agricultural wastewater ponds, or poultry farm litter or wastewater. Rule 13-6 similarly provides for the discharge of farm animal effluent from dairy sheds, poultry farms and existing piggeries as a controlled activity.

387. The issue with Rule 13-6 is that the matters that need to be covered and dealt with in the rule are not easily written as permitted activity standards that would be capable of meeting the tests outlined in section 2.6.3. While the activity of discharging farm animal effluent from dairy sheds, poultry farms and piggeries is routine, the activity does require a site by site assessment to ensure the potential effects are demonstrably minor and the risks to the environment are small. These activities have been previously controlled through DL Rule 4. The proposed matters of control will enable careful consideration of potential and actual adverse effects, including the matter of contingency measures.

388. It is recommended that clause (a) within the matters control is reserved over be clarified by adding reference to timing and frequency of discharge, including the rate of discharge, infiltration rates, soil depth, soil water deficits, maximum nitrogen loading, and best management practices to minimise nutrient loss. These changes address the matters raised by Mr Houlbrooke and discussed by the Panel at the Hearing.

3.57. Chapter 13 – Rule 13-7 Effluent from new piggeries – Water Quality

389. New Zealand Pork seeks controlled activity status for Rule 13-7 on the basis that manure does not differ between new and existing piggeries.

390. While it is accepted that the manure is likely to be the same, there are several other factors influencing the recommendation. These are:

(i) recent experience indicates that the scale and manure production of new piggeries is much larger than existing piggeries and the potential environmental effects are more appropriately managed under a discretionary activity status

(ii) existing piggeries and their environmental effects are largely tolerated, but a proposal for a new piggery creates significant public interest which is more appropriately dealt with under discretionary activity status.

391. Rule 13-7 currently makes effluent from new piggeries a discretionary activity in the POP as notified and it is recommended that this not be changed.

3.58. Chapter 13 - Rule 13-8 Agricultural land uses not covered by other rules – Water Quality

392. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.59. Chapter 13 – Rule 13-9 Discharges of water to water – Water Quality

393. It is recommended to include a specific exclusion regarding the discharge of water to water as part of the normal operation of a dam, as this is regulated by Rules 16-8 and 16-9.

3.60. Chapter 13 – Rule sub heading - 13.4 Sewage rules – Water Quality

394. The word "*sewage*" is recommended to be altered to "human effluent" and the term "*wastewater*" be changed to "domestic wastewater" in the heading as this better reflects the rules that follow.

3.61. Chapter 13 – Rule 13-10 Existing discharges of domestic wastewater* – Water Quality

395. CPG NZ Ltd seeks a number of changes to Rules 13-10 and 13-11. The caucusing undertaken in relation to on-site wastewater disposal on 3 March 2010 agreed that a number of changes would work better in relation to the application of these rules. These changes have been considered from a planning perspective and generally are workable in the context of the rules. The recommended changes are shown in the Track Changes document.

396. Rule 13-10 (h) was discussed at the caucusing meeting. The clause requires the land application system to be maintained either in accordance with manufacturer's instructions or where none exist, in accordance with the Manual. The notes from the caucusing meeting sought to include the words *"whichever is the most stringent"* at the end of the clause. The addition of the words "whichever is the most stringent" will not work given the current wording of the clause, as it states that where there are no manufacturer's instructions, the activity shall be undertaken in accordance with the manual, ie. it is either or. To provide consistency between Rules 13-10 and 13-11 it is considered appropriate to use the wording from Rule 13-11(l) in Rule 13-10(h).

3.62. Chapter 13 – Rule 13-11 New and upgraded discharges of domestic wastewater* – Water Quality

397. CPG NZ Ltd seeks to have Rule 13-11(da)(iv) and (db(v) restrict the number of on-site wastewater systems per lot.

398. There was disagreement at the caucusing between the experts as to whether the rules needed to specify that there would only be one on-site wastewater treatment and discharge system per property title. CPG considered that there should be a standard requiring this and Mr Barnett did not agree. The existing standards that sit within the rule specify discharge quality standards, the system to be used, and the areal loading rates. The standards are clear and certain. From a technical point of view, there would be nothing to stop a number of land application systems being installed on one property providing the land area was large enough to cope with the application rates and there was a minimum of 5,000 m^2.

399. It is not considered necessary to include a standard restricting the number of systems per property. Territorial authorities have the function of determining how many dwellings can be placed on particular lot sizes and it is appropriate that the control on the number of dwellings and their associated wastewater systems be dealt with by the territorial authorities.

400. The word "*subsurface*" has been removed from Rule 13-11 in the sentences that state *"dose load subsurface pressure compensating dripper irrigation line".* The term "subsurface" is unnecessary as it is recommended to add in a further clause (gb) requiring the placement, burial, covering and exclusion of the land application area to be as described in the Manual. Technically, where there is a high groundwater table it is possible to install the dripline on the soil surface and cover with bark or mulch.

401. Rule 13-11(f) and (g) have been recommended to be deleted. Instead, it is recommended that an additional clause (ga) be added to specify that separation distances be in accordance with those specified in Table 2.2 of the Manual.

402. It is accepted that the Manual may prescribe a lesser rate and therefore it is recommended to also refer to the lesser rates in accordance with the Manual within the relevant clauses.

403. The caucusing undertaken in relation to on-site wastewater disposal on 3 March agreed that additional operation and maintenance guidance can be provided outside of the Manual process.

404. The 3 March caucusing (see caucusing notes dated 3rd March 2010) also agreed that instead of a four tier approach for land area requirements for wastewater that there be a three tier approach. The bottom tier would alter to cover any land area less than 4 hectares.

405. Paragraph 15 and the associated table in the report from the submitters' caucus meeting sets out the three tiers that are now proposed and the applicable standards for each tier. In essence, the three tiers are land areas greater than 10 hectares, areas between 4 and 10 hectares, and land areas less than 4 hectares. The changes simplify the approach taken and target the standards to deal with the effects at issue.

406. It is recommended to amend the requirement within clause (db) for land areas less than 4 hectares to have a nitrogen limit of 60 g/m^3.

407. The caucusing undertaken in relation to on-site wastewater disposal on 3 March agreed that the Regional Council would develop a methodology for training, accreditation and certification, and that this would sit outside of the Manual. It is adequately covered by Method 6-3 in the Plan. It was for this reason that planners advised that no change to the Manual should was necessary, not at the request of the Panel, as was incorrectly recorded in the minutes of the caucusing.

408. Within the Activity Column it is recommended to reinstate when the rule applies, which will be the date the Plan becomes operative.

