
BEFORE THE ENVIRONMENT COURT

In the matter of appeals under clause 14 of the First Schedule to the Resource Management Act 1991 concerning the Proposed One Plan for the Manawatu-Wanganui Region.

between **FEDERATED FARMERS OF NEW ZEALAND**
ENV-2010-WLG-000148

and **MINISTER OF CONSERVATION**
ENV-2010-WLG-000150

and **DAY, MR ANDREW**
ENV-2010-WLG-000158

and **HORTICULTURE NEW ZEALAND**
ENV 2010-WLG-000155

and **WELLINGTON FISH & GAME COUNCIL**
ENV-2010-WLG-000157

Appellants

and **MANAWATU-WANGANUI REGIONAL COUNCIL**
Respondent

**STATEMENT OF PLANNING EVIDENCE BY CLARE BARTON ON THE TOPIC
OF SURFACE WATER QUALITY – NON-POINT SOURCE DISCHARGES ON
BEHALF OF MANAWATU-WANGANUI REGIONAL COUNCIL**

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Introduction

1. My name is Julie Clare Barton and I am a Senior Consents Planner at Manawatu Wanganui (Horizons) Regional Council. I have been employed by Horizons in this capacity since May 2010. I hold a Bachelor of Regional Planning degree (Honours) from Massey University, Palmerston North.

2. I have 22 years experience in New Zealand in the profession of planning. I have worked both as employee and consultant to local government authorities, the Ministry for the Environment and private consultancy firms. I was, until November 2010, a Director of the consulting firm Environments by Design Limited (EBD). EBD consulted predominantly in Palmerston North, Horowhenua, Taranaki and Wellington in relation to a range of resource management matters. I worked in the Resource Management Directorate of the Ministry for the Environment from 1991 to 1994 and worked on preparing recommendations to select committees on both the Resource Management Act and its first amendment. I have been involved in the development of District Plans and in various Private Plan Change applications. I have assessed and reported on many applications for resource consents, including matters that have been decided in Hearings and in the Environment Court.

3. I have worked for the regional council firstly on a consultancy basis within the Consents Section since December 2006 and in the Policy Section since 2009. I became involved in the preparation of the Proposed One Plan during the hearings phase. Whilst I was not the planner who presented evidence to the Hearing Panel on Rule 13-1, I was the author of the section 42A report on the topic of surface water quality generally. I therefore have a good understanding of the inter-related links between the water quality provisions of the Proposed One Plan.

4. I became an employee of Horizons in May 2010 and was seconded to work full-time in the Policy Section in 2011 to focus on the Proposed One Plan appeals process. During that time I have attended many meetings with appellants and represented MWRC at all of the Court assisted mediation on this topic.
5. I am therefore familiar with the issues and process involved in the development of the Proposed One Plan and I have a good understanding of the issues that have arisen in the implementation of the provisions of the Proposed One Plan.
6. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Notes. I agree to comply with that code of conduct.

Terms

TEB	=	technical evidence bundle
NV	=	notified version of POP
DV	=	decisions version of POP
MV	=	mediated version of POP
MCB	=	mediation compilation bundle
LUC	=	land use capability
MWRC	=	Manawatu Wanganui Regional Council (Horizons)
FARM Strategy	=	the Farmer Applied Resource Management Strategy
N	=	nitrogen
P	=	phosphorus
RMA	=	Resource Management Act 1991
NPS Freshwater	=	National Policy Statement Freshwater Management (2011)
Kg	=	kilograms

Issues covered in this evidence

7. Rules 13-1 and 13-1B and associated policies in Chapters 6 and 13 of the DV POP regulate existing and new dairy farming land use activities through requiring resource consent as a controlled activity. Existing dairy farming is regulated in 24 targeted water management sub-zones (seven catchments). New dairy farming is regulated throughout the region.
8. There is agreement amongst most of the appellants (including Fonterra) and the respondent that dairy farming in specified catchments identified in DV-POP should be regulated by means of a requirement for a resource consent to manage all discharges and land use activities that have the potential to affect water quality. In this context urinating dairy herds are treated as a land use. There are however, a number of remaining areas of debate about the policy approach and the rules. In summary these issues are:

Policy approach

- (a) The DV POP only requires resource consents for dairy farming. The NV POP also required resource consents for intensive sheep and beef, market gardening (horticulture) and cropping (non-dairy intensive farming). Some appellants¹ seek to have these additional activities either controlled by the requirement for consent (and subject to nutrient limits) or their absence addressed in the policy framework. One appellant² considers the contribution the non-dairy intensive farming makes to water quality is similar in character (and possibly scale) to dairy and therefore the approach focusing on dairy solely is incomplete and also does not allow for trading of nitrogen (N) within catchments. Some appellants³ consider that the incomplete regulation of significant agricultural nutrient inputs by excluding intensive sheep and beef and horticulture and cropping

¹ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157); Andrew Day (ENV-2010-WLG-000158)

² Andrew Day (ENV-2010-WLG-000158)

³ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157); Andrew Day (ENV-2010-WLG-000158)

(non-dairy intensive farming) increases the environmental risks that the water quality outcomes required by the policy framework in the DV POP and the NPS Freshwater will not be achieved.

- (b) In the NV POP there were 36 targeted water management sub-zones (11 catchments) in which dairy (and at that time other non-dairy intensive farming activities) were regulated. In the DV POP there are 24 targeted water management sub-zones (seven catchments). Some appellants⁴ seek the re-inclusion of some of the original catchments from the NV POP and in particular, Lake Horowhenua (Hoki_1a and 1b), Other Coastal Lakes (West_4 and 5), Coastal Rangitikei (Rang_4) and Mangawhero/Makotuku (Whau_3b, 3c and 3d). One appellant⁵ seeks the deletion of sub-zones from the DV POP, namely the Manawatu above the Gorge (Mana_6, 9a, 9a and 9c) and Northern Manawatu Lakes (West_6).
- (c) In the NV-POP, Table 13.2 established allowable N leaching rates for each LUC (Land Use Capability) class for both existing and new intensive farming land uses. There were four levels of N leaching limits. First, when Rule 13-1 commenced in a specified catchment (year 1) and thereafter at years 5, 10 and 20. In the DV-POP the LUC table applies only to Rule 13-1B (new dairy farms) and now only has one set of numbers that apply i.e. not a stepped change over 20 years. Appellants have raised a number of issues with Table 13.2 and the use of LUC including:
- i. The need to apply an upper N limit within Rule 13-1 (existing dairy farms) i.e. apply Table 13.2 or another set of numbers or singular number to existing dairy farms. Some appellants⁶ consider the absence of specific nutrient limits fails to institute a regime in order to achieve the maintenance and enhancement of water quality in the region. According to these appellants, the absence of a regime means 'no plan' and

⁴ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

⁵ Federated Farmers of New Zealand (ENV-2010-WLG-000148)

⁶ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157); Andrew Day (ENV-2010-WLG-000158)

having no plan is a plan to fail to achieve surface water quality outcomes.

- ii. One appellant⁷ questions the use of the natural capital approach to determining allowable N leaching (i.e. the leaching rates set in Table 13.2). They allege that land values will be reduced if LUC values are used to limit N loss. Dr Alec Mackay⁸ summarised the natural capital approach as: *“The N leaching loss limit for a given land unit can be calculated using the potential animal stocking rate that can be sustained by a legume-based pasture fixing N biologically, under optimum management and before the introduction of additional technologies. Using the land units listed in the extended legend of LUC worksheets’ “attainable potential livestock carrying capacity” as a proxy for the soil’s natural capital, stocking rates were transformed to pasture production and used in the OVERSEER nutrient budget model to calculate N leaching losses under a pastoral use.”* I discuss LUC further in paragraphs 76 to 84 of this evidence.
 - iii. Some appellants⁹ seek the reinstatement of a staged approach within Table 13.2 to provide standards for improvement over time.
- (d) One appellant¹⁰ considers that there is a need for rules/methods to exclude stock from water bodies in the region, otherwise there is the potential for the life supporting capacity of the region’s rivers to be compromised.

Rule mechanics

- (a) One appellant¹¹ seeks to make the activity category for the rules permitted rather than controlled, as they are of the “principled view”

⁷ Federated Farmers of New Zealand (ENV-2010-WLG-000148)

⁸ Mackay, TEB v. 3 p. 1603, paragraph 34

⁹ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

¹⁰ Minister of Conservation (ENV-2010-WLG-000150)

¹¹ Federated Farmers of New Zealand (ENV-2010-WLG-000148)

that all farming should be permitted but accept that controls may be applied.

- (b) Some appellants¹² seek to change the classification status for the rule where the controlled activity provisions are not met, from restricted discretionary to discretionary.
- (c) In the NV POP each water management sub-zone in Table 13.1 had a specified date that the rules came into force. These dates were staggered across the different sub-zones. Some appellants¹³ seek to reinstate the “*When the Rule Should Commence*” column into Table 13.1.
- (d) All appellants question how “*reasonably practicable farm management practices*” in Rule 13-1 DV POP will be decided. It is considered to be uncertain in its application and is open to broad interpretation by MWRC, leading to uncertainty for the farming community.
- (e) Some appellants¹⁴ seek to have the Farmer Applied Resource Management (FARM) strategy, which was included in the NV POP, re-included. The requirement for a FARM strategy was a performance standard that outlined how farm plans were to operate within the N leaching limits and provides an integrated mechanism to deliver catchment water quality outcomes through customised farm level assessments and management.

9. I will address in my evidence each of the issues listed under the ‘Policy approach’ and ‘Rule mechanics’ headings above in the following manner:

- a) Providing, by way of background, comment on the following:
 - i. The water quality management framework in the NV POP and DV POP.

¹² Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

¹³ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

¹⁴ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

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- ii. What water quality assessments led to the approach in relation to targeted catchments.
 - iii. How dairy farming is dealt with in targeted catchments including the approach to address outputs from activities farming in the targeted catchments.
 - iv. N leaching and the use of LUC classes.
 - v. A summary of the mediated outcomes on the related policies in the NV and DV POP;
- b) Focusing on the changes that I am proposing to Rules 13-1 and 13-1B and associated policies and rules in Chapter 13, and Policy 6-7 and proposed additional policies and methods in Chapter 6; and
 - c) Responding to the following questions:
 - i. What does Rule 13-1 and the associated policy framework cover? What does it intend to achieve? How will it be implemented? I also include an assessment of the NPS Freshwater.
 - ii. Why did the Hearing Panel take the approach they did to Rule 13-1?
 - iii. What are the acknowledged gaps in the policy and rule framework and how are they proposed to be filled?
10. Before delving into the specific issues, I wish to preface this statement of evidence by noting the following, matters that I had in my mind as guiding principles in arriving at the proposed amendments to the rules and policies:
- (a) There is no such thing as “perfect” environmental science in the field of managing contaminants to air or water there will always be an element of uncertainty both as to the precise environmental risks of various options and the precise environmental benefits that will be created. This is particularly so in the complex field of managing land use to achieve surface water quality outcomes. Nevertheless the science is compelling (and multi-disciplinary) as to the relationships between land use and surface water quality and outcomes that are

likely based on the various options available and requires a coherent management regime in light of the statutory tests in the RMA.

- (b) There are limitations in any management approach that is taken and it is the 'best management fit' option or 'most appropriate' option that should be selected. This should be a principled regime that will achieve the desired planning goals. Like any regime it will have a methodology with small scale contradictions or fact specific limitations that do not make the regime flawed. These limitations should be analysed and addressed as required.
 - (c) There needs to be a realistic weighing of the economic impacts of a regime with the benefits there will be in relation to environmental outcomes. In addition rates of change should recognise social and cultural and economic matters relevant to the industries affected and the communities that rely upon those industries.
 - (d) The policy approach can allow for improvements to be a journey over time i.e. immediate improvement or comprehensive coverage of the regulatory regime is not necessary or indeed always possible. There are also resource capacity issues at the Council level to consider when introducing new regulation.
11. The amendments I am proposing to Rules 13-1 and 13-1B and associated policies and rules, and Policy 6-7 and proposed additional policies and methods are contained in Attachments 1 and 2 to this evidence. The proposed amendments are highlighted in yellow and underlined.

Executive summary

12. A key issue for the MWRC region is surface water quality degradation. There are a number of catchments where water quality is poor including the Manawatu River and its tributaries. In some catchments with elevated nutrient levels, the proportion of the catchment in dairying is closely associated with poorer water quality i.e. there is a cause and effect link. These catchments have been selected as "targeted" catchments (water management sub-zones). Information from State of the Environment

monitoring, water resource assessments, water quality trend analyses, contact recreation monitoring, reports in relation to specific point sources and technical reports referenced in evidence to the Hearing Panel were used to determine which catchments were at risk of continued or worse nitrogen and phosphorus contamination and affected by poor water clarity. Existing dairy farming activities are regulated in these “targeted” catchments through Rule 13-1 in the DV POP. Rule 13-1B regulates new dairy farming activities across the Region.

13. Appellants¹⁵ seek to have further water management sub-zones captured by regulation and request that those intensive farming activities (cropping, market gardening and intensive sheep and beef) be governed by a rule equivalent to NV-POP as refined by council officers in their end of hearing report. The concern raised by these appellants is that there is inadequate control to ensure that water quality will be maintained or enhanced as required by the NPS Freshwater and the POP needs to address this. I propose a policy solution to deal with the capture of other land use activities and other water management sub-zones over time.
14. Further work undertaken by Dr Roygard, Ms McArthur and Ms Clark and presented in their joint technical evidence to the Court, confirms that water quality within the water management sub-zones captured in Rule 13-1 which wholly focuses on regulating dairy activities, can as a minimum be maintained and possibly enhanced. The outcome of maintaining and enhancing water quality is dependent upon setting benchmark N leaching limits for dairy farming activities. Dr Roygard considers that if a single N leaching number were selected then this would need to be in the order of 24 kg of N/ha/year to achieve as a minimum the maintenance of water quality. At this limit across all land use capability classes there will be significant costs for the farming community and the forgoing of economic benefits of maximising use of elite soils. I support the LUC class approach, which incorporates a range of 8 numbers for kg of N/ha/year and that currently applies in the DV POP to new dairy farming, also apply to existing dairy farming.

¹⁵ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157); Andrew Day (ENV-2010-WLG-000158)
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15. I consider the regulatory approach I recommend in my evidence acknowledges and deals with the identified gaps in the policy and rule framework in DV-POP achieves the maintenance and enhancement of water quality and sets a pragmatic course whilst:
- (a) Recognising the tolerances for accuracy is risk prediction in this field.
 - (b) Acknowledging the limitations of even the best regime.
 - (c) Achieving an appropriate weighting of economic impacts and environmental costs.
 - (d) Allowing for improvements to be a journey over time i.e. immediate improvement is not desirable or indeed feasible.

History of POP and key environmental issues

16. I have provided evidence to the Court separately summarising the development of the POP in: *OVERVIEW STATEMENT, AS DIRECTED BY JUDGE BP DWYER (18 MAY 2011)*, dated 15 December 2011.
17. In that evidence I outline the process taken by MWRC during the development of the POP and how this led to identification of four keystone environmental issues: surface water quality degradation, increasing water demand, unsustainable hill country land use and threatened indigenous biodiversity.
18. These environmental issues were identified during extensive early public and stakeholder consultation and confirmed through research by the MWRC's science team.
19. Section 6.1.4 *Water Quality*¹⁶ of the DV POP summarises the issues associated with water quality for the Region as:
- "In the past, the biggest threats to water quality were municipal, (e.g., sewage), industrial (eg., meat works and fellmongers) and agricultural (dairy shed effluent) discharges. Although considerable improvements have been*

¹⁶ Chapter 6, Page 6-4 DV POP
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made to discharges to water, further improvement is still possible and necessary.

The intensification in agriculture during the past 10 to 15 years has been especially marked in the dairy sector. Raising stock numbers increases the quantity of dairy shed effluent requiring disposal, the quantity of stock urine produced (a concentrated source of nutrients), and the opportunities for stock to access water bodies and their beds. The agricultural sector is recognising the impact it is having on the nation's water bodies and has started to act. The dairy sector was the first to respond, with the Dairying and Clean Streams Accord (an agreement between Fonterra, the Ministry for the Environment, Regional Councils and others on an approach to enhance water quality). Such voluntary approaches are one way of lowering nutrient and faecal levels in the Region's water bodies and the Regional Council supports them, although further improvements are needed."

20. Issue 6-1: *Water Quality*¹⁷ in the DV POP further describes the issues associated with water quality as:

"The quality of many rivers and lakes in the Region has declined to the point that ecological values are compromised and contact recreation such as swimming is considered unsafe. The principal causes of this degradation are:

- (a) nutrient enrichment caused by run-off and leaching from agricultural land, discharges of treated wastewater, and septic tanks*
- (b) high turbidity and sediment loads caused by land erosion, river channel erosion, run-off from agricultural land and discharges of stormwater*
- (c) pathogens from agricultural run-off, urban run-off, discharges of sewage, direct stock access to water bodies and their beds and discharges of agricultural and industrial waste..."*

21. The management of water quality through the DV POP occurs through a multi-pronged approach (regulatory and non-regulatory) that focuses on:

¹⁷ Chapter 6, page 6-7 DV POP
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- (a) Maintaining water quality where the existing water quality is at a level sufficient to support the values for rivers. [These values are set out in Schedule AB of the DV POP and are described further in paragraphs 29-31 of this evidence.]
 - (b) Enhancing water quality where existing water quality is not at a level sufficient to support the values in Schedule AB.
22. Paragraphs 24 to 36 in this evidence describe more fully the water management framework within the DV POP.
23. In relation to nutrient enrichment it is noted that it can cause accelerated growth of nuisance plant material and can compromise recreational, consumptive use and life supporting capacity values. Nutrient enrichment of the region's rivers from agricultural land was therefore identified as a key issue requiring management which ultimately led to the genesis of the 13-1 rules and policy provisions.

General outline of the DV POP framework for managing water quality

24. It is helpful to set out, by way of background, the framework within the DV POP for managing water quality.
25. The freshwater management framework for the MWRC Region was developed using a three tier approach as follows (in descending order):
- (a) Define physical management areas known as water management zones using an appropriate resource methodology;
 - (b) Determine water body values (management objectives) for the water management zones through a process of community consultation and scientific survey and analysis; and
 - (c) Develop water quality numerics from published literature and expert review to provide for the values.
26. I will explain the concepts of water management zones, values and numerics in the following paragraphs (27 to 36).

Water management zones

27. To ensure that the water management framework was targeted to the local environment the region was divided into 44 water management zones, which were further subdivided into 124 sub-zones (or sub water catchments). These sub-zones created a physical framework for the application of locale specific water quality objectives, policies and numerics. The sub-zones were derived after considering factors such as catchment geology, land use, population and resource pressure and existing regulatory frameworks¹⁸. Most of the sub-zone boundaries were determined by a multi-disciplinary expert panel of regional council staff, utilising local knowledge.
28. The water management zones are also used by the regional council as the base unit for policy effectiveness monitoring. This is because the physical characteristics of the catchment and resource pressures within the total land drainage area upstream of a particular river site have an overriding influence on the water quality, water quantity and the ecological and recreational values of that site.

Values and numerics

29. Four groups of values were defined for the Region:
 - (a) Ecological (ecosystem).
 - (b) Recreational and Cultural.
 - (c) Water Use.
 - (d) Social/Economic.
30. Each of the four values groups contained several individual values that were identified for particular water bodies. These individual values are set out in Table 1 below.

¹⁸ McArthur K, Roygard J, Ausseil O, Clark M. 2007. Development of Water Management Zones in the Manawatu-Wanganui Region: Rechnical report to support policy development. Horizons Regional Council Report No. 2006/EXT/733. ISBN 1-877413-47-X
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Table 1: Surface water value groups and individual values identified in the DV POP for the MWRC Region, New Zealand. Values highlighted in grey are provided for by specific water quality numerics in Schedule D of the DV POP.

Values Group	Individual Values
Ecosystem Values	Natural State
	Life-Supporting Capacity
	Sites of Significance – Aquatic
	Sites of Significance – Riparian
	Inanga Spawning
Recreational and Cultural Values	Whitebait Migration
	Contact Recreation
	Mauri
	Sites of Significance – Cultural
	Trout Fishery
Water Use Values	Trout Spawning
	Aesthetics
	Water Supply
	Industrial Abstraction
Social/Economic Values	Irrigation
	Stock water
	Capacity to Assimilate Pollution
	Flood Control and Drainage
	Existing Infrastructure

31. The key values (tied to s.5(2)(a)-(c) RMA) have relevant numerics applied using a range of water quality indicators. For example, the life-supporting capacity value has numerics for periphyton, macroinvertebrate community indices, temperature, pH, biochemical oxygen demand, particulate organic matter, soluble phosphorus and nitrogen, ammonia, toxicants, dissolved oxygen and water clarity. These numerics are listed in Schedule D of the DV POP.
32. The term target is used in the DV POP rather than numeric. The term numeric evolved through the mediation process as a term that more clearly defines how the numerics apply in the context of the POP. The NPS Freshwater defines the term target as: *“A limit which must be met at a defined time in the future. This meaning only applies in the context of over- allocation.”* Rather than cause confusion between how the term target applies in the context of the NPS and the POP a new term “numeric” was coined. ‘Numerics’ was the choice of the mediation participants. Policies 6-3 to 6-5 (refer to the wording

in Attachment 1) were the subject of mediation. The intent of these policies is to:

- (a) Where water quality meets the relevant Schedule D water quality numeric the numeric must continue to be met.
 - (b) Where the relevant Schedule D water quality numeric is not met then water quality must be managed in a manner that enhances existing water quality.
33. Fourteen numerics are assigned on a sub-zone by sub-zone basis depending on the values within each sub-zone. For some values the numerics apply region-wide (e.g. the faecal indicator (*E. coli*) and periphyton cover numerics to support the contact recreation value). A further four numerics relate only to reaches of rivers identified for the trout spawning value between the months of May and September (inclusive).
34. Numeric limits were determined from published literature, expert opinion and assessment of existing monitoring data against established guidelines such as the ANZECC (2000) Guidelines¹⁹ or the New Zealand Periphyton Guidelines.²⁰ They were the subject of robust scrutiny by many experts through the hearing process including through peer review by external water quality experts including John Quinn, Rob Davies-Colley, Graham McBride, John Zeldis, Barry Biggs, Roger Young and Bob Wilcock.
35. The practicality and affordability of monitoring each numeric was considered at the time the numerics and related policies were developed.
36. The numerics are applied as absolute standards in the context of permitted activities and are threshold limits for assessment through the resource consent process.

¹⁹ ANZECC 2000. Australia and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council. Agriculture and Resource Management Council of Australia and New Zealand. ISBN 09578245 0 5.

²⁰ Biggs, BFJ 2000. New Zealand Periphyton Guidelines: Detecting, monitoring and management enrichment of streams. Prepared for the Ministry for the Environment by the National Institute of Water and Atmospheric Research (NIWA).

Water quality indicators

37. As noted in paragraph 33 above the numerics are applied using a range of water quality indicators. There are a number of indicators of the quality of freshwater ecosystems that can be measured in various ways in rivers and streams. Physicochemical indicators are traditional measurements of water quality taken either by collecting samples from the river for laboratory analysis or recorded in the river using meters or probes. Some parameters can also be continuously monitored over time with permanent in-river probes.
38. These methods are used to determine the concentrations of contaminants such as N, P, faecal bacteria or sediment and to measure physical characteristics of the water such as pH, dissolved oxygen or temperature. Physicochemical indicators are particularly useful for explaining the influence of physical and chemical stressors on the biology and functioning of river ecosystems, and for tracing the potential sources of contaminants.
39. Monitoring of biological indicators has been used for a number of years in rivers and is commonly known as biomonitoring. Aquatic macroinvertebrate, periphyton and fish communities are commonly monitored throughout the country to assess the state and health of rivers. Bacteria and other organisms can also be used for this purpose. The advantage of biological indicators is that they assimilate the full range of physical and chemical conditions in a river over time and can provide a more integrated and in many cases longer term picture of ecosystem health.
40. In the case of aquatic macroinvertebrates, indices have been developed to provide guidance on what the community of organisms being measured is saying about the state of the river (i.e. the Macroinvertebrate Community Index or MCI and its variants). For periphyton the amount of cover across the river bed or chlorophyll *a* (a photosynthetic pigment) produced gives a measure of the degree of nuisance growth and thereby the degree of adverse effects on river values. Biological indicators such as invertebrates or periphyton also provide excellent mechanisms to measure the effectiveness of management objectives over time as they are direct measurements of in-river

outcomes. Hence their usefulness as water quality indicators within the policy and rule framework of the DV POP.

41. Rivers and streams perform various ecosystem functions, including processes such as decomposition, nutrient cycling and metabolism. Functional indicators measure the rates of these processes to help determine what catchment characteristics or inputs to the ecosystem are driving metabolic processes. Ecosystem metabolism is a functional measure of the main factors controlling dissolved oxygen in rivers and is a useful indicator of river ecosystem health that is measured by monitoring the daily changes in oxygen. The fluctuation of dissolved oxygen depends on the amount of photosynthesis (production of oxygen by algae during the day) and respiration (use of oxygen by algae and other organisms at night) within the river. High rates of primary productivity occur when there is plenty of light and nutrients available to support algal growth.
42. Significant rates of gross primary productivity and ecosystem respiration were found in the upper Manawatu River, indicating adverse effects on the ecosystem function as a result of high inputs of organic matter from point and diffuse sources upstream. For more information on functional indicators see the evidence of Dr Young (paragraphs 10-36 in the revised s.42A report dated January 2010 and appended as Attachment 4).

What are the effects on water quality from nutrient enrichment? Why is it a problem?

43. Freshwater ecosystems contain communities of fish, aquatic macroinvertebrates (e.g. insects, molluscs and worms), periphyton and aquatic plants (macrophytes). Periphyton is the community of organisms which grows on river beds and is made up of algae, fungi, bacteria, diatoms and cyanobacteria. Periphyton is the primary productive base of many river ecosystems and like plants it uses sunlight and carbon dioxide to grow. Although it is a natural part of freshwater biodiversity, nuisance proliferations can occur in unshaded rivers if low flood frequency and elevated nutrient conditions prevail.

44. Accelerated periphyton growth and accumulations of thick, slimy mats are common responses to increases in N and P from intensive land use. Where nutrient-enhanced periphyton growth exceeds the rate of removal by aquatic invertebrate herbivores, floods or desiccation (during extreme low flows), periphyton can increase to nuisance levels. Some of the common effects of nuisance growth include:
- (a) loss of aquatic biodiversity and habitat quality, resulting in low measures of macroinvertebrate health;
 - (b) production of toxins or irritants that affect recreation and stock and human drinking water supplies;
 - (c) impairment of fishing and the quality of food for trout;
 - (d) increased fluctuations in dissolved oxygen and pH between day and night and subsequent adverse effects on aquatic animals; and
 - (e) clogged water intakes for irrigation, water supply or industry.
45. River flow has an overriding influence on the growth and biomass of periphyton. High flows remove periphyton from the river bed through abrasion, scouring and bed movement and periphyton generally increases with time since the last flow disturbance (accrual time). During these periods the concentrations of N and P strongly influence the rate of periphyton growth. Light is another factor that limits periphyton growth and in small streams riparian shading can limit the effects of nutrients on periphyton. However, in larger streams and rivers, riparian vegetation does not provide enough channel shading to limit growth. For more detailed information on the effects of nutrients on periphyton and aquatic ecosystems see the s. 42A evidence of Dr Biggs (paragraphs 18-26²¹).

Nitrogen

46. N is one of the main nutrients that can result in increased rates of periphyton growth. N is an essential plant nutrient that is available for immediate uptake when in soluble inorganic forms (nitrate, nitrite or ammonia). A summary of the effects of nutrient enrichment of freshwater are discussed in paragraphs

²¹ TEB. V. 2 p. 961-965
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44 to 45 above and a detailed explanation of the N cycle can be found in the s. 42A evidence of Dr Clothier, paragraphs 53-72²². Put simply, N inputs to soil can come from fertilisers, legume fixation, rainfall, and atmospheric deposition, the breakdown of plant material and stock dung and urine. Inorganic N within the soil solution (water within the soil) can change state as a result of nitrification (ammonia to nitrate) or de-nitrification (nitrate released as nitrogenous gases) by soil microbes. N is removed from the system by release to the atmosphere, uptake by plants and consumption by farm animals and leaching loss beyond the root zone of plants. It is the effects of N loss beyond the root zone of the plant on water quality that is at issue.

State and trends of water quality including water quality issues in targeted water management sub-zones (those captured by Rule 13-1)

47. In order to understand what drove the approach taken to managing water quality in the NV POP and as now contained in the DV POP it is necessary to have an understanding of the state and trends of water quality in the region. The following also provides a summary of the water quality issues in relation to the targeted water management sub-zones identified in Table 13.1 and in which dairy farming land uses are regulated. I will also in this section outline how the assessment of the state and trends in water quality led to the selection of specified catchments in the NV POP and how further work by Dr Roygard, Ms McArthur and Ms Clark (as presented in their evidence) confirms the inclusion of the specified catchments in the DV POP .
48. Water quality is variable across the region. Generally, the headwaters of most rivers have excellent water quality. There are, however, a number of catchments where water quality is poor including the Manawatu River and its tributaries. Catchments with degraded water quality have high proportions of pastoral land use and/or significant point source discharges that cause nutrient, faecal and sediment contamination, which in turn affects the ecological and recreational values of the rivers.

²² TEB. V. 3 p. 1544-1549

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49. In some catchments with elevated nutrient levels, for example the Mangatainoka or the Waikawa Rivers, the proportion of the catchment in intensive land use (i.e. dairying) is closely associated with poorer water quality. Catchments with such associations were selected as target catchments for nutrient management through the POP and are discussed in more detail below and in the joint technical evidence from Dr Roygard, Kate McArthur and Maree Clark.
50. An analysis of water quality from 88 sites in the Region against that found at 891 sites nationally found that the number of sites with poorer water quality in the Region was broadly consistent with the state of water quality nationally. National patterns in water quality show a strong and undeniable association between pastoral land development and elevated N and P, particularly at lowland sites. Data from nationally monitored sites in the region show increasing N trends at sites in the upper, middle and lower Manawatu catchment where it is strongly correlated to pastoral land development. It is acknowledged that water quality trends are more variable at other sites.
51. To determine the state of water quality in relation to biological indicators at sites around the region, the mean MCI score for the site was compared to the NV POP MCI and periphyton numeric. The MCI score gives an indication of the pollution tolerance of aquatic animals. Sites with a low score (below the standard) mean there are few pollution sensitive animals at that site. Of the 48 sites monitored across the region, only 44% met the MCI standard. Thirty two per cent of the 56 periphyton monitoring sites never exceeded any of the three standards. A further 30% exceeded one or more standards on more than five occasions over three years of monitoring.
52. The physicochemical, biological and functional indicators mentioned in paragraphs 37 to 42 above can be used to illustrate evidence of poor water quality in a target catchment. The following example is from the upper Manawatu target water management sub-zone, specifically the Manawatu above Hopelands.
53. Using the findings for the Manawatu at Hopelands the general conclusions that can be reached are:

- (a) The approach taken in the DV POP will not maintain or enhance water quality based on annual averages for N loads.
- (b) If all dairy is captured in the regulatory framework for N loss then water quality will be improved. There will also be improvement by 2030 and this scenario also allows for an 11% expansion in dairy.
- (c) If the approach taken in the NV POP to capturing all land use activities (cropping, market gardening and intensive sheep and beef) were adopted then in 20 years time the outcomes in terms of water quality would be the best out of all of the scenarios. Although it is noted that the NV POP year 1 outcomes are not as good as the proposed approach if that approach is implemented immediately.
- (d) In terms of a single number, any number selected below 24 kg of N/ha/year will result in water quality improvements. If a number above 24 is selected then water quality will degrade assuming there is 11% expansion of dairy.
- (e) All of the do nothing scenarios result in degraded water quality by 2030 by varying degrees depending on increases in production and subsequent loss rates.

Note: There are two water management sub-zones presented in the modeling scenarios for the Tiramea at Hopelands and the Mangahao at Ballance which are not target water management sub-zones contained in Table 13.1. They are included in the scenarios as they are necessary to calculate the numbers for the Manawatu at Upper Gorge.

54. The selection of the targeted catchments for nutrient management through the POP was based on a range of factors assessed by a MWRC staff team. The key selection criterion was identified poor water quality where diffuse sources were a major contributor. Information from state of the environment monitoring, water resource assessments, water quality trend analyses, contact recreation monitoring and reports in relation to specific point sources were used to determine which catchments were at risk of N and P contamination and affected by poor water clarity. Further information on the selection of the target catchments can be found in paragraphs 310-315 of the s.42A report of Dr Roygard²³.

²³ TEB. V. 1 p. 365-367
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55. The evidence of Dr Roygard, Ms McArthur and Ms Clark confirms that the water management sub-zones in Table 13.1 have poorer water quality and therefore they should be retained.

The differences in the approach taken in the NV POP to addressing outputs from intensive farming in specified catchments, and the DV POP including proposed changes to addressing outputs from dairy farming in specified catchments

56. In the NV POP four intensive farming activities were captured in the rules. The evidence presented in the TEB to the Court provides details of the original scientific approach taken to determine the contributions of nutrient lost to water from various land use activities is outlined in the s. 42A evidence of Dr Clothier, paragraphs 88 – 108²⁴ and Dr Roygard paragraphs 285 – 290²⁵. Clothier et al (2007)²⁶ used simultaneous equations from nutrient load and land use information in two areas of the upper Manawatu catchment along with researched average N losses from different land uses to determine attenuation factors between nutrient input to land and nutrients reaching surface water.
57. The methods for calculation of nutrient loads to rivers is detailed in the s. 42A report of Dr Roygard (paragraphs 231 – 241²⁷) and the refined load calculation methods are discussed in detail in the joint technical evidence to the Court dated February 2012.
58. In the joint statement of evidence by Dr Roygard, Ms McArthur and Ms Clark, Dr Roygard has outlined why the original scientific approach has been modified and outlines the additional science used to determine the leaching losses from various land uses in the target catchments. Dr Roygard has used a method that is less reliant on literature estimates for nutrient loss rates for particular land uses. Instead the method uses the available land use and in-river nutrient load data from catchments with large proportions of specific

²⁴ TEB. V. 3 p. 1553-1559

²⁵ TEB. V. 1 p. 349-351

²⁶ Clothier B., Mackay A., Carran A., Gray R., Parfitt R., Francis G., Manning M., Duerer M. and Green S. (2007) Farm strategies for contaminant management. *A report by SLURI (Sustainable Land Use Research Initiative) for Horizons Regional Council.*

²⁷ TEB. V. 1 p. 320-326

land use types to derive loss rates for land uses such as forestry (native and exotic) and sheep and beef farming.

59. The terms used by Dr Roygard in his statement of evidence in relation to nutrient loads are defined as follows:
- (a) The current load calculated from water quality samples and flow is the “measured load”.
 - (b) The “target load” is that which is calculated using river flow and the concentration-based standards from Schedule D DV POP.
 - (c) The “point source load” is the amount of nutrient entering the river from known point sources determined from water quality samples and discharge flow rates.
 - (d) The “non-point source load” is the amount of nutrient entering the river from all diffuse sources in the catchment and is determined by removing the point source load from the measured load.
60. Nutrients lost from various land uses in a catchment make their way via diffuse transport mechanisms which include over land flow (also known as run-off) and leaching through soils into sub-surface groundwater and thereby into surface water. Depending on a number of variables, including soil type, rainfall, hydrology, farming systems and whether the nutrient in question is N or P, not all of the nutrients lost from land end up in the river.
61. The amount captured by plant uptake or bound to soils before reaching water is known as the ‘attenuation’ factor (for more information see the s. 42A evidence of Dr Clothier paragraphs 88 to 92²⁸ and the joint statement of evidence by Dr Roygard, Ms McArthur and Ms Clark).
62. By measuring the flow and concentrations of N and P in rivers, a ‘load’ of nutrient (less attenuation) can be calculated. Likewise by using concentration-based nutrient standards and flow information desired “standard loads” can be determined over specified (annual in this case) timescales for each catchment.

²⁸ TEB. V. 3 p. 1553-1554
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63. In-river loads will include all sources of nutrients (both diffuse and point source). The concentrations and flow rates of point source discharges can also be used to estimate point source loads of N and P. In order to calculate a total diffuse (non-point source) load the known point source load is removed from the load measured in the river.
64. When the amount of different types of land use and the load from point sources are known, assumptions and scenarios about attenuation and leaching loss rates can be used to apportion loads to different land use types and to predict changes in river nutrient loads from changes in land use. Methods, assumptions and calculations are included in the joint evidence statement of Dr Roygard, Ms McArthur and Ms Clark.
65. The result is a methodology for calculating N loss limits according to the potential of soil types within a water management zone and customised to an individual property to support production.
66. DV POP adopts an integrated approach to dealing with the outputs from new intensive farming activities through setting a requirement for compliance with the specified cumulative N leaching maximum for the land. The DV POP does not however, take the same integrated approach for existing dairy farm activities. The history of the evolution of the two rules regulating these activities is provided in the next section.

History of the evolution of Rules 13-1 and 13-1B from the NV POP to DV POP

67. Rules 13-1 and 13-1B require resource consent as a controlled activity for existing dairy farms within targeted catchments and new dairy farms across the Region. Controls by means of resource consents focuses on land use activities with the potential for high nitrogen leaching with the aim of progressing towards the achievement of the maintenance and enhancement of water quality within the targeted catchments.

68. There have been a number of changes made to Rules 13-1 and 13-1B between the approach taken in the NV POP and the DV POP. These differences are summarised and compared in Table 2 below.

Table 2: Comparison of the approach taken to Rules 13-1 and 13-1B and supporting provisions between the NV POP and DV POP

NV POP	DV POP
<p><u>Table 13.1 Water Management Sub-Zones.</u> 36 targeted water management sub-zones (11 catchments).</p>	<p><u>Table 13.1 Water Management Sub-Zones.</u> 24 targeted water management sub-zones (seven catchments)</p>
<p><u>Table 13.2 Cumulative Nitrogen Leaching Maximum by Land Use Capability Class.</u></p> <p>Applied to both new and existing dairy farming. There were four suites of nitrogen leaching rates, applying firstly when Rule 13-1 commenced in a specified catchment (year 1) and thereafter at years 5, 10 and 20. The N leaching rates got more restrictive over the 20 year time frame which recognised that time was required for farmers (particularly existing farmers) to implement the necessary mechanisms to reduce N loss.</p>	<p><u>Table 13.2 Cumulative Nitrogen Leaching Maximum by Land Use Capability Class.</u></p> <p>Applies only to new dairy farming. One different leaching rate applies to each of the eight LUC classes (there is only one row of numbers, they are not staged over 20 years).</p>
<p><u>Activities Captured by the Rules.</u></p> <p>The rules covered dairy farming, cropping, market gardening and intensive sheep and beef farming.</p>	<p><u>Activities Captured by the Rules.</u></p> <p>Dairy farming (new and existing).</p>

NV POP	DV POP
<p data-bbox="395 327 874 472"><u>Farmer Applied Resource Management Strategy (FARM Strategy).</u></p> <p data-bbox="395 521 874 763">The FARM Strategy was a tool used within the rules to identify and manage nutrient, sediment and faecal bacteria loss and prepared for each farm.</p>	<p data-bbox="911 327 1396 472"><u>Farmer Applied Resource Management Strategy (FARM Strategy).</u></p> <p data-bbox="911 521 1396 667">No longer included. It has been replaced with a requirement for a nutrient management plan.</p>
<p data-bbox="395 815 874 904"><u>Staggering of Dates when the rules came into force.</u></p> <p data-bbox="395 954 874 1144">Table 13.1 included a column which staggered the dates the rules came into force across the different sub-zones (from 2009 to 2015).</p>	<p data-bbox="911 815 1396 904"><u>Staggering of Dates when the rules came into force.</u></p> <p data-bbox="911 954 1396 1518">No longer included. The Hearing Panel noted that as Table 13.1 now only applied in relation to new dairy farms there was no need for the phase in period as it would apply from when an application is received for a new dairy farm. I discuss (at paragraphs 127 to 129) the need for the staggering of dates within Table 13.1 if my proposal to apply this table to existing dairy farming is accepted.</p>
<p data-bbox="395 1570 874 1603"><u>Activity Status for the Rules.</u></p> <p data-bbox="395 1653 874 1843">Controlled and then Discretionary (under Rule 13-27) if the activity could not comply as a Controlled Activity.</p>	<p data-bbox="911 1570 1396 1603"><u>Activity Status for the Rules.</u></p> <p data-bbox="911 1653 1396 1843">Controlled and then Restricted Discretionary (under Rules 13-1A and 13-1C) if the activity does not comply as a Controlled Activity.</p>

NV POP	DV POP
<p data-bbox="391 327 879 465"><u>Reference to “reasonably practicable” in relation to Nutrient Management.</u></p> <p data-bbox="391 517 879 757">Not included. The rule required compliance with the Table 13.2 nitrogen leaching maximum and compliance with the FARM Strategy workbook.</p>	<p data-bbox="906 327 1401 465"><u>Reference to “reasonably practicable” in relation to Nutrient Management.</u></p> <p data-bbox="906 517 1401 972">Control is reserved under Rule 13-1 (for existing dairy farms) to the implementation of reasonably practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses from the land. A nutrient management plan must be prepared.</p>

69. Included in paragraphs 108 to 141 of this evidence are the reasons in for the decisions²⁹ given by the hearing panel for making the changes between the NV POP and DV POP for each of the issues identified in Table 2 above.
70. The Court has available to it the choice of reverting back to the approach taken in the NV POP (and some appellants³⁰ seek this), retaining the wording and approach of the DV POP as it stands or taking a different approach within the scope of appeals. I consider there are sound reasons for retaining the general approach of the DV POP (which was developed to address the concerns of many submitters) but with further refinement to address specific concerns raised in appeals and to achieve a more complete and robust nutrient management regime for dairy farming in specified catchments as a necessary and sufficient first step in achieving the settled planning goals of maintaining and improving surface water quality.

²⁹ Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for the Decisions, August 2010

³⁰ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157); Andrew Day (ENV-2010-WLG-000158)
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71. Before addressing my proposed alterations to the policy and rule framework I will provide a description of what is meant by natural capital, LUC and the FARM strategy as these are concepts that influence the selection of a policy and rule framework.

Natural capital and land use capability

Natural Capital

72. One appellant³¹ questions the approach taken to connecting natural capital and LUC in the DV POP, which is applied to new dairy farming, and particularly seek that it not apply to existing dairy farming. I explain in this section, by way of background, what is meant by natural capital and how LUC fits in to express the definition of natural capital.
73. The natural capital approach is a framework that recognises the different environmental services of natural resources as a basis for achieving sustainable management. Natural capital has been defined as:
- “The renewable and non-renewable stocks of natural resources that support life and enable all social and economic activities to take place. It includes rivers, lakes and aquifers, soil, minerals, biodiversity and the earth’s atmosphere.”³²*
74. The natural capital concept was applied in NV-POP to manage nutrient leaching. The differences in the natural capital of soils is the productivity differences arising from the inherent qualities of soil texture, organic matter, content and depth as categorised in the LUC classification system. Dr MacKay in his evidence uses a proxy for productivity and therefore natural capital:
- “...the ability of the soil to sustain a legume based pasture fixing N biologically under optimum management and before the introduction of additional technologies. A legume based pasture is a self regulating biological system*

³¹ Federated Farmers of New Zealand (ENV-2010-WLG-000148)

³² *Growing for Good. Intensive Farming, Sustainability and New Zealand’s Environment.* Parliamentary Commissioner for the Environment. October 2004. P.21
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*with an upper limit on the amount of N that can be fixed, retained, cycled and made available for plant growth.*³³

75. The introduction of technologies such as irrigation, drainage, N fertiliser, wintering pads, off-farm grazing and imported feeds all have the potential to lift pasture and livestock production levels above the inherent productive capacity of the pasture system or to overcome climatic limitations. Dr Mackay then compares those soils with a high and low natural capital and concludes:

*“Soils with high natural capital have high absorption capacity and primary production levels and minimal environmental impacts. Conversely, soils with lower natural capital, such as shallow and stony, or sandy soils have limited ability to store nutrients and water. These soilsrequire more frequent irrigation and additional nutrients to compensate for losses and inefficiencies.”*³⁴

Elite soils are low input, high output soils that require less mitigation to achieve maximum output. The converse is true for less versatile soils. The natural capital approach acknowledges these differences in capacity of soils to provide ‘environmental services’ (including economic benefits) to the community in setting N loss limits.

Land Use Capability (LUC)

76. The Land Use Capability (LUC) Classification system is defined as: *“a systematic arrangement of different kinds of land according to those properties that determine its capacity for long-term sustained production. Capability is used in the sense of suitability for productive use or uses after taking into account the physical limitations of the land.”*³⁵
77. The LUC index assesses aspects of rock types, soils, landform and slopes, erosion types and severities and vegetation cover. The LUC assessment is supplemented with information on climate, flood risk, erosion history and the

³³ TEB v. 3 p. 1602-1603.

³⁴ TEB v. 3 p. 1625-1626.

³⁵ Lynn, I. Manderson, M. Page, M Harmsworth, G. Eyles, G. Douglas, G. MacKay, A. and Newsome, p (2009). Land Use Capability survey Handbook – A New Zealand handbook for the classification of land. 3rd ed. AgResearch (Hamilton), Landcare Research (Lincoln) and GNS science (Lower Hutt) p. 8.

effects of best practices. There are eight LUC classes. Class I has no limitations through to Class VIII which has many limitations to production.

78. As the limitations to use increase (i.e. as the classes increase from I to VIII) the underlying productive capacity and the ability of the soil to sustain a legume based pasture system declines. Also as the classes increase from I to VIII the potential N leaching loss declines without the introduction of additional technologies. Class I and II soils have the greatest capacity to limit leaching losses because:

*"... with high natural capital it will produce more and require less input for output at a given level of production. Agricultural production on versatile soils (i.e. soils with high natural capital) requires lower levels of inputs (e.g. fossil fuels, fertilisers and irrigation water) per unit of output than soils with lower versatility (i.e. with low natural capital)."*³⁶

79. The following series of paragraphs are contained in Dr Mackay's s42A report and supplementary evidence to the Hearing Panel. The quotations lead to the conclusion that for the same level of production N leaching will be higher on soils with less natural capital and soils with higher natural capital require fewer inputs and have less of an environmental footprint.

*"The cost of technologies generally increases, as does the production benefit, as the natural capital of a soil declines..."*³⁷

*"There is substantial evidence to show there has been no measurable increase in the level of pasture production from our legume based pastures over the past 50 years..."*³⁸

"On that basis, the estimates of the potential productive capacity of a legume-based pasture, fixing N biologically under a "typical sheep and beef farming system", for each Land Use Capability (LUC) unit in New Zealand listed under "attainable potential carrying capacity" in the extended legend of the Land Use Capability are still very relevant today. They are not dated, as suggested

³⁶ TEB. V. 3 p. 1638.

³⁷ TEB. V. 3 p. 1640.

³⁸ TEB. V. 3 p. 1655.

by some and as a consequence, do provide an excellent proxy for the soils natural capital, before the introduction of other technologies³⁹."

"In sharp contrast to the lack of any increase in the production levels of legume-based pastures, farm productivity continues to increase⁴⁰."

"Nitrogen fertiliser, imported feeds and off-farm grazing enable farm productivity gains beyond that possible with a legume-based pasture alone⁴¹."

"Whereas a legume-based pasture system is self regulated with a ceiling yield and associated N leaching loss that is reflective of the soil's underlying natural capital and local climate (Figure 3), a number of these other technologies (e.g. imported feeds and off-farm grazing) remove the soil and climate limitations, allowing annual farm productivity gains to continue regardless of the soil's underlying productive capacity and ability to assimilate nutrient. There are no limits to the farm productivity gains possible or the environmental impact with limits. Our success in developing production technologies to overcome production constraints has created an environmental problem." [Emphasis Added.]⁴²

80. Mr Grant, in his evidence, provides further explanation of LUC. I understand that specific on farm LUC assessments are a useful farm management tool.
81. The approach taken in POP aims to manage outputs or losses of N. Focusing on losses (rather than input based controls) is considered to provide greater flexibility for farm management. Farmers are then able to consider and customise land uses and management options to achieve loss limits within a given farm. How the focus on outputs translates through the consent process is discussed further in paragraphs 105 to 107 of this evidence.
82. The LUC allocation method has a number of **strengths** including:
- (a) N loss allocations are not linked to the current land use but to the potential of the land resource.

³⁹ Ibid. TEB. V. 3 p. 1656 (para 18)

⁴⁰ Ibid. TEB. V. 3 p. 1656 (para 20)

⁴¹ Ibid. TEB. V. 3 p. 1657 (para 24)

⁴² Ibid. TEB. V. 3 p. 1658 (para 25)

- (b) The method does not target land use, intensity of use, or limit inputs but rather focuses on managing outputs.
 - (c) The method resolves several of the limitations of other options considered for N loss allocation because it provides for continued economic growth, ongoing flexibility of land use and does not penalise current developing or efficient farmers or, conversely, reward inefficient farming enterprises.
83. The LUC allocation method has been criticised for:
- (a) Resulting in unachievable N loss limits for areas of high rainfall on LUC Class IV and above.
 - (b) Being unduly restrictive in the Region's sand country (predominantly along the west coast around Foxton).
84. I address the proposed policy framework for high rainfall and above Class IV LUC land in Table 3 of this evidence. In relation to the region's sand country which is located on the west coast of the region (primarily around Foxton), Mr Grant⁴³ concludes that if the physical limitations are reduced i.e. by re-contouring and irrigation then the LUC class will also be improved. The N leaching numbers that would apply under the new re-classification would then be less restrictive.

Alternatives to the Land Use Capability Approach

85. Another approach to limiting or capping N losses is the "grandparenting" approach. The limit or cap is based on current or historical rates of nitrogen loss. The cap prevents further increases in N loss but without other mechanisms to reduce N losses water quality will not improve. In fact it will get worse where growth in intensive farming is possible in a catchment. A full analysis of the range of options for managing N loss is contained in Dr McKay's s.42A report⁴⁴.

⁴³ Paragraph 74 of Mr Grant's Evidence to the Court dated 31st January 2012.

⁴⁴ TEB V. 3 p. 1593-1648

86. Grandparenting is an approach used in the Lake Taupo catchment by Environment Waikato. The first nutrient management regime considered by the Environment Court. The scope of the debate was limited by the original design parameters of the regime. Some of the limitations of this option have been overcome by implementing a N trading regime (whereby farmers can buy and sell N loss rights) and by setting up a public fund (partially funded by the New Zealand Government) to purchase some of those N loss rights, thereby reducing the total amount of N in the system over time. The environmental and administrative success of that regime remains to be seen. It is not considered viable as a region wide mechanism to manage agricultural land uses within catchments so that limits on nutrient leaching are recognised and to ensure farming is placed on a sustainable nutrient management footing while also maximising the regions economic potential from effluent use of elite soils.
87. The grandparenting approach was not considered to be an appropriate response in the Manawatu-Wanganui Region for the following reasons:
- (a) Grandparenting failed to allow for future growth options and flexibility of land use. It is not focussed on resources and their use but current use. For example, it was identified by Dr MacKay in his evidence that there is significant potential for future development in the Upper Manawatu River catchment and estimates were that the opportunity could contribute \$105 million per annum into the regional economy. It was considered that this potential would be unlikely to be realised under a grandparenting scenario.
 - (b) There are many more properties involved in this Region (35 water management zones containing a total of over 500 landowners) compared to the Lake Taupo example (one catchment with approximately 80 farms) so setting up a similar scheme would be administratively more difficult.
 - (c) A large public fund would also need to be made available to purchase N loss rights to make progress towards meeting water quality standards for soluble inorganic N.

- (d) The grandparenting option was considered to be less efficient than the LUC allocation method because while it recognises historical investment in production, it fails to recognise investment in N loss mitigation and does not provide equal opportunities for all land users to consider alternative land use options.
88. A comprehensive grandparenting regime was not advanced by any party to the hearing panel and is not an option I understand is advanced by any party to this hearing. I am unaware of any other system of management worthy of being called a 'nutrient management regime' that was put before the hearing panel or fully developed through the submission process based on detailed science including an examination of the likely surface water quality and economic outcomes.

The Farmer Applied Resource Management (FARM) Strategy

89. In the NV POP Rule 13-1 included as a standard the requirement for the activity to be undertaken in accordance with a FARM Strategy which was prepared to meet the requirements set out in the FARM Strategy Workbook (prepared by MWRC – 2007). The FARM Strategy was a reporting tool to complete farm-specific assessment of factors that may contribute to non-point source contamination of water. The FARM strategy covered a range of factors e.g. stock access to water bodies, management of effluent and nutrient losses.
90. The Hearing Panel replaced the FARM Strategy approach with the requirement for the preparation of a nutrient management plan and this is included in Rules 13-1 and 13-1B. The term "nutrient management plan" is defined in the DV POP as:

"Nutrient management plan means a plan prepared annually in accordance with the Code of Practice for Nutrient Management (NZ Fertiliser Manufacturer's Research Association 2007) which records (including copies of the OVERSEER input and output files used to prepare the plan) and takes into account all sources of nutrients for dairy farming and identifies all relevant nutrient management practices and mitigations, and which is prepared by a

person who has both a Certificate of Completion in Sustainable Nutrient Management in New Zealand Agriculture and a Certificate of Completion in Advanced Sustainable Nutrient Management from Massey University.”

91. Whilst the FARM Strategy was tailored to regional requirements and the Code of Practice for Nutrient Management has a particular emphasis on fertiliser use, the requirement for a nutrient management plan generally covers off the same breadth of factors to deal with non-point source contamination e.g. nutrient losses. In practice, MWRC staff are working with farmers in the implementation of Rule 13-1B and the nutrient management plans being developed by applicants are covering off the requirements specific to the Region. The development of the nutrient management plans is, in the experience of the MWRC, now working well in practice after some initial teething problems. I comment further on the implementation of Rule 13-1B which includes a requirement for a nutrient management plan in paragraphs 105 to 107 of this evidence.
92. There is a related issue in relation to Rule 13-1 as to how the matter of control over *“the implementation of reasonably practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses”* will be interpreted. I deal with this matter in paragraphs 118 of my evidence.

An assessment of the National Policy Statement on Freshwater Management (2011)

93. The NPS Freshwater contains two objectives (supported by a number of policies) as follows:

“Objective A1

To safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water, in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2

The overall quality of fresh water within a region is maintained or improved while:

- a) Protecting the quality of outstanding freshwater bodies*
- b) Protecting the significant values of wetlands; and*
- c) Improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.”*

94. The NPS Freshwater requires:

- (a) Water quality and quantity limits to be established for freshwater bodies.
- (b) Water quality to be improved in catchments that are over allocated in terms of both water quality and quantity. This will mean that any decision made cannot result in any future over-allocation and also requires a reduction over time in over-allocated catchments.
- (c) The establishment of timeframes by which over-allocated catchments are reduced to the established limits.

95. The NPS refers to over-allocation as being: *“a point where freshwater objectives are no longer being met and this applies to both quantity and quality”*. 55 out of a total of 124 water management sub-zones across the region do not meet either one or both nutrient standards and many fail the contact recreation standards for *E. coli* i.e. they are currently over-allocated for these parameters.⁴⁵

96. The regional council must give effect to the NPS Freshwater. I have given careful consideration to whether the POP does give effect to the NPS. My conclusions, which I have also voiced in forums including the Regional Mayors and Chairs Forum at Rangitikei District Council on 16 September 2011, are:

- (a) The targets (numerics) for water quality are set in Schedule D of the DV POP. In the case of the DV POP, where water quality targets are exceeded, it can be assumed that the resource is over-allocated. The

⁴⁵ TEB. V. 2 p. 731

DV POP contains a robust framework for identifying when water quality is over-allocated and how these situations are to be managed. Policies in Chapter 6 DV POP (specifically policies 6-3 to 6-5) set out a framework for dealing with specific situations where there is over-allocation and these policies link to the Schedule D numerics. In relation to the framework in the DV POP I consider the POP gives effect to the NPS Freshwater.

(b) The DV POP however, in my opinion, does not specify timeframes by which over-allocated catchments are to reach established levels.

97. The provisions of the POP are inter-related to the extent that if one part is altered then the overall strategy (to maintain and enhance water quality) begins to 'unravel'. To some extent the decision made by the hearing panel to remove certain intensive land use activities (cropping, market gardening and intensive sheep and beef farming) and remove a number of sub-zones from the regulation captured under Rule 13-1 has 'unravelling' the linked provisions. This has a consequential effect of reducing the efficacy by which the DV POP gives effect to the NPS Freshwater. I do not consider this unravelling effect to be unacceptable. I consider it necessary to bolster the focus of the regulatory framework on dairy by proposing policies that signal that additional land uses and water management sub-zones may be added to the framework over time as further monitoring and assessment work is completed and I have set a timeframe of 30 June 2017 to initiate a review of the Plan. I include the specific changes to the policies in Attachment 1. I consider that with these changes the POP will give effect to the NPS Freshwater and the interrelated nature of the DV POP. This will also enable sufficient time for the regional council to 'bed down' the regulatory regime as it applies to dairy farming.
98. In addressing the absence of timeframes within the DV POP, I propose additional provisions within Policy 6-7 which link the achievement of N leaching rates to the common catchment expiry dates within the DV POP. The proposed wording for Policy 6-7 is contained in Attachment 1.
99. Based on the evidence of Dr Roygard the N leaching loss limits set in Table 13.2 do as a minimum maintain water quality in the targeted catchments and therefore gives effect to the NPS Freshwater.

100. Referring back to the guiding principles I had in my mind in preparing this evidence (refer paragraph 10), I consider that with the changes to the policy framework as I propose, the policy framework will allow for improvements over time. This also reflects the approach taken in the NPS Freshwater which requires full implementation of the provisions of the NPS Freshwater by 31 December 2030 i.e. improvement takes time.
101. In the case of existing dairy farming it is appropriate that the policy framework provides for compliance with the N leaching loss limits whilst also recognising particular constraints e.g. high rainfall which require time and an assessment of the economic impacts. This links to another of my guiding principles set out in paragraph 10, of the need for a realistic weighting of the economic impacts of various approaches and the benefits of achieving particular environmental outcomes.
102. I do not consider that the NPS Freshwater requires that any particular activity must wholly shoulder any requirement to achieve the maintenance and enhancement of water quality. Certainly, the framework in the DV POP recognises there are a number of activities that contribute (point and non-point source discharges) to water quality issues and all of which are guided through the approach taken to water management in the DV POP towards maintaining and enhancing water quality.
103. In summary, I consider the DV POP, in conjunction with the amendments I propose to the policy provisions of Chapters 6 and 13, gives effect to the NPS Freshwater.

Analysis – What do Rules 13-1 and 13-1B and the associated policy framework cover? How will the rules be implemented?

What do Rules 13-1 and 13-1b and the associated policy framework cover?

104. The policy framework for the rules is contained in both Chapter 6 *Water* and Chapter 13 *Discharges to Land and Water*. The following provides a summary of the relevant plan provisions (this includes additional proposed policy

provisions as suggested in this evidence): [Note: The proposed and existing wording of these provisions is included in Attachments 1 and 2.]

Table 3: A Summary of the Relevant DV POP Provisions Associated with Rules 13-1 and 13-1B

Relevant DV POP Provision (Including Proposed Additional Provisions)	Comment
Section 6.1.4. Water Quality.	I propose to add a further sentence to this Overview Section to acknowledge that further improvements in water quality require a mix of regulatory and non-regulatory approaches.
Policy 6-7. Dairy Farming land use activities affecting groundwater and surface water.	<p>This policy covers nutrients, faecal contamination and sediment. As this policy is in Part I DV POP (RPS) and provides direction for the Part II DV POP (Plan) I propose the policy include:</p> <ul style="list-style-type: none"> (a) A three year step down approach for existing dairy farms to meet the nitrogen leaching limits. (b) Require dairy farming activities to advance the achievement of the Schedule AB values and the numerics in Schedule D no later than the first ten year anniversary date of the relevant common catchment expiry date in Table 11A.1.

Relevant DV POP Provision (Including Proposed Additional Provisions)	Comment
Proposed Policy 6-7A. Rural land use activities (other than dairy) not affecting groundwater and surface water quality in water management sub-zones listed in Table 13.1.	This proposed policy covers the approach that will be taken to all other rural land use activities within the targeted catchments and a potential need to alter the N leaching limits and that the Plan must be reviewed no later than 30 June 2017.
Proposed Policy 6-7B. Existing dairy farming and other rural land use activities in water management sub-zones not listed in Table 13.1.	This proposed policy specifies that additional water management sub-zones will get captured as targeted catchments where monitoring demonstrates that water quality numerics are not met and the Schedule AB values are compromised.
Proposed Method 6-6A. Lake Horowhenua and Other Coastal Lakes.	A non-regulatory method for the MWRC that signals that MWRC will work with other agencies to protect and enhance Lake Horowhenua and other Coastal Lakes.
Proposed Method 6-6B. Lake Quality Research, Monitoring and Reporting	A non-regulatory method requiring the development of an integrated research, monitoring and reporting programme defining the current state of the Region's coastal lakes.
Policy 13-2C. Management of new and existing dairy farming land uses.	I propose to add to this policy to provide guidance on: (a) The exclusion of dairy cattle from waterbodies.

Relevant DV POP Provision (Including Proposed Additional Provisions)	Comment
	<p>(b) Provide for a three year step down approach for existing dairy farming where they cannot immediately achieve the nitrogen leaching limits.</p> <p>(c) Provide a policy “gateway” for high rainfall and class IV LUC and above land to recognise the particular constraints of this land.</p> <p>(d) Detail the “reasonably practicable” farm management practices that will be considered when an application is made for a Restricted Discretionary activity.</p> <p>(e) Require that the nitrogen leaching rates must ultimately be achieved by the first ten year common catchment anniversary date.</p>
Table 13.1. water management sub-zones.	This table outlines the water management sub-zones captured through rule 13-1 (existing dairy farms). It is proposed to add in a staged date as to when the rules come into force within each sub-zone.
Table 13.2. Cumulative Nitrogen Leaching Maximums by Land Use Capability Class.	Eight different nitrogen leaching number limits apply across the eight LUC classes and it is proposed that these numbers apply to existing as well as new dairy farm activities.
Rule 13-1. Existing dairy farming land use activities.	The specifics of the controlled activity rule are addressed in the remainder of this evidence.

Relevant DV POP Provision (Including Proposed Additional Provisions)	Comment
Rule 13-1A. Existing dairy farming land use activities not complying with Rule 13-1.	Minor consequential amendments are proposed to remove references to grade Ab, Ba or Bb biosolids and add an additional matter of discretion referring to the matters listed in Rule 13-6.
Rule 13-1B. New dairy farming land use activities.	The specifics of the controlled activity rule are addressed in the remainder of this evidence.
Rule 13-1C. New dairy farming land use activities not complying with Rule 13-1B.	Minor consequential amendments are proposed to remove references to grade Ab, Ba or Bb biosolids and add an additional matter of discretion referring to the matters listed in Rule 13-6.

How will the rules be implemented?

105. The consents team at the MWRC have had approximately 18 months of experience in implementing Rule 13-1B which covers new dairy farm activities. The following provides a summary of their experience during that time in implementing the rule:

- (a) A nutrient management plan is prepared by the applicant and it is assessed by MWRC staff. The requirement for a nutrient management plan as part of the application has gone unchallenged. The management plan has proved to be a useful tool to provide for a comprehensive assessment of the activity and an identification of the key farm management practices that need to and will be employed. The specific management practices employed on farm to minimise nutrient loss are locked in to the consent by way of conditions.
- (b) There has been challenge over how to incorporate the farm management practices into the conditions of consent i.e. should the conditions simply require compliance with the management plan or

should the conditions be targeted to the key outcomes in the management plan?

- (c) A set of conditions was initially developed which focused on providing certainty for the consent holder and MWRC. The conditions have however, been modified to provide for greater flexibility. The issue that arose was how could something like a change from planting squash one year to another crop the second year be accommodated without the need for a formal change of consent conditions. The conditions are now framed to allow the consent holder to alter their on farm practices as long as bottom line outcomes (i.e. the N leaching loss limits) are met which was and is the intent of the rule.

106. The consent is for a controlled activity and provided a management plan is prepared properly to deal with the nutrient loss effects then the process only then requires agreement over consent conditions. The process that has been established by the consents team is one of enabling the farmer to operate on a day to day basis with controls put in place to focus on outputs i.e. nutrient loss.
107. It is anticipated that once Rule 13-1 is made operative and is in force, the process which has now been established for Rule 13-1B, will be followed.

Analysis – Why did the Hearing Panel take the approach they did to Rule 13-1?

108. In this section of my evidence I set out the reasons why the hearing panel took the approach it did in making changes to Rules 13-1 and 13-1B, and associated provisions between the NV POP and the DV POP. If you refer to Table 2 at paragraph 68 of my evidence I set out a number of key changes between the two versions of the POP. I use the same heading order as contained within table 2 in the following sections of my evidence. I also refer to applicable technical evidence on each topic to support the approach that has been taken in the DV POP. I wish to note that while I set out the rationale given by the hearing panel in making the decisions they did, I have

arrived at my own conclusions on the approach within the DV POP. My conclusions are reflected in this statement of evidence.

109. For each issue I set out the environmental context for each issue and assess the environmental risk associated with each issue, except where the issues are blurred in which case I just comment. Proposed changes to the DV POP are at paragraphs 156 to 169 of this evidence.

Table 13.1 Water Management Sub-Zones:

110. Summary of issue: Which water management sub-zones should be captured by the rule framework and applied in relation to regulating existing dairy farming? Specifically should the following water management sub-zones be re-included?

- (a) Lake Horowhenua (Hoki_1a and 1b).
- (b) Other Coastal Lakes (West_4 and 5).
- (c) Coastal Rangitikei (Rang_4).
- (d) Mangawhero/Makotuku (Whau_3b, 3c and 3d).

111. Should the following water management sub-zones be deleted?

- (a) The Manawatu above the Gorge (Mana_6, 9a, 9a and 9c).
- (b) Northern Manawatu Lakes (West_6).

112. Environmental context (key features): The following reasons were given by the hearing panel⁴⁶ for the deletion or inclusion of the above water management sub-zones from Table 13.1 and these reasons help inform the environmental context for their retention or deletion:

- (a) Lake Horowhenua (Hoki_1a and 1b). *"Intensive farming land uses comprise 24.5% of the catchment and non-intensive sheep and beef farming comprises 51%. Of the intensive farming land uses, cropping accounts for 3% of the catchment and horticulture 3.5%. We accept that an evidential basis exists for including the Lake Horowhenua*

⁴⁶ Summary of reasons given in section 8.6.9.1 (pages 8-29 to 8-36 of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010 SOE Clare Barton. Surface Water Quality – Non-Point Source Discharges

catchment in table 13.1 provided cropping and horticulture are retained as intensive land uses to be regulated.” As cropping and horticulture were removed from the regulatory approach this catchment was deleted.

- (b) Other Coastal Lakes (West_4 and 5). *“We note that “water quality monitoring data is limited to Lakes Pauri and Wiritoa... We were also advised “Like other coastal lakes in the Region, the hydrological regime and source of contaminant inputs is complex. Until the capture zones of the catchment’s lakes and wetlands are better understood, predicted nitrogen losses from implementation of the FARM strategy cannot be compared with a Standard load Limit or Measured Load.” A combination of a lack of an evidential basis for their inclusion and the low number of dairy farming land uses (which was all that is regulated under the DV POP) were the reasons for the deletion of these sub-zones.*
- (c) Coastal Rangitikei (Rang_4). *“Importantly, we note “The Coastal [Rangitikei] Water Management Zone is subject to a number of significant point source discharges in the mainstem and tributaries... Mrs McArthur also advised us “The implementation of the FARM strategy in the Coastal [Rangitikei] zone is largely driven by the need to ensure land use intensification does not degrade the river any further. The conversion of land use to more intensive forms such as dairying does not necessitate the catchment being included in Table 13.1. Rule 13.1 as notified applies to all dairy conversions Region-wide.” A combination of a lack of an evidential basis for it’s inclusion, the low number of dairy farming land uses and the contributing factor of point source discharges affecting water quality were the reasons for the deletion of these sub-zones.*
- (d) Mangawhero/Makotuku (Whau_3b, 3c and 3d). *“There are only five dairy effluent discharges in the catchment with one of them to water. We do not accept that there is an evidential basis for including the Mangawhero and Makotuku River catchment in Table 13.1. To the extent that water quality problems exist, they seem attributable to the sewage [Ohakune and Raetihi] treatment plant discharges.” A combination of a lack of an evidential basis for inclusion, the low*

number of dairy farming land uses and the contributing factor of point source discharges affecting water quality were the reasons for the deletion of these sub-zones.