3.63. Chapter 13 – Rule 13-12 Discharges of domestic wastewater* not complying with Rules 13-10 and 13-11 – Water Quality

409. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.64. Chapter 13 – Rule 13-13 Human effluent storage and treatment facilities – Water Quality

410. The Territorial Authority Collective seeks to have (i) and (ii) amended to replace the words *"prevented"* with *"minimised as far as practicable"*.

411. The wording *"minimised as far as practicable"* within a permitted activity standard is uncertain, ie. how would a person determine whether the run-off from effluent storage and treatment facilities into surface water is minimised as far as is practicable? It introduces a degree of subjectivity which is considered inappropriate in the context of a permitted activity rule. This addition in clause (i) would also make the rule inconsistent with Rule 13-14, which prohibits the discharge of human effluent directly to water.

3.65. Chapter 13 – Rule 13-14 Discharges of untreated human effluent directly into surface water – Water Quality

412. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.66. Chapter 13 – Rule 13-15 Discharges of stormwater to surface water and land – Water Quality

413. Transpower and the Oil Companies seek to have a statement included that the Plan is not controlling inputs but only the outputs from the infrastructure. They specifically seek a rule guide regarding stormwater to state:

"Stormwater discharges into network utility systems are not regulated by this Plan. Permissions may need to be obtained from the network owner to discharge into the network. The network owner is responsible for the quality of the discharge from the end of a network system and any consents arising in relation to these rules. However, persons will be open to prosecution under the RMA if they allow contaminants to escape into the network that results in adverse effects upon the receiving environment."

414. The functions of the Regional Council under section 30(1)(f) are for the control of discharges of contaminants into or onto land, air or water and discharges of water into water. It is clear under the RMA that the Regional Council is dealing with end-of-pipe

matters, ie. the actual discharge. The inclusion of a rule guide is considered unnecessary.

3.67. Chapter 13 – Rule 13-16 Discharges of stormwater to land not complying with Rule 13-15 – Water Quality

415. Submitters did not raise this provision as an issue in contention at the Hearing. No further changes are recommended.

3.68. Chapter 13 – Rule 13-17 Discharges of stormwater to surface water not complying with Rule 13-16 – Water Quality

416. The Oil Companies consider there is duplication between Rules 13-15 and 13-16 regarding the standard for an interceptor system and that if the permitted activity rule cannot be met, and falls to a controlled activity, then it will not be able to meet the interceptor system condition. In addition, they consider there is an inconsistency between the rules in that a discharge to land not meeting these standards is considered as a discretionary activity and a discharge to water is a restricted discretionary activity.

417. The cascade of these rules provides for discharges of stormwater to water as a restricted discretionary activity where the permitted activity standards cannot be met. In relation to discharges to land where the permitted activity standards cannot be met, it falls for consideration as a controlled activity. However, the conditions within the controlled activity rule are similar to those within the permitted activity rule; this means that where they cannot be met, the activity would be a discretionary activity. This effectively means the consent status for discharges to land are more stringent than discharges to water. This was not the intent.

418. It is recommended that discharges of stormwater to land not meeting the permitted activity standards be made a restricted discretionary activity, which would be the same category of consent as discharges to water. There would be no further cascade to a discretionary activity category.

3.69. Chapter 13 – Rule 13-18 Discharges of dye and salt tracers

419. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.70. Chapter 13 – Rules 13-19 through to 13-21

420. Submitters did not raise these provisions as an issue in contention at the Hearing. No further changes are recommended.

3.71. Chapter 13 – Rule 13-22 Discharges of persistent and harmful contaminants – Water Quality

421. Generally, submitters did not raise these provisions as an issue in contention at the Hearing.

422. It is recommended that the word "*floodplain*" be deleted because it is too broad. The issue is making sure composting operations do not occur in areas that could flood. The definition of bed in the RMA covers the annual fullest flow of a river, which is the issue of concern. Retention of the word "*bed*" in the rule will allow for the issues of concern to be dealt with.

3.72. Chapter 13 – Rules 13-23 and 13-24

423. Submitters did not raise these provisions as an issue in contention at the Hearing. No further changes are recommended.

3.73. Chapter 13 – Rule 13-25 Discharges of contaminants to land that will not enter water – Water Quality

424. Generally, submitters did not raise these provisions as an issue in contention at the Hearing.

425. New Zealand Defence Force originally sought an exception from Rule 13-25 for the discharge of live ammunition. What NZDF specifically sought was to have the discharge of ammunition to a rare habitat or threatened habitat to be provided for without the need to apply for a resource consent. This was originally provided for in the recommended Biodiversity rules.

426. NZDF indicated at the Hearing that it did not require an exemption from Rule 13-25 as the matter was adequately provided for by the Provisional Determination for Land. . However, on reviewing the Provisional Determination it appears that the Panel has provided for exemptions for Defence Force activities in the definition of vegetation

clearance and land disturbance. This does not give an exemption for discharges into rare habitats or threatened habitats (a large amount of which occurs on Defence Force land). It is recommended that the Hearing Panel reviews this link and makes exemptions as appropriate.

3.74. Chapter 13 – Rule 13-26 Discharges of contaminants to land that may enter water – Water Quality

427. Submitters did not raise this provision as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.75. Chapter 13 – Rule 13-27 Discharges of contaminants to land or water not covered by other rules in this Plan – Water Quality

428. Generally submitters did not raise these provisions as an issue in contention at the Hearing. A question asked by the Panel was in relation to the consistency of approach in dealing with the catch all discretionary activity rules. In relation to Rule 13-27, it does not specify that it is also intended to cover activities that do not comply with other rules in the Plan. An additional provision has been added into the Track Changes document.

New Objective 15-1

429. Mighty River Power seeks to have Objective 15-1 refer to Chapters 2, 3, 4 and 6 within clause (b). It is not considered necessary to generally cross reference other chapters within the Objectives. The Objectives set the over-arching goals rather than providing specific policy guidance. The supporting policies within Chapter 15 cross reference to other chapters. This is considered adequate and appropriate.

430. Meridian Energy Limited wants the references to *"take and use"* to be changed to *"take or use".* A check has been made of the references and in some cases the "take and use" are linked and in others they are separate and should therefore be "take or use". Recommended changes are reflected in the Track Changes document.

3.76. Chapter 15 – Policies 15-1 and 15-2

431. Submitters did not raise these provisions as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.77. Chapter 15 – Policy 15-3 Consent decision making for bores – Ground and Surface Water Allocation

432. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains. It is recommended that there be a general re-ordering of the policies to have policies dealing with particular issues being grouped together.