- (e) The Manawatu above the Gorge (Mana_6, 9a, 9a and 9c). *“We were concerned that the officers were not able to quantify the diffuse run-off contribution of nitrogen and phosphorus from the land use in this catchment. However, we also note that nearly half of the catchment is in dairying. Therefore, on that basis and as a cautionary measure, we accept that an evidential basis exists for including the Manawatu catchment above Gorge Sub-zones in Table 13.1.”* Dr Roygard in his statement of evidence has provided evidence that quantifies the diffuse run-off contribution of nitrogen from dairy farming land use in this catchment. Given this level of contribution it is considered appropriate that this sub-zone be included in Table 13.1.
- (f) Northern Manawatu Lakes (West_6). *“The “Other Coastal lakes” area also includes the Northern Manawatu Lakes Sub-zone comprising the catchments of Pukepuke and Omanuka Lagoons and Lakes Kaikokopu and Koputara. There is no water quality data for the water bodies in this area apart from the Kaikokopu Stream (the outlet to Lake Kaikokopu). That stream has been monitored for bathing water quality only... Intensive land use (all dairy) comprises 50% of the catchment and non-intensive sheep and beef farming comprises 28%... Therefore, on that basis and as a cautionary measure, we accept that an evidential basis exists for including the Northern Manawatu Lakes Water Management Sub-zone in Table 13.1.”* Ms McArthur in her statement of evidence has provided evidence regarding the significance of the water bodies and coastal water quality data which supports their retention in Table 13.1.

113. Environmental risks: There are environmental risks arising from not including certain sub-zones within Table 13.1. Their non-inclusion means that there is no regulation of existing dairy land use within those catchments and therefore N leaching is not regulated and ultimately this will have an impact on the maintenance and enhancement of water quality.

114. The evidence of Dr Roygard and Ms McArthur sets out the risk of not capturing the Manawatu above the Gorge (Mana_6, 9a, 9a and 9c) and Northern Manawatu Lakes (West_6) sub-zones within Table 13.1. In summary, the risks are:
- (a) The major land use activity within these sub-zones is dairy and the non-inclusion of these sub-zones results in the absence of control over N leaching.
 - (b) Coastal water quality data for the Northern Manawatu Lakes shows that the standards are being breached and the biodiversity significance of the waterbodies warrants protection.
 - (c) Sites within target catchments all exceeded the target loads for N by more than 50 per cent (with the exception of two upstream reference sites) and many also exceeded the phosphorus targets. Of the sites tested (including the Rangitikei target catchment from the NV POP) N was approximately twice to four times the target load. In all cases non-point (diffuse) sources were the key contributors of contaminants.
115. For those reasons I consider that the Manawatu above the Gorge (Mana_6, 9a, 9a and 9c) and Northern Manawatu Lakes (West_6) sub-zones within Table 13.1 should be retained as contained in the DV-POP.
116. In relation to the other sub-zones identified in paragraph 111 above, currently there is insufficient evidential basis to link the land use activities (i.e. dairy) with the water quality issues within those sub-zones. Therefore I do not consider that they should be captured within Table 13.1. I acknowledge that one of my guiding principles as set out in paragraph 10 above is that there is no such thing as “perfect” environmental science and there will always be uncertainty. In this case though it is not just the lack of science around the contribution of dairy within these sub-zones but the low number of dairy farming land uses in these sub-zones that leads to my conclusion that they should not be re-included.
117. I do propose a policy solution to cover these other sub-zones in paragraph 157 of my evidence which I consider better gives effect to the NPS Freshwater than the DV POP provisions.

Table 13.2 Cumulative Nitrogen Leaching Maximum by Land Use Capability Class:

118. Summary of issue: The LUC methodology and the approach taken to the development of the N leaching numbers is set out in paragraphs 76 to 84 of this evidence. One appellant⁴⁷ has criticised the approach and the nitrogen leaching numbers. There has however, been no proven workable alternative methodology put forward by the parties other than a criticism of the LUC approach and that the limits are unduly restrictive.

(a) Environmental context (key features) and the environmental risks associated with each issue:

- (i) One appellant⁴⁸ considers that the approach taken through the use of LUC does not recognise particular constraints either on sand country or in high rainfall areas where the LUC class is IV or above. These are then identified specific potential gaps in the LUC approach.

The evidence of Mr Grant confirms that irrigation on sand country (where wetness is not a limiting factor) will result in the LUC classification being altered. As a result the N leaching numbers that would apply under the new re-classification are less onerous and are achievable for the majority (as covered in case study examples in the evidence of Mr Taylor⁴⁹). If a particular farm in the sand country is unable to meet the controlled activity conditions i.e. the achievement of the LUC N leaching numbers then consent is required as a Restricted Discretionary Activity. In this scenario a nutrient management plan would need to be prepared and there would need to be a demonstration that all potential mitigation measures have been considered. In a planning sense the tests for obtaining consent are not unduly onerous and I do not propose any changes to the DV POP provisions.

⁴⁷ Federated Farmers of New Zealand (ENV-2010-WLG-000148)

⁴⁸ Federated Farmers of New Zealand (ENV-2010-WLG-000148)

⁴⁹ Paragraph 32. SOE of Mr Taylor to the Environment Court dated 2nd February 2012
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It is recognised in the evidence of Mr Taylor⁵⁰ that the achievement (on farm) of the LUC nitrogen leaching numbers is problematic for land in high rainfall areas (areas with an average rainfall over 1500mm per annum). As noted above under these scenarios the controlled activity conditions would not be able to be met and consent would be required as a restricted discretionary activity. Whilst this is not considered unduly onerous in terms of process I do accept that further policy guidance recognising the particular constraints in this situation would be helpful given the larger numbers of existing dairy farms in this scenario. I include the proposed policy approach in Attachment 2.

- (ii) One appellant⁵¹ consider that a single N leaching number is appropriate rather than different numbers applying under each of the eight LUC classes.

With a single N leaching number it would need to be set at a low threshold if the environmental outcome in river of maintenance of water quality is to be achieved. This statement is supported by the scenarios provided in the evidence of Dr Roygard which confirms a single N threshold number of around 24 would need to be set to as a minimum maintain water quality.

This approach is not favoured because it is contrary to the principle of managing the land according to it's natural capital. The effect of a single number will allow all classes of land to be developed for any land use irrespective of it's suitability for that land. Whilst in theory LUC class IV and above land is not leaching any more than the lower classes (i.e. I to III) to achieve similar levels of production will require greater inputs which requires greater reliance on infrastructural assets and imported feed which in turn if the total loadings from a catchment prove to be too high will cause proportionately much greater hardship in future years if the loads have to be reduced to achieve water quality outcomes. For example, in the Upper Manawatu water management sub-zone

⁵⁰ Paragraph 33. SOE of Mr Taylor to the Environment Court dated 2nd February 2012

⁵¹ Federated Farmers of New Zealand (ENV-2010-WLG-000148)
SOE Clare Barton. Surface Water Quality – Non-Point Source Discharges

approximately 16.6% of the catchment is Class II and II conversely 83.4% is Class IV or higher. In the higher class land it is much harder to mitigate the environmental footprint as there are fewer options available. By putting increased inputs in then there are greater environmental risks associated with it. Wise management suggests that we should not be allowing farmers to get in to an awkward situation in the future should more restrictive controls on N loss prove to be required.

If a higher single number were selected then the outcome in river would not result in the maintenance of water quality. The approach of using a single N leaching number is a potential option available to the Court however, in my opinion, it is an option that does not implement the objectives and policies as efficiently as the LUC approach from an economic and environmental perspective.

- (iii) Some appellants⁵² seek to have the LUC N leaching numbers apply to existing dairy farms. Currently Rules 13-1 and 13-1B require as a matter of control that there be the implementation of reasonably practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses from the land. There has been general agreement amongst the appellants and respondent that the term “reasonably practicable farm management practices” is open to inconsistent interpretation and application which is particularly problematic in the context of a controlled activity rule which must be approved. The potential for the term to be open to inconsistent interpretation and application poses a risk for both the farmer, in terms of what will be required of them, and an environmental risk given there is no standard or benchmark used as a measure to work towards the achievement of the maintenance of water quality.

In my opinion, “reasonably practicable farm management practices” in the context of a controlled activity rule (which cannot be declined) is uncertain. The DV POP provides no guidance to an

⁵² Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157); Andrew Day (ENV-2010-WLG-000158)

applicant or council consent's officer as to what is required. In my opinion, "reasonably practicable farm management practices" is a term that could remain in the restricted discretionary rules (13-1A and 13-1C) where there is the ability for particular consideration but it would benefit from a supporting policy in Chapter 13 which helps define what the term means.

The issue then remains as to how to best deal with defining what is necessary for managing nutrient losses for existing dairy farming. Setting a nutrient leaching loss limit is a certain and achievable approach. I note that the hearing panel determined that it was inappropriate to apply Table 13.2 N leaching loss limits to existing dairy farming.

In particular, the hearing panel raised concerns⁵³ about the year 5 and beyond leaching rates in Table 13.2 as contained in the NV POP and stated that it was not appropriate to apply Table 13.2 to existing dairy because⁵⁴:

- (a) *"Dr Mackay's "natural capital" approach is not based on technological changes that have enabled farmers to lift productivity levels since the 1980's.*
- (b) *For existing farms, the "natural capital" approach therefore ignores existing land use and existing levels of farm production. That is inequitable and impracticable.*
- (c) *The officers have taken Dr Mackay's scientifically derived values and arbitrarily amended them to address point (b) which has resulted in Table 13.2 lacking scientific robustness.*
- (d) *The year 5, 10 and 20 nitrogen leaching reduction values were derived arbitrarily and do not relate to the achievement of the Schedule D water quality standards.*

⁵³ Summary of reasons given in section 8.6.9.4 (pages 8-40 to 8-49 of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010

⁵⁴ Summary of reasons given in section 8.6.9.4 (page 8-46 of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010
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- (e) *Around 20% of targeted dairy farms will not be able to meet the year 20 leaching values in a practicable and affordable manner.*
- (f) *The achievement of the year 20 leaching values will not resolve the actual environmental issues of concern (namely the high soluble inorganic nitrogen levels and levels of periphyton in the affected rivers) for those few rivers where Council has been able to assess the effect of Rule 13-1. In some of the target catchments which we have decided should remain in Table 13.1, we have no idea how effective the rule will be.*
- (g) *The implementation of Rule 13-1 will impose a significant cost on the farming community."*

I consider that the reasoning of the hearing panel on this topic is flawed for the following reasons:

- (a) The hearing panel endorsed the natural capital approach as an appropriate method for controlling nutrient leaching from dairy conversions. That is an uncontested part of POP. The rationale that justified the adoption of the natural capital approach for dairy conversions remains valid for existing dairy farms except to the extent that applying it leads to inappropriate consequences.
- (b) One difference the hearing panel noted in applying the natural capital approach to existing dairy farming activity (compared with future farms) is that it does not address technological changes that enabled farmers to lift productivity levels since the 1980s. Hence the hearing panel considered that it ignored existing levels of farm production such that application of the natural capital approach is inequitable and impractical. I note the following:

- (i) Generally there is little evidence of significant changes in productivity achieved by technology alone since the 1980s;
- (ii) The term 'technologies' is used in a very generic manner and applied in a very broad brush away;
- (iii) In the sand country on the west coast of the region, irrigation by means of use of groundwater has overcome water limitations but it has not overcome basic soil structural qualities. To the extent the limitation is overcome, this situation is sufficiently addressed by a refinement of the LUC system. It does not require a rejection of the natural capital approach;
- (iv) With regard to technologies such as nutrient inputs, these technologies, where applied, have had impacts on the levels of nutrient leaching from the farming operations. These inputs are harder to mitigate on lower quality soils and produce lower levels of production compared with elite soils. A requirement to manage this situation and provide mitigation is not unreasonable. It is more inequitable to fail to distinguish such farming operations from existing operators that do not generate the same effects or to fail to recognise the inherent capacity for greater production and mitigation on superior soils where they exist;
- (v) The rationale is not catchment specific and does not identify the type of technologies being considered and the relative importance as part of farming management systems in the specified catchments. For example the technologies specifically relevant to overcoming climactic limitations in sand country have no application to the upper Manawatu catchment.

- (c) The hearing panel identified some uncertainty about how effective the rule would be. This is not quite correct as the technical evidence demonstrated that it would at least maintain water quality in some specified catchments based on realistic projections of dairy farming growth. More importantly however, is the fact that the reasonably practicable management regime that the hearing panel adopted generated greater uncertainty as to the surface water quality outcomes that it would achieve. That uncertainty arose from:
- (i) No measurable targets that would be able to be correlated to surface water quality outcomes;
 - (ii) Imprecision in the nature and extent of mitigation required;
 - (iii) An individual farm consenting regime without any policy guidance as to how to exercise the power to impose conditions.
- (d) The hearing panel noted that some of the cumulative N leaching values set in the staggered regime in Table 13.2 in NV-POP were amendments to Dr Mackay's figures. However, the derivation of these changes was explained by the officers and represented an amelioration of the figures derived by Dr Mackay to recognise the practical achievability of the limits over time. Fonterra's planning witness adjusted the figures in a similar manner in his evidence at the hearing based on Fonterra's knowledge of the nutrient budgets of dairy farmers in specified catchments. The attraction of Dr Mackay's regime is that it allows adjustments of various variables to achieve desired environmental, economic or social goals. While there is an element of arbitrariness in the leaching values ultimately selected, the regime is transparent and coherent and applied based on clear applied environmental science.

- (e) The hearing panel noted that 20% of targeted dairy farms will not be able to reach the 20 year leaching values in a practical and affordable manner. While that is true based on the case studies undertaken by the regional council, the management regime always provided for a default category for these 'specially challenged' cases and the regional council has always made it plain that these farms would be encouraged to do what was practically feasible without more. In other words it wasn't seeking to close down farms. Using the 20% as a basis for setting aside the regime is 'the tail wagging the dog'.
- (f) The hearing panel noted that Rule 13-1 in NV-POP will impose significant cost on the farming community. These costs were calculated by Mr Neild and Mr Rhodes for the regional council. What is not clear from the decision of the hearing panel is how the environmental costs are weighed and why the economic costs identified by the experts including Mr Rhodes and Mr Neild were justified as disproportionate or inappropriate given that the environmental costs are an externality of the farming operations. The capital cost to farmers will be amortised over a 20 year implementation period. I do not share their assessment that the costs are inappropriate.

Activities captured by the rules:

119. Summary of issue: Which land use activities should be captured by the rule framework and specifically should the following activities (in addition to dairy) be re-included as provided for the in NV POP?
- (a) Cropping.
- (b) Market gardening.
- (c) Intensive sheep and beef farming.

120. Environmental context (key features): The following reasons were given by the Hearing Panel⁵⁵ for the deletion of cropping, market gardening and intensive sheep and beef farming from the rule framework:

Cropping

- (a) The farmed areas used for cropping vary on a paddock by paddock basis annually. It would be extremely problematic to include such a transient land use in a regulatory framework.
- (b) In relation to the sub-zones captured by the rules only Lake Horowhenua has any cropping associated with it. In this case there is less than 3% of the catchment in cropping being significantly less than dairying.
- (c) There is a lack of evidence about the ability of cropping to meet the rule limits.

Market gardening

- (a) Market gardening (commercial vegetable growing) is, like cropping, undertaken on a mix of leased and farmer owned land and therefore it would be problematic to include in a regulatory framework.
- (b) The lack of evidence about the ability of commercial vegetable growers to meet the limits of the rule or the consequences for them.
- (c) Of the sub-zones within Table 13.1 only the Mangapapa (2%) and Lake Horowhenua (3.5%) contain horticulture (which includes commercial vegetable growing) and these areas are small when compared with dairy.

Intensive Sheep and Beef

- (a) A lack of evidence on the N leaching rates for intensive sheep and beef.
- (b) A lack of evidence on the actual area of and within the sub-zones currently comprising intensive sheep and beef.

⁵⁵ Summary of reasons given in section 8.6.9.3 (pages 8-37 to 8-40 of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010 SOE Clare Barton. Surface Water Quality – Non-Point Source Discharges

121. Environmental risks: The hearing panel determined that voluntary or industry led nutrient leaching management methods would apply to cropping, market gardening and intensive sheep and beef. The environmental risks associated with a reliance on non-regulatory techniques are that these voluntary initiatives may not gain traction, take time to develop and in some cases there may be a lack of momentum to actually develop them. Ultimately the potential failure to develop techniques which limit nutrient leaching may have an impact on the maintenance and enhancement of water quality.
122. I do propose a policy solution to cover these other land use activities in paragraph 159 of my evidence which in my opinion, still works towards the achievement of the maintenance and enhancement of water quality in a timely manner whilst recognising the current limitations in data and methodology to manage nutrient loss for these other activities.

Farmer Applied Resource Management Strategy (FARM Strategy):

123. In paragraph 89 of this evidence I provide the background as to the FARM Strategy approach as contained in the NV POP. This approach is not contained in the DV POP and has been replaced with a requirement for a nutrient management plan. Some appellants⁵⁶ seek to have the requirement for a FARM Strategy reinstated within Rules 13-1 and 13-1B.
124. The definition of nutrient management plan in the DV POP requires that the plan be prepared in accordance with the Code of Practice for Nutrient Management (NZ Fertiliser Manufacturers' Research Associated 2007). This Code of Practice, given who it was developed by, has a particular focus on fertiliser application. The FARM Strategy approach was a broader tool developed specifically to address nutrient management.
125. In practice, MWRC has now had experience in implementing Rule 13-1B (new dairy farms) and using the references to nutrient management plans. The approach is working, after some initial teething issues regarding interpretation and breadth of conditions on consent. Given the practice is working I do not consider there to be benefit from changing the approach mid-stream to refer to a FARM Strategy.

⁵⁶ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)
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126. I therefore do not propose changes to Rules 13-1 and 13-1B to replace nutrient management plan with FARM Strategy.

Staggering of dates when the rules came into force:

127. In the NV POP, Rule 13-1 (existing dairy) included staggered dates as to when the rule came into force across the different targeted catchments. Under s20A(1) RMA existing dairy farming activities would have continued until the rule became operative. Then under s20A(2) RMA farmers would have had six months to apply for resource consent. The hearing panel removed the staged implementation of the rule in the DV POP and gave the following reasons for doing so⁵⁷:

“There is no need to stage the introduction of the rule as it applies to a smaller number of catchments and it does not require specified nitrogen leaching rates to be achieved. It will therefore be less onerous to comply with and implement for the farmers and the Council.”

128. If the Court determines that it is appropriate to include a requirement to include N leaching maximums for Rule 13-1 (existing dairy) then there is merit in a staged approach for the implementation of the rule. The staged approach provides time for Council staff to interact with each farmer and develop workable solutions on a case by case basis. This considered approach, in my opinion, will assist long term with getting the best outcomes both considering the particular situations for each farm as well as the achievement in nutrient losses needed to maintain and enhance water quality.
129. I recommend (refer to paragraph 162 of this evidence) an amendment to Table 13.1 water management sub-zones to allow for staggered dates from 2012 to 2014.
130. Environmental risks: The environmental risk of providing for such a staged implementation of the dates Rule 13-1 would come into force in the particular targeted catchments is that there is no particular impetus in the intervening period for farmers to minimise nutrient leaching, faecal contamination and sediment loss. This has the potential for a consequential effect in the short term on the maintenance and enhancement of water quality.

⁵⁷ Summary of reasons given in section 8.6.9.7 (page 8-52) of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010
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131. I consider the longer term benefits of getting things right on each farm outweighs the shorter term negative effect of perhaps not having an immediate effect on positively influencing water quality.

Activity status of the rules:

132. Federated Farmers seek to have the activity classification within Rules 13-1 and 13-1B altered from controlled to permitted. In a mediation memorandum dated 28 October 2011⁵⁸ it was agreed that there were certain tests that a Permitted Activity must be able to meet including:

- (i) A determinable and appropriate N loss limit.
- (ii) Sufficient interaction between council and each farmer regarding farm specific practices for managing nutrients and other contaminants.
- (iii) Overseer could be applied for the purpose of determining compliance.
- (iv) Ability to recover monitoring costs and adequate record keeping.
- (v) Determination of compliance does not require a subjective assessment or exercise of discretion.

133. There was discussion both in mediation and in planner caucusing around a permitted activity rule. Most planners (other than Federated Farmers and Ravensdown) agreed that a permitted activity rule was inappropriate. A consensus amongst planners was reached in the Taupo case to the same effect. I consider that managing nutrients under Rules 13-1 and 13-1B as a permitted activity is problematic because:

- (a) There is a level of technical compliance required to correctly run the OVERSEER model and therefore it is difficult through a permitted activity rule to demonstrate compliance in an impartial and consistent manner. Accurate application of OVERSEER and consistent monitoring and record keeping is essential to an effective nutrient regime.
- (b) The ability for interaction between the farmer and MWRC regarding how nutrient management is being addressed is frustrated by a permitted activity rule as the accountability of the resource consent mechanism is

⁵⁸ MCB SWQ RP9
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removed. Farm specific solutions for nutrient management warrant interaction between the community representative (in the form of the council) and the farmer whose activities cause nutrient leaching. These interactions are generally beneficial in achieving sustainable management of farming activities.

- (c) The costs associated with monitoring and compliance would be borne by MWRC if the rule is permitted unless a separate rule is developed. This is not proposed. A controlled activity is considered more efficient and effective in allocating the cost of monitoring and control to the farmer who is the 'exacerbator'.
- (d) The discharge of farm animal effluent onto or into land is a controlled activity under Rule 13-6⁵⁹. It makes sense to run together the consent for the discharge of farm animal effluent along with any consent requirement for dairy farming land uses under Rules 13-1 and 13-1B. Certainly one of the outcomes sought through the development of the POP was the achievement of more streamlined consent processing and resource consent applications to cover both activities. The result is a more streamlined process and a more integrated outcome.
- (e) The effects of the discharge of farm animal effluent (as Controlled through Rule 13-6) are similar to the effects associated with dairy farming land uses (covered by Rules 13-1 and 13-1B). The integrity of the POP comes into question if one activity with similar effects requires consent and the other does not. Under the Operative Land and Water Regional Plan the discharges of agricultural effluent require resource consent as a controlled activity⁶⁰. There is then an established and expected approach regarding the management of nutrient leaching effects associated with dairy farming.
- (f) A controlled activity approach recognises the links between the related objectives and policies which seek to have regard to the values in Schedule AB.

⁵⁹ Chapter 13, page 13-17 of the DV POP

⁶⁰ DL Rule 4 *Discharges of Agricultural Effluent* page 21 of the Operative Land and Water Regional Plan.

134. I consider that the controlled activity classification for Rules 13-1 and 13-1B provides for consistency across the DV POP, links to the objectives and policies within the DV POP and meets the necessary tests for a rule including being reasonable and certain.
135. Some appellants⁶¹ seek to have the classification status for the rule, where the controlled activity provisions are not met, changed from restricted discretionary to discretionary.
136. The Hearing Panel in their decision state⁶²:
- “We find a restricted discretionary rule, with its targeted matters of discretion, is a more efficient and effective method than relying on the default discretionary rule 13-27.”*
137. In the NV POP the rule hierarchy resulted in an activity falling for consideration under the “catch all” Rule 13-27 as a discretionary activity, where it did not meet the controlled activity Rule 13-1. A discretionary activity classification allows all potential and actual adverse effects to be considered. A restricted discretionary activity classification requires the matters over which discretion is reserved to be specified. The Council can only decline consent or impose consent conditions in relation to those matters. In the context of Rules 13-1 and 13-1B where the issues are defined and confined, I consider that the restricted discretionary a ctivity classification is fit for purpose and allows for consent to ultimately be declined if needed. I agree with the conclusion reached by the hearing panel that in the context of these rules the catch all discretionary activity classification is less efficient and potentially less effective as it is not targeted to the issues requiring consideration.

Reference to “reasonably practicable” in relation to nutrient management.

138. Rules 13-1 and 13-1B both include a reference within the matters over which control is reserved column to: *“(a) The implementation of reasonably*

⁶¹ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

⁶² Summary of reasons given in section 8.6.9.6 (page 8-51) of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010
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practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses from the land.”

139. The Appellants and Respondent agree that the inclusion of the term “*reasonably practicable farm management practices*” is too open and ill-defined. This is problematic in the context of controlled activity rules which require the matters over which control is reserved to be certain given the activity has to be granted consent.
140. The hearing panel determined that it was appropriate that existing dairy farms implement a package of best management practices that is applicable to the circumstances of their individual farms.⁶³ As a concept I understand all parties accept that the circumstances of each farm need to be considered and the potential mitigation measures need to be tailored accordingly. The concern remains however, that “*reasonably practicable*” is uncertain in how it will be applied in any given situation. What is the standard/condition that the *reasonably practicable* measures are trying to achieve?
141. Environmental context (key features): I recommend (refer to paragraph 161 of this evidence) an amendment to Rule 13-1 regarding “*reasonably practicable*” and the inclusion of new policy guidance for a restricted discretionary activity in terms of what “*reasonably practicable*” means.
142. I outline in paragraph 118 why I consider the approach of utilising the Table 13.2 N loss limits for existing dairy is appropriate. By setting a standard for achievement of the loss of N there is no necessity to then require, in the controlled activity rule, a requirement for *reasonably practicable* measures.

Stock exclusion from water bodies

143. Rules 13-1 and 13-1B both include conditions which:
- (a) Require dairy cattle to be excluded from wetlands and lakes that are a rare habitat or threatened habitat and from the beds of rivers that are permanently flowing or have an active bed width greater than 1m other than where access for stock crossings are required; and

⁶³ Summary of reasons given in section 8.6.9.4 (page 8-47) of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010

- (b) Requires that where rivers are permanently flowing or have an active bed width greater than 1m and are crossed by more than 1350 dairy cattle movements per month that the crossing must be bridged or culverted.

144. The hearing panel⁶⁴ in relation to stock exclusion from water bodies state:

"...In that regard Dr Manderson advised us, in terms of the Council's initial six case study farms, "In most cases the farmers were managing their N-inputs efficiently (e.g. low N-fertiliser rates and split dressings), and several already had significant N-mitigation practices in place (e.g. the regular use of N-inhibitors, feeding maize silage)" but that "all dairy cases required some degree of stock exclusion from appreciable streams or lakes, and the installation of bridges or culverts across regular crossings."⁶⁵

On that basis, we conclude that Rule 13-1 should additionally require the fencing of streams and the bridging of certain water bodies for all existing and new dairy farms unless it is impracticable or unaffordable to do so. This represents an extension of existing requirements on dairy farmers under the Clean Streams Accord."

145. Environmental context (key features): Some appellants⁶⁶ seek to have a general stock exclusion from water bodies rule apply across the region. Such a rule would require fencing of water bodies to exclude the stock and also require bridging and culverting at stock crossings (this may not be required until a certain number of stock crossings occur).

146. The NV POP did not include a general rule requiring the exclusion of stock from water bodies. Rule 13-1 in the NV POP, which captured dairy farming and intensive sheep and beef, did not include a specific requirement for the fencing, culverting or bridging of water bodies. The requirement for fencing, culverting and bridging was added by the hearing panel.

⁶⁴ Summary of reasons given in section 8.6.9.4 (page 8-48) of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010

⁶⁵ TEB. V. 4 p. 1685 (para 69).

⁶⁶ Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)

147. I accept, based on the evidence presented to the hearing panel, that there is an evidential basis that stock exclusion, particularly of cattle and deer, is a necessary component to minimise N leaching into water bodies.
148. Environmental risks: Without the inclusion of such a rule there is the potential for visual clarity to be reduced in waterbodies and an increase in bacteria levels. This has the effect of increasing the time required to improve water quality.
149. I accept there are environmental risks from not excluding stock from water bodies. I am concerned however, that the farming community could not have reasonably expected that any amended POP developed through the appeal process would include a general requirement for fencing and stock crossings outside of Rules 13-1 and 13-1B. There is the potential for such a rule to impose significant costs on a farmer. I consider it better planning practice to introduce such a change through a plan change process where it is signalled that the intent of the plan change is to introduce such a rule and specific submissions can be made on the matter.
150. The Minister of Conservation's appeal (point 28) requests to:
- "Retain Rule 13-1 to read as in the notified version of the Plan, except including within the rule the specific standards established by the FARM Strategy (particularly those relating to fencing stock from streams)."*
151. In the Environment Court decision *Christchurch International Airport Ltd and Canterbury Regional Council and Christchurch City Council*⁶⁷ Judge Jackson made the following statement regarding scope:
- I hold that, as part of the ultimate question as to whether an amendment to a proposed plan is fairly and reasonably within the submissions filed, the local authority must consider whether interested persons would reasonably have appreciated that such an amendment could have resulted from the decision sought by the submitter as summarised by the local authority. As the Full Court pointed out in Countdown this is very much a question of degree. An amendment to a proposed plan may, as a result of other submissions and further deliberation, be in quite different words but to be "fairly and*

⁶⁷ Environment Court Decision No: C77/99, Clause 15. Judge Jackson.
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reasonably” within a submission, the amendment must at least bear a family resemblance to:

- (a) The original proposed plan; or*
- (b) A submission and the relief sought as summarised by the Council; or*
- (c) Something in between (a) and (b) – including possible new objectives, policies and rules.*

An amendment to a proposed plan cannot be the opposite or completely different from the relief in at least one of the local authority’s clause 7 summaries. If it is, then such a procedural defect can be just as fatal as a substantive decision going outside the scope of a submission.”

152. Referring to the conclusions of the Court I consider the questions to be considered in evaluating scope are:

- (a) Is the amendment “fairly and reasonably” within the appeals filed?
- (b) Would other interested parties reasonably have appreciated that such an amendment could have resulted from the decision sought by the appellant as summarised?

153. The appeal from the Minister of Conservation signals that stock should be excluded in relation to those regulated in the NV POP which is stock associated with dairy and intensive sheep and beef farming.

154. There may be some scope within the appeal for stock in the water management sub-zones captured by Rule 13-1 on dairy and intensive sheep and beef farming to be regulated to require fencing and stock crossing. I do not consider there is any scope beyond that. I do not propose the addition of further water management sub-zones within Rule 13-1 so any scope would be limited to capturing intensive sheep and beef in the targeted water management sub-zones.

155. I do not recommend the inclusion of a general rule requiring stock exclusion from water bodies. Rules 13-1 and 13-1B both require the exclusion of stock and I consider this to strike an appropriate balance regarding achieving

environmental improvement whilst recognising costs to the farming community.

Analysis – What are the acknowledged gaps in the policy and rule framework and how are they proposed to be filled?

156. Drawing together the conclusions I reach in the previous sections of my evidence I consider a number of changes to the policy and rule framework within Chapters 6 and 13 DV POP are required. I summarise the policy and regulatory response that I consider appropriate in the following sections. I have considered the framework I propose against the relevant statutory tests in Attachment 3. The proposed changes to the policy and rule framework are included in Attachments 1 and 2.

Table 13.1 Water Management Sub-Zones:

157. As outlined previously a number of water management sub-zones were taken out of the regulatory framework as contained in Rule 13-1 in the NV POP. I consider that there needs to be a clear signal provided through the POP that additional water management sub-zones can be added to the regulatory framework over time as additional monitoring indicates that water quality in these catchments is not being maintained or improved.

(a) Appropriate policy response:

- (i) I consider the addition of a further policy within Part I DV POP is warranted (proposed policy 6-7B) which:
 - a) Outlines that monitoring will focus on particular water management sub-zones for monitoring and assessment. The sub-zones listed reflect the targeted sub-zones that were included in the NV POP and removed from Table 13.1 water management sub-zones in the DV POP; and
 - b) Requires that additional water management sub-zones be added to Table 13.1 where the Schedule D water quality numerics are not met and/or the relevant Schedule AB values are compromised.

- (ii) Support the additional policy with two further methods in Chapter 6 (Method 6-6A Lake Horowhenua and other Coastal Lakes and Method 6-6B Lake Quality Research, Monitoring and Reporting). The first proposed method requires MWRC in conjunction with other agencies to protect and enhance water quality within Lake Horowhenua and other coastal lakes. The second proposed method requires the development of an integrated research and monitoring programme to define the current state of the Region's lakes particularly coastal lakes. This second method specifies that the outcomes will link into work to refine existing policies, objectives and methods in terms of adding additional rural land uses and additional water management sub-zones to the regulatory framework.

Activities Captured in the POP:

- 158. As outlined earlier in Table 2 of my evidence the NV POP also regulated cropping, market gardening and intensive sheep and beef farming. These activities were taken out of the regulatory regime in the DV POP.
- 159. To complement the proposed policy approach to capturing additional water management sub-zones in the DV POP over time, I consider an additional policy is appropriate that recognises that other land use activities have the potential to affect water quality and these activities must likewise be managed over time.
 - (a) Appropriate policy response:
 - (i) I propose the addition of a further policy within Part I DV POP (proposed policy 6-7A) which:
 - a) Targets the management of water quality within the water management sub-zones listed in Table 13.1 across all rural land uses that have the potential to affect water quality.
 - b) Requires the management of other land uses including through regulation where there is a significant

contribution to elevated contaminant levels in surface water quality.

- c) Requires a review of the approach taken in the POP no later than 30 June 2017 to enable progress towards the numerics in Schedule D and introduce further regulatory control as required.
- d) Where additional land use activities are regulated then the policy framework can address mechanisms such as N trading.

Table 13.2 Cumulative Nitrogen Leaching Maximum by Land Use Capability Class:

160. I consider a policy stream to deal with the areas of high rainfall on LUC Class IV and above (refer Table 3 of this evidence) is justified. In relation to the Region's sand county I do not propose any change to the DV POP given LUC can be re-classified with irrigation resulting in a less restrictive number applying.
161. I conclude in paragraph 118 of this evidence that it is appropriate for a certain standard to apply to existing dairy farming under Rule 13-1.
- (a) Appropriate regulatory response:
 - (i) Table 13.1 N Leaching Maximum by Land Use Capability Class should apply to Rule 13-1 (existing dairy).
 - (ii) Provide policy guidance within Chapters 6 and 13 (Policy 6-7(a)(i)(B) and Policy 13-2C(c)(ii)(A) and (B)) to outline that where existing dairy farms cannot meet the N loss limit immediately then there is a three year reduction period at the end of which (i.e. by year four) the N loss limit is met and to provide specific policy guidance where farms are in high rainfall areas on LUC class IV and above.

Staggering of dates when the rules came into force:

162. If the Court considers it appropriate to apply the Table 13.1 N leaching maximums to Rule 13-1 (existing dairy) then I recommend the staggering of the dates that the rule comes into effect.

(a) Appropriate regulatory response:

- (i) The Mangapapa, Waikawa and Other South West Catchments (Papaitonga) have a date the rules come into effect of 1 July 2012.
- (ii) The Mangatainoka and other coastal lakes have a date the rules come into effect of 1 July 2013.
- (iii) The Upper Manawatu above Hopelands and the Manawatu above gorge have a date the rules come into effect of 1 July 2014.

Reference to “reasonably practicable” in relation to Nutrient Management.

163. I consider that “reasonably practicable” is inappropriate in the context of a controlled activity.

(a) Appropriate regulatory response:

- (i) I propose the reference to “reasonably practicable” be deleted from Rule 13-1 and instead control be retained over the implementation of the nutrient management plan. The changes proposed in relation to implementing the nutrient management plan needs to be supported by the proposed changes to include Table 13.2 N leaching maximums. In that way there is a certain standard that must be achieved and the nutrient management plan will detail the methods that any particular farmer will adopt to achieve the standard.
- (ii) I recommend the addition of two sub-clauses within Policy 13-2C (sub-clauses (g) and (h)) to guide the reasonably practicable farm management practices to be considered in relation to a restricted discretionary activity where the term “reasonably practicable”

would be retained. The list of reasonably practicable practices for minimising nutrient leaching, faecal contamination and sediment losses is not an exclusive list. The list was derived from the best management practices provided in expert evidence to the hearing panel and specifically through the evidence of Dr Mackay.⁶⁸

Consequential amendments to achieve consistency of approach

164. Rules 13-1 and 13-1B contain references within the activity column to the discharge of grade Aa, Ab, Ba or Bb biosolids and a corresponding condition in the Condition Column that states:

“The discharge of grade Ab, Ba or Bb biosolids onto or into production land and any ancillary discharge of contaminants into air must comply with the conditions of Rule 13-4A.”

165. Rule 13-4A⁶⁹ is a restricted discretionary activity rule and it includes a number of conditions that apply to the discharge of grade Ab, Ba or Bb biosolids. Grade Aa biosolids are dealt with as a Permitted Activity in Rule 13-4.

166. The hearing panel⁷⁰ includes the following comment in relation to grade Ab, Ba or Bb biosolids:

“Ms Beecroft also sought the insertion of a new restricted discretionary activity rule dealing with Class Ab, Ba or Bb biosolids. She stated: “Lower grade (Ab, Ba and Bb) biosolids are deemed to be safe for application to land with appropriate management controls. To encourage the safe use of lower grade biosolids we believe a separate rule should be established to assist users to plan the safe use of lower grade biosolids.”⁷¹

167. The hearing panel accepted that an approach of recognising the differences in terms of potential adverse effects between Grade Aa and other biosolids was appropriate and consequently made Grade Aa biosolids Permitted Activities (Rule 13-4) and other biosolids Restricted Discretionary (Rule 13-4A).

⁶⁸ Mackay, Section 42A Report, August 2009, page 21 para 73.

⁶⁹ Chapter 13 Rule 13-4A page 13-14 of the DV POP

⁷⁰ Summary of reasons given in section 8.6.12 (pages 8-61 to 8-62) of the Decisions on Submissions to the Proposed One Plan Volume 1 – Reasons for Decisions August 2010

⁷¹ Beecroft, Statement of Evidence, 23 February 2010, page 4 para 15
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168. I consider that consistency of approach is appropriate. I do not understand why Class Ab, Ba or Bb biosolids when applied under Rules 13-1 and 13-1B should be controlled activities when elsewhere they are restricted discretionary activities. I consider that the ability to determine whether the use of lower grade biosolids is safe in a particular situation is paramount and if necessary consent should be able to be declined. I have therefore proposed changes within Rules 13-1 and 13-1B removing the references to Class Ab, Ba or Bb biosolids and therefore these activities would be covered by Rule 13-4A as a restricted discretionary activity. (Refer to the track changes to these rules in Attachment 2).
169. I accept the scope for making this change is limited to the fact that some appellants⁷² seek to have Rule 13-1 as in the NV POP reinstated. Rule 13-1 in the NV POP only makes reference to the discharge of grade A [not qualified as Aa or Ab] biosolids and not other biosolids.



Clare Barton
SENIOR CONSENTS PLANNER

⁷² Minister of Conservation (ENV-2010-WLG-000150); Wellington Fish and Game Council (ENV-2010-WLG-000157)
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Attachment 1

**Proposed wording change to
Chapter 6: Water**

PROPOSED CHANGES ARE MARKED IN YELLOW HIGHLIGHT.

Note: Changes marked in grey highlight were made as a result of mediation.

6 Water

6.1 Scope and Background

6.1.1 Scope

This chapter addresses the management of fresh water in the Region. It covers:

- **Water Management Zones* and Sub-zones* and Values** - the establishment of *Water Management Zones** and *Sub-zones** and associated water management Values for each *Sub-zone**, for the purpose of managing water quality, water quantity and activities in the beds of rivers and lakes.
- **Surface water quality** - the establishment of water quality targets for rivers and lakes, in order to give effect to the Values, together with a policy regime of maintaining water quality in those *Water Management Sub-zones** that meet their water quality targets, and improving water quality over time in those *Water Management Sub-zones** that do not.
- **Groundwater quality** - the maintenance of existing groundwater quality and its improvement where it is degraded.
- **Discharges and land use activities affecting water quality** - the management of discharges into surface water, discharges onto or into land, and diffuse run-off and other land use activities affecting surface water and groundwater quality.
- **Surface water quantity and allocation** - the establishment of minimum flows and allocation regimes for rivers, and the management of water takes and other activities affecting surface water quantity.
- **Groundwater quantity and allocation, and bores*** - the establishment of *Groundwater Management Zones**, identification of the respective allocable volumes and the active management of groundwater takes.
- **Beds of rivers and lakes** - the management of activities that disturb the beds of rivers and lakes, the management of existing and new structures in the beds of rivers and lakes, and the establishment of sustainable gravel extraction limits for rivers.
- **Land adjacent to the beds of rivers and lakes** - the management of some activities in relation to flood control or drainage purposes.

The effects of hill country erosion on water quality are addressed in Chapter 5. The ecological impacts of takes, diversions, discharges and drainage on *rare habitats**, *threatened habitats** and *at-risk habitats** are addressed in Chapter 7.

6.1.2 Overview

Water is critical for life to exist. People living in the Region enjoy a temperate climate, a large number of rivers, streams and lakes and an extensive groundwater system. The Region does not experience the severity of droughts that impact on some other parts of New Zealand and generally there is enough water to meet everyone's needs. People have grown up with an expectation of access to clean, safe water. But ready access means that water has not always been valued highly. The health of the surface water resource has steadily declined in most catchments as a result.

Despite this decline, there has been a revolution around water in the past few decades. In response to public concerns, significant improvements have been

made to the quality of discharges from towns and industrial *sites**. For example, untreated sewage is no longer discharged directly into water bodies, and rivers no longer receive blood discharged from freezing works. Many former discharges to water, particularly discharges of dairy shed effluent, are now discharged to land. New large water takes, such as those associated with hydroelectric development, are carefully managed to ensure that the downstream needs of people and ecosystems are catered for. Although there have been substantial improvements in the quality of point source discharges to water, improvement is still possible and is necessary.

There has been a substantial intensification within the agricultural sector in recent years. This has contributed to a vibrant and booming regional economy but has also increased pressure on the Region's water resources. There has been a significant increase in irrigation demand and the amount of nutrients leaching to surface water and groundwater. Although the impacts of agricultural intensification are less obvious than those caused by the major point source discharges and abstractions mentioned above, they have increased progressively over time.

As the Region has grown, we have significantly altered the physical nature of many of its water bodies and their beds with structures, drainage and flood protection works, particularly in the Manawatu Plains. These changes have led to a poor and declining state of physical health in the Region's water bodies and their beds.

The impact of discharges and run-off on water quality and the increasing demand for water abstraction are two of the four most critical issues addressed in this Plan.

6.1.3

Water Quantity

The demand on surface water and groundwater resources is one of the most critical issues addressed in this Plan.

Water from the two main fresh water sources within the Region - surface water (rivers and lakes) and groundwater - is abstracted for a variety of uses, including drinking water supply, stock water supply, irrigation, electricity generation and industrial use.

The single largest user of water in the Region is the energy sector. Hydroelectric power generation takes are concentrated around Mount Ruapehu and on the Mangahao River. The amount of water used for power generation has not changed significantly in the past decade, although there is potential for more hydroelectricity generation in the future.

In contrast, with the exception of consented water supply abstraction from surface water, other uses have steadily increased over the past few decades in response to stock numbers increasing and the establishment of industrial plants. In recent years there has been a dramatic increase in water demand. From 1997 to 2009, consented groundwater takes almost doubled and consented surface water takes more than doubled (Table 6.1).

Table 6.1 Change in Consented Water Abstraction Volumes from 1997 to 2009 (excluding hydroelectric power generation)

Source	Sector	1997 to 2009 Percentage Change in Consented Water Takes		
		1997 (m ³ /d)	2009 (m ³ /d)	Increase (%)
Groundwater	All Sectors	287,000	537,179	+85%
Surface water	Agriculture	70,668	385,579	+446%
	Industry	38,835	97,782	+152%
	Water supply	162,024	133,259	-18%
	All Sectors	271,527	616,620	+127%

The greater the amount of water taken from a water body, the greater the potential impact on instream life, recreational activities (including fishing, swimming and boating), cultural/spiritual values and the ability of the water body and its bed to assimilate waste*. As important as the volume of water abstracted is the timing of abstraction. Rivers in the Region experience natural low flows during summer, which coincides with the period of greatest demand. The taking of water during higher flows generally has little impact, but even small takes during summer low flow conditions can have adverse effects. Measures which avoid those effects during the more critical summer low flow conditions should be encouraged. Maintaining natural flow variability is important for the habitat requirements of fish species, natural character and water quality. The ever-increasing demand on the Region's surface water resource means that it must be used efficiently, so that the amount of water allocated for abstraction is available to as many users as possible.

Groundwater monitoring indicates that groundwater levels are stable and research indicates that there is sufficient water for all users at a regional scale. A recent increase in large groundwater takes along the west coast has raised the potential for saltwater intrusion. This occurs when enough water is removed from an aquifer to allow seawater to migrate inland. Groundwater contaminated with saltwater is no longer suitable for irrigation or as stock water. Saltwater-contaminated groundwater will clear with time, but the timescale is measured in centuries.

The high density of bores* in some areas has caused localised problems. These include:

- (a) impacts on other groundwater users. Allowing too many new users to access the groundwater resource will impact on the amount that is available to existing users and can affect the ability of existing bores* to draw water.
- (b) impacts on groundwater-fed streams, lakes and wetlands. Many of the streams, lakes and wetlands along the west coast of the Region (eg., Lakes Papaitonga and Horowhenua) are dependent upon groundwater. Groundwater is particularly important during summer, as it may be the only source of inflow.

Bores* are the main means of accessing groundwater resources. They provide the principal way of studying the subsurface environment by enabling sampling of subsurface geology, allowing direct measurement of groundwater levels and quality and allowing testing of aquifer yields. This Plan adopts the NZS 4411:2001

Environmental Standard for Drilling of Soil and Rock in its entirety for the management of *bores** (design, drilling, completion, development, testing, *maintenance**, cleaning/disinfection, record keeping and decommissioning).

6.1.4 Water Quality

There is significant variation in water quality across the Region. Rivers (including streams) emerging from the mountains or areas that have retained their original vegetation cover tend to have very good water quality. The one exception to this is the Whangaehu River, which flows from the crater lake on Mt Ruapehu. It is naturally acidic and contains high levels of sulphur and heavy metals.

As rivers flow towards the sea, they pick up sediment and nutrients from the surrounding land. As would be expected, water quality in the lower reaches of rivers and streams is poorer than in the headwaters.

In the past, the biggest threats to water quality were municipal (eg., sewage), industrial (eg., meat works and fellmongers) and agricultural (dairy shed effluent) discharges. Although considerable improvements have been made to discharges to water, further improvement is still possible and necessary.

The intensification in agriculture during the past 10 to 15 years has been especially marked in the dairy sector. Raising stock numbers increases the quantity of dairy shed effluent requiring disposal, the quantity of stock urine produced (a concentrated source of nutrients), and the opportunities for stock to access water bodies and their beds. The agricultural sector is recognising the impact it is having on the nation's water bodies and has started to act. The dairy sector was the first to respond, with the Dairying and Clean Streams Accord (an agreement between Fonterra, the Ministry for the Environment, Regional Councils and others on an approach to enhance water quality). Such voluntary approaches are one way of lowering nutrient and faecal levels in the Region's water bodies and the Regional Council supports them, although further improvements are needed. Further improvements will require a mix of regulatory and non-regulatory approaches, that may alter over time.

Groundwater quality within the Region varies according to both depth and location. Generally, deeper groundwater is of higher quality. For example, shallow groundwater within the Horowhenua District near Levin has high concentrations of nitrates, which are believed to be the result of septic tank discharges and *fertiliser** use on market gardens. There have been no significant changes in groundwater quality over the length of the Regional Council's monitoring record (more than 15 years). There is no evidence that groundwater quality is deteriorating.

The overall state of fresh water quality in the Region is as follows:

- (a) The middle reaches of many rivers are unsafe to swim in because of bacterial contamination, or are unpleasant to swim in because of slime (periphyton) growth (Figure 6.1). Elevated nitrate and phosphate levels promote slime growth. The slime also impacts on fish and instream invertebrate communities.
- (b) The lower reaches of many rivers have high concentrations of bacteria, nitrates, phosphates and sediments, and these levels are increasing.
- (c) There is minimal contamination of surface water from heavy metals, hydrocarbons and other toxic substances.

- (d) The quality of groundwater in the Region is generally suitable for stock needs and irrigation, with a low sodium hazard and a low-medium salinity hazard.
- (e) Nitrate levels are high in shallow groundwater in parts of the Region, but the levels have not changed during the period of monitoring.
- (f) Groundwater is free of herbicides and pesticides.

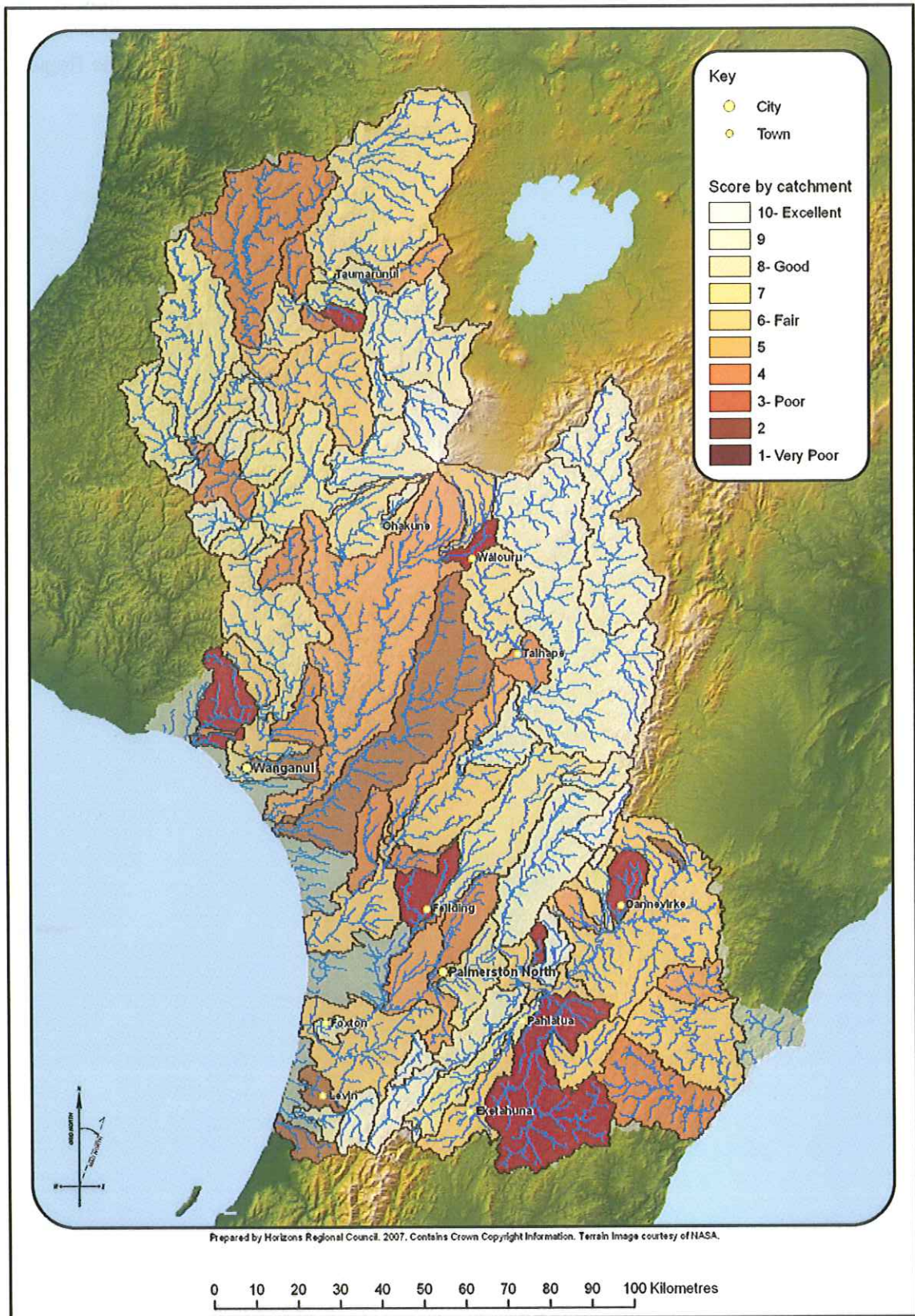


Figure 6.1 Suitability of water quality for contact recreation within the Region

6.1.5 Beds of Rivers and Lakes

People have always been attracted to rivers and lakes to live, work and play. Despite the economic, cultural, social and environmental importance of rivers and lakes, many of the rivers and lakes in the Region have been highly modified over the years. Works to control flooding and erosion, dams, and diversions for hydroelectricity generation can be large scale and have significant effects on the physical nature of the Region's rivers and lakes. Smaller-scale changes like river crossings and small dams can have negative cumulative impacts. Urban expansion often alters rivers. Utilisation of the Region's gravel resource provides an economic benefit and there may be flood protection benefits from having it removed from rivers. However, gravel extraction, when not managed well, can lead to increased flooding and erosion risk.

This modification has contributed to the economic growth and wellbeing of the Region, but it has also negatively altered the character and ecology of most rivers and lakes in the Region, impacting on cultural values attributed to them and leading to the loss or fragmentation of indigenous plant and animal populations.

6.2 Significant Resource Management Issues

Issue 6-1: Water quality

The quality of many rivers and lakes in the Region has declined to the point that ecological values are compromised and contact recreation such as swimming is considered unsafe. The principal causes of this degradation are:

- (a) nutrient enrichment caused by run-off and leaching from agricultural land, discharges of treated wastewater, and septic tanks
- (b) high turbidity and sediment loads caused by land erosion, river channel erosion, run-off from agricultural land and discharges of stormwater
- (c) pathogens from agricultural run-off, urban run-off, discharges of sewage, direct stock access to water bodies and their beds and discharges of agricultural and industrial waste*.

Shallow groundwater in areas of intensive rural subdivision and horticulture in the Horowhenua and Tararua Districts has elevated nitrate levels in excess of the New Zealand drinking water standard. However, the quality of groundwater in the Region is generally suitable for stock needs and irrigation, and there has been no evidence of deteriorating groundwater quality during the past 15 years.

Issue 6-2: Water quantity and allocation

The use of both surface water and groundwater has increased dramatically during the last decade. The demand for surface water in the Ohau, Oroua and parts of the upper Manawatu catchments already exceeds supply, and other catchments are experiencing marked increases. This increased demand has the potential to adversely affect both instream values and the natural character of rivers, wetlands and lakes, if not managed. The amount of groundwater is generally capable of meeting demand within the Region, although there is a need to actively manage effects between bores* at a local level, the effects of groundwater takes on surface water, and to be vigilant about the risk of saltwater intrusion along the west coast.

Issue 6-3: Beds of rivers and lakes

The demand for flood and erosion control to protect many types of land use has led to significant modification of the Region's rivers and lakes and their margins. Structures required to be located within the beds of rivers and lakes, including bridges, culverts, water intake and discharge pipes and hydroelectricity structures, also affect the natural character of rivers and lakes and their margins. These types of uses and developments, in conjunction with gravel extraction, have modified, and continue to modify the physical characteristics and ecology of many of the Region's rivers and lakes.

6.3**Objectives****Objective 6-1: Water[^] management Values**

Surface water bodies[^] and their beds[^] are managed in a manner which advances the achievement of the Values ~~has regard to the Values~~ in Schedule AB¹.

Whāinga 6-1: He ūara whakahaere wai

Ka āta whakahaeretia ngā mata wai me ngā papa o ērā me te aro atu ki ngā Ūara kei roto i Pukapuka Āpiti AB.

Objective 6-2: Water[^] quality

- (a) Surface water[^] quality is managed to ensure that:
- (i) water[^] quality is maintained in those rivers[^] and lakes[^] where the existing water[^] quality is at a level sufficient to support the Values in Schedule AB
 - (ii) water[^] quality is enhanced in those rivers[^] and lakes[^] where the existing water[^] quality is not at a level sufficient to support the Values in Schedule AB
 - (iii) accelerated eutrophication and sedimentation of lakes[^] in the Region is prevented or minimised
 - (iv) the special values of rivers[^] protected by water conservation orders[^] are maintained.
- (b) Groundwater quality is managed to ensure that existing groundwater quality is maintained, or enhanced where it is degraded.

Whāinga 6-2: Te kounga o te wai

- (a) *Ka whakahaeretia te kounga o te mata wai kia hua ai:*
- (i) *ka tiakina te kounga o te wai kei roto i ngā awa me ngā roto he kaha tonu te kounga o te wai hei hāpai i ngā Ūara kei roto i Pukapuka Āpiti AB*

¹ Schedule AB is not a component of Part I - the Regional Policy Statement. It is a component of Part II - the Regional Plan.

- (ii) *ka whakapaingia te kounga o te wai kei roto i ngā awa me ngā roto kāore i te kaha te kounga o te wai hei hāpai i ngā Ūara kei roto i Pukapuka Āpiti AB*
 - (iii) *ka āraia, ka whakaitingia rānei te tere parahanga ā-matū whakamōmona, te parakiwai hoki o ngā roto o te Rohe, ā,*
 - (iv) *ka tiakina ngā ūara motuhake o ngā awa e whakamarumarutia e ngā whakahau whakauka wai, arā, ko ngā water conservation orders.*
- (b) *Ka whakahaeretia te kounga o te waiopapa kia hua ai ka tiakina – ka whakarākaitia te kounga o te waiopapa i ngā wā kua whakaparungia.*

Objective 6-3: **Water[^] quantity and allocation**

Water[^] quantity is managed to enable people, industry and agriculture to take and use water[^] to meet their reasonable needs while ensuring that:

- (a) For surface *water[^]*:
 - (i) after allowing for takes for existing hydroelectricity generation, minimum flows and allocation regimes are set for the purpose of maintaining or enhancing the existing life-supporting capacity of *rivers[^]* and their *beds[^]* and providing for the other Values in Schedule AB as appropriate
 - (ii) in times of *water[^]* shortage, takes are restricted to those that are essential to the health or safety of people and communities, or drinking *water[^]* for animals, and other takes are ceased
 - (iii) the amount of *water[^]* taken from *lakes[^]* does not compromise their existing life-supporting capacity
 - (iv) the requirements of *water conservation orders[^]* are upheld.
- (b) For groundwater:
 - (i) takes do not cause a significant adverse *effect[^]* on the long-term groundwater yield
 - (ii) groundwater takes that are hydrologically connected to *rivers[^]*, are managed within the minimum flow and allocation regimes established for *rivers[^]*
 - (iia) groundwater takes that are hydrologically connected to *lakes[^]* or *wetlands[^]* are managed to protect the life-supporting capacity of the *lakes[^]* or *wetlands[^]*
 - (iii) the significant adverse *effects[^]* of a groundwater take on other groundwater and surface *water[^]* takes are avoided
 - (iv) saltwater intrusion into coastal aquifers, induced by groundwater takes, is avoided.
- (c) In all cases, *water[^]* is used efficiently.

Whāinga 6-3: Te nui o te wai me tōna tūaritanga

Ka whakahaeretia te wai kia āhei ai te tangata, ngā ahumahi, me te hunga ahuwahenua te tango me te whakamahi i te wai hei whakatutuki i ō rātou hiahia, kia hua ai hoki:

- (a) *Mō te mata wai:*

- (i) *whai muri mai i te maumahara mō te tango wai hei mahi hiko ā-wai ka whakatauria ngā rerenga iti me ngā tikanga whakahaere tūaritanga hei tiaki i te oranga tonutanga o ngā awa me ngā papa o ērā hei taunaki hoki i ngā Ūara e tika ana kei roto i Pukapuka Āpiti AB*
- (ii) *i ngā wā kōpaka wai, ka whakatikina te tango wai hāunga rā hei tiaki i te hauora, te haumaru rānei o te tangata, ngā hapori, hei wai inu mō ētahi kararehe rānei, ā, ka katia rawatia te tango mō take kē atu*
- (iii) *e kore e waimeha te oranga tonutanga mā te tango wai i ngā roto*
- (iv) *ka hāpaitia ngā whakaritenga o ngā tauākī whakauka wai me ngā pānui ā-takiwā mō te whakauka wai, arā, ko ngā local water conservation notices.*
- (b) *Mō te waiopapa:*
- (i) *e kore te tango wai e pā kaha atu ki te huanga roa o te waiopapa*
- (ii) *ka whakahaeretia te tango waiopapa e pā ana ki ngā awa i runga i ngā tikanga whakahaere rerenga wai iti, tūaritanga hoki kua whakaritea*
- (iia) *ka whakahaeretia te tango waiopapa e pā ana ki ngā roto, ngā papa waiwai rānei hei whakamarumaruru i te oranga tonutanga o ngā roto, ngā papa waiwai rānei*
- (iii) *ka parea ngā pānga kino o te tango waiopapa ki te mahi tango i waiopapa kē, tango mata wai rānei*
- (iv) *ka parea te urunga o te waitai, nā te tango waiopapa, ki roto i ngā kahupapa takutai moana, ā.*
- (c) *I ngā wā katoa ka whakamahia te wai i runga i te tikanga whakamau.*

Objective 6-4: Beds[^] of rivers[^] and lakes[^]

The beds[^] of rivers[^] and lakes[^] and land[^] adjacent to the bed[^] of reaches with a Schedule AB Value of Flood Control and Drainage are managed to enable future use and development, while having regard to their other Schedule AB Values and achieving Objective 7-2(b) and (c).

Whāinga 6-4: Ngā papa awa me ngā papa roto

Ka whakahaeretia ngā papa awa me ngā papa roto me ngā whenua e pātata ana ki aua papa me te toronga e hāngai ana ki te Whakahaere Waipuke me te Ūara Awakeri – kia hua ai te whakamahi me te whakaahu mea ake nei, me kī, kia aro hoki ki ērā atu o ngā Ūara Pukapuka Āpiti AB, ā, kia tutuki hoki ngā Whāinga 7-2(b) me (c).

6.4 Policies

6.4.1 Water Management Framework

Policy 6-1: Water Management Zones* and Values

For the purposes of managing water[^] quality, water[^] quantity, and activities in the beds[^] of rivers[^] and lakes[^], the catchments in the Region have been divided into

*Water Management Zones** and *Water Management Sub-zones** in Schedule AA.² Groundwater has been divided into *Groundwater Management Zones** in Schedule C.³

The *river*[^] and *lakes*[^] and their *beds*[^] must be managed in a manner which has regard to advances the achievement of the Schedule AB Values when decisions are made on avoiding, remedying or mitigating the adverse *effects*[^] of activities or in relation to any other function exercised by the Regional Council or Territorial Authorities. The individual Values and their associated management objectives are set out in the Schedule AB Surface Water Management Values Key and repeated in Table 6.2.

Table 6.2 Surface *Water*[^] Management Values and Management Objectives

Value Group	Individual Values		Management Objective
Ecosystem Values	NS	Natural State	The <i>river</i> [^] and its <i>bed</i> [^] are maintained in their natural state
	LSC	Life-supporting Capacity	The <i>water body</i> [^] and its <i>bed</i> [^] support healthy aquatic life / ecosystems
	SOS-A	Sites of Significance - Aquatic	Sites of significance for indigenous aquatic biodiversity are maintained or enhanced
	SOS-R	Sites of Significance - Riparian	Sites of significance for indigenous riparian biodiversity are maintained or enhanced
	IS	Inanga Spawning	The <i>water body</i> [^] and its <i>bed</i> [^] sustain healthy inanga spawning and egg development
	WM	<i>Whitebait</i> [*] Migration	The <i>water body</i> [^] and its <i>bed</i> [^] are maintained or enhanced to provide safe passage of inwardly migrating juvenile native fish known collectively as <i>whitebait</i> [*]
Recreational and Cultural Values	CR	Contact Recreation	The <i>water body</i> [^] and its <i>bed</i> [^] are suitable for contact recreation
	MAU	<i>Maun</i> [*]	The <i>mauri</i> [*] of the <i>water body</i> [^] and its <i>bed</i> [^] is maintained or enhanced
	SOS-C	Sites of Significance - Cultural	Sites of significance for cultural values are maintained
	TF	Trout Fishery	The <i>water body</i> [^] and its <i>bed</i> [^] sustain healthy rainbow or brown trout fisheries
	TS	Trout Spawning	The <i>water body</i> [^] and its <i>bed</i> [^] meet the requirements of rainbow and brown trout spawning and larval and fry development

² Schedule AA is not a component of Part I - the Regional Policy Statement. It is a component of Part II - the Regional Plan.

³ Schedule C is not a component of Part I - the Regional Policy Statement. It is a component of Part II - the Regional Plan.

Value Group	Individual Values		Management Objective
	AE	Aesthetics	The aesthetic values of the <i>water body</i> [^] and its <i>bed</i> [^] are maintained or enhanced
Water[^] Use	WS	<i>Water</i> [^] Supply	The <i>water</i> [^] is suitable, after treatment, as a drinking <i>water</i> [^] source for human consumption
	IA	Industrial Abstraction	The <i>water</i> [^] is suitable as a <i>water</i> [^] source for industrial abstraction or use, including for hydroelectricity generation ⁺
	I	Irrigation	The <i>water</i> [^] is suitable as a <i>water</i> [^] source for irrigation
	SW	Stockwater	The <i>water</i> [^] is suitable as a supply of drinking <i>water</i> [^] for livestock
Social/ Economic Values	CAP	Capacity to Assimilate Pollution	The capacity of a <i>water body</i> [^] and its <i>bed</i> [^] to assimilate pollution is not exceeded
	FC/D	Flood Control and Drainage	The integrity of existing flood and <i>river</i> [^] bank erosion protection <i>structures</i> [^] and existing drainage <i>structures</i> [^] is not compromised and <u>the risks associated with flooding and erosion are managed sustainably</u>
	EI	Existing <i>Infrastructure</i> [^]	The integrity of existing <i>infrastructure</i> [^] is not compromised

⁺ *Water Management Zones*^{*} and *Water Management Sub-zones*^{*} throughout the Region (and particularly those with good head and flow available) may have potential for hydroelectricity generation. Further *site*^{*}-specific assessment will be needed to establish the locations where such potential may be realised while having regard to the Schedule AB Values of the relevant *water bodies*[^] and their *beds*[^].

6.4.2 Water Quality

6.4.2.1 Surface Water Quality

Policy 6-2: *Water*[^] quality ~~targets~~ numerics

In Schedule D⁴, *water*[^] quality ~~targets~~ numerics relating to the Schedule AB Values (repeated in Table 6.2) are identified for each *Water Management Sub-Zone*^{*}. Other than where they are incorporated into *permitted activity*[^] rules as *conditions*[^] to be met, the *water*[^] quality ~~targets~~ numerics in Schedule D must be used to inform the management of surface *water*[^] quality in the manner set out in Policies 6-3, 6-4 and 6-5.

⁴ Schedule D is not a component of Part I - the Regional Policy Statement. It is a component of Part II - the Regional Plan.

Policy 6-3: Ongoing compliance where *water*[^] quality ~~targets~~ numerics are met

- (a) ~~In each case w~~Where the existing *water*[^] quality meets the relevant Schedule D *water*[^] quality ~~targets~~ numerics within a *Water Management Sub-zone*^{*}, activities ~~water quality~~ must be managed in a manner which ensures that the *water*[^] quality ~~targets~~ numeric continues to be met ~~beyond the zone of reasonable mixing and the numeric operates (other than the toxicants)⁵ as a standard which must not be breached.~~
- (b) For the avoidance of doubt:
- (i) in circumstances where the existing *water*[^] quality of a *Water Management Sub-zone*^{*} meets all of the *water*[^] quality ~~targets~~ numerics for the *Sub-zone*^{*} (a) applies to every *water*[^] quality ~~targets~~ numerics for the *Sub-zone*^{*}
 - (ii) in circumstances where the existing *water*[^] quality of a *Water Management Sub-zone*^{*} meets some of the *water*[^] quality ~~targets~~ numerics for the *Sub-zone*^{*} (a) applies only to those ~~targets~~ numerics that are met.

Policy 6-4: Enhancement where *water*[^] quality ~~targets~~ numerics are not met

- (a) ~~In each case w~~Where the existing *water*[^] quality does not meet the relevant Schedule D *water*[^] quality ~~targets~~ numerics within a *Water Management Sub-zone*^{*}, activities ~~must be managed in a manner which, beyond the zone of reasonable mixing~~ *water*[^] quality within that sub-zone must be managed in a manner that enhances existing *water*[^] quality in order to meet the *water*[^] quality numerics for the *Water Management Zone*^{*} in Schedule D: + and in a manner that is consistent with Policies 6-7, 6-7A, 6-7B and 6-8.