3.78. Chapter 15 – Policy 15-4 Monitoring requirements of consent holders - Ground and Surface Water Allocation

433. Winstone Pulp International seeks either the deletion of Policy 15-4 or its amendment to delete most of the clauses within the Policy, and instead refer to utilising monitoring equipment suitable for and at a frequency appropriate for the volume of the take. The wording proposed by Winstone Pulp is uncertain in its intent. The removal of all the clauses that sit within the policy will result in an unclear policy framework.

434. Horticulture New Zealand considers that the monitoring requirements of Policy 15-4 are too stringent, particularly in regard to the number and size of takes that would require telemetry. Policy 15-4 covers monitoring requirements for consent holders in relation to water takes (the technical basis for these requirements was discussed in detail in the evidence of Dr Roygard). The wording used in the introductory sentence of the Policy is that water takes *"shall generally be subject to the following monitoring requirements"*. There are then a number of clauses that follow. It is considered that the inclusion of the word "*generally"* within the Policy provides that where there may be specific cases where the monitoring requirement is unnecessary, conditions regarding monitoring would not be imposed. This can be undertaken through the consent application process. The monitoring provisions within Policy 15-4 are common practice in terms of conditions on current consent decisions. No change is recommended.

3.79. Chapter 15 – Policy 15-5 Consent review and expiry – Ground and Surface Water Allocation

435. Issues raised in relation to this policy are discussed in section 2.2 above.

3.80. Chapter 15 – Policy 15-6 Transfer of water permits – Ground and Surface Water Allocation

436. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, the original recommendation remains.

3.81. Chapter 15 – Rule 15-1 Minor takes and uses of surface water – Ground and Surface Water Allocation

437. Submitters did not raise this provision as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.82. Chapter 15 – Rule 15-2 Minor takes and uses of groundwater – Ground and Surface Water Allocation

438. The discussion regarding what is an appropriate limit for the take for surface water is contained in section 2.4 of this report.

439. In terms of water use and the term "*property*" within Rules 15-1 and 15-2 it is recommended that the term "property" be qualified by "*property held in the same ownership*".

440. It is recommended that Rule 15-2 in the Activity column refer to section 14(3)(b) as is included in Rule 15-1 to achieve consistency.

441. It is recommended to change clause (b) within Rule 15-2 to refer to the take not being located within 50 m of any other bore on any other property, in order to clarify that the effects of concern are potential adverse effects of drawdown beyond the property boundary.

442. It is also recommended to delete the reference to "*spring*" within Rule 15-2 (c) as the term "*river*" is broad enough to cover water that may be a spring. "Spring" is not a defined term and could be open to interpretation; therefore it is considered appropriate to be consistent and use the term "*river*".

3.83. Chapter 15 – Rule 15-3 Use of heat and energy from surface water – Ground and Surface Water Allocation

443. Submitters did not raise these provisions as an issue in contention at the Hearing.

3.84. Chapter 15 – Rule 15-4 Bore groundwater testing – Ground and Surface Water Allocation

444. In a number of places, including within Rule 15-4, it is recommended to clarify that discharge would include sediment or other contaminants. This clarifies what is covered by the discharge.

3.85. Chapter 15 – Rule 15-5 Takes and uses of surface water complying with core allocations – Ground and Surface Water Allocation

445. Submitters did not raise this provision as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.86. Chapter 15 – Rule 15-6 Takes of surface water not complying with core allocations – Ground and Surface Water Allocation

446. Comments on the matters raised by the hydroelectricity generation companies regarding the categories of consent for hydroelectricity generation are contained within section 2.3.4 of this report.

447. Minor changes are recommended to condition (b) in Rule 15-5 to provide clearer wording.

448. In relation to Rule 15-6, it is recommended that the Non-Complying Rule column also refer to the rule capturing takes or uses of water taken at or below minimum flow, as this wording is already recommended to be included in the Activity column.

3.87. Chapter 15 – Rule 15-7 Takes from rivers protected by water conservation orders – Ground and Surface Water Allocation

449. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, the original recommendation regarding deletion of this rule remains.

3.88. Chapter 15 – Rule 15-8 Other takes and uses of water – Ground and Surface Water Allocation

450. The wording of Rule 15-8 is recommended to be altered to capture activities that do not meet the permitted or controlled activity rules in the Plan. This aims to make the catch-all wording for the discretionary activities more consistent.

3.89. Chapter 15 – Rule 15-9 Lawfully established diversions, including existing drainage – River and Lake Beds

451. Genesis Energy seeks to have Rule 15-9 (permitted activity rule for lawfully established diversions of water) provide for diversions from existing lawfully established hydroelectricity generation activities and allow for diversions from these activities between different catchments. In response to questions asked by the Panel, Genesis indicated it accepted that in relation to the Tongariro Power Scheme it was agreed that in terms of the consent process the company did not want permitted activity status and wanted to go through the consent process to ensure certain outcomes. Similarly, Mighty River Power seeks the deletion of clause (a) in Rule 15-9, which does not allow diversion or discharge within different sub-zones. It is not considered appropriate to provide for diversions between catchments as a permitted activity because the significant adverse effects that may arise from the point of the 'take' and any potential adverse effects on the catchment to which the water is discharged (for example variations in water quality) need to a careful case by case assessment, which is most appropriately provided for by a resource consent process.

3.90. Chapter 15 – Rule 15-10 and 15-11

452. Submitters did not raise these provisions as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.91. Chapter 15 – Rule 15-12 Diversions that do not comply with permitted and controlled activity rules – River and Lake Beds

453. Submitters did not raise these provisions as an issue in contention at the Hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, and to provide cross referencing to Rule 15-10 within Rule 15-11, the original recommendation remains.

3.92. Chapter 15 – Rule 15-13 Drilling and bore construction – Ground and Surface Water Allocation

454. Submitters did not raise this provision as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.93. Chapter 15 – Rule 15-14 Unsealed Bores

455. Mr Zarour and Mr Callander identified at the Hearing that the permitted activity rule proposed for bore drilling was missing some important information requirements. This has been rectified in the most recent version of the Track Changes. It is still considered that permitted activity is the most appropriate activity status as the activity can be undertaken on a routine and low risk basis in accordance with the conditions, without the need to impose site by site restrictions. The only interaction required with the Regional Council is the provision of information and bore log records. Requiring a resource consent for this activity would add a layer of regulation to the activity without any additional benefit.

3.94. Chapter 16 – Policy 16-1 Consent decision making for activities in river and lake beds (including modified watercourses) – River and Lake Beds

456. TrustPower Limited and Might River Power both sought for Policy 16-1 to include a reference to Chapter 3.

457. On review of Policy 16-1 I agree that it is appropriate to reference Chapter 3 as this will help assist consent decision makers on how to treat activities in the beds of rivers and lakes where the activity is associated with infrastructure.