~~+ except in the case of toxicants where investigation as per ANZECC (to be clarified)~~

- (i) ~~enhances existing~~ *water*[^] quality ~~where that is reasonably practicable, or otherwise maintains it, and~~
 - (ii) ~~has regard to the likely~~ *effect*[^] of the activity on the relevant Schedule AB Value that the *water*[^] quality target is designed to safeguard.
- (b) For the avoidance of doubt:
- (i) in circumstances where the existing *water*[^] quality of a *Water Management Sub-zone*^{*} does not meet ~~all~~ any of the *water*[^] quality ~~targets~~ numerics for the *Sub-zone*^{*}, (a) applies to every *water*[^] quality ~~target~~ numeric for the *Sub-zone*
 - (ii) in circumstances where the existing *water*[^] quality of a *Water Management Sub-zone*^{*} does not meet some of the *water*[^] quality targets for the *Sub-zone*^{*}, (a) applies only to those targets not met.

⁵ In the case of toxicants (identified as toxicants in Schedule D) they shall be applied as trigger values.

Policy 6-5: Management of activities water[^] quality in areas where existing water[^] quality is unknown

- (a) In each case Where there is insufficient data to enable a comparison of the existing water[^] quality with the relevant Schedule D water[^] quality targets numerics, activities water[^] quality within the Water Management Sub-Zone⁶ must be managed in a manner which, beyond the zone of reasonable mixing:
- (i) maintains or enhances the existing water[^] quality
 - (ii) has regard to the likely effect of the activity on the relevant Schedule AB Values that the water[^] quality target numeric is designed to safeguard
 - (iii) has regard to relevant information about the existing water[^] quality in upstream or downstream Water Management Sub-zones*, where such information exists.
- (b) For the avoidance of doubt:
- (i) in circumstances where there is insufficient data to enable a comparison of the existing water[^] quality with all of the water[^] quality targets numerics for a Water Management Sub-zone* (a) applies to every water[^] quality target numeric for the Sub-zone*
 - (ii) in circumstances where there is insufficient data to enable a comparison of the existing water[^] quality with some of the water[^] quality targets numerics for a Water Management Sub-zone* (a) applies only to those targets numerics with insufficient data.

6.4.2.2

Groundwater Quality

Policy 6-6: Maintenance of groundwater quality

- (a) Discharges[^] and land[^] use activities must be managed in a manner which maintains the existing groundwater quality, or enhances it where it is degraded.
- (aa) An exception may be made under (a) where a discharge[^] onto or into land[^] better meets the purpose of the RMA than a discharge[^] to water[^], provided that the best practicable option[^] is adopted for the treatment and discharge[^] system.
- (b) Groundwater takes in the vicinity of the coast must be managed in a manner which avoids saltwater intrusion.

6.4.2.3

Discharges and Land use Activities Affecting Water Quality

Policy 6-7: Dairy Farming* Land[^] use activities affecting groundwater and surface water[^] quality

The management of dairy farming* land use activities affecting surface water must give effect to the strategy for surface water quality set out in Policies 6-2, 6-3, 6-4 and 6-5, and the strategy for groundwater quality in Policy 6-6, and by managing diffuse discharges of contaminants in the following manner:

- (a) **Nutrients**

⁶ In the case of toxicants (identified as toxicants in Schedule D) they shall be applied as trigger values.

- (i) Existing *dairy farming* land^* use activities must be regulated in specified *Water Management Sub-zones** to achieve nutrient management planning by:
- (A) Setting nitrogen leaching rates for each *LUC* class of land^* which must not be exceeded except as provided for in (B).
 - (B) Providing a three year step down approach to meet the nitrogen leaching rate for each *LUC* class of land^*. In year one the annual average nitrogen leaching loss from the dairy farm must be based on the nutrient loss in the year 2011. In year two there must be either a 33% reduction in the difference between the loss limit set in year one and the *nitrogen leaching maximum** set out in Table 13.2 or a reduction of 2kg/N/ha whichever is the greater. In year three there must be a further 33% reduction from the loss limit set for year one and the *nitrogen leaching maximum** set out in Table 13.2 or a reduction of 2kg/N/ha whichever is the greater. With achievement of the nitrogen leaching rate for each *LUC* class of land^* by year four.
 - (C) the exclusion of dairy cattle from some surface *water bodies^* and their *beds^*, and
 - (D) the requirement for ~~provision of~~ dairy cattle crossings over some *rivers^*.
- (ia) New *dairy farming* land^* use activities must be regulated throughout the Region so as not to exceed nitrogen leaching rates based on the *natural capital** of each *LUC* class of land^*, and to achieve nutrient management planning, the exclusion of dairy cattle from some surface *water bodies^* and their *beds^* and the provision of dairy cattle crossings over some *rivers^*.
- (ii) For the purposes of (a)(i), specified *Water Management Sub-zones** are those *Sub-zones** listed in Table 13.1 where, collectively, *dairy farming* land^* use activities are significant contributors to elevated nutrient levels in groundwater or surface *water^*.
- (iii) Existing and new *dairy farming* land^* use activities shall manage nitrogen leaching rates in order to advance the achievement of the Schedule AB Values and the *water^* quality numerics for the *Water Management Zone** in Schedule D no later than the first ten year anniversary of the relevant common catchment expiry date in Table 11A.1.
- (b) **Faecal contamination**
- (iii) Those persons carrying out existing *dairy farming* land^* use activities in the *Water Management Sub-zones** listed in Table 13.1 or new conversions to *dairy farming** anywhere in the Region must be required, amongst other things, to
- (1) prevent dairy cattle access to some surface *water bodies^* and their *beds^*
 - (2) mitigate faecal contamination of surface *water^* from other entry points (eg., race run-off)
 - (3) establish programmes for implementing any required changes to advance the achievement of the Schedule AB Values and the *water^* quality numerics for the *Water Management Zone** in Schedule D no later than the first ten year anniversary of the relevant common catchment expiry date in Table 11A.1.

(c) **Sediment**

- (i) In those *Water Management Sub-zones** where agricultural *land*[^] use activities are the predominant cause of elevated sediment levels in surface *water*[^], the Regional Council will promote the preparation of voluntary management plans under the Council's Sustainable Land Use Initiative or Whanganui Catchment Strategy for the purpose of reducing the risk of *accelerated erosion*^{*}, as described in Chapter 5.

Policy 6-7A: Rural *land*[^] use activities (other than dairying) affecting groundwater and surface *water*[^] quality in *Water Management Sub-zones listed in Table 13.1**

Rural *land*[^] use activities (other than dairying) affecting groundwater and surface *water*[^] quality in the *Water Management Sub-zones** listed in Table 13.1 shall be managed in the following manner:

- (a) The management of water quality within the *Water Management Sub-zones** listed in Table 13.1 must acknowledge that all rural *land*[^] use activities (other than dairying) have the potential to affect water quality.
- (b) Rural land use activities other than dairying that make a significant contribution to problem nutrient levels in surface water bodies must be actively managed, including through regulation.
- (c) The adequacy of the approach taken in the One Plan must be reviewed as further monitoring data is available and no later than 30 June 2017, to enable assessment of progress towards achieving the water quality numerics in Schedule D. Where necessary regulatory control will be extended over all rural *land*[^] use activities including through requiring compliance with relevant industry standards and codes where they exist and through amending the cumulative nitrogen leaching maximums by Land Use Capability Class contained in Table 13.2.
- (d) As additional *land*[^] use activities are regulated then the policy framework may include mechanisms to provide for nitrogen trading.

Policy 6-7B: Existing dairy farming* and other rural land[^] use activities in Water Management Sub-zones* not listed in Table 13.1

To advance the achievement of the Schedule AB Values for all Water Management Sub-Zones* not listed in Table 13.1 through the following:

- (a) Focus on the following Water Management Sub-Zones as priority catchments for monitoring and assessment:
- (i) Mowhanau (West_3)
 - (ii) Lake Horowhenua (Hoki_1a and Hoki_1b)
 - (iii) Other south-west catchments (Waitarere) (West_7)
 - (iv) Other coastal lakes (West_4 and West_5)
 - (v) Coastal Rangitikei (Rang_4)
 - (vi) Mangawhero/Makotuku (Whau_3b, Whau_3c and Whau_3d)
- (b) Additional Water Management Sub-Zones* must be added to Table 13.1 through a change to the One Plan when water quality and land use monitoring within a Water Management Sub-Zone* demonstrates water quality such that the Schedule D water quality numerics are not met and/or the relevant Schedule AB values are compromised and these changes can reasonably be attributed to specified land[^] use activities.

Policy 6-8: Point source discharges[^] to water[^]

- (a) The management of point source discharges[^] into surface water[^], after allowing for reasonable mixing*, must have regard to advance the achievement of the strategies for surface water[^] quality management set out in Policies 6-3, 6-4 and 6-5, while having regard to:
- (i) the degree to which the activity will adversely affect the Schedule AB Values for the relevant Water Management Sub-zone*
 - (ii) whether the discharge[^], in combination with other discharges[^], including non-point source discharges[^] will cause the Schedule D water[^] quality targets numerics to be breached
 - (iii) the extent to which the activity is consistent with contaminant[^] treatment and discharge[^] best management practices
 - (iv) the need to allow reasonable time to achieve any required improvements to the quality of the discharge[^]
 - (iva) whether the discharge[^] is of a temporary nature or is associated with necessary maintenance[^] or upgrade* work and the discharge[^] cannot practicably be avoided
 - (ivb) whether adverse effects[^] resulting from the discharge[^] can be offset by way of a financial contribution set in accordance with Chapter 18

(ivc) whether it is appropriate to adopt the *best practicable option*^.

Policy 6-9: Point source *discharges*^ to *land*^

Discharges^ of *contaminants*^ onto or into *land*^ must be managed in a manner which:

- (b) does not result in pathogens or other toxic substances accumulating in soil or pasture to levels that would render the soil unsafe for agricultural, domestic or recreational use
- (c) has regard to the strategies for surface *water*^ quality management set out in Policies 6-3, 6-4 and 6-5, and the strategy for groundwater management set out in Policy 6-6
- (d) maximises the reuse of nutrients and *water*^ contained in the *discharge*^ to the extent reasonably practicable
- (e) results in any *discharge*^ of liquid to *land*^ generally not exceeding the available *water*^ storage capacity of the soil (deferred irrigation)
- (f) ensures that adverse *effects*^ on *rare habitats*^*, *threatened habitats*^* and *at-risk habitats*^* are avoided, remedied or mitigated.

Policy 6-11: Human sewage discharges[^]

Notwithstanding other policies in this chapter:

- (a) before entering a surface *water body*[^] all new *discharges*[^] of treated human sewage must:
 - (i) be applied onto or into *land*[^], or
 - (ii) flow overland, or
 - ~~(iii) pass through a rock filter, or~~
 - ~~(iv) pass through a *wetland*[^] treatment system, or~~
 - (v) pass through an alternative system that mitigates the adverse *effects*[^] on the *mauri*^{*} of the receiving *water body*[^], and
- (b) all existing direct *discharges*[^] of treated human sewage into a surface *water body*[^] must change to a treatment system described under (a) by the year 2020 or on renewal of an existing consent, whichever is the earlier date.

6.4.3 Water Quantity and Allocation**6.4.3.1 Policies applying to both Surface Water and Groundwater****Policy 6-12: Reasonable and justifiable need for *water*[^]**

Subject to Policy 6-19, the amount of *water*[^] taken by resource users must be reasonable and justifiable for the intended use. In addition, the following specific measures for ensuring reasonable and justifiable use of *water*[^] must be taken into account when considering consent applications to take *water*[^] for irrigation, *public water supply*^{*}, animal drinking *water*[^], dairy shed washdown or industrial use, and during reviews of consent *conditions*[^] for these activities.

- (a) For irrigation, *resource consent*[^] applications must be required to meet a reasonable use test in relation to the maximum daily rate of abstraction, the irrigation return period and the seasonal or annual volume of the proposed take. When making decisions on the reasonableness of the rate and volume of take sought, the Regional Council must:
 - (i) consider *land*[^] use, crop *water*[^] use requirements, on-site physical factors such as soil *water*[^]-holding capacity, and climatic factors such as rainfall variability and potential evapo-transpiration
 - (ii) assess applications either on the basis of an irrigation application efficiency of 80% (even if the actual system being used has a lower application efficiency), or on the basis of a higher efficiency where an application is for an irrigation system with a higher efficiency
 - (iii) link actual irrigation use to soil moisture measurements or daily soil moisture budgets in consent *conditions*[^].
- (aa) For domestic use, animal drinking *water*[^] and dairy shed washdown *water*[^], reasonable needs must be calculated as:
 - (i) up to 300 litres per person per day for domestic needs
 - (ii) up to 70 litres per animal per day for drinking *water*[^]
 - (iii) up to 70 litres per animal per day for dairy shed washdown.

- (b) For industrial uses, *water*[^] allocation must be calculated where possible in accordance with best management practices for *water*[^] efficiency for that particular industry.
- (c) For *public water supplies*^{*}, the following must generally be considered to be reasonable:
 - (i) an allocation of 300 litres per person per day for domestic needs, plus
 - (ii) an allocation for commercial use equal to 20% of the total allocation for domestic needs, plus
 - (iii) an allocation for industrial use calculated, where possible, in accordance with best management practices for *water*[^] efficiency for that particular industry, plus
 - (iiia) an allocation necessary for hospitals, other facilities providing medical treatment, marae, schools or other education facilities, New Zealand Defence Force facilities or correction facilities, plus
 - (iiib) an allocation necessary for public amenity and recreational facilities such as gardens, parks, sports fields and swimming pools, plus
 - (iv) an allocation necessary to cater for the reasonable needs of animals or agricultural uses that are supplied by the *public water supply*^{*} system, plus
 - (v) an allocation necessary to cater for growth, where urban growth of the municipality is provided for in an operative *district plan*[^] for the area and is reasonably forecast, plus
 - (vi) an allocation for leakage equal to 15% of the total of (i) to (v) above.
- (d) When making decisions on consent applications where the existing allocation for a *public water supply*^{*} exceeds the allocation determined in accordance with (c)(i) to (c)(vi) above:
 - (i) consideration must be given to imposing a timeframe within which it is reasonably practicable for the existing allocation to be reduced to the determined amount, or
 - (ii) if (i) is not imposed, an alternative allocation must be determined based on the particular social and economic circumstances of the community serviced by the *public water supply*^{*} and the actual and potential *effects*[^] of the abstraction on the relevant Schedule AB Values for the reach of *river*[^] or its *bed*[^] affected by the take.

Policy 6-13: Efficient use of *water*[^]

Water[^] must be used efficiently, including by the following measures:

- (a) requiring *water*[^] audits and *water*[^] budgets to check for leakages and *water*[^]-use efficiency as appropriate
- (b) requiring the use of, or progressive *upgrade*^{*} to, *infrastructure*[^] for *water*[^] distribution that minimises the loss of *water*[^] and restricts the use of *water*[^] to the amounts determined in accordance with Policy 6-12
- (c) enabling the transfer of *water permits*[^]
- (ca) promoting *water*[^] storage
- (d) raising awareness about *water*[^] efficiency issues and techniques

- (e) requiring monitoring of *water*[^] takes, including by installing *water*[^] metering and telemetry.

6.4.3.2

Policies for Surface Water

Policy 6-15: Overall approach for surface *water*[^] allocation

- (a) The requirements of *water conservation orders*[^] must be given effect under this Plan.
- (ba) Takes lawfully established for hydroelectricity generation at the time of Plan notification (31 May 2007) must be provided for prior to implementing (c) and (d) below.
- (c) Core allocations of surface *water*[^] from *rivers*[^] must be determined in accordance with Policies 6-16 and 6-17. Takes that comply with the relevant core allocation, when assessed in combination with all other takes, must be allowed.
- (d) Supplementary allocations of surface *water*[^] from *rivers*[^] must be determined in accordance with Policy 6-18.
- (e) Takes from *rivers*[^] must be apportioned, restricted or suspended when *river*[^] flows are at or below their minimum flows in accordance with the provisions of Policy 6-19.
- (f) Takes of *water*[^] from *lakes*[^] must comply with Policy 6-20.

Policy 6-16: Core allocations and minimum flows

- (a) The taking of *water*[^] from *rivers*[^] must be managed in accordance with the minimum flows and cumulative core allocations set out in Schedule B.
- (b) The minimum flows and cumulative core allocations set out in Schedule B must be set after excluding any takes lawfully established for hydroelectricity generation at the time of Plan notification (31 May 2007).

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

- (a) Where good hydrological information, such as a specific *water*[^] resource study or a long-term flow record, is available it must be used to set minimum flows and core allocations in Schedule B.
- (b) Where information described in (a) above is not available, the minimum flows and core allocations set out in Schedule B must generally be a minimum flow equal to the estimated or calculated one-day mean annual low flow, and a core allocation equal to a percentage of the minimum as specified in Schedule B.
- (c) The use of a revised minimum flow or core allocation that is an alternative to that set under (a) or (b) may be considered on a case-by-case basis where:
 - (i) an applicant for a *water*[^] take consent has proposed a revised minimum flow or core allocation based on new or improved scientific knowledge, and
 - (ii) the adverse *effects*[^] of the revised minimum flow and core allocation on the Schedule AB Values for the *river*[^] or its *bed*[^] at, and downstream of, the point of take are no more than minor.

Policy 6-18: Supplementary *water*[^] allocation

In addition to the core allocations set out in Policy 6-16, a supplementary allocation from *rivers*[^] may be provided:

- (a) in circumstances where *water*[^] is only taken when the *river*[^] flow is greater than the median flow, and the total amount of *water*[^] taken by way of a supplementary allocation does not exceed 10% of the actual flow in the *river*[^] at the time of abstraction, and
- (b) in circumstances where it can be shown that the supplementary allocation will not:
 - (i) increase the frequency or duration of minimum flows
 - (ia) lead to a significant departure from the natural flow regime, including the magnitude of the median flow and the frequency of flushing flows
 - (ii) cause any adverse *effects*[^] that are more than minor on the Schedule AB Values of the *water body*[^] or its *bed*[^]
 - (iii) limit the ability of anyone to take *water*[^] under a core allocation
 - (iv) derogate from *water*[^] allocated to hydroelectricity generation.

Policy 6-19: Apportioning, restricting and suspending takes in times of minimum flow

When a *river*[^] is at or below its minimum flow, takes from it must be managed in the following manner:

- (a) **Permitted takes** - Takes that are permitted by this Plan (surface *water*[^] and groundwater takes) or are for fire-fighting purposes must be allowed to continue regardless of *river*[^] flow.
- (aa) **Existing hydroelectricity generation takes** - must be allowed to continue subject only to any minimum flow restrictions specified in their consent *conditions*[^]
- (ab) **Supplementary takes** - must cease at a flow specified in their consent *conditions*[^] and that cessation flow must be higher than the Schedule B minimum flow such that the requirements of Policy 6-18(b)(i) are met
- (b) **Essential takes** - The following core *water*[^] allocation takes are deemed essential and must be managed in the manner described.
 - (i) takes greater than permitted by this Plan (and therefore subject to *resource consent*[^]) that are required for reasonable domestic needs, reasonable needs of animals for drinking *water*[^], and reasonable dairy shed washdown *water*[^] must be allowed to continue regardless of *river*[^] flow, but must not exceed:
 - (A) up to 250 litres per person per day for domestic needs
 - (B) up to 70 litres per animal per day for drinking *water*[^]
 - (C) up to 70 litres per animal per day for dairy shed washdown
 - (ii) takes required to meet the reasonable needs of hospitals, other facilities providing medical treatment, marae, schools or other education facilities, New Zealand Defence Force facilities or correction facilities must be allowed to continue regardless of

- river*[^] flow, but must be required to minimise the amount of *water*[^] taken to the extent reasonably practicable
- (iii) takes which were lawfully established at the time of Plan notification (31 May 2007) required for industries which, if their take were to cease, would significantly compromise a community's ability to provide for its social, economic or cultural wellbeing or for its health or safety (including the hygienic production and processing of perishable food), must be allowed to continue regardless of *river*[^] flow, but must be required to minimise the amount of *water*[^] taken to the extent reasonably practicable
 - (iv) *public water supply*^{*} takes must be restricted to a total public *water*[^] consumption calculated as follows:
 - (A) an allocation of 250 litres per person per day for domestic needs, plus
 - (B) an allocation for commercial use equal to 20% of the total allocation for domestic needs, plus
 - (C) an allocation which meets the reasonable needs of those facilities and industries listed under (b)(ii) and (b)(iii) where such facilities and industries are connected to the *public water supply*^{*} system, plus
 - (D) any allocation necessary to cater for the reasonable needs of animals that are supplied by the *public water supply*^{*} system, plus
 - (E) an allocation for leakage equal to 15% of the total of (A) to (D) above.
 - (c) **Non-essential takes** - Other core *water*[^] allocation takes, including irrigation takes but excluding the essential takes described under (b), must be managed in the following manner:
 - (i) *water*[^] takes must be required to cease when the *river*[^] is at or below its minimum flow, as set out in Policy 6-16
 - (ii) *water*[^] takes must be allowed to recommence once the *river*[^] flow has risen above its minimum flow.
 - (d) **Meaning of "core *water*[^] allocation take"** - For the purposes of this policy, a core *water*[^] allocation take means a take that has been granted consent in accordance with a core allocation made under Policy 6-16, or in accordance with a previous core allocation regime.

Policy 6-20: Surface *water*[^] allocation - *lakes*[^]

Decisions on *resource consent*[^] applications to take *water*[^] from a *lake*[^] must ensure that there are no significant adverse *effects*[^] on the Schedule AB Values of the *lake*[^] and have regard to the policies for indigenous *biological diversity*[^] in Chapter 12.

6.4.3.3

Policies for *Bores*^{*} and Groundwater

Policy 6-21: Overall approach for *bore*^{*} management and groundwater allocation

- (a) New *bores*^{*} must be constructed and managed in accordance with Policy 15-2A.
- (aa) *Groundwater Management Zones*^{*} are mapped in Schedule C.

- (b) Total groundwater allocations must comply with the annual allocable volumes for *Groundwater Management Zones** set out in Policy 6-23.
- (c) The measured or modelled *effects*[^] of a proposed groundwater take on other groundwater users, surface *water bodies*[^] and saltwater intrusion must be managed in accordance with Policies 15-1, 15-2B, 15-2C and 15-2D.

Policy 6-23: Groundwater Management Zones

The total amount of consented groundwater allocated from each *Groundwater Management Zone** mapped in Schedule C must not exceed the annual allocable volume for the *GWMZ** specified in Schedule C.

6.4.4

Beds of Rivers and Lakes

Policy 6-27: General management of the *beds*[^] of *rivers*[^] and *lakes*[^]

Activities in, on, under or over the *beds*[^] of *rivers*[^] and *lakes*[^] must generally be managed in a manner which:

- (a) has regard to the Schedule AB Values for the *Water Management Sub-zone(s)** in which the activity takes place, in the manner described in Policies 6-28, 6-29 and 6-30
- (b) avoids any significant reduction in the ability of a *river*[^] and its *bed*[^] to convey flood flows, or significant impedance to the passage of floating debris
- (c) avoids, remedies or mitigates any significant adverse *effects*[^] on the stability and function of existing *structures*[^] including flood and erosion control *structures*[^]
- (d) avoids, remedies or mitigates any significant reduction in the habitat diversity, including the morphological diversity, of the *river*[^] or *lake*[^] or its *bed*[^]
- (e) manages *effects*[^] on natural character and public access in accordance with the relevant policies in Chapter 7. Natural character can include the natural style and dynamic processes of the *river*[^], such as *bed*[^] style and width and the quality and quantity of *bed*[^] habitat
- (f) provides for the safe passage of fish both upstream and downstream
- (g) ensures that the existing nature and extent of navigation of the *river*[^] or *lake*[^] are not obstructed
- (h) ensures that access required for the *operation*^{*}, *maintenance*^{*}, and *upgrade*^{*} of *infrastructure*[^] and other physical resources of regional or national importance is not obstructed
- (i) provides for continued public access in accordance with Policy 7-9.

Policy 6-28: Activities in *sites*^{*} with a Value of Natural State, Sites of Significance - Cultural, or Sites of Significance - Aquatic

In *sites*^{*} with a Schedule AB Value of Natural State, Sites of Significance - Cultural or Sites of Significance - Aquatic, activities in, on, under or over the *beds*[^] of *rivers*[^] and *lakes*[^] must be managed in a manner which:

- (a) avoids adverse *effects*[^] on these Values as far as reasonably practicable or otherwise remedies or mitigates those *effects*[^]
- (b) maintains the habitat and spawning requirements of the species identified.

Policy 6-29: Activities in *rivers*[^] or *lakes*[^] and their *beds*[^] with a Value of Flood Control and Drainage

In reaches of *rivers*[^] or *lakes*[^] and their *beds*[^] with a Schedule AB Value of Flood Control and Drainage, activities in, on, under or over the *beds*[^] of *rivers*[^] and *lakes*[^] and on *land*[^] adjacent to the *bed*[^] where the Value is located must be managed in a manner which:

- (a) enables the level of flood hazard and erosion control existing at the time of Plan notification (31 May 2007) to be maintained or enhanced
- (b) maintains other Schedule AB Values associated with the *river*[^] or *lake*[^] and its *bed*[^], unless functional constraints make this impractical, in which case adverse *effects*[^] on other Values must be mitigated or offset or compensated by way of a financial contribution in accordance with the policies in Chapter 18.

Policy 6-30: Activities in *rivers*[^] or *lakes*[^] and their *beds*[^] with other Schedule AB Values

In *sites*^{*} with Schedule AB Values other than Natural State, Sites of Significance - Cultural, Sites of Significance - Aquatic, or Flood Control and Drainage, activities in, on, under or over the *beds*[^] of *rivers*[^] and *lakes*[^] must be managed in a manner which:

- (a) avoids, remedies or mitigates significant adverse *effects*[^] on these other Values
- (b) provides consent applicants with the option of making an offset to compensate for adverse *effects*[^]
- (c) allows compensation by way of a financial contribution in accordance with the policies in Chapter 18.

Policy 6-31: Essential and beneficial activities

Notwithstanding Policies 6-27 to 6-30, activities in, on, under or over the *beds*[^] of *rivers*[^] and *lakes*[^] that are essential or result in an environmental benefit must generally be allowed, including:

- (a) the use, *maintenance*^{*} and *upgrading*^{*} of existing *infrastructure*[^] and other physical resources of regional or national importance
 - (aa) works designed to maintain or improve the stability and functionality of existing *structures*[^]
- (b) the removal of derelict, unlawful or non-functional *structures*[^]
- (c) the restoration or enhancement of natural habitats.

Policy 6-32: Gravel extraction

Subject to Policies 6-27 to 6-31 and the need to ensure that gravel extraction volumes are sustainable, activities that enable gravel extraction will generally be allowed in recognition of the benefit the gravel resource provides for use and development and the flood protection benefit of having it managed.

6.5**Methods**

The taking of surface water and groundwater, discharging contaminants to surface water and to land, and the undertaking of activities that disturb the beds of rivers or lakes, are largely regulated activities. Part II: Regional Plan contains rules relating to the activities described in this chapter. The key non-regulatory methods the Regional Council will pursue are outlined below.

Method 6-1	Large Water Abstractors
Description	<p>The aim of this method is to provide assistance to large water abstractors to identify options for improving the water abstraction, distribution and use components of their activities. It is expected this method will reduce the abstraction pressure on the groundwater and surface water resources, while providing abstractors with financial benefits and their business/customers with greater certainty of supply.</p> <p>The emphasis will be on working with large abstractors to identify and implement opportunities for increasing water use efficiency, reducing distribution network leakages, agreeing priority of use within distribution networks, and consideration of alternative water supply and storage options.</p>
Who	The Regional Council, Territorial Authorities, industry (including hydroelectricity generators) and large irrigators will work together to develop, fund and implement this programme.
Links to Policy	This method implements Policies 6-12 and 6-13.
Target	All major abstractors in the Region have been contacted and assistance provided where requested by 2016.

Method 6-2	Sewage Treatment Plant Upgrades
Description	The aim of this method is to assist Territorial Authorities to seek central Government funding for sewage treatment plant upgrades, given that the plants make a significant contribution to contaminants to water bodies during low flows. The Regional Council will work with Territorial Authorities to analyse their treatment and disposal options and to develop a package to present to Government with the aim of securing capital works funding to reduce the environmental

Method 6-2	Sewage Treatment Plant Upgrades
	impact of these discharges.
Who	Regional Council, Territorial Authorities, Ministry of Health, local health agencies (eg., MidCentral Health) and iwi authorities.
Links to Policy	This method implements Policies 6-2, 6-6, 6-8 and 6-11.
Targets	Central Government funding applications completed for upgrade of sewage treatment plants as required.

Method 6-3	On-site Wastewater System Forum
Description	<p>The aim of this method is to facilitate implementation of the Regional Council's Manual for On-Site Wastewater Systems Design and Management.</p> <p>The Regional Council will establish a forum to aid understanding and implementation of the manual and will undertake regular reviews of new types of on-site treatment and disposal systems.</p>
Who	The forum will comprise, as a minimum, representatives from the Regional Council, Territorial Authorities, consulting engineers and system installers.
Links to Policy	This method implements Policies 6-2, 6-6 and 6-9.
Target	Two meetings per year.

Method 6-4	Human Sewage Discharges to Water
Description	<p>The Regional Council will provide assistance to Territorial Authorities to upgrade existing sewage treatment systems that directly discharge treated human sewage to the Region's water bodies.</p> <p>The Regional Council to work with Territorial Authorities to reduce water volume, explore land application options and assist with funding opportunities.</p>
Who	Regional Council, Territorial Authorities and iwi authorities.
Links to Policy	This method implements Policies 6-2 and 6-11.
Target	To stop direct human sewage discharges to water by 2020.

Method 6-5	Stormwater System Discharge Upgrades
Description	<p>The Regional Council will provide assistance to Territorial Authorities wanting to upgrade the treatment of their existing urban stormwater system discharges, where these are into water bodies.</p> <p>The Regional Council to work with Territorial Authorities to reduce water volume, explore land disposal options and assist with funding opportunities.</p>
Who	Regional Council, Territorial Authorities and iwi authorities.
Links to Policy	This method implements Policies 6-2, 6-6, 6-8 and 6-9.
Target	To reduce the number, and improve the quality, of urban stormwater discharges by 2016.

Method 6-6	Trout and Native Fish Spawning Habitat
Description	<p>The Regional Council and other agencies will work with landowners to protect and enhance water bodies and their beds that serve as spawning <i>sites</i>* for brown and rainbow trout and native fish. Resources will be directed towards the most significant <i>sites</i>*.</p> <p>Landowners will be provided with advice and financial/project management assistance to carry out enhancement and protection measures including fencing, planting, providing fish passage and pest plant and pest animal control. The Regional Council will seek funding from third parties to assist with this method.</p> <p>The effectiveness of the protection and enhancement works will be monitored.</p> <p>The method will include publicity to increase public awareness about the importance of trout and native fish.</p>
Who	Regional Council, Territorial Authorities, Fish and Game, Department of Conservation, landowners and funding agencies including He Tini Awa Trust.
Links to Policy	This method implements Policies 6-2, 6-27 and 6-30.
Target	30 of the top trout spawning habitat <i>sites</i> * and native fish habitat spawning <i>sites</i> * are actively managed, including protection and enhancement measures, within 10 years of this Plan becoming operative.

Method 6-6A	Lake Horowhenua and Other Coastal Lakes
Description	<p>The Regional Council and other agencies will work with all agencies to protect and enhance Lake Horowhenua and other coastal lakes.</p> <p>Landowners and other agencies will be provided with advice and project management assistance to carry out enhancement and protection measures including fencing, planting, sediment control, wastewater/stormwater management and fertiliser application management. The Regional Council will seek funding from third parties to assist with this method.</p> <p>The effectiveness of the protection and enhancement works in achieving improved water quality within Lake Horowhenua and other Coastal Lakes will be monitored.</p> <p>The method will include publicity to increase public awareness about the importance of the lakes. The method will include utilising industry codes of practice as a means of enhancing and protecting water quality e.g. the Code of Practice for Commercial Vegetable Growing in the Horizons Region.</p>
Who	Regional Council, Territorial Authorities, Fish and Game, Department of Conservation, iwi, Horticulture NZ, landowners and other agencies.
Links to Policy	This method implements Policy 6-7B.
Target	The Lake is actively managed, including protection and enhancement measures, within 5 years of this Plan becoming operative.

Method 6-6B	Lake Quality Research, Monitoring and Reporting
Description	<p>The aim of this method is to develop an integrated research, monitoring and reporting programme. The focus will be to define the current state of the quality of the Region's lakes particularly the Region's coastal lakes. The method will seek to assess the state and quality of the lakes to better understand the influences on water quality in those lakes. The outcomes will link into work to refine existing policies, objectives and methods in terms of the need to add rural land uses and water management sub-zones in managing nutrient management and effects on water quality. The outcomes will also guide implementation planning and allow implementation effectiveness is to be assessed.</p>
Who	Regional Council, Department of Conservation, Fish and Game,

Method 6-6B	Lake Quality Research, Monitoring and Reporting
	<u>Horticulture New Zealand, DairyLink, research institutes, universities, non-Government agencies, community groups and iwi authorities as required.</u>
Links to Policy	<u>This method implements Policies 6-3, 6-4, 6-5, 6-7, 6-7A and 6-7B.</u>
Targets	<u>A research, monitoring and reporting programme that defines the current state of water quality of the Region's lakes (particularly coastal lakes) and measure changes in water quality.</u>

Description	<p>The Regional Council and other agencies will work with landowners to protect and enhance the water quality of the Region's water bodies. Landowners in those <i>Water Management Sub-zones*</i> where the nutrient management (non-point source discharge) control rules are to be introduced will receive the highest priority for assistance. This method represents an expansion of the Regional Council's existing water quality improvement programme, which focuses almost entirely on dairy farmers as part of the Dairying and Clean Streams Regional Action Plan for Manawatu-Wanganui Region.</p> <p>Landowners will be provided with advice and financial/project management assistance to carry out enhancement and protection measures including fencing and planting of riparian margins. The Regional Council will seek funding from third parties to assist with this method.</p> <p>The effectiveness of the protection and enhancement works will be monitored.</p>
Who	Regional Council, Dairy NZ, Fonterra, Territorial Authorities and funding agencies including the He Tini Awa Trust and Nga Whenua Rahui.
Links to Policy	This method implements Policies 6-2, 6-4 and 6-7.
Targets	<ul style="list-style-type: none"> • The targets of the Dairying and Clean Streams Regional Action Plan for Manawatu-Wanganui Region are achieved by the due dates. • Advice and assistance is offered to all landowners affected by the nutrient management rules. • All landowner requests for advice and assistance regarding water quality improvement are responded to promptly.