3.95. Chapter 16 – Policy 16-2 Consent decision making for activities in the beds of artificial watercourses and artificial lakes – River and Lake Beds

458. Meridian Energy Limited sought that Policy 16-2 include a reference to Chapter 3.

459. On review of Policy 16-2 I agree that it is appropriate to reference Chapter 3 as this will help assist consent decision makers on how to treat activities in artificial watercourses and artificial lakes where the activity is associated with infrastructure.

3.96. Chapter 16 – Table 16-1 Standard conditions for permitted activities involving the beds of rivers and lakes – River and Lake Beds

460. A large number of issues in contention were raised by Federated Farmers in relation to Table 16.1.

461. With regards to condition (c), Federated Farmers requested that the condition for change in horizontal visibility of 30% be re-instated.

462. It has been recommended in the officer's report that clause (c) within the Life Supporting Capacity row of Table 16.1 be linked to the standard within Schedule D that specifies particular clarity standards for each sub-zone, ie. is either 20% or 30%. So the change links the standard set out in Table 16.1 and the resulting effects on the environment in a way that is tailored to the receiving environment.

463. I do not recommend any change as a result of this request from Federated Farmers.

464. With regards to condition (i), Federated farmers noted that where a temporary diversion is proposed it will not be possible to maintain the same capacity for flow as in the original bed.

465. Clause (i) within the Life Supporting Capacity row in Table 16.1 includes reference to requiring that the diversion channel has sufficient capacity to carry the same flow as the original bed. Permitted activity Rule 9 of the Beds of Rivers and Lakes Plan also included a standard that the realigned section of the bed shall have sufficient capacity to carry the same flow as the original bed.

466. The intent of this provision is to avoid a situation where a diversion may be in place for a long period of time and a flood event occurs which cannot be accommodated. After considering the issues raised by the submitter it is considered that the standard

requiring the diversion to have the same capacity and carry the same flow as the original bed is inappropriate where those works are only in place for a short period of time and the risk of a flood event is not a high probability.

467. The effect at issue is the length of time the diversion may be in place and the risk associated with potential flooding events. It is therefore recommended that the standard instead specify a maximum period for the temporary diversion to be in place and remove the reference to the diversion having the same capacity as the original bed. A period of 30 consecutive days is proposed as an appropriate time period to minimise risk.

468. With regards to condition (k) Federated Farmers has proposed for streams 3 metres or smaller that the straightening will not exceed 50 m within any 2 km stretch of river in any 12 month period.

469. Table 16.1 condition (k) states: *"Any permanent straightening or channelling of a river must not exceed a length equal to 2 times the bed width of the river in any 2-km length of a river in any 12–month period."* The intent of the condition is to:

(a) limit the linear length of works

(b) prevent adverse cumulative effects from works adjacent to each other

(c) prevent works from being undertaken within a stretch of river on a regular basis, ie. in a period of less than 12 months, to manage potential adverse effects.

470. The experts from the Department of Conservation, Fish & Game and Horizons caucused on 8 February 2010 and determined that any permanent straightening of a river is not appropriate as a permitted activity. The changes that were agreed in caucusing were that standard (k) read: *"Any ~~permanent~~ straightening or channelling of a river must not exceed a length equal to 2 times the bed width of the river in any 2-km length of a river in any 12–month period <u>and shall not be permanent</u>".* That is, they agreed that the standard requires that any straightening not be permanent.

471. It was also agreed at caucusing that permanent straightening associated with structures in Rule 16-6 (maintenance and repair of structures), Rule 16-11 (culverts) and Rule 16-12 (other structures) be exempt from this condition as each of these rules has limits on their size that would control the effects of concern, eg. culverts are limited to a maximum length of 20 metres.

472. Potential planning problems with the approach agreed at caucusing are:

(a) The change would reverse the presumption of the standard, in that permanent straightening would not be provided for. Currently, the standard puts limits around what permanent straightening involves. Under the proposed approach, would straightening that is in place for a period of 12 months, and then the bed alignment alters through natural processes, be a permanent straightening? It is unclear. And defining what is permanent would be problematic.

(b) What is the difference from an effects perspective between straightening that is associated with the installation of a culvert and straightening undertaken to realign a channel that has eroded into a bank? There potentially isn't a difference as it comes down to the issue of the scale of the works.

473. Federated Farmers' approach proposes only limiting straightening on streams 3 metres or smaller and reducing the lineal extent from 100 metres to 50 metres, but retaining the requirements regarding any 2 km stretch of river in any 12 month period.

474. Having considered the caucusing position and that of Federated Farmers, it is recommended that the standard remain as notified for the following reasons:

(a) The standard is clear and does not restrict straightening to particular activities but rather focuses on the effects of concern.

(b) It would be difficult to define what temporary straightening is.

(c) The 100 metres length restriction currently in the standard is more generous than the 50 metre length proposed by Federated Farmers.

475. With regards to condition (v) Federated Farmers has requested there be more certainty required around the positioning of flow recording devices, to allow for pre-existing uses or excavation established prior to the operation of a new flow recording site. On the same topic Federated Farmers also suggested that Rule 16-12 (a) should have an additional condition that recording sites not be installed 500 m upstream or 1 km downstream of an existing gravel extraction site without unless prior written permission of adjoining landowners or infrastructure operators has been obtained.

476. In order to answer this question I approached Jeff Watson (Horizons Manager Catchment Information) who confirmed that flow recording sites are generally only installed in silt beds as gravel beds can cause issues with the measurements from flow recorders. In the last five years the Regional Council has not installed any flow recorders within gravel beds. He noted that the Regional Council talks to landowners before flow recorders are placed on the land and there are often agreements in place about access and if there is an issue with the flow recorder in place that generally is

raised. Mr Watson also noted that if this condition was not in the Plan and someone was to disrupt the bed near a flow recording site, there would not only be serious consequences in terms of the data (which the Regional Council relies upon for flood warnings) being inaccurate, but also the cost of maintaining the site would rise from $10,000-$12,000 per year up to approximately $25,000 per year.

477. Having reviewed the provisions with Mr Watson, it is considered appropriate to amend the distance to 500 metres downstream of a flow recorder site rather than 1 kilometre. Mr Watson is happy that this change will still achieve the same outcome.

478. With regards to condition (x) Federated Farmers has requested that the condition be altered to remove the requirement for controls for small scale farm works between 1 December and 28 February.

479. The standard restricts activities that result in suspended sediment during weekends and public holidays between 1 December and 28 February. The standard aims to protect fishery recreational values by ensuring that sediment is not released over the periods when rivers will be most commonly used by anglers, ie. weekends and public holidays. It is considered to be a reasonable and balanced standard which recognises works need to occur during a normal working week and that recreational values can be provided for at weekends and public holidays. In my opinion this is an appropriate standard and small activities that do not result in suspended sediment being conspicuous would still be able to continue. No changes to this clause is recommended as a result of the evidence presented by Federated Farmers.