Method 6-8	Education in Schools - Water
Description	The aim of this method is to raise awareness amongst the youth of the Region of the significance of the water (quantity and quality) resource, the threats to it, and what they can do to protect/restore it. This will be achieved through various environmental education programmes/initiatives - for example, Green RIG, Enviroschools and Trees for Survival.
Who	Regional Council, various national and local environmental education providers and the Youth Environment Forum.
Links to Policy	This method implements Policy 6-2.
Targets	The Regional Council develops and delivers a water-related environmental education programme.

Method 6-9	Water (Fluvial Resources, Quality and Quantity) Research, Monitoring and Reporting
Description	The aim of this method is to develop an integrated research, monitoring and reporting programme. The focus will be to define the current state of the natural character of the Region's rivers by analysing their habitat and morphological diversity. This may include: planform/ channel morphology classification; fairway width; sinuosity; barforms; percentage of pool, riffle, run, habitat; gravel resources, level of entrenchment, and location and extent of riparian and wetland areas. The method will also seek to measure changes in natural character, including habitat and morphological diversity. The outcomes will link into monitoring undertaken by the River Works Environmental Code of Practice and support delivery and refinement of existing policies, objectives and methods. The outcomes will also guide implementation planning and allow implementation effectiveness to be assessed.
Who	Regional Council, Department of Conservation, Fish and Game, research institutes, universities, non-Government agencies, community groups and iwi authorities as required.
Links to Policy	This method implements Policies 6-2, 6-15, 6-17, 6-27, 6-28, 6-29, 6-30, 6-31 and 7-8.
Targets	A research, monitoring and reporting programme that defines the current state of the natural character of the Region's rivers and measure changes in natural character, including habitat and morphological diversity.

6.6 Anticipated Environmental Results

Anticipated Environmental Result	Link to Policy	Indicator	Data Source
<p>During the life of this Plan, water quality and quantity maintain the Values set in this Plan.</p> <p>In <i>Water Management Sub-zones</i>*:</p> <ul style="list-style-type: none"> where water quality targets are met prior to this Plan becoming operative, they continue to be met where water quality targets are not met prior to this Plan becoming operative, they are either met or improved from the current state where targeted for action or, where not targeted for action, they are no worse than prior to this Plan becoming operative. 	<p>Water Policies: 6-1, 6-2, 6-3, 6-4, 6-5, 6-7, 6-8, 6-9, 6-11, 6-12, 6-13, 6-15, 6-16, 6-18, 6-20, 6-27, 6-28, 6-29, 6-30 and 6-31</p> <p>Land Policies: 5-1, 5-2A and 5-5</p> <p>Living Heritage Policies: 7-1, 7-2A, 7-4, 7-5 and 7-8</p>	<ul style="list-style-type: none"> Measured water quality compared to <i>Water Management Sub-zone</i>* targets, especially measures for "muddy waterways", "safe swimming", "safe food gathering", and "aquatic ecosystem health" in priority catchments Incidents where surface water quality is confirmed as unfit for use Measured flows of surface water compared to the allocation and minimum flow regime outlined in this Plan 	<ul style="list-style-type: none"> The Regional Council's State of Environment water quality and quantity monitoring programme The Regional Council's incidents database Ministry of Health raw water monitoring
<p>By 2017, the natural, physical and cultural qualities of the beds of rivers are suitable for specified <i>Water Management Sub-zone</i>* Values.</p>	<p>Water Policies: 6-1, 6-27, 6-28, 6-29, 6-30 and 6-31</p>	<ul style="list-style-type: none"> Confirmed incidents of damage to the beds of rivers Consents granted for activities in beds of rivers and lakes 	<ul style="list-style-type: none"> The Regional Council's incidents database The Regional Council's consents database
<p>The amount of groundwater used does not exceed replenishment rates and its quality is the same as or better than that measured prior to this Plan becoming operative, other than where discharges to land are a permitted activity or are allowed by resource consent.</p>	<p>Water Policies: 6-6, 6-9, 6-12, 6-13, 6-21 and 6-23</p>	<ul style="list-style-type: none"> Groundwater levels Region-wide, but with a focus on Opiki and Himatangi areas Groundwater quality Region-wide, but with a focus on nitrates in Horowhenua and Tararua districts and conductivity along the Foxton-Tangimoana coast Confirmed incidents where groundwater sources become unavailable (ie., dry up) or water quality is unfit for use 	<ul style="list-style-type: none"> The Regional Council's State of Environment groundwater monitoring programme The Regional Council's compliance monitoring programme The Regional Council's incidents database Ministry of Health raw water monitoring

6.7

Explanations and Principal Reasons

The Region has been divided into *Water Management Sub-zones** for the purpose of managing water quality and quantity. Water bodies and their beds within these *Water Management Sub-zones** have been assigned Values which represent the ecosystem, recreational, cultural and social and economic attributes of the water body and its bed (Objective 6-1, Policy 6-1). Targets have been assigned to protect these Values (Policies 6-2 to 6-5).

Discharges to water and land

The water chapter deals with discharges to land and water holistically. This is because discharges to land have the potential to adversely affect groundwater and surface water quality if not managed well. Three types of discharges of concern have been identified: point source discharges to land (including *domestic wastewater**), point source discharges to water (including industrial discharges and treated sewage) and non-point source discharges to land (from agricultural land uses). All these types of discharges will be managed to meet the objectives and policies for water quality (Objective 6-1, 6-2, Policies 6-2 - 6-5), including discharges to land (Policy 6-9).

Agricultural land uses contribute to water bodies not meeting the Region's targets for nutrients, faecal contamination and sediment levels. These need to be targeted for control in problem catchments and through the Regional Council's Sustainable Land Use Initiative (SLUI) and Whanganui Catchment Strategy and the regulation of *dairy farming** (Policy 6-7). Control will centre around using best practice management techniques and requiring *nutrient management plans**.

Point source discharges to water need to be managed to achieve water quality targets (Policy 6-8). This may mean that it is appropriate to consider alternatives to discharging to water. This may include considering alternative treatment options for all or part of the year, to achieve or move closer to water quality targets at critical times of the year. In all cases, point source discharges to water of untreated human sewage are culturally unacceptable, and direct discharges of treated human sewage should be changed to involve land application before discharge (Policy 6-11).

Surface Water Quantity

Water will be used and allocated in a way which enables water to be used for the wellbeing of people and the community, while providing for other Values (Objective 6-3, Policy 6-15). Water allocation limits are set for each *Water Management Sub-zone** and water will be managed to maintain these limits (Policies 6-16 and 6-17). When water use needs to be restricted, life sustaining and essential water takes have first priority (Policy 6-19). Water harvesting and alternative sources of water to surface water are also encouraged and provided for (Policy 6-18). Efficiency of use is an important consideration, and will ensure that water is available to the maximum number of users and is not wasted (Policies 6-12 and 6-13).

Groundwater

Groundwater quality and quantity is connected to that of surface water and this is recognised in this chapter, while providing for its management separately. *Bores** will be managed to ensure that they are properly constructed, efficient and fully functioning and do not lead to contamination of groundwater, wastage of water or unnecessary effects on other *bores** or surface water bodies (Policy 6-21). *Groundwater Management Zones** have been established and sustainable allocations set; groundwater takes will be managed within these allocations (Policy 6-23). Groundwater quality within the Region is generally good and is not declining, but maintaining this good quality will be a consideration when managing discharges (Policy 6-9).

Beds of Rivers and Lakes

The physical nature of the Region's rivers and lakes and their beds is important to maintaining the Values assigned to them. Management of activities in the beds of rivers and lakes will be undertaken in order to maintain these Values, and other important physical attributes (Objective 6-4, Policies 6-27 and 6-31). Some Values are treated differently. Important aquatic biodiversity *sites**, cultural *sites** and natural state areas would be negatively and potentially permanently harmed by some activities and consequently are given a high level of protection (Policy 6-28). Flood control and drainage schemes have damaged water Values in some areas, but also provide valuable protection services to the community. Maintaining this level of service is important, while ensuring that other Values are not further compromised (Policy 6-29). While recognising the Values, acknowledgement is also needed that some activities, such as river restoration, are beneficial and should be allowed to occur (Policy 6-31).

Gravel extraction is an important activity in river beds, both for the benefit the gravel resource provides and the flood protection benefit of having it removed from the river. However, if not well managed, too much extraction or extraction in an inappropriate manner can damage river Values. Gravel extraction needs to be managed to ensure that extraction volumes are sustainable (Policy 6-32).

Attachment 2

**Proposed wording change to
Chapter 13: Discharges to land and water**

THE PROPOSED CHANGES ARE HIGHLIGHTED IN YELLOW TEXT.

Note: Changes marked in grey were made as a result of mediation

13 Discharges to Land and Water

13.1A Objectives

Objective 13-1: Regulation of discharges[^] to land[^] and water[^]

The regulation of discharges[^] onto or into land[^] (including those that enter water[^]) or directly into water[^] in a manner that:

- (a) has regard to the Values and management objectives in Schedule AB,
- (b) has regard to the objectives and policies of Chapter 6 as they relate to surface water[^] and groundwater quality, and
- (c) where a discharge[^] is onto or into land[^], avoids, remedies or mitigates adverse effects[^] on surface water[^] or groundwater.

13.1 Policies

Policy 13-1: Consent decision-making for discharges[^] to water[^]

When making decisions on resource consent[^] applications, and setting consent conditions[^], for discharges[^] of water[^] or contaminants[^] into water[^], the Regional Council must have regard to:

- (a) the objectives and policies of Chapter 6 regarding the Schedule AB Values and the water[^] quality targets in Schedule D,
- (b) avoiding discharges[^] which contain any persistent contaminants[^] that are likely to accumulate in a water body[^] or its bed[^],
- (c) the appropriateness of adopting the best practicable option[^] to prevent or minimise adverse effects[^] in circumstances where:
 - (i) it is difficult to establish discharge[^] parameters for a particular discharge[^] that give effect to the management approaches for water[^] quality and discharges[^] set out in Chapter 6, or
 - (ii) the potential adverse effects[^] are likely to be minor, and the costs associated with adopting the best practicable option[^] are small in comparison to the costs of investigating the likely effects[^] on land[^] and water[^], and
- (d) the objectives and policies of Chapters 3, 4, 7, 10 and 11A to the extent that they are relevant to the discharge[^].

Policy 13-2: Consent decision-making for discharges[^] to land[^]

When making decisions on *resource consent[^]* applications, and setting consent *conditions[^]*, for *discharges[^]* of *contaminants[^]* onto or into *land[^]* the Regional Council must have regard to:

- (a) the objectives and policies of Chapter 6 regarding the management of groundwater quality and *discharges[^]*,
- (b) where the *discharge[^]* may enter surface *water[^]* or have an adverse *effect[^]* on surface *water[^]* quality, the degree of compliance with the approach for managing surface *water[^]* quality set out in Chapter 6,
- (c) avoiding as far as reasonably practicable any adverse *effects[^]* on any sensitive receiving *environment[^]* or potentially incompatible *land[^]* uses, in particular any residential buildings, educational facilities, churches, marae, public areas, *infrastructure[^]* and other physical resources of regional or national importance identified in Policy 3-1, *wetlands[^]*, surface *water bodies[^]* and the *coastal marine area[^]*,
- (d) the appropriateness of adopting the *best practicable option[^]* to prevent or minimise adverse *effects[^]* in circumstances where:
 - (i) it is difficult to establish *discharge[^]* parameters for a particular *discharge[^]* that give effect to the management approaches for *water[^]* quality and *discharges[^]* set out in Chapter 6,
 - (ii) the potential adverse *effects[^]* are likely to be minor, and the costs associated with adopting the *best practicable option[^]* are small in comparison to the costs of investigating the likely *effects[^]* on *land[^]* and *water[^]*,
- (e) avoiding *discharges[^]* which contain any persistent *contaminants[^]* that are likely to accumulate in the soil or groundwater, and
- (f) the objectives and policies of Chapters 3, 4, 7, 10 and 11A to the extent that they are relevant to the *discharge[^]*.

Policy 13-2A: Industry-based standards

The Regional Council will examine relevant industry-based standards (including guidelines and codes of practice) and may accept compliance with those standards as being adequate to avoid, remedy or mitigate adverse *effects[^]* to the extent that those standards address the matters in Policies 13-1 and 13-2.

Policy 13-2B: Options for discharges[^] to surface water[^] and land[^]

When applying for consents and making decisions on consent applications for *discharges[^]* of *contaminants[^]* into *water[^]* or onto or into *land[^]*, the opportunity to utilise alternative *discharge[^]* options, or a mix of *discharge[^]* regimes, for the purpose of mitigating adverse *effects[^]* where reasonably practicable, must be considered, including but not limited to:

- (a) discharging *contaminants[^]* onto or into *land[^]* as an alternative to discharging *contaminants[^]* into *water[^]*,
- (b) withholding from discharging *contaminants[^]* into surface *water[^]* at times of low flow, and

- (c) adopting different treatment and discharge[^] options for different receiving environments[^] or at different times (including different flow regimes or levels in surface water bodies[^]).

Policy 13-2C: Management of new and existing dairy farming* land[^] uses

When making decisions on resource consent[^] applications, and setting consent conditions[^], for dairy farming* as a land[^] use, the Regional Council must:

- (a) give effect have regard to Policy 6-7.4
- (b) seek to exclude cattle from the following waterbodies within the water management sub-zones* listed in Table 13.1:
- (i) a wetland or lake that is a rare habitat*, threatened habitat* or at risk habitat*.
 - (ii) a river that is permanently flowing, or is intermittently flowing with an active bed* width greater than 1 metre (when measured as an average across the property) at any time the bed contains water.
- For the purposes of this policy "exclude" means stock access must be restricted to the waterbody* by any permanent or temporary fence or barrier or any natural barrier. Where there are more than 1350 stock movements per week across a river identified in (b)(ii) then a culvert or bridge shall be installed.

Existing Dairy Farming* land[^] uses

- (c) ensure that nitrogen leaching from the land[^] is minimised as far as reasonably practicable for existing dairy farming* land[^] uses does not exceed nitrogen leaching rates for each LUC* class of land[^] as set out in Table 13.2. Where achievement of the Table 13.2 nitrogen leaching rate maximum is not immediately possible then:
- (i) the nitrogen leaching loss from the farm must be based on the actual demonstrated nitrogen leaching loss for the 2011 year, and
 - (ii) the nitrogen leaching loss limit calculated under (c)(i) shall be reduced through conditions of consent to meet the Table 13.2 nitrogen leaching rate maximum in the following manner:
 - (A) In year two there must be a 33% reduction in the difference between the loss limit set under (c)(i) and the nitrogen leaching maximum* set out in Table 13.2 or a reduction of 2kg/N/ha whichever is the greater.
 - (B) In year three there must be a further 33% reduction in the difference between the loss limit set under (c)(i) and the nitrogen leaching maximum* set out in Table 13.2 or a reduction of 2kg/N/ha whichever is the greater.
 - (C) In year four the Table 13.2 nitrogen leaching rate must be achieved.
- (d) an exception to (c) may be made in circumstances where:
- a. the land contains 50% or higher of LUC Classes IV to VIII and has an average rainfall per annum in excess of 1500mm.

In relation to the exception identified in (d)(i) consent conditions will require:

- i. best management practices to be in place to minimise the loss of nitrogen, phosphorous, faecal contamination and sediment.
- ii. any losses of nitrogen, phosphorous, faecal contamination and sediment which cannot be avoided, remedied or mitigated are offset or mitigated including by way of environmental compensation offered by the applicant.

New Dairy Farming* land^ uses

- (e) ensure that nitrogen leaching from new dairy farming* land^ uses does not exceed nitrogen leaching rates based on the natural capital* of each LUC* class of land^ used for dairy farming* and
- (f) ensure that dairy cattle are excluded from surface water^ as far as reasonably practicable.

Restricted Discretionary Activity New and Existing Dairy Farming* land^ uses (considered under Rules 13-1A and 13-1C)

- (g) In relation to Rules 13-1A and 13-1C reasonably practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses from the land^ include but are not limited to:

- (i) Cut and carry.
- (ii) Intensive forage cropping.
- (iii) Herd homes and effluent capture.
- (iv) Winter feed pads and effluent capture.
- (v) Low nitrogen feeds.
- (vi) Replace nitrogen fertiliser with equivalent supplements.
- (vii) Graze animals off-farm over the winter months.
- (viii) Reducing stock rate.
- (ix) Best management (amount and timing and land area) of nitrogen fertiliser inputs.
- (x) Management of infrastructure (e.g. reducing leaks in effluent irrigation systems and lining of effluent ponds and feedpads).
- (xi) Nitrogen inhibitors.
- (xii) Non-pastoral land use; and
- (xiii) Creation of wetland and riparian zones.

- (h) The implementation of reasonably practicable farm management practices to reduce nitrogen leaching must achieve the nitrogen leaching rates for each LUC* class of land^ as set out in Table 13.2 no later than the first ten year anniversary of the common catchment expiry dates set in Table 11A-1.

Policy 13-3: Management of discharges^ of domestic wastewater*

When making decisions on *resource consent*[^] applications, and setting consent *conditions*[^], for on-site *discharges*[^] of *domestic wastewater*^{*}, the Regional Council must generally ensure that the *discharge*[^] is in accordance with the Manual for On-site Wastewater Systems Design and Management (Horizons Regional Council 2010).

For *discharges*[^] that are not in accordance with the Manual for On-site Wastewater Systems Design and Management (Horizons Regional Council 2010) the Regional Council must make decisions on *resource consent*[^] applications, and set consent *conditions*[^], for on-site *discharges*[^] of *domestic wastewater*^{*}, to ensure that:

- (a) the *site*^{*} is suitable for the intended on-site wastewater management system,
- (b) the *discharge*[^] does not result in actual or potential contamination of:
 - (i) groundwater at any point of abstraction utilised for irrigation, stock or domestic drinking *water*[^],
 - (ii) surface *water bodies*[^],
 - (iii) stormwater drains,
 - (iv) *artificial watercourses*^{*}, or
 - (v) neighbouring *properties*^{*},
- (c) the *discharge*[^] does not constitute a public health threat,
- (d) the *discharge*[^] does not cause any offensive or objectionable odour beyond the *property*^{*} boundary, and
- (e) a sufficient area of *land*[^] is set aside as a reserve disposal area.

Policy 13-4: Monitoring requirements for consent holders

Point source *discharges*[^] of *contaminants*[^] to *water*[^] must generally be subject to the following monitoring requirements:

- (a) the regular monitoring of *discharge*[^] volumes on *discharges*[^] smaller than 100 m³/day and making the records available to the Regional Council on request,
- (b) the installation of a pulse-count capable meter in order to monitor the volume *discharged*[^] for *discharges*[^] of 100 m³/day or greater,
- (c) the installation of a Regional Council compatible telemetry system on *discharges*[^] of 300 m³/day or greater, and
- (d) monitoring and reporting on the quality of the *discharge*[^] at the point of *discharge*[^] before it enters surface *water*[^] and the quality of the receiving *water*[^] upstream and downstream of the point of *discharge*[^] (after *reasonable mixing*^{*}) may also be required. This must align with the Regional Council's environmental monitoring programme where reasonably practicable to enable cumulative impacts to be measured.

13.2

Rules - Agricultural Activities

Table 13.1 sets out the target *Water Management Sub-zones** where management of existing *dairy farming* land^* use activities must be specifically controlled.

Table 13.1 *Water Management Sub-zones**

Catchment	Water Management Sub-zone*	Date the rules of the Plan come into force in relation to Rule 13-1
Mangapapa	Mangapapa Mana_9b	1 July 2012
Waikawa	Waikawa West_9a	1 July 2012
	Waikawa West_9b	
Other south-west catchments (Papaītonga)	Lake Papaītonga West_8	1 July 2012
Mangatainoka	Upper Mangatainoka Mana_8a	1 July 2013
	Middle Mangatainoka Mana_8b	
	Lower Mangatainoka Mana_8c	
	Makakahi Mana_8d	
Upper Manawatu above Hopelands	Upper Manawatu Mana_1a	1 July 2014
	Mangatawainui Mana_1b	
	Mangatoro Mana_1c	
	Weber-Tamaki Mana_2a	
	Mangatera Mana_2b	

Catchment	Water Management Sub-zone*	Date the rules of the Plan come into force in relation to Rule 13-1
Manawatu above gorge	Upper Tamaki Mana_3	1 July 2014
	Upper Kumeti Mana_4	
	Tamaki-Hopelands Mana_5a	
	Lower Tamaki Mana_5b	
	Lower Kumeti Mana_5c	
Other coastal lakes	Oruakeretaki Mana_5d	1 July 2013
	Raparapawai Mana_5e	

Table 13.2 sets out the cumulative nitrogen leaching maximum* for the land^ used for dairy farming* within each specified land use capability class*.

Table 13.2 Cumulative nitrogen leaching maximum* by Land Use Capability Class*

LUC* I	LUC* II	LUC* III	LUC* IV	LUC* V	LUC* VI	LUC* VII	LUC* VIII
30	27	24	18	16	15	8	2

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
<p>13-1 Existing dairy farming* land^ use activities</p>	<p>The use of land^ pursuant to s9(2) RMA for dairy farming* that was existing as at 1 July 2010 in the Water Management Sub-zones* listed in Table 13.1 and any of the following discharges^ pursuant to ss15(1) or 15(2A) RMA associated with dairy farming*:</p> <ul style="list-style-type: none"> (a) the discharge^ of fertiliser* onto or into land^ (b) the discharge^ of contaminants^ onto or into land^ from <ul style="list-style-type: none"> (i) the preparation, storage, use or transportation of stock feed on production land^ (ii) the use of a feedpad* (c) the discharge^ of grade Aa, Ab, Ba or Bb biosolids^, soil conditioners* or compost* onto or into production land^ (d) the discharge^ of poultry farm litter* onto or into production land^ (e) the discharge^ of farm animal effluent* onto or into production land^ (or upon expiry or surrender of any existing consent for that discharge^) including: <ul style="list-style-type: none"> (i) effluent from dairy sheds and feedpads* (ii) effluent received from piggeries (iii) sludge from farm effluent ponds (iv) poultry farm effluent 	<p>Controlled</p>	<ul style="list-style-type: none"> (a) A nutrient management plan* must be prepared from the date specified in Table 13.1 for the land^, compiled with and provided annually to the Regional Council. The activity must be operated in accordance with the nutrient management plan*. (b) The nutrient management plan* referred to in condition (a) above, must demonstrate that the nitrogen leaching loss will not exceed the cumulative nitrogen leaching maximum* as set out in Table 13.2 except that: <ul style="list-style-type: none"> (i) As at the date listed in Table 13.2 (i.e. only the first time an application is made) the nitrogen leaching loss limit can be based on the actual demonstrated nitrogen leaching loss from the farm in the year 2011. This limit will then be reduced in the following manner: <ol style="list-style-type: none"> 1. In year two there must be either a 33% reduction in the difference between the loss limit set in year one and the nitrogen leaching maximum* set out in Table 13.2 or a reduction of 2kg/N/ha whichever is the greater. 2. In year three there must be a further 33% reduction in the difference between the loss limit set in year one and the nitrogen leaching maximum* set out in Table 13.2 or a reduction of 2kg/N/ha whichever is the greater. 3. By year four the nitrogen leaching loss will not exceed the cumulative nitrogen leaching maximum* as set out in Table 13.2 (a) Dairy Cattle must be excluded from: 	<p>Control is reserved over:</p> <ul style="list-style-type: none"> (a) the implementation of the nutrient management plan* reasonably practicable farm management practices for minimising nutrient-leaching, faecal contamination and sediment losses from the land^ (b) compliance with the specified requirements referred to in the conditions of Rule 13-6 and the matters of over which control is reserved in Rule 13-6 including a requirement to seal effluent storage and treatment facilities (including sumps and ponds) (c) compliance with the specified requirements referred to in the conditions of Rules 13-2, 13-3, 13-4 and 13-4B (d) avoiding, remedying or mitigating the effects of odour, dust, fertiliser* drift or effluent drift (e) provision of information including the nutrient management plan* (f) duration of consent (g) review of consent conditions^ (h) compliance monitoring. <p>Resource consent^ applications under this</p>

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	<p>and any ancillary discharge[^] of contaminants[^] into air pursuant to ss15(1) or 15(2A) RMA.</p> <p>Where the existing <u>dairy farming</u>[*] land use is located partly on land within one or more of the <u>Water Management Sub-zones</u>[*] listed in Table 13.1 and partly on other <u>land</u>[^] this rule only applies if at least 20% of the <u>dairy farming</u>[*] land use is located on <u>land</u>[^] within the listed <u>Water Management Sub-zones</u>[*].</p>		<p>(i) wetlands[^] and lakes[^] that are a rare habitat[^] or threatened habitat[^], and</p> <p>(ii) the beds[^] of rivers[^] that are permanently flowing or have an active bed[^] width greater than 1 m, other than at any specific location where access is required for dairy cattle to cross the river[^] in which case (dg) applies.</p> <p>(b) Where there will be Rivers[^] that are permanently flowing or have an active bed[^] width greater than 1 m, that are crossed by more than 1350 dairy cattle movements per week across any river that is permanently flowing or has an active bed width greater than 1 m, the cattle must cross via a bridge or culvert, and run-off originating from the carriageway of the bridge or culvert must be discharged[^] onto or into land[^].</p> <p>(c) The discharge[^] of fertiliser[^] onto or into land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-2.</p> <p>(d) The discharge[^] of contaminants[^] onto or into land[^] from:</p> <ul style="list-style-type: none"> (i) the preparation, storage, use or transportation of stock feed on production land[^], or (ii) the use of a feedpad[^] <p>and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-3.</p> <p>(e) The discharge[^] of grade Aa biosolids[^], soil conditioners[^] or compost[^] onto or into production land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-4.</p>	<p>rule[^] will not be notified and written approval of affected persons will not be required (notice of applications need not be served[^] on affected persons).</p>

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion
			<p>(f) The discharge[^] of grade-Ab, Ba or Bb-biosolids* onto or into production-land[^] and any ancillary-discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-4A.</p> <p>(g) The discharge[^] of poultry farm litter* onto or into production land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-4B.</p> <p>(h) The discharge[^] of farm animal effluent* onto or into production land[^] including:</p> <ul style="list-style-type: none"> (i) effluent from dairy sheds and feedpads* (ii) effluent received from piggeries (iii) sludge from farm effluent ponds (iv) poultry farm effluent <p>and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^], standards and terms of Rule 13-6.</p>	<p>Non-Notification</p>
<p>13-1A Existing dairy farming* land[^] use activities not complying with Rule 13-1</p>	<p>The use of land[^] pursuant to s9(2) RMA for dairy farming* that was existing as at 1 July 2010 in the Water Management Sub-zones* listed in Table 13.1, and any of the following discharges[^] pursuant to ss15(1) or 15(2A) RMA associated with dairy farming*, that do not comply with one or more of the conditions[^], standards and terms of Rule 13-1:</p> <ul style="list-style-type: none"> (a) the discharge[^] of fertiliser* onto or into land[^] (b) the discharge[^] of contaminants[^] onto or into land[^] from 	<p>Restricted Discretionary</p>		<p>Discretion is restricted to:</p> <ul style="list-style-type: none"> (a) preparation of a nutrient management plan* for the land[^] (b) the implementation of reasonably practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses from the land[^] (c) measures to exclude dairy cattle from wetlands[^] and lakes[^] that are a rare habitat* or threatened habitat*, and rivers[^] that are permanently flowing or

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion
	<p>(i) the preparation, storage, use or transportation of stock feed on <i>production land</i>^A</p> <p>(ii) the use of a <i>feedpad</i>[*]</p> <p>(c) the <i>discharge</i>^A of grade Aa-, Ab-, Ba- or Bb <i>biosolids</i>^A, <i>soil conditioners</i>[*] or <i>compost</i>[*] onto or into <i>production land</i>^A</p> <p>(d) the <i>discharge</i>^A of <i>poultry farm litter</i>[*] onto or into <i>production land</i>^A</p> <p>(e) the <i>discharge</i>^A of <i>farm animal effluent</i>[*] onto or into <i>production land</i>^A (or upon expiry or surrender of any existing consent for that <i>discharge</i>^A) including:</p> <p>(i) effluent from dairy sheds and <i>feedpads</i>[*]</p> <p>(ii) effluent received from piggeries</p> <p>(iii) sludge from farm effluent ponds</p> <p>(iv) poultry farm effluent</p> <p>and any ancillary <i>discharge</i>^A of <i>contaminants</i>^A into air pursuant to ss15(1) or 15(2A) RMA.</p>			<p>have an <i>active bed</i>[*] width greater than 1 m</p> <p>(d) the bridging or culverting of <i>rivers</i>^A that are permanently flowing or have an <i>active bed</i>[*] width greater than 1 m that are crossed by dairy cattle</p> <p>(e) the matters referred to in the <i>conditions</i>^A of Rules 13-2, 13-3, 13-4, 13-4A and 13-4B</p> <p>(f) the matters referred to in the <i>conditions</i>^A of Rule 13-6</p> <p>(g) the matters referred to in the <i>conditions</i>^A of Rule 13-6 and the matters of control in Rule 13-6</p> <p>(h) avoiding, remedying or mitigating the effects of odour, dust, <i>fertiliser</i>[*] drift or effluent drift</p> <p>(i) provision of information including the annual <i>nutrient management plan</i>[*]</p> <p>(j) duration of consent</p> <p>(k) review of consent <i>conditions</i>^A</p> <p>(l) compliance monitoring.</p>
13-1B New dairy farming [*] land ^A use activities	<p>The use of <i>land</i>^A pursuant to s9(2) RMA for any conversion to <i>dairy farming</i>[*] that occurs after 1 July 2010 anywhere within the Region and any of the following <i>discharges</i>^A pursuant to ss15(1) or 15(2A) RMA associated with <i>dairy farming</i>[*]:</p> <p>(a) the <i>discharge</i>^A of <i>fertiliser</i>[*] onto or into <i>land</i>^A</p> <p>(b) the <i>discharge</i>^A of <i>contaminants</i>^A onto</p>	Controlled	<p>(a) A <i>nutrient management plan</i>[*] must be prepared for the <i>land</i>^A, completed with and provided annually to the Regional Council. The activity must be operated in accordance with the <i>nutrient management plan</i>[*].</p> <p>(b) The <i>nutrient management plan</i>[*] must demonstrate compliance with the <i>cumulative nitrogen leaching maximum</i>[*] as set out in Table 13.2 for the <i>land</i>^A used for <i>dairy farming</i>[*].</p> <p>(c) Dairy cattle must be excluded from:</p>	<p>Control is reserved over:</p> <p>(a) the implementation of farm management practices to maintain compliance with the <i>cumulative nitrogen leaching maximum</i>[*] for the <i>land</i>^A</p> <p>(b) the implementation of reasonably practicable farm management practices for minimising nutrient leaching, faecal</p>

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	<p>or into land[^] from</p> <p>(i) the preparation, storage, use or transportation of stock feed on production land[^]</p> <p>(ii) the use of a feedpad[*]</p> <p>(c) the discharge[^] of grade Aa, Ab, Ba or Bb biosolids[^], soil conditioners[*] or compost[*] onto or into production land[^]</p> <p>(d) the discharge[^] of poultry farm litter[*] onto or into production land[^]</p> <p>(e) the discharge[^] of farm animal effluent[*] onto or into production land[^] including:</p> <p>(i) effluent from dairy sheds and feedpads[*]</p> <p>(ii) effluent received from piggeries</p> <p>(iii) sludge from farm effluent ponds</p> <p>(iv) poultry farm effluent</p> <p>and any ancillary discharge[^] of contaminants[^] into air pursuant to ss15(1) or 15(2A) RMA.</p>		<p>(i) wetlands[^] and lakes[^] that are a rare habitat[^] or threatened habitat[^], and</p> <p>(ii) the beds[^] of rivers[^] that are permanently flowing or have an active bed[^] width greater than 1 m, other than at any specific location where access is required for dairy cattle to cross the river[^] in which case (d) applies.</p> <p>(d) Where there will be Rivers[^] that are permanently flowing or have an active bed[^] width greater than 1 m, that are crossed by more than 1350 dairy cattle movements per week across any river that is permanently flowing or has an active bed width greater than 1m, the cattle must cross via a bridge or culvert, and run-off originating from the carriageway of the bridge or culvert must be discharged[^] onto or into land[^].</p> <p>(e) The discharge[^] of fertiliser[*] onto or into land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-2.</p> <p>(f) The discharge[^] of contaminants[^] onto or into land[^] from:</p> <p>(i) the preparation, storage, use or transportation of stock feed on production land[^], or</p> <p>(ii) the use of a feedpad[*]</p> <p>and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-3.</p> <p>(g) The discharge[^] of grade Aa biosolids[^], soil conditioners[*] or compost[*] onto or into production land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-4.</p> <p>(h) The discharge[^] of grade Ab, Ba or Bb biosolids[^] onto</p>	<p>contamination and sediment losses from the land[^]</p> <p>(c) compliance with the specified requirements referred to in the conditions of Rule 13-6 and the matters of over which control is reserved in Rule 13-6</p> <p>(d) compliance with the specified requirements referred to in the conditions of Rules 13-2, 13-3, 13-4 and 13-4B</p> <p>(e) the matters of control in Rule 13-6</p> <p>(f) avoiding, remedying or mitigating the effects of odour, dust, fertiliser[*] drift or effluent drift</p> <p>(g) provision of information including the nutrient management plan[*]</p> <p>(h) duration of consent</p> <p>(i) review of consent conditions[^]</p> <p>(j) compliance monitoring.</p> <p>Resource consent[^] applications under this rule[^] will not be notified and written approval of affected persons will not be required (notice of applications need not be served[^] on affected persons).</p>