480. At the Hearing it was noted that some of conditions in Table 16.1 use the term "*weekend*" which is not defined and potentially open to interpretation. The anglers who appeared on behalf of Fish & Game signalled that the weekend period should be between 6pm on a Friday and through to Monday morning.

481. I also sought advice from Horizons Consents department on this matter noting that when Consent advice notes have been added to consents regarding weekends, restrictions are generally that no excavation be undertaken on any Saturday after 12:00 pm or on Sundays.

482. I also noted that the normal understanding of weekend would be from midnight Friday to midnight Sunday.

483. I believe that the 'normal' understanding of "weekend" would be best used to clarify what is meant by weekend in Table 16-1. I have recommended this wording be added to conditions (x) and (u).

3.97. Chapter 16 – Rule Guide, General – river and lake beds

484. Submitters did not raise the Rule Guide, General as an issue in contention at the hearing.

3.98. Chapter 16 – Rules – General – River and Lake Beds

485. A number of submitters raised issues with the rules of Chapter 16 in a general way.

486. Genesis Energy sought a new restricted discretionary activity rule to catch those activities not meeting the conditions within Rules 16-6, 16-7, 16-10, 16-11, 16-12 and 16-12A.

487. On analysing this request it is noted that these permitted activity rules cover a number of activities, including maintenance of a structure, removal and demolition of a structure, erection or placement of lines or cables, and other structures including access structures and flow recording sites.

488. If a restricted discretionary activity rule approach was to be taken then there would need to be a number of rules to cover all of these matters, as one catch-all restricted discretionary activity rule would be unwieldy. Then as there are a number of permitted activity standards there would need to be a large suite of matters over which discretion was reserved. It is considered this would be unworkable.

489. The difference between the discretionary and restricted discretionary categories will not be too much different in practice as the same considerations and cost implications for processing would apply.

490. No change is recommended as a result of this piece of evidence presented by Genesis Energy.

491. New Zealand Defence Force requested in the evidence of Ms Grace that provision be made for temporary bridges for military training purposes as a permitted activity.

492. Bridges generally are provided for as a permitted activity subject to standards in Rule 16-12. If the temporary bridge does not have any footing within the bed of a river then it is permitted by the rules in Chapter 16. It is understood that in some cases NZDF bridges would not meet the standards regarding catchment area and possibly the area occupied.

493. Section 4.135 of the s42A Officer's report states that it is not appropriate to provide for the activity of one organisation as a specific permitted activity and considers the question: "Why should the effects of the same activity be treated differently just because of the person undertaking the works".

494. Bridges, whether temporary or not, have the potential to result in adverse effects and where they cannot meet the permitted activity standards they should fall for consideration as a discretionary activity.

495. If NZDF is undertaking these activities on a regular basis then there is no reason why a global consent could not be applied for that would be tailored to the specifics of the activities and provide NZDF with certainty.

496. No change is recommended as a result of this piece of evidence presented by Ms Grace on behalf of the New Zealand Defence Force.

497. Ms Janita Stuart raised concerns at the hearing regarding Palmerston North's secondary stopbank and the potential restrictions placed on landowners (in Rule 16-14) which reside along side the stopbank.

498. Careful consideration has been given as to how best address this issue.

499. A series of discussions were held with the Operations Department and as a result it is recommended that a new rule be inserted. This rule (16-14A) is specifically tailored to the secondary stopbank and provides less onerous restrictions while still allowing the functional integrity of the stopbank to be retained.

3.99. Chapter 16 – Rule 16-1 Damming of protected rivers – River and Lake Beds

500. TrustPower Limited was the only submitter at the Water hearing to raise issues regarding Rule 16-1. TrustPower sought a lesser category of consent rather than prohibited status for damming of water bodies subject to water conservation orders.

501. In the s42A Officer's report it was outlined that the prohibited status of Rule 16-1 is appropriate because rivers listed in (a) to (e) of Rule 16-1 have local or national water conservation orders/notices in place which stipulate that no damming takes place. Furthermore, all of the rivers listed in (a) to (i) have high aesthetic value, as discussed in Ms McArthur's s42A Evidence (paragraphs 68-69). The Beds of Rivers and Lakes Plan also identifies these activities as prohibited.

502. Considering the above, no changes are recommended as a result of the evidence presented.

503. Minor changes for clarity and consistency purposes have been made and can be seen in the Track Changes documents.

3.100. Chapter 16 – Rule 16-2 Other structures and disturbances in protected rivers – River and Lake Beds

504. Federated Farmers was the only submitter to raise issues regarding Rules 16-2 and 16- 2A at the Water hearing. Federated Farmers specifically sought that Rules 16-2 and 16-2 be altered so that fencing or crossing by stock were not caught as non-complying activities.

505. While considering this evidence I referred to the submissions presented on these topics and I do not believe any of the submissions give scope for the changes requested above.

506. Considering the above, no changes are recommended as a result of the evidence presented.

507. Minor changes for clarity and consistency purposes have been made and can be seen in the Track Changes documents.

3.101. Chapter 16 - Rule 16-3 Reclamation and drainage of regionally significant lakes – River and Lake Beds

508. Submitters did not raise Rule 16-3 as an issue in contention at the hearing. Therefore, aside from minor changes for the purpose of consistency and clarity, our original recommendation remains.

3.102. Chapter 16 – Rule 16-4 Structures and disturbances involving water bodies valued as Natural State, Sites of Significance - Aquatic, and Sites of Significance – Cultural – River and Lake Beds

509. Submitters did not specifically raise Rule 16-4 as an issue in contention at the hearing.

510. However, Tanenuiarangi Manawatu Incorporated did bring forward evidence regarding 'Site Of Significance – Cultural' which has resulted in additions to Schedule Ba for this value. It has not, however, resulted in any specific changes to this rule.

511. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

3.103. Chapter 16 – Rule 16-5 Use of structures – River and Lake Beds

512. Submitters did not raise Rule 16-5 as an issue in contention at the hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

3.104. Chapter 16 – Rule 16-6 Maintenance and repair of structures, and associated removal of bed material and plants – River and Lake Beds

513. Submitters did not raise Rule 16-6 as an issue in contention at the hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

3.105. Chapter 16 – Rule 16-7 Removal and demolition of structures – River and Lake Beds

514. Submitters did not raise Rule 16-7 as an issue in contention at the hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

515. With regards to the Rule Guide for this section (Rules 16-5 to 16-7) – the Panel will note that in consultation with the New Zealand Defence Force I added a sentence from the Rule Guide for Rule 16-8 to 16-9 which states, "*For dams -This means that the Regional Council has decided to accept the presence of existing dam structures and has declined*

to give itself the discretion as to whether an existing dam structure should remain". This addition is supported by Ms Grace in her supplementary evidence (paragraph 3.30).

516. On review, I believe that this sentence duplicates the first sentence of the Rule Guide and is not as necessary as first thought. I have therefore recommended that it be removed.

3.106. Chapter 16 – Rules sub heading 16.5 Dams rules – River and Lake Beds

517. Submitters did not raise Rules sub heading 16.5 as an issue in contention at the hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

3.107. Chapter 16 – Rule 16-8 New and existing small dams – River and Lake Beds

518. Federated Farmers sought that all conditions should apply to new dams only and not lawfully established dams.

519. In my opinion it is appropriate that, once a new dam is established, that it continues to comply with the conditions which it was established upon, ie. that fish passage continues to be allowed for, erosion does not occur and that dam safety regulations are met, in order to ensure that its ongoing effects on the environment remain minor.

520. Considering the above, no changes are recommended as a result of the evidence presented.

3.108. Chapter 16 – Rule 16-9 Other existing dams – River and Lake Beds

521. Ms Grace, on behalf of the New Zealand Defence Force, noted in her evidence that she has some concerns about Rule 16-9 condition (b) and suggested alternative wording.

522. On reviewing this rule and considering questions raised by the Panel, I have recommended the deletion of condition (b) as I agree that it does blur the line between controlling damming (the intent of the rule) and the dam structure (which the Regional Council has stated it does not wish to control once the dam structure established). I have also recommended that the title of Rule 16-9 be changed to refer to damming rather than dams to ensure that what the rule seeks to control is explicitly clear.

523. I have also recommended other minor changes for the purposes of consistency and clarity.

524. With regards to the Rule Guide for Rules 16-8 to 16-9, Ms Grace has suggested two additions – one to clarify how new small dams are dealt with and another to clarify how dams are dealt with if they do not meet the criteria of the permitted activities. I believe that the rules and the guides are sufficient to explain how new small dams are dealt with, however I agree that the additions to clarify how dams that do not meet the permitted criteria are useful and should be added in part to the extent they are relevant.

3.109. Chapter 16 – Rules sub Heading 16.6 Other structures rules – River and Lake Beds

525. Submitters did not raise Rules sub heading 16.6 as an issue in contention at the hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

3.110. Chapter 16 – Rule 16-10 Lines, cables, pipelines and ropeways – River and Lake Beds

526. Transpower, in its evidence, raised that Rule 16-6 deals with the maintenance and upgrade of structures and potentially overlaps with Rule 16-10, which deals with the erection, reconstruction, placement, alteration or extension of lines, cables, pipelines, and ropeways.

527. On further analysis, I note that "*maintenance*" is defined as worded in the Land and General Provisional Determinations as including "*reconstruction and alteration*".

528. Rule 16-10 should not include reference to reconstruction or alteration as these are defined within "maintenance" and therefore dealt with under Rule 16-6. As the definition of "maintenance" specifically states that the character, intensity and scale of the structure, system, facility or installation remains either the same or similar - the effects of the maintenance activities will be minor. Furthermore, Chapter 3 signals that the Regional Council will allow maintenance and repair of infrastructure.

529. It is recommended that the words "*reconstruction and alteration*" be deleted.

3.111. Chapter 16 – Rule 16-11 Culverts – River and Lake Beds

530. At the Water hearing, a number submitters including NZ Forest Managers Ltd, Hancock Forest Management (NZ) Ltd, Ernslaw One Ltd and PF Olsen Ltd raised issues with Rule 16-11, particularly in relation to the Rule not allowing for multi-barrel culverts (sometimes also called battery culverts). The following specific points were raised:

1. Amend condition (b) and (c)(iii) to allow for multiple pipes.
2. Amend condition (c)(iv) to allow for more than 2 metres of fill if a suitable spillway is incorporated into the design.
3. Amend condition (c)(ii) to provide for a culvert diameter up to 1.5 metres.

531. In the Officer's report, the issue of multiple culverts were also addressed at recommendation WTR 153 , of the planners report in chief - to which I responded on the advice given to me by Horizons ecologist, James Lambie, that:

"With regard to condition (b) it is appropriate that only one culvert be allowed. Within James Lambie's s42A report he outlines that one barrel is more fish friendly as it imitates a natural water body and multiple barrels quicken the stream's flow."

532. After presentation of the above evidence at the Hearing I asked Mr Lambie to comment on the evidence raised; he has done this in his End of Hearing report Mr Lambie notes that:

- Restrictions on the diameter need to be retained to ensure that the full flow of the river can pass through the culvert
- Clause 16-11(c)(iii) follows the design principles for 'fish friendly' culverts by making the culvert synonymous with the bed size
- Drawing on expert references, multi barrel culverts are generally assessed on a case by case basis
- The width of the culvert could be extended to 1.5 m as a permitted activity, but engineering effects regarding the flow need to also be considered.

533. I have taken some time to consider what other regional councils have in place regarding multi barrel culverts:

- Environment Bay of Plenty (EBOP) has a similar permitted activity culvert rule which also only allows one culvert per crossing (Rule 59). Multi barrel culverts require a consent.
- Environment Canterbury (Ecan) specifically allows for single or double barrel culverts in its Proposed Natural Resources Regional Plan (Rule BRL2). This

stipulate that the bed width must be less than 5 m and that for double barrel culverts each must be at least 1 m in size.

- Environment Waikato (EW) has a catchment limit on its culvert rule, something which our rule does not. Culverts (single or multi) within a certain catchment size (less than 500 ha) are permitted with conditions.
- Hawkes Bay Regional Council (HBRC) has a catchment limit on its culvert rule, something which our rule does not. Culverts (single or multi) within a certain catchment size (150 ha) are permitted with conditions.

534. The approaches vary around New Zealand but – as shown above – councils generally take the approach of restricting the culvert size or restricting the catchment size. We have taken the approach of restricting the culvert size.

535. After gaining additional advice from Mr Lambie, I also sought additional advice from a Horizons engineer in regard to:

1. the culvert size
2. the use of two or more culverts.

536. Mr Peter Blackwood, Manager investigations and design, responded with regards to permitting the use of a 1.5 m culvert. He noted that the difference between a 1.2 m and 1.5 m culvert is 27% more capacity and that a culvert of that size needs to be assessed on a case by case basis.

537. With regards to the use of two or more culverts, Mr Blackwood concurred with Mr Lambie's evidence that multiple culverts should be assessed on a case by case basis because of the effect they can have on the flow of the river and the scouring and erosion of the bed and bank that can result.