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion
13-1C New dairy farming* land [^] use activities not complying with Rule 13-1B	The use of land [^] pursuant to s9(2) RMA for dairy farming* that occurs after 1 July 2010 anywhere within the Region, and any of the following discharges [^] pursuant to ss15(1) or 15(2A) RMA associated with dairy farming*, that do not comply with one or more of the conditions [^] , standards and terms of Rule 13-1B: (a) the discharge [^] of fertiliser* onto or into land [^] (b) the discharge [^] of contaminants [^] onto or into land [^] from (i) the preparation, storage, use or transportation of stock feed on	Restricted Discretionary	<p>of into production land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-4A:</p> <p>(i) The discharge[^] of poultry farm litter* onto or into production land[^] and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^] of Rule 13-4B.</p> <p>(ii) The discharge[^] of farm animal effluent* onto or into production land[^] including: (i) effluent from dairy sheds and feedpads* (ii) effluent received from piggeries (iii) sludge from farm effluent ponds (iv) poultry farm effluent and any ancillary discharge[^] of contaminants[^] into air must comply with the conditions[^], standards and terms of Rule 13-6.</p>	Non-Notification
				<p>Discretion is restricted to:</p> <p>(a) preparation of a nutrient management plan* for the land[^]</p> <p>(b) the implementation of reasonably practicable farm management practices for maintaining compliance with the cumulative nitrogen leaching maximum* for the land[^]</p> <p>(c) the implementation of reasonably practicable farm management practices for minimising nutrient leaching, faecal contamination and sediment losses from the land[^]</p>

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	<p><i>production land</i>[^]</p> <p>(ii) the use of a <i>feedpad</i>[*]</p> <p>(c) the <i>discharge</i>[^] of grade <i>Aa</i>, <i>Ab</i>, <i>Ba</i> or <i>Bb</i> <i>biosolids</i>[^], <i>soil conditioners</i>[*] or <i>compost</i>[*] onto or into <i>production land</i>[^]</p> <p>(d) the <i>discharge</i>[^] of <i>poultry farm litter</i>[*] onto or into <i>production land</i>[^]</p> <p>(e) the <i>discharge</i>[^] of <i>farm animal effluent</i>[*] onto or into <i>production land</i>[^] including:</p> <p>(i) effluent from dairy sheds and <i>feedpads</i>[*]</p> <p>(ii) effluent received from piggeries</p> <p>(iii) sludge from farm effluent ponds</p> <p>(iv) <i>poultry farm effluent</i></p> <p>and any ancillary <i>discharge</i>[^] of <i>contaminants</i>[^] into air pursuant to ss15(1) or 15(2A) RMA.</p>			<p>(d) measures to exclude dairy cattle from <i>wetlands</i>[^] and <i>lakes</i>[^] that are a <i>rare habitat</i>[*] or <i>threatened habitat</i>[*], and <i>riders</i>[^] that are permanently flowing or have an <i>active bed</i>[*] width greater than 1 m</p> <p>(e) the bridging or culverting of <i>riders</i>[^] that are permanently flowing or have an <i>active bed</i>[*] width greater than 1 m that are crossed by dairy cattle</p> <p>(f) the matters referred to in the <i>conditions</i>[^] of Rules 13-2, 13-3, 13-4, 13-4A and 13-4B</p> <p>(g) the matters referred to in the <i>conditions</i>[^] of Rule 13-6 and the matters of control in Rule 13-6</p> <p>(h) avoiding, remedying or mitigating the effects of odour, dust, <i>fertiliser</i>[*] drift or effluent drift</p> <p>(i) provision of information including the <i>annual nutrient management plan</i>[*]</p> <p>(j) duration of consent</p> <p>(k) review of consent <i>conditions</i>[^]</p> <p>(l) compliance monitoring.</p>
<p>13-2</p> <p>Fertiliser[*]</p>	<p>The <i>discharge</i>[^] of <i>fertiliser</i>[*] onto or into <i>land</i>[^] pursuant to ss15(1) or 15(2A) RMA and any ancillary <i>discharge</i>[^] of <i>contaminants</i>[^] into air pursuant to ss15(1) or 15(2A) RMA, except where the <i>discharge</i>[^] is undertaken in association with a use of <i>land</i>[^] controlled by Rules 13-1</p>	<p>Permitted</p>	<p>(a) There must be no direct <i>discharge</i>[^] of <i>fertiliser</i>[*] into any surface <i>water body</i>[^] or its <i>bed</i>[^] or <i>artificial watercourse</i>[*] other than as provided for under (ba).</p> <p>(ba) All reasonable measures must be taken to prevent:</p> <p>(i) any <i>discharge</i>[^] of <i>fertiliser</i>[*] within the <i>bed</i>[^] of a <i>river</i>[^] that is permanently flowing or has an <i>active</i></p>	

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	to 13-1C.		<p><i>bed</i>[*] width greater than 2 m, or any <i>lake</i>[^] or <i>wetland</i>[^] that has an area of 1 ha or more</p> <p>(ii) any <i>discharge</i>[^] into any <i>rare habitat</i>[*], <i>threatened habitat</i>[*] or <i>at-risk habitat</i>[*], except for the purpose of enhancing such habitats.</p> <p>Under condition (ba) "reasonable measures" includes the use of GPS technology.</p> <p>(b) For <i>production land</i>[^] the <i>fertiliser</i>[*] must be <i>discharged</i>[^] in accordance with the Code of Practice for Nutrient Management (New Zealand Fertiliser Manufacturers' Research Association, 2007).</p> <p>(c) Where nitrogen <i>fertiliser</i>[*] is <i>discharged</i>[^] onto <i>land</i>[^] in excess of an average rate of 60 kgN/ha/year averaged across the grazed or crepped area of a whole farm area or in excess of an average rate of 150 kgN/ha/year on any application area a nutrient budget undertaken using the OVERSEER[®] model, which takes into account all other sources of nitrogen, and covers and identifies the whole farm area including details of individual blocks and which is designed to minimise nitrogen leaching rates, must be used to plan and carry out the <i>fertiliser</i>[*] <i>discharge</i>[^] and be made available to the Regional Council upon request. If a <i>nutrient management plan</i>[*] is required under Rules 13-1, 13-1A, 13-1B or 13-1C then the nutrient budget required by this <i>condition</i>[^] must be consistent with it and the activity must be carried out in accordance with it.</p> <p>(d) The <i>discharge</i>[^] must not result in any offensive or objectionable odour or <i>fertiliser</i>[*] drift beyond the <i>property</i>[*] boundary.</p>	

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion
<p>13-3</p> <p>Stock feed including feedpads*</p>	<p>The discharge[^] of contaminants[^] onto or into land[^] pursuant to ss15(1) or 15(2A) RMA from:</p> <p>(a) the preparation, storage, use or transportation of stock feed on production land[^], or</p> <p>(b) the use of a feedpad[^] and any ancillary discharge[^] of contaminants[^] into air pursuant to ss15(1) or 15(2A) RMA, except where the discharge[^] is undertaken in association with a use of land[^] controlled by Rule 13-1 to 13-1C.</p>	<p>Permitted</p>	<p>(a) All silage (excluding maize silage) storage pits that have an area greater than 500 m² and all feedpads[^], must be sealed to restrict seepage of contaminants[^]. The permeability of the sealing layer must not exceed 1x10⁻⁹ m/s.</p> <p>(b) All areas used for storing stock feed, for feedpads[^] or for otherwise feeding stock (including feeding silage) must be located and managed in a manner that ensures at all times when such areas are in use:</p> <p>(i) run-off from the area into surface water[^] or artificial watercourses[^], is prevented</p> <p>(ii) run-off from the surrounding catchment is prevented from entering the area.</p> <p>(c) All areas used for storing stock feed, for feedpads[^] or for otherwise feeding stock (including feeding silage) must comply with the following separation distances:</p> <p>(i) 50 m from rare habitats[^], threatened habitats[^] and at-risk habitats[^],</p> <p>(ii) 20 m from bores[^], surface water bodies[^], artificial watercourses[^], and the coastal marine area[^], and</p> <p>(iii) 50 m from any historic heritage[^] identified in any district plan[^] or regional plan[^].</p> <p>(d) All animal effluent[^] collected from feedpads[^] must be treated and discharged[^] in accordance with Rule 13-6.</p> <p>(e) The discharge[^] must not result in any offensive or objectionable odour or dust beyond the property[^] boundary.</p>	<p>Non-Notification</p>
<p>13-4</p> <p>Discharges[^] of grade Aa biosolids[^], soil</p>	<p>The discharge[^] of grade Aa biosolids[^], soil conditioners[^] or compost[^] onto or into production land[^] pursuant to ss15(1) or 15(2A) RMA, and any ancillary discharge[^]</p>	<p>Permitted</p>	<p>(a) There must be no direct discharge[^] or run-off into any surface water body[^] or its bed[^] or artificial watercourse[^].</p> <p>(c) For soil conditioners[^] and compost[^] the material must</p>	

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
<p>conditioners* and compost* to production land[^]</p>	<p>of <i>contaminants[^]</i> into air pursuant to ss15(1) or 15(2A) RMA, except where the <i>discharge[^]</i> is undertaken in association with a use of <i>land[^]</i> controlled by Rules 13-1 to 13-1C.</p>		<p>not contain any human or animal pathogens, or any <i>hazardous substances*</i>.</p> <p>(ca) For <i>grade Aa biosolids*</i> the <i>discharge[^]</i> must comply with the requirements for <i>grade Aa biosolids*</i> as included with Chapters 4 and 7 of Volume 1 and Chapters 8 (including monitoring requirements) and 9 of Volume 2 of the Guidelines for the Safe Application of Biosolids to Land in New Zealand (New Zealand Water and Waste Association, August 2003).</p> <p>(d) The <i>discharge[^]</i> must comply with the following separation distances:</p> <ul style="list-style-type: none"> (iii) 50 m from <i>rare habitats*</i>, <i>threatened habitats*</i> and <i>at-risk habitats*</i> (iv) 20 m from <i>bores*</i>, <i>surface water bodies[^]</i>, <i>artificial watercourses*</i> and the <i>coastal marine area[^]</i> (v) 50 m from any <i>historic heritage[^]</i> identified in any <i>district plan[^]</i> or <i>regional plan[^]</i>. <p>(e) A nutrient budget undertaken using the OVERSEER® model, which takes into account all other sources of nitrogen and which is designed to minimise nitrogen leaching rates, must be used to plan and carry out the <i>discharge[^]</i> of the <i>grade Aa biosolids*</i>, <i>soil conditioner* or compost*</i>. If a <i>nutrient management plan*</i> is required under Rules 13-1 to 13-1C then the nutrient budget required by this <i>condition[^]</i> must be consistent with it and the activity must be carried out in accordance with it.</p> <p>(f) The <i>discharge[^]</i> must not result in any offensive or objectionable odour or dust beyond the <i>property*</i> boundary.</p> <p>(g) The discharger must keep the following records:</p>	

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
13-4A Grade Ab, Ba or Bb <i>biosolids</i> *	The <i>discharge</i> [^] of grade Ab, Ba or Bb <i>biosolids</i> * onto or into <i>production land</i> [^] pursuant to ss15(1) or 15(2A) RMA, and any ancillary <i>discharge</i> [^] of <i>contaminants</i> [^] into air pursuant to ss15(2) or 15(2A) RMA, except where the <i>discharge</i> [^] is undertaken in association with a use of <i>land</i> [^] controlled by Rules 13-1 to 13-1C.	Restricted Discretionary	<p>(i) a daily record of the <i>discharge</i>[^] volume and location</p> <p>(ii) a monthly (or more frequent) analysis of the nitrogen concentration of a <i>discharge</i>[^] sample and make these records available to the Regional Council upon request.</p> <p>(a) There must be no direct <i>discharge</i>[^] or run-off into any <i>surface water body</i>[^] or its <i>bed</i>[^] or <i>artificial watercourse</i>*.</p> <p>(b) The material must have undergone stabilisation processes to achieve at least B grade as defined by the Guidelines for the Safe Application of Biosolids to Land in New Zealand (New Zealand Water and Waste Association, August 2003). <i>Hazardous substances</i>* must not exceed B grade limits as given by the Guidelines for the Safe Application of Biosolids to Land in New Zealand (New Zealand Water and Waste Association, August 2003).</p> <p>(c) The <i>discharge</i>[^] must comply with the following separation distances:</p> <ul style="list-style-type: none"> (i) 150 m from residential buildings, public places and amenity areas where people congregate, education facilities and public roads (ii) 50 m from <i>property</i>* boundaries (iii) 50 m from <i>rare habitats</i>*, <i>threatened habitats</i>* and <i>at-risk habitats</i>* (iv) 20 m from <i>bores</i>*, <i>surface water bodies</i>[^], <i>artificial watercourses</i>* and the <i>coastal marine area</i>[^] (v) 50 m from any <i>historic heritage</i>[^] identified in any <i>district plan</i>[^] or <i>regional plan</i>[^]. 	Discretion is reserved over: <ul style="list-style-type: none"> (a) the rate of <i>discharge</i>[^] and frequency of <i>discharge</i>[^] to control nutrient and contaminant loading rates (b) maintenance of vegetative cover in the area of <i>discharge</i>[^] (c) avoiding, remedying or mitigating the effects of odour or dust (d) contingency measures, including for events of mechanical failure and prolonged wet weather (e) monitoring and information requirements (f) duration of consent (g) review of consent <i>conditions</i>[^], and (h) compliance monitoring.

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion
<p>13-6 Farm animal effluent* including effluent from dairy sheds, poultry farms and piggeries</p>	<p>The discharge[^] of farm animal effluent* onto or into production land[^] pursuant to ss15(1) or 15(2A) RMA including:</p> <ul style="list-style-type: none"> (a) effluent from dairy sheds and feedpads* (b) effluent from piggeries (c) sludge from farm effluent ponds (d) poultry farm effluent <p>and any ancillary discharge[^] of contaminants[^] into air pursuant to ss15(1) or 15(2A) RMA, except where the discharge[^] is undertaken in association with a use of land[^] controlled by Rules 13-1 to 13-1C.</p>	<p>Controlled</p>	<ul style="list-style-type: none"> (d) A nutrient budget undertaken using the OVERSEER® model, which takes into account all other sources of nitrogen and which is designed to minimise nitrogen leaching rates, must be used to plan and carry out the biosolids* discharge[^]. If a nutrient management plan* is required under Rules 13-1 to 13-1C then the nutrient budget required by this condition[^] must be consistent with it and the activity must be carried out in accordance with it. (e) The discharge[^] must not result in any offensive or objectionable odour or dust beyond the property* boundary. 	<p>Non-Notification</p>
			<ul style="list-style-type: none"> (a) There must be no direct discharge[^] or run-off of effluent into a surface water body[^] or its bed[^] or artificial watercourse*, including from effluent holding facilities. (b) The entire extent of effluent storage and treatment facilities (including sumps and ponds) must be sealed so as to restrict seepage of effluent where all or any part of the storage facility (including weeping walls, stone traps, sumps and ponds) is established or extended (including deepening) from the date the Plan is made operative[^]. The permeability of the sealing layer must not exceed 1x10⁻⁹ m/s subject to the following exceptions: <ul style="list-style-type: none"> (i) Where there are multiple ponds that make up the storage facility, but not all are being extended then only those that are being extended are required to be fully sealed, or (ii) The establishment or extension of sumps weeping walls or stone traps alone do not trigger a requirement for sealing of existing ponds (c) The discharge[^] must comply with the following 	

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
			<p>separation distances:</p> <ul style="list-style-type: none"> (i) for discharges[^] of piggery effluent, 150 m from any residential buildings, public places and amenity areas where people congregate, and education facilities and public roads (ii) for other discharges[^], 20 m from any residential buildings, public places and amenity areas where people congregate, education facilities and public roads (iii) for all discharges[^], 50 m from rare habitats*, threatened habitats* and at-risk habitats* (iv) for all discharges[^], 20 m from bores*, surface water bodies*, artificial watercourses* and the coastal marine area[^] (v) for all discharges[^], 50 m from any historic heritage[^] identified in any district plan[^] or regional plan[^]. <p>(d) Stormwater from ancillary roof areas, and hardstand areas which do not hold animals, must not discharge[^] to the effluent storage facility unless the volume calculation for the pond takes into consideration the input from ancillary roof and hardstand areas.</p> <p>(e) A nutrient budget, undertaken using the OVERSEER[®] model, which takes into account all other sources of nitrogen and which is designed to minimise nitrogen leaching rates, must be used to plan and carry out the animal effluent* discharge[^]. If a nutrient management plan* is required under Rules 13-1 to 13-1C then the nutrient budget required by this condition[^] must be consistent with it and the activity must be carried out in accordance with it.</p> <p>There must be no offensive or objectionable odour, dust, or</p>	

Attachment 3

**Statutory tests for a Regional Policy
Statement and Regional Plan for Surface
Water Quality – Non-Point Source
Discharges Provisions of Chapters 6 & 13**

Statutory tests for REGIONAL POLICY STATEMENTS	Statutory references	Assessment Narrative
A. General requirements.		
<p>1. A regional policy statement should be designed in accordance with the functions of the regional council so as to achieve the purpose of the Act.</p>	<p>s.59, s.61</p>	<p>The DV POP is a single document incorporating the Regional Policy Statement, Regional Plan and Regional Coastal Plan. It is designed to achieve the purpose of the Act by providing an overview of the resource management issues for the Manawatu-Wanganui Region and the objectives, policies and methods to achieve integrated management of these resources. Chapter 6 includes the significant resource management issues for water quality and includes objectives, policies and methods to respond to the issues. The methods are a mixture of regulatory and non-regulatory approaches.</p> <p>The matters listed in s.61 were considered when drafting of these provisions as outlined below.</p>
<p>2. When preparing its regional policy statement the regional council must give effect to any national policy statement or New Zealand Coastal Policy Statement.</p>	<p>s.62(3)</p>	<p>National Policy Statement for Freshwater Management 2011</p> <p>The National Policy Statement Freshwater Management (2011) requires that water quality and quantity limits be established for freshwater bodies and for water quality to be improved in catchments that are over allocated.</p> <p>I provide an assessment of the DV POP in relation to the NPS in my evidence. I conclude that the framework for managing water quality in the DV POP with the changes I propose gives effect to the NPS.</p> <p>The addition of the policies proposed in my evidence to include other land uses (along with dairy farming) and other water management sub-zones over time echo the provisions of the NPS while recognising that time is required to give them full effect.</p> <p>New Zealand Coastal Policy Statement 2010 (NZCPS)</p> <p>The NZCPS contains objectives and policies seeking coastal water quality be maintained or enhanced where it is deteriorated from its natural condition because of discharges associated with human activity. It came into effect after DV POP was released. The NV POP, Chapter 9 was developed to give effect to the previous NZCPS. Chapter 17 (Activities in a Coastal Marine Area) and Schedule H, together with Chapters 11, 11A and 18, and the relevant definitions in the Glossary, are the Regional Coastal Plan as required by s64 of the RMA.</p>

		<p>The NZCPS 2010 is relevant to the extent that water quality outcomes in rivers affect the quality of coastal water. The DV POP gives effect to the NZCPS 2010 in Chapter 9 Coast by promoting integrated management of the coastal environment, including through the provisions in other chapters of the DV POP such as those addressing surface water quality. For the reasons set out in the statement of evidence I consider that the maintenance of water quality (as achieved through the policy framework) will give effect to the provisions of the NZCPS 2010.</p> <p>Other National Policy Statements</p> <p>I do not consider the National Policy Statement on Electricity Transmission 2008 or the National Policy Statement for Renewable Electricity Generation 2011 to be relevant to surface water quality – non-point source discharges provisions.</p>
<p>3. When preparing its regional policy statement the regional council must also:</p> <ul style="list-style-type: none"> • have regard to any relevant management plans and strategies under other Acts, and to any relevant entry in the Historic Places Register and to various fisheries regulations; and to consistency with policy statements and plans of adjacent regional councils; • take into account any relevant planning document recognised by an iwi authority; and 	<p>s.61(1)</p> <p>s.61(3)</p>	<p>The Historic Places Register is not relevant to surface water quality – non-point source discharges provisions.</p> <p>It is considered that policy statements and plans of adjacent regional councils are not relevant matters to consider in relation to surface water quality – non-point source discharges provisions. The provisions are based on catchment based Water Management Sub-zones which lie almost exclusively in the Manawatu-Wanganui Region. If an issue arises it will be dealt with as cross boundary issue in accordance with DV POP, Chapter 10A.</p> <p>In this region MWRC is aware of two iwi resource management plans. These are:</p> <ul style="list-style-type: none"> • Ngati Rangi Waterways document (2002) • Ngati Tuwharetoa Environmental Iwi management Plan (2003). <p>These documents were taken into account during the drafting of the RPS provisions in Chapter 4. Table 4.1 in Chapter 4 sets out the Resource Management Issues of Significance to hapu and iwi and the relevant chapter of the POP that addresses those issues. I note that there are a number of cross-references in Table 4.1 relating to water quality in Chapter</p>

<ul style="list-style-type: none"> • <u>not</u> have regard to trade competition; • must not be inconsistent with a water conservation order 	s.62(3)	<p>6. Those that relate specifically to non-point source discharges are Issues (a), (b), (c), (d), and (ia).</p> <p>No trade competition situations have been identified.</p> <p>Two water conservation orders exist for the Manawatu-Wanganui Region. The policy provisions for non-point-source discharges do not directly affect the catchments these relate to.</p>
<p>4. The regional policy statement must be prepared in accordance with any regulation;</p>	s.61(1)	<p>There are no regulations identified.</p>
<p>5. The formal requirement that a regional policy statement <u>must</u> also state:</p> <ul style="list-style-type: none"> • The significant resource management issues for the region; • The objectives, policies and methods; • The principal reasons for adopting the objectives, policies and methods and; • the environmental results anticipated from the implementation of the policies and methods; • The processes to be used to deal with cross-boundary issues; • The local authority responsible for specifying objectives, policies and methods for the control of the use of land relating to natural hazards, hazardous substances, and indigenous biological diversity; • The procedures to monitor the efficiency and effectiveness of the policies or methods in the regional policy statement. 	<p>s.62(1)(a) s.62(1)(c-e) s.62(1)(f)</p> <p>s.62(1)(g)</p> <p>s.62(1)(h) s.62(1)(i)</p> <p>s.62(1)(j)</p>	<p>The DV POP RPS includes the following policy provisions for Surface water quality – non-point source discharges:</p> <ul style="list-style-type: none"> - Issue 6-1 Water quality; - Objective 6-1 Water management values - Objective 6-2 Water quality - Policy 6-1 Water Management Zones and Values - Policy 6-2 Water quality targets - Policy 6-3 Ongoing compliance where water quality targets are met - Policy 6-4 Enhancement where water quality targets are not met - Policy 6-5 Management of activities in areas where existing water quality is unknown - Policy 6-7 Land use activities affecting groundwater and surface water quality - Part Section 6.6 Anticipated Environmental Results - Part Section 6.7 Explanations and Principal Reasons <p>In my evidence I am proposing amendments to existing DV POP policy provisions and additional provisions as follows:</p> <ul style="list-style-type: none"> - Amended Policy 6-7 Dairy farming land use activities affecting groundwater and surface water quality - New Policy 6-7A Rural land use activities (other than dairy) affecting groundwater and surface water quality in Water Management Sub-zones

		<p>listed in Table 13.1</p> <ul style="list-style-type: none"> - New Policy 6-7B Existing dairy farming and other rural land use activities in Water Management Sub-zones not listed in Table 13-1 - New Method 6-6A Lake Horowhenua and Other Coastal Lakes - New Method 6-6B Lake Quality Research, Monitoring and Reporting <p>I consider these refinements are generally consistent with the approach taken in the DV POP while achieving a more complete and robust policy and rule framework.</p> <p>MWRC is the local authority responsible for specifying objectives, policies and methods for the management of water quality.</p> <p>The process to be used to deal with cross boundary issues is set out in Chapter 10A.</p> <p>The procedures for monitoring the efficiency and effectiveness of the policies and methods in the RPS are set out in Chapter 10A.</p>
B. Objectives [the section 32 test for objectives]		
<p>6. Each proposed objective in a regional policy statement is to be evaluated by the extent to which it is the most appropriate way to achieve the purpose of the Act.</p>	s.32(3)(a)	<p>Objectives 6-1 and 6-2 in the NV POP were evaluated against each of the key components of the purpose of the Act in the <i>Section 32 Report: One Plan, May 2007</i>. It was noted that there was significant research and monitoring supporting development of the water quality objective. As a result of the evaluation, both objectives were considered to be the most appropriate way to achieve the purpose of the Act.</p> <p>Although the objectives were amended by the Hearing Panel in the DV POP the outcomes sought are unchanged. I do not propose any amendments to the objectives. As a consequence I consider that the original Section 32 Report is still applicable.</p>

C. Policies and methods (excluding rules) [the section 32 test for policies and methods]		
<p>7. The policies are to implement the objectives, and the methods are to implement the policies;</p>	<p>s.62(1)(d) and (e)</p>	<p>Objectives 6-1 and 6-2 are implemented through Policies 6-1, 6-2, 6-3, 6-4, 6-5, 6-7(amended), 6-7A(new) and 6-7B(new) (and associated Schedule AA which describes the Water Management Zones, Schedule AB which describes the Values and where they apply, and D which specifies the water quality targets (numerics) and where they apply).</p> <p>These provisions are implemented by MWRC as a lead agency through resource consent processes and new Methods 6-6A and 6-6B.</p>
<p>8. Each proposed policy or method is to be examined, having regard to its efficiency and effectiveness, as to whether it is the most appropriate method for achieving the objectives of the regional policy statement:</p> <p>(a) taking into account:</p> <ul style="list-style-type: none"> (i) the benefits and costs of the proposed policies and methods; and (ii) the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the policies, or methods; 	<p>s.32(3)(b)</p> <p>s.32(4)</p>	<p>The <i>Section 32 Report – One Plan</i>, May 2007 provides an evaluation of various policy approaches to implement the objectives. It was concluded that a mix of regulatory and non-regulatory policies and methods would be the most efficient and effective means of implementing the objectives.</p> <p>The mix of regulatory and non-regulatory methods was considered appropriate as it ensures that, where careful control is required the tools are available, and where there is a need for general education and changes in community approaches, softer methods are available.</p> <p>In respect of land use activities affecting water quality, the evaluation concluded that directly managing these activities by controlling outputs was the appropriate approach.</p> <p>After evaluating evidence provided to it at the Water Hearing, the Hearing Panel narrowed the scope of control from a number of specified intensive land use activities down to dairy farming land use activities, and reduced the number of Water Management Sub-zones where control of existing dairy farming was provided for.</p> <p>I have re-evaluated the policy provisions after considering the provisions of the NV POP, DV POP, relief sought by appellants and new research provided in the joint technical evidence of Roygard, McArthur and Clark, 14 February 2012. In this re-evaluation I was mindful that there needs to be a realistic weighing of the economic impacts a regime with the benefits there will be in relation to environmental outcomes. I conclude that by amending Policy 6-7 and providing additional policies 6-7A and 6-7B in tandem with Methods 6-6A and 6-6B will achieve a more complete and robust policy and rule framework.</p>

E. Other statutes:		
9. Finally regional councils may be required to comply with other statutes.		No other statutes have been identified in relation to surface water quality – non-point source discharges.
F. (On appeal)		
10. On appeal the Environment Court must have regard to one additional matter – the decision of the regional council.	s.290A	The Decisions on Submissions to the Proposed One Plan Volumes 1-5 have been provided to the Court. Reference to the Hearing Panel decisions on Surface Water Quality – Non-point Source Discharges is made as appropriate in my planning evidence.

Statutory tests for REGIONAL PLANS	Statutory references	Assessment Narrative
A. General requirements.		
<p>1. A regional plan (change) should be designed in accord with, and assist the regional council to carry out its functions so as to achieve the purpose of the Act.</p>	<p>s.30, s.63(1), s.66(1)</p>	<p>The DV POP is a single document incorporating the Regional Policy Statement, Regional Plan and Regional Coastal Plan. It is designed to achieve the purpose of the Act by providing an overview of the resource management issues for the Manawatu-Wanganui Region and the objectives, policies and methods to achieve integrated management of these resources. Chapter 6 includes the significant resource management issues for water quality and includes objectives, policies and methods to respond to the issues. The methods are a mixture of regulatory and non-regulatory approaches.</p> <p>Chapter 13 of the Regional Plan contains the regulatory objectives, policies and rules to implement the provisions relating to surface water quality – non-point source discharges provisions in the RPS.</p>
<p>2. When preparing its regional plan (change) the regional council must give effect to any national policy statement or New Zealand Coastal Policy Statement.</p>	<p>s.67(3)</p>	<p>National Policy Statement for Freshwater Management 2011</p> <p>The National Policy Statement Freshwater Management (2011) requires that water quality and quantity limits be established for freshwater bodies and for water quality to be improved in catchments that are over allocated.</p> <p>I provide an assessment of the DV POP in relation to the NPS in my evidence. I conclude that the framework for managing water quality in the DV POP with the changes I propose gives effect to the NPS.</p> <p>The addition of the policies proposed in my evidence to include other land uses (along with dairy farming) and other water management sub-zones over time echo the provisions of the NPS while recognising that time is required to give them full effect.</p> <p>New Zealand Coastal Policy Statement 2010 (NZCPS)</p> <p>The NZCPS contains objectives and policies seeking coastal water quality be maintained or enhanced where it is deteriorated from its natural</p>

		<p>condition because of discharges associated with human activity. It came into effect after DV POP was released. The NV POP, Chapter 9 was developed to give effect to the previous NZCPS. Chapter 17 (Activities in a Coastal Marine Area) and Schedule H, together with Chapters 11, 11A and 18, and the relevant definitions in the Glossary, are the Regional Coastal Plan as required by s64 of the RMA.</p> <p>The NZCPS 2010 is relevant to the extent that water quality outcomes in rivers affect the quality of coastal water. The DV POP gives effect to the NZCPS 2010 in Chapter 9 Coast by promoting integrated management of the coastal environment, including through the provisions in other chapters of the DV POP such as those addressing surface water quality. For the reasons set out in my statement of evidence I consider that the maintenance of water quality (as achieved through the policy framework) will give effect to the provisions of the NZCPS 2010.</p> <p>Other National Policy Statements</p> <p>I do not consider the National Policy Statement on Electricity Transmission 2008 or the National Policy Statement for Renewable Electricity Generation 2011 to be relevant to surface water quality – non-point source discharges provisions.</p>
<p>3. When preparing a regional plan (change) the regional council shall:</p> <p>(a) have regard to any proposed regional policy statement;</p>	s.66(2)(a),	<p>The DV POP is a single document incorporating the Regional Policy Statement, Regional Plan and Regional Coastal Plan. There is a direct and demonstrable cascade of policy provisions from the RPS to the Regional Plan. The Regional Plan is the product of the RPS and contains the regulatory objectives, policies and rules to implement the surface water quality – non-point source discharge provisions in Chapter 6 of the RPS.</p>
<p>4. In relation to other regional plans:</p> <p>(a) The regional plan (change) must not be inconsistent with an operative regional plan for the region or a water conservation order;</p>	s.66(4)(a), (b)	<p>The POP Regional Plan is a complete green-fields review of the operative RPS and regional plans and will replace them when it is made operative.</p> <p>Two water conservation orders exist for the Manawatu-Wanganui Region. The policy provisions for non-point-source discharges do not directly affect the catchments these relate to.</p>

<p>5. In preparing its regional plan (change) the regional council must also:</p> <ul style="list-style-type: none"> • have regard to any relevant management plans and strategies under other Acts, and to any relevant entry in the Historic Places Register and to various fisheries regulations; and to consistency with plans and proposed plans of adjacent regional councils; and to the Crown's interests in the Coastal Marine Area. • take into account any relevant planning document recognised by an iwi authority; and • not have regard to trade competition; 	<p>s.66(b), (c)</p> <p>s.66(2A)</p> <p>s.66(3)</p>	<p>There are no other planning instruments identified that are relevant to the topic of surface water quality – non-point source discharges.</p> <p>MWRC is aware of two iwi resource management plans in the Region. These are:</p> <ul style="list-style-type: none"> • Ngati Rangi Waterways document (2002) • Ngati Tuwharetoa Environmental Iwi management Plan (2003). <p>The policy provisions in Chapter 13 relating to non-point-source discharges do not directly affect the catchments these iwi resource management plans relate to, however, these documents were taken into account during the drafting of the RPS provisions in Chapter 4. Table 4.1 in Chapter 4 sets out the Resource Management Issues of Significance to hapu and iwi and the relevant chapter of the POP that addresses those issues. I note that there are a number of cross-references in Table 4.1 relating to water quality in Chapter 6. Those that relate specifically to non-point source discharges are Issues (a), (b), (c), (d), and (ia).</p> <p>No trade competition situations identified.</p>
<p>6. A regional plan (change) must be prepared in accordance with any regulation (there are none at present) and any direction given by the Minister for the Environment</p>	<p>s.66(1)</p>	<p>No regulations or directions have been identified.</p>
<p>7. The formal requirement that a regional plan (change) <u>must</u> state its objectives, policies and the rules (if any) and may state other matters.</p>	<p>s.75(1)</p>	<p>The DV POP Regional Plan includes the following policy provisions related to surface water quality – non-point source discharges:</p> <ul style="list-style-type: none"> - Objective 13-1 Regulation of discharges to land and water - Policy 13-2C Management of dairy farming land use - Table 13.1 Water Management Sub-zones where management of existing dairy farming land use activities must be specifically controlled - Rule 13-1 Existing dairy farm land use activities

		<ul style="list-style-type: none"> - Rule 13-1A Existing dairy farming land use activities not complying with Rule 13-1 - Rule 13-1B New dairy farming land use activities - Rule 13-1C New dairy farming land use activities not complying with Rule 13-1B <p>In my evidence I am proposing amendments to these DV POP Regional Plan provisions. I consider these refinements are generally consistent with the approach taken in the DV POP while achieving a more complete and robust policy and rule framework.</p>
7A. The formal requirement that a regional plan (change) <u>must</u> also record how it has allocated natural resource under s.30(1)(fa) or (fb) and (4) if it has done so.	s.67(5)	No allocation of natural resources in the surface water quality – non-point source discharges provisions.
B. Objectives [the section 32 test for objectives]		
8. Each proposed objective in a regional plan is to be evaluated by the extent to which it is the most appropriate way to achieve the purpose of the Act.	s.32(3)(a)	Objective 13-1 is a simple statement that establishes the linkage between the regulation of discharges to land and water to the policy provisions in the RPS in the POP. To that extent the objective relies on the section 32 test for RPS Objectives and policies that result in the use of a regulatory approach to implementation.
C. Policies and methods (including rules) [the section 32 test for policies and methods]		
9. The policies are to implement the objectives, and the rules (if any) are to implement the policies;	s.67(1)	<p>In terms of policy provisions related to surface water quality – non-point source discharges, Objective 13-1 is implemented through Policy 13-2C, Table 13-1 and Rules 13-1, 13-1A, 13-1B and 13-1C</p> <p>These policy provisions are implemented by MWRC.</p>
10. Each proposed policy or method (including each rule) is to be examined, having regard to its efficiency and effectiveness , as to whether it is the most appropriate method for achieving the objectives of the regional plan:	s.32(3)(b)	The <i>Section 32 Report – One Plan, May 2007</i> provides an evaluation of various policy approaches to implement the objectives. It was concluded that a mix of regulatory and non-regulatory policies and methods would be the most efficient and effective means of implementing the objectives.