538. In terms of amending condition (c)(iv) to allow for more than 2 metres of fill, it is noted in section 4.153.2 of the Officer's report (page 342) that the addition of 2 metres of fill above a culvert with a diameter of 1.2 metres would result in a height of 3.2 metres. The Officer's report stated that this could then potentially be deemed to be a large dam with potential for adverse effects to occur, including:

(a) increased scouring effects
(b) increased impacts on the bed of a river
(c) potential increased effects of water heading up and a spillway being required.

539. In a major flood event a larger diameter culvert would have a large impact if the culvert or fill were to fail. It would be difficult to provide for a suitable spillway design through a

permitted activity rule and it is more appropriate that the effects of fill in excess of 2 metres are considered through a consent process. No change is recommended.

540. Taking into account the expert advice received, and the approaches taken by other regional councils, I am of the opinion that our rule is appropriate for our Region and have only recommended minor changes. These include retaining the maximum culvert size as 1.2 m as standard culvert sizes are 1.2 m or 1.5 m but not 1.25 m; and the culvert standard to be written to cover both circular culverts, which will have a diameter size, and square culverts, which will have dimensions for width and height.

3.112. Chapter 16 – Rule 16-12 Other structures including bridges, fords and other access structures – River and Lake Beds

541. NZ Forest Managers Ltd, Hancock Forest Management (NZ) Ltd, Ernslaw One Ltd and PF Olsen Ltd presented evidence at the Hearing that Rule 16-12 (c) be deleted or amended to allow for a greater area than 20 m^2 for ford crossing structures.

542. In this instance I refer to the Officer's report (in chief). At section 4.154 (page 346) I outline what approach has been taken to the size of fords in other regions and conclude that while any number is somewhat arbitrary, 20 m^2 is 'middle of the road' in comparison with other rules, and that this size will allow for the effects of the activity to be minor.

543. I reject the idea raised by the forestry submitters that the condition be deleted, because the environmental effects of not having a standard present could be substantial.

544. Therefore, aside from minor changes for the purposes of consistency and clarity, my original recommendations in regards to Rule 16-12 remain.

3.113. Chapter 16 – Rule 16-13 Activities undertaken by the Regional Council in flood control and drainage schemes – River and Lake Beds

545. Wellington Fish and Game requested that Rule 16-13 and the Environmental Code of Practice for River Works include a section that requires the morphological characteristics of a river system to be maintained.

546. Rule 16-13 covers activities undertaken by or on behalf of the Regional Council in water bodies valued for flood control or drainage. Section 1.2 in Part I of the Code of Practice specifically deals with morphological characteristics which have been developed in

conjunction with Wellington Fish and Game. The rule now specifically refers to this section of the Code among others, and requires the activity to be undertaken in accordance with the Code. No further change is recommended as morphological characteristics are covered adequately.

547. Fish & Game supports the changes to Method 6-9 which deal with fluvial monitoring, including defining the current state of Natural Character (refer to paragraph 11.34 of Ms Jordan's Evidence in Chief).

3.114. Chapter 16 – Rule 16-14 Activities affecting flood control or drainage schemes – River and Lake Beds

548. A number of submitters presented evidence relating to Rule 16-14.

549. Federated Farmers in its evidence noted that Rule 16-14(d) restricts the height of fencing on a stopbank or next to a river which is valued for Flood Control and Drainage to 1.2 m high. Federated Farmers sought that this allowance should be greater than 1.2 m in the inland toe of a stopbank.

550. In considering this evidence I discussed this issue with Allan Cook. Mr Cook confirmed that fenced higher than 1.2 metres could be permitted so long as they remained parallel to the watercourse and were a fence like structure opposed to a solid structure that may impede flow.

551. I have recommended that this condition is changed to allow fences 1.8 metres in height.

552. Transpower, in its evidence, noted that Rule 16-14 applies to the placement of building or structures, and that this could capture transmission lines. Transpower requested a specific exclusion be added to Rule 16-14 regarding the maintenance or upgrading of existing overhead infrastructure and/or the establishment of new infrastructure that avoids locating support structures in areas identified by conditions (h) to (k).

553. In considering this evidence I note that "*structure*" is defined in the RMA as meaning a structure that is fixed to land. Therefore, lines and cables which do not have support structures in the area controlled by Rule 16-14, are not caught by the definition of 'structure' and will not be caught by clause (b) of Rule 16-14.

554. Further, I addressed this issue in section 4.156 of the s42A Officer's report and noted that Rule 16-6 provides for maintenance of existing lines and associated structures as a permitted activity and Rule 16-10 provides for new lines and cables suspended above the waterbody as a permitted activity.

555. In my opinion the relief sought by Transpower is already provided for in the Plan and I do not recommend that any further changes or specific exclusions are required.

556. Therefore, aside from the alteration to clause (d) and other minor changes for the purposes of consistency and clarity, my original recommendation remains.

3.115. Chapter 16 – Rules 16-15 to 16-20

557. Submitters did not raise these rules as an issue in contention at the hearing. Therefore, aside from minor changes for the purposes of consistency and clarity, our original recommendation remains.

3.116. Glossary – Term - Animal effluent – Water Quality

558. New Zealand Pork seeks consistency in terms of how animal manure is dealt with to be widened to include sediment and compost material (a definition for animal manure has been proposed by NZ Pork) and how fertiliser is dealt with.

559. NZ Pork proposes a definition for animal manure that covers dung and urine and compost containing nutrients, trace elements, micro-organisms, organic matter and water. There is currently no reference within the rule structure that uses the term animal manure. There is then no need for a definition of animal manure. The issue seems to be more about how animal manure generally is treated in the rule structure and ensuring the application of animal manure can be dealt with as a permitted activity.

560. "*Fertiliser*" is defined in the Plan as a substance or mix of substances that sustain or increase growth but does not include biosolids or dead animal matter. Fertiliser is provided for as a permitted activity under Rule 13-2.

561. "*Soil conditioner*" is defined in the Plan as a substance that alters the physical or structural characteristics of soil and excludes substances derived from animal tissue, bone or blood. Soil conditioners are provided for as a permitted activity in Rule 13-4.

562. Animal manure being applied deliberately to the soil to improve the condition of the soil is a fertiliser and would be a permitted activity under Rule 13-2.

563. "*Animal effluent*" is defined as faeces and urine from animals other than humans. Animal effluent is referred to within Rule 13-1 and the activity description also lists fertiliser and soil conditioners as separate activities that are caught by the rule. Rule 13-6 uses the term animal effluent and specifically qualifies that the rule also covers effluent from dairy sheds, poultry farms and piggeries. In the context of the rules, animal effluent is the excrement directly passed by an animal onto the ground and effluent that is collected, eg. process water. It is recommended that the definition be altered to include these matters.

564. It is not considered necessary to specifically define animal manure as it is not referred to in the rules and does not need to be.

565. It is also recommended to exclude animal effluent from the definition of biosoilds.

3.117. Glossary – Term – Biosolids – Water Quality

566. An amended definition is recommended for Grade Aa biosolids. The discussion regarding the recommended change is contained in section 3.54 above.

3.118. Glossary – Term – Cleanfill – Water Quality

567. As outlined in the document 'Response to Hearing Panel Questions – Water' – question 249 - it is recommended that "*cleanfill*" be defined as one term and "*cleanfill material*" be separately defined.

3.119. Glossary – Commercial Vegetable Growing – Water Quality

568. Horticulture New Zealand seeks a new definition for commercial vegetable growing based on a distinction between perennial and annual crops:

"Commercial vegetable growing means vegetables grown on an annual basis for human production on an area of land greater than 4 hectares. Fruit crops and vegetables that are perennial are not included as commercial vegetable growing for the purposes of the use of this definition and related rules in the Plan."

569. It is understood that Horticulture NZ considers that if Rule 13-1 is to deal with commercial vegetable growing then the focus should be on annual cropping, as these involve cultivation, and that vegetable crops require more fertiliser than fruit.

3.120. Glossary - General - River and Lake Beds

570. Federated Farmers seeks a definition of "*bed*" in an artificial watercourse.

571. The definition of "*bed*" in the RMA does not include the bed of an artificial watercourse except an artificial lake. On reflection, where the term bed is used in Rule 16-18 in relation to artificial watercourse, the term should be deleted to be consistent with the RMA. It is recommended that the term be deleted as the reference to watercourse is able to stand on its own without the inclusion of reference to "*bed*".

572. Wellington Fish & Game does not agree with the change to refer to water bodies and a specific definition for water body, as it considers it is inappropriate to redefine a term already defined in the RMA.

573. It is recommended to include a specific definition for water body because:

(a) Schedule Ba refers to values which apply to all water bodies as opposed to just rivers and lakes. If the references within the policies and rules solely refer to rivers and lakes then the issue of dealing with the bed of a river or lake is lost as the definition of "*river*" does not capture the bed.

(b) Water body is defined in the RMA as only referring to the body of water not the bed of the river or lake.

(c) The values that sit within Schedule Ba deal with both the bed, including the margins that the bed may extend to, and the body of water.

(d) The recommended definition of water body captures both the body of water and the bed. If this definition is not accepted then current references throughout the Plan to the beds of rivers and lakes with a value of Natural State, Sites of Significance – Cultural, Sites of Significance – Aquatic and Flood Control and Drainage, etc will not make sense in the context of Schedule Ba.

574. Federated Farmers considers there should be a two-tier definition for "*river*" to target effects based on major and minor impacts.

575. Kate McArthur has outlined in evidence that streams and rivers, regardless of width and depth and potentially whether ephemeral or permanently flowing, have ecological values

that require protection (refer to the Supplementary Evidence paragraphs 33-36 of Ms McArthur).

576. Therefore, it is appropriate that all streams and rivers are given an equal level of protection in that potential and actual adverse effects are avoided or mitigated. To distinguish between small and large streams would be technically difficult and from a planning point of view would be arbitrary and would have no sound ecological rationale.

3.121. Glossary – Term - Public water supply - Ground and Surface Water Allocation

577. As outlined in the answers to the Panel's questions, it is recommended that the word community be deleted from the definition for public water supply.

3.122. Glossary – Term - Water management zone – Water Quality

578. As outlined in the answers to the Panel's questions, it is recommended that there be a separate definition for Water Management Sub-zone.

3.123. Schedule B Surface Water Quantity

579. There are a number of changes recommended for Schedule B.

580. The changes recommended have been made largely to correct the table as a result of new information or further analysis of the minimum flow and core allocation limit data - for example adding in the core allocation limit where it was previously 20% of MALF. Some other minor changes have also been recommended including updating map references in the 'flow monitoring site map locations' column.

581. Scope for individual changes throughout Schedule B are outlined in the Report on scope for water chapter recommendations (Appendix II).

3.124. Schedule C Groundwater Management Zones

582. Horticulture New Zealand objects to setting groundwater allocation limits in Schedule C which are based on 5% of the annual average rainfall.

583. Mr Callander in his s42A Evidence (paragraphs 50 and 51) sets out the reasons why 5% of average rainfall is considered to be a reasonable limit and essentially states that an

allocation limit of 5% of average annual rainfall is estimated to be about 10-15% of average annual recharge, and allows a suitable balance between allowing a reasonable level of increase above the current abstracted quantities while ensuring no large-scale adverse cumulative effects occur.

3.125. Schedule D Values that apply to water bodies in the Manawatu-Wanganui Region

584. Tanenuiarangi Manawatu Inc seeks the addition of Sites of Significance – Cultural (SOS-C) Value for specific sites known to Tanenuiarangi Manawatu Inc for the Middle and Lower Manawatu, Coastal Manawatu and Oroua River, and for coastal lakes.

585. The Track Changes document includes additional provisions within Schedule Ba relating to SOS-C to address sites that have been identified by Tanenuiarangi Manawatu Incorporated (TMI). The changes have been prepared in conjunction with TMI. Submission 238/16 from TMI provides scope for the change.

586. Additional SOS-C sites have been identified by Ngati Kahungunu Iwi Incorporated and have been included in the Track Changes document. The changes have been prepared in conjunction with Ngati Kahungunu Iwi Incorporated. It is considered that submission 180/81 from Ngati Kahungunu Iwi Incorporated provides scope for the inclusion of these sites. While the submission was in relation to Policy 16-1, it specifically seeks that there be recognition of and provision for the relationship of tangata whenua with the water body or for effects to be remedied or mitigated where such recognition and provision is not entirely possible. The inclusion of the sites within SOS-C is a mechanism by which the relationship of tangata whenua with the water body can be recognised and provided for.

587. Tanenuiarangi Manawatu Inc (TMI) seeks the inclusion of tuna and godwit within the Environmental Code of Practice for River Works. It is not recommended that provisions for godwit, caspian tern, and siberian tern be included within the Environmental Code of Practice for River Works because these birds do not frequent the areas where river control works are undertaken. Further discussions have taken place with TMI representatives, who accept that it is not necessary to include these birds. See the supplementary evidence of James Lambie for the End of Hearing report – Section 5.

588. With regards to the rest of Schedule D, any changes are documented in Appendix I to the Report on Scope for Water Chapter Recommendations.

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