12.	There are special provisions for rules about contaminated land	s.68(11)	Not applicable
13.	There are special provisions for rules relating to maximum or minimum levels or flows or rates of flows or rates of use of water or minimum standards for water quality or air quality, or ranges of temperature or pressure of geothermal water.	s.68(7)	Not applicable
13A.	There are special provisions relating to rules in regional coastal plans	s.68(8), (9), (10)	Not applicable
E.	Other statutes:		
14.	Regional councils may be required to comply with other statutes.		Other statutes identified in DV POP and provided for as appropriate, e.g., Historic Places Act 1993. No other statutes have been identified in relation to surface water quality – non-point source discharges.
F.	(On appeal)		
15.	On appeal the Environment Court must have regard to one additional matter – the decision of the regional council.	s.290A	The Decisions on Submissions to the Proposed One Plan Volumes 1-5 have been provided to the Court. Reference to the Hearing Panel decisions on Surface Water Quality – Non-point Source Discharges is made as appropriate in my planning evidence

Attachment 4

**Revised Section 42A Report of
Dr Roger Graeme Young on behalf of
Horizons Regional Council**

BEFORE THE HEARINGS PANEL

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

**REVISED SECTION 42A REPORT OF DR ROGER GRAEME YOUNG
ON BEHALF OF HORIZONS REGIONAL COUNCIL**

1. INTRODUCTION

My qualifications/experience

1. My name is Roger Graeme Young. I am a freshwater ecologist and have been employed at the Cawthron Institute in Nelson for the last 12 years. I have the following qualifications: BSc Honours and PhD in Zoology from the University of Otago. I am a member of the New Zealand Freshwater Sciences Society and the North American Benthological Society.
2. My areas of expertise include river health assessment, water quality, freshwater fisheries, and river ecosystem ecology.
3. Over the last 12 years I have undertaken freshwater ecological work throughout New Zealand for clients including power companies, regional councils, Ministry for the Environment, Department of Conservation and Fish & Game New Zealand. I have also been involved with research investigating the effects of catchment management on water quality and river health, developing new tools for river health assessment, and determining links between human pressure indicators and aquatic ecosystem integrity. This latter study involved an assessment of the health of large rivers throughout New Zealand, including the Manawatu and Rangitikei rivers. I have also studied the behavioural response of back country trout to anglers, factors affecting trout abundance, accuracy of drift-dive assessments of trout abundance, and catchment-wide patterns of fish movement. I have written 22 scientific papers and more than 50 reports relating to this work.
4. Examples of recent hearings for which I have presented evidence relating to water quality, freshwater fisheries, river ecology and instream habitat include:
 - Otago Regional Council's Water Plan Environment Court Hearing;
 - Natural Gas Corporation's hearing relating to the proposed expansion of the Stratford Power Station;
 - Trustpower's hearing relating to re-consenting the Cobb Power Scheme;
 - Meridian Energy's lower Waitaki North Branch Tunnel Concept Water Resource Consents Hearing; and
 - Fish & Game NZ's hearing relating to its application for a Water Conservation Order on the Hurunui River.

5. I confirm that I have read the Environment Court's practice note entitled Expert Witnesses – Code of Conduct and agree to comply with it. This evidence is within my area of expertise, except where I state that I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

My role in the One Plan

6. My role in the One Plan has been as a reviewer of technical documents produced by Horizons Regional Council staff and other agencies.
7. I am a co-author of a report for Horizons Regional Council on water quality guidelines to maintain trout fishery values (Hay *et al.*, 2006).
8. I am also a co-author of a report for Horizons Regional Council on seasonal patterns in ecosystem metabolism in the Rangitikei and Manawatu rivers. This report investigates dissolved oxygen dynamics in these rivers and compares measurements of ecosystem metabolism from these rivers with measurements from other large rivers throughout New Zealand (Clapcott & Young 2009).

Scope of evidence

9. I have been asked by the Horizons Regional Council to provide evidence to this hearing on the following:
- the state of the Manawatu and Rangitikei rivers, with respect to ecosystem metabolism, compared to other large rivers in New Zealand;
 - a summary of a recent project examining seasonal changes in ecosystem metabolism in the Manawatu, Mangatainoka and Rangitikei rivers;
 - a summary of my reviews of technical reports produced during the development of the Proposed One Plan; and
 - a summary of water quality guidelines needed to maintain trout fishery values.

2. EXECUTIVE SUMMARY OF EVIDENCE

10. The concentrations of dissolved oxygen in the water are a critical component affecting the life supporting capacity of a river system. Ecosystem metabolism – the combination of primary productivity (photosynthesis) and ecosystem respiration – is a measure of the main factors controlling dissolved oxygen dynamics in rivers, and indicates how much

organic carbon is produced and consumed in river systems. Recent research has shown that ecosystem metabolism is a useful indicator of river ecosystem health.

11. As part of a study on the ecosystem integrity of New Zealand's large rivers, ecosystem metabolism was measured at 16 sites throughout the country. The results showed that rates of gross primary productivity (GPP) and ecosystem respiration (ER) in the lower Manawatu River at Opiki were among the highest ever reported internationally and well above the thresholds considered to represent the transition from satisfactory to poor ecosystem health (Figure 1). Rates of ER in the lower Rangitikei River at Bulls were also high and indicative of poor ecosystem health, while rates of GPP in the Rangitikei River were within the normal range and not indicative of any concerns (Figure 1).
12. These results were based on measurements of dissolved oxygen changes over one 24-hour period in one location on each river. Further work has subsequently been conducted at five sites to determine if concerns raised about these rivers are consistent over time or among sites. The initial version of my evidence from these five sites was based on calculations from raw data which has subsequently been shown to have some errors. These errors have now been addressed and metabolism rates for the five sites recalculated.
13. Recalculated metabolism rates were high in the Manawatu River at Hopelands and generally indicative of poor ecosystem health. Rates of metabolism were more moderate in the Manawatu River at Teachers College and Mangatainoka at Pahiatua and indicative of good-satisfactory health in autumn, winter and spring, but indicative of poor ecosystem health in summer. Rates of metabolism from the Rangitikei River at Mangaweka and Onepuhi were generally indicative of good-satisfactory health throughout the year.

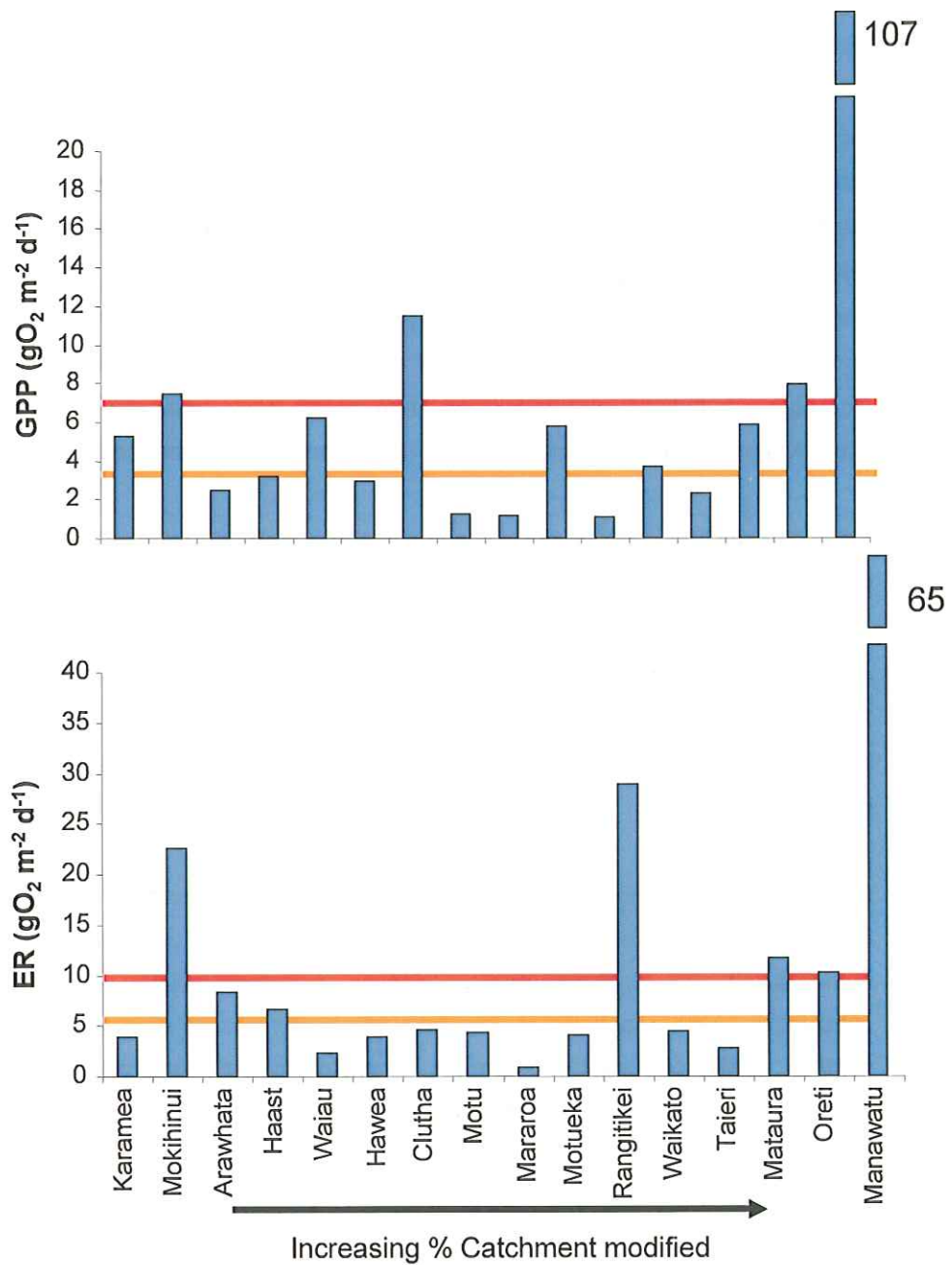


Figure 1. Measurements of gross primary production (GPP) and ecosystem respiration (ER) in a variety of large rivers throughout New Zealand. The rivers are arranged in order of % catchment modified. The orange and red lines are guidelines representing the transition from good to satisfactory health, and satisfactory to poor ecosystem health, respectively.

14. Sites with very high rates of ecosystem metabolism are likely to have a lower life supporting capacity than sites that are within the normal range. Sites with high rates of ER will be prone to low minimum dissolved oxygen concentrations and have the potential to kill fish and other aquatic life. Sites with high rates of GPP are likely to experience algal and cyanobacterial blooms that can degrade aesthetic and recreational values, and have potential health implications for humans and animals. High algal densities associated with high rates of GPP can also cause large pH fluctuations, smother habitat for invertebrates, cause taste and odour problems for water supplies, and cause problems with low DO (such as fish kills) when the periphyton mats mature and decompose.
15. A review of the data used to calculate metabolism from the five sites indicated that minimum DO concentrations were well below the dissolved oxygen saturation standards in the Proposed One Plan at the Manawatu at Hopelands and Mangatainoka at Pahiatua sites and breached these standards on a relatively regular basis. However, DO concentrations at the other sites were generally above the proposed standards during these periods.
16. In general, I support the approach taken by Horizons in the Proposed One Plan, with an initial emphasis on the values to be protected, followed by specific standards that should protect those values. In my opinion, this approach is closely linked with the effects-based philosophy of the RMA. I am particularly impressed at the degree of spatial resolution within the Proposed One Plan with standards set for specific water management sub-zones.
17. The key parameters for the protection of trout fisheries and trout spawning habitat are water temperature, dissolved oxygen, water clarity/turbidity, food supply, and fine sediment. Direct measurement of fine sediments is currently problematic, so standards relating to water clarity and the Macroinvertebrate Community Index (MCI) could act as surrogate controls on fine sediment loads.
18. The most applicable guidelines relating to periphyton biomass and cover for the protection of trout fishery values are contained in the New Zealand Periphyton Guidelines (Appendix 1). These guidelines may be sufficient to protect fishery values in lowland fisheries. However, algal biomass at such levels would be seen as a significant reduction in the 'pristine' natural character of many headwater fisheries. The benthic biodiversity guideline would provide better protection of trout habitat, benthic invertebrate habitat and aesthetic values, and I support use of this guideline in the Proposed One Plan for rivers recognised as supporting outstanding fisheries.

3. EVIDENCE

Dissolved oxygen and ecosystem metabolism

19. Concentrations of dissolved oxygen in the water are a critical component affecting the life supporting capacity of a river system. Dissolved oxygen concentrations are affected by three key processes – 1) oxygen production associated with photosynthesis of algae and other aquatic plants, which raises the oxygen concentrations within the water, 2) oxygen uptake associated with respiration of all river life including fish, invertebrates, algae, aquatic plants and microbes, which lowers the oxygen concentrations in the water, and 3) oxygen diffusion through the water surface, which can either raise or lower oxygen concentrations.
20. Ecosystem metabolism – the combination of primary productivity (photosynthesis) and ecosystem respiration – is a measure of the main factors controlling dissolved oxygen dynamics in rivers and indicates how much organic carbon is produced and consumed in river systems. Recent research has shown that ecosystem metabolism is a useful indicator of river ecosystem health, and complements traditional monitoring tools such as water quality analysis, periphyton cover and/or biomass, and invertebrate community composition.
21. Ecosystem metabolism can be measured by monitoring the daily changes in oxygen concentration at a site. Dissolved oxygen concentrations rise during the daytime when sunlight facilitates photosynthesis, and then decline during the night when only respiration is occurring. The size of the daily fluctuations depends on the amount of photosynthesis and respiration occurring within the river and also the flux of oxygen through the river surface. More oxygen diffuses through the surface of fast flowing, shallow, turbulent streams compared to the surface of slow flowing, deep rivers.
22. Sites with very high rates of primary production will normally be characterised by a river bed covered with a high biomass of periphyton (algae and other slimes growing on the substrate) or other aquatic plants. The highest rates of production will occur in situations where there is plenty of light and nutrients available to support plant growth. Sites with high rates of ecosystem respiration are normally characterised by large inputs of organic matter from point source discharges of sewage/waste water, or large diffuse inputs from sources such as agricultural run-off. High biomasses of algae and other aquatic plants are also often associated with high rates of ecosystem respiration.

Comparison of the Manawatu and Rangitikei rivers with other large rivers around New Zealand

23. As part of a study on ecosystem integrity of New Zealand's large rivers, ecosystem metabolism was measured at 16 sites throughout the country. The results showed that rates of gross primary productivity (GPP) and ecosystem respiration (ER) in the lower Manawatu River at Opiki were higher than observed in any of the other rivers that were sampled (Figure 1), and among the highest ever reported internationally. Rates of ER in the lower Rangitikei River at Bulls were also very high, but rates of GPP were relatively low (Figure 1).
24. Rates of both GPP and ER in the Manawatu River at Opiki were well above the thresholds considered to represent the transition from satisfactory to poor ecosystem health (Figure 1). Rates of ER in the Rangitikei River at Bulls were also indicative of poor ecosystem health, while rates of GPP in the Rangitikei River at Bulls were within the normal range and not indicative of any concerns (Figure 1). The high rates of ER and normal rates of GPP in the Rangitikei River suggest that discharges of organic waste may be an issue in this river.
25. These thresholds were derived from the statistical distribution of metabolism measurements from 213 relatively unmodified sites around the world which included systems of all sizes from small streams through to large rivers.

Seasonal patterns in ecosystem metabolism at five sites in the Manawatu, Mangatainoka and Rangitikei rivers

26. The comparison of rates of ecosystem metabolism in the Manawatu and Rangitikei Rivers with other large rivers around New Zealand (Paragraphs 23-25) was based on measurements of dissolved oxygen changes over one 24-hour period (27 November 2007) in one location on each river. Further work has subsequently been conducted to determine if concerns raised about these rivers are consistent over time or among sites. Since 2005, oxygen loggers have been deployed by Horizons at hydrometric recorder stations at two sites on the Manawatu River (Hopelands, Teachers College), two sites on the Rangitikei River (Mangaweka, Onepuhi) and one site on the Mangatainoka River (Pahiatua). These provide data every 15 minutes that is suitable for determining ecosystem metabolism.
27. Improvements in dissolved oxygen measurement technology over just the last decade have now enabled long-term continuous measurement of dissolved oxygen to be conducted in

rivers. Prior to this development, oxygen loggers could only be deployed for 1-2 days before requiring sensor maintenance and re-calibration. Protocols for long-term deployment, sensor calibration, data storage and quality control are still being refined based on experience with this relatively new technology. Experience so far suggests that sensor cleaning and calibration is required more frequently than suggested by the instrument manufacturers.

28. Data supplied by Horizons was used for metabolism calculations presented in the original version of my evidence (dated August 2009). Subsequently, we discovered a problem with the dissolved oxygen saturation readings being delivered from the Horizons database, and also found that the dissolved oxygen sensor at the Manawatu at Hopelands site had been damaged by flooding during August 2007 making data from that period unsuitable for metabolism calculations.
29. Metabolism was re-calculated from corrected data from each of the five sites over a five-day period during summer (February 2007), autumn (May 2007), winter (August 2007) and spring (November 2007) (Figure 2). There were still some concerns with the calibration of the oxygen loggers at some sites during some seasons, but the data were corrected before metabolism calculation (Clapcott & Young 2009). As mentioned, suitable data was not available for the Manawatu River at Hopelands in winter 2007.

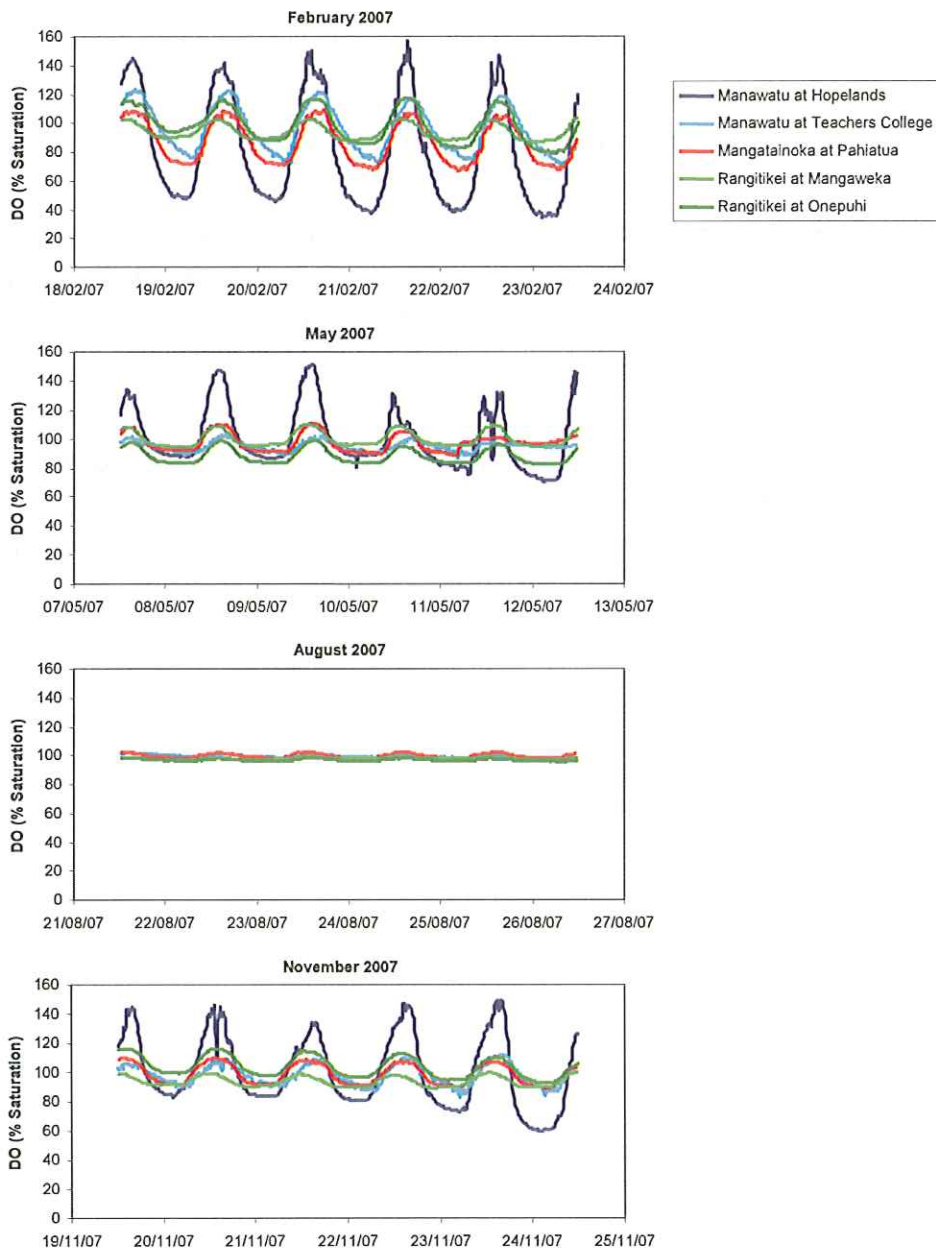


Figure 2. Dissolved oxygen data used in metabolic calculations for each of the five study sites for February, May, August and November 2007. No data is available for the Manawatu at Hopelands in August 2007.

30. Rates of GPP in the Manawatu River at Hopelands were high (up to $25 \text{ gO}_2/\text{m}^2/\text{day}$) and regularly above the threshold indicating poor ecosystem health (Figure 3). Rates of GPP in the Manawatu River at Teachers College site were generally lower, although values measured in summer were above the threshold indicating poor ecosystem health (Figure 3).

31. Rates of ER were also high in the Manawatu River at Hopelands and consistently indicative of poor ecosystem health in summer and spring and satisfactory-poor health in autumn (Figure 4). Rates of ER at the Teachers College site were lower and indicative of poor ecosystem health only during summer (Figure 4).
32. Rates of GPP and ER in the Mangatainoka River at Pahiatua were generally indicative of good-satisfactory conditions (Figures 3 & 4). However, rates of ER during summer were often indicative of poor ecosystem health (Figure 4).
33. Rates of GPP and ER in the Rangitikei River at Onepuhi were indicative of good ecosystem health (Figures 3 & 4). Rates of GPP in the Rangitikei River at Mangaweka were indicative of good-satisfactory health (Figure 3), whereas rates of ER were indicative of good health in autumn, satisfactory health in spring and summer, and poor health in winter (Figure 4).

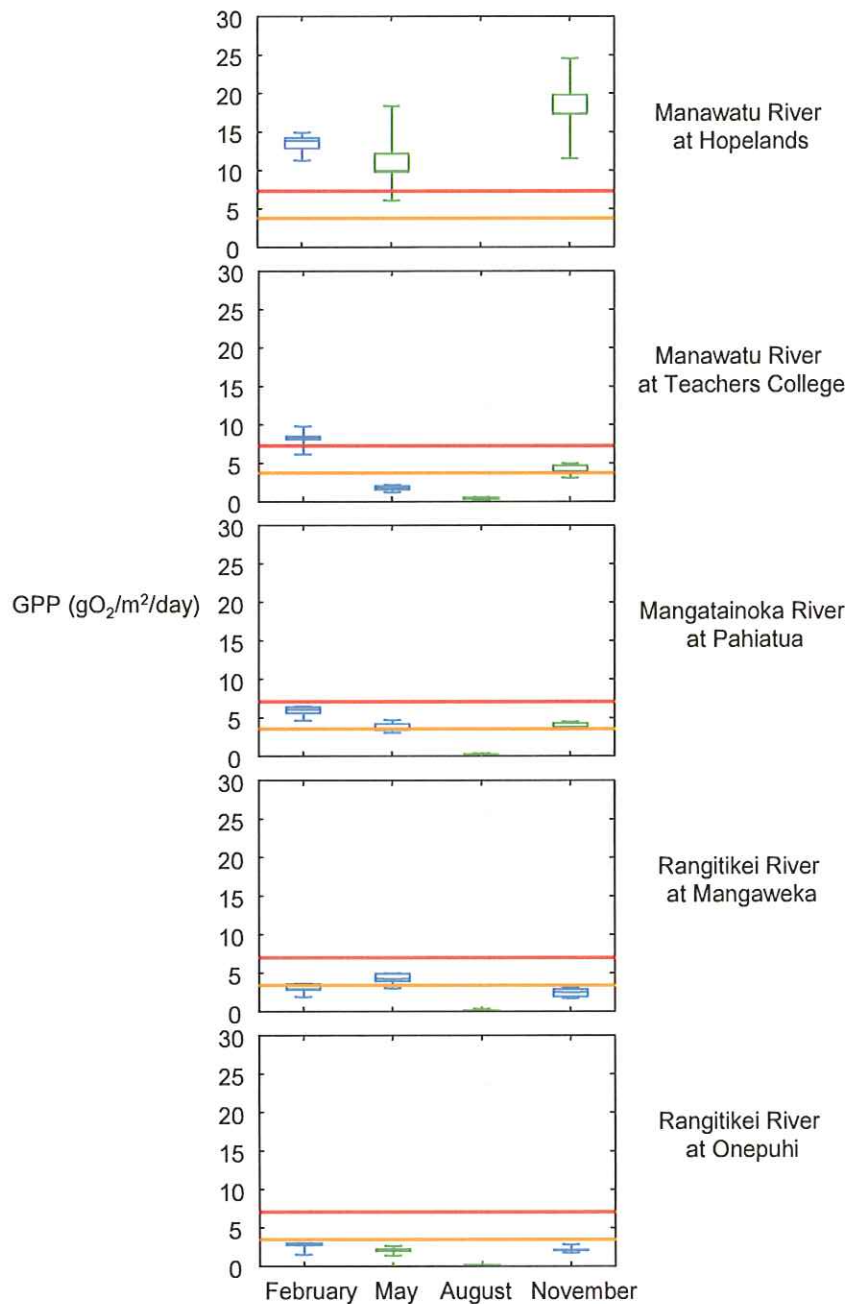


Figure 3. Rates of GPP for the five sites. Box plots show the median, upper and lower quartiles and range of values. Blue boxes indicate GPP calculated using data that did not need correction, while green boxes indicate GPP calculated from corrected data. The orange and red lines are guidelines representing the transition from good to satisfactory health, and satisfactory to poor ecosystem health, respectively. No data is available for the Manawatu at Hopelands in August 2007.

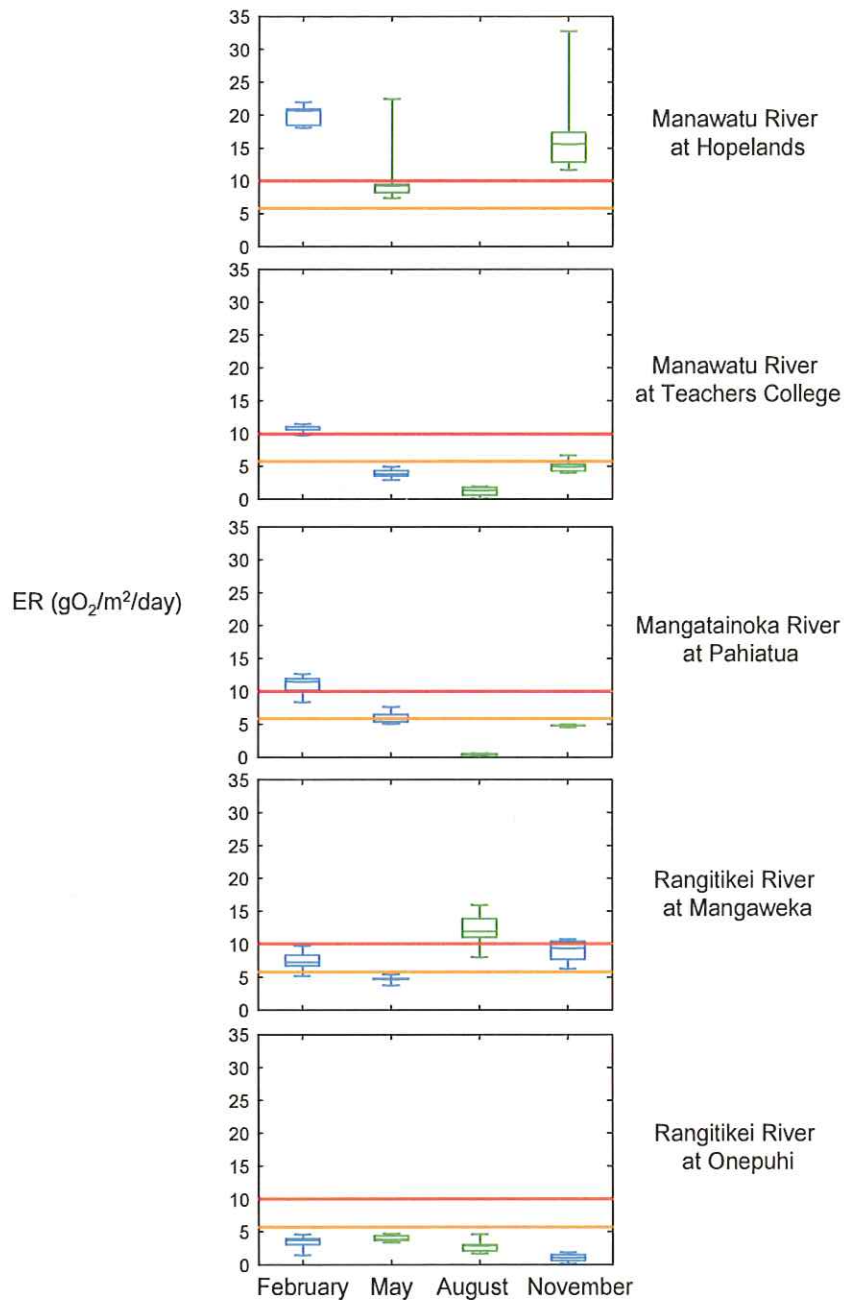


Figure 4. Rates of ER for the five sites. Box plots show the median, upper and lower quartiles and range of values. Blue boxes indicate ER calculated using data that did not need correction, while green boxes indicate ER calculated from corrected data. The orange and red lines are guidelines representing the transition from good to satisfactory health, and satisfactory to poor ecosystem health, respectively. No data is available for the Manawatu at Hopelands in August 2007.

How does this relate to the values that the One Plan seeks to protect?

34. In terms of the values that are listed in the Proposed One Plan, sites that exceed the guidelines for ecosystem metabolism are likely to have a lower life supporting capacity than sites that are within the normal range of values that would be expected. The most direct mechanism for this effect is via dissolved oxygen concentrations. Sites with high rates of ER will be prone to low minimum dissolved oxygen concentrations, especially at dawn. Low dissolved oxygen concentrations have the potential to kill fish and other aquatic life. A review of the data used to calculate metabolism from the five sites indicated that minimum DO concentrations were well below the dissolved oxygen saturation standards in the Proposed One Plan at the Manawatu at Hopelands and Mangatainoka at Pahiatua sites and breached these standards on a relatively regular basis (Table 1). However, DO concentrations at the other sites were generally above the proposed standards during these periods.

Table 1. Range in dissolved oxygen data and proportion of time breaching standards at the five study sites, calculated from the 20 days of data used to calculate ecosystem metabolism. Data was not available for Hopelands during August 2007.

Site	% DO Min	% DO Max	Proportion of measurements breaching proposed DO standard (*>70% Saturation, #>80% Saturation)
Manawatu at Hopelands	34	158	19%*
Manawatu at Teachers College	71	124	0%*
Mangatainoka at Pahiatua	65	111	11%#
Rangitikei at Mangaweka	87	110	0%#
Rangitikei at Onepuhi	79	117	0.3%#

35. Sites with high rates of GPP are likely to experience algal blooms (nuisance periphyton growths) that can degrade aesthetic and recreational values. Toxic cyanobacterial blooms may also result in high rates of GPP and have potential health implications for humans and animals. High algal densities associated with high rates of GPP can also cause large pH fluctuations, smother habitat for invertebrates, cause taste and odour problems for water supplies, and cause problems with low DO (such as fish kills) when the periphyton mats mature and decompose.
36. The Proposed One Plan seeks to maintain water bodies so they support healthy aquatic life and ecosystems. River health traditionally has been assessed with structural measures related to water quality or community composition of invertebrates and fish. However, river ecosystems also have functional components, which include the rates of

key ecosystem processes such as ecosystem metabolism. Adequate characterisation of ecosystems requires information on both structure and function because stressors may cause changes to one or both of these elements. Therefore, extremely high or low rates of ecosystem metabolism indicate that the ecosystem is functioning in an unusual way and this should be a concern independent of the other linked effects on values that I have already outlined in Paragraphs 34 and 35.

Summary of technical report reviews

37. I reviewed three technical reports for Horizons Regional Council. These reports were:
- Sites of significance for aquatic biodiversity in the Manawatu-Wanganui Region (McArthur *et al.*, 2007).
 - Limiting nutrients for controlling undesirable periphyton growth (Wilcock *et al.*, 2007).
 - Recommended water quality standards for the Manawatu-Wanganui Region (Ausseil & Clark, 2007).
38. In general, I support the approach taken by Horizons in the Proposed One Plan, with an initial emphasis on the values to be protected, followed by specific standards that should protect those values. In my opinion, this approach is closely linked with the effects-based philosophy of the RMA where controls are specifically linked with the values that are potentially threatened by activities.
39. I am particularly impressed at the degree of spatial resolution within the Proposed One Plan with standards set for specific water management sub-zones. In my opinion, this approach is what is needed to protect aquatic values that are treasured by the community and is a big step up from the region-wide or national standards that are generally applied elsewhere in New Zealand. The high degree of spatial resolution in the proposed plan will help focus rehabilitation efforts on areas that fail to meet the standards and also protect the values present in areas that are currently in good health.
40. The approach used to determine aquatic sites of significance focused largely on fish and whio (blue duck), which in my opinion is a relatively narrow focus. I note that only one of the potential criteria that could be used to determine if a site was significant was actually used to define sites of significance. Further analysis of invertebrate community composition and potentially an analysis of key ecosystem processes/functions would enable a more broad view on the sites that could be considered significant.

41. I also note the difficulties with defining a river reach as a site of significance for a diadromous fish that migrates to and from the sea as part of its life cycle. If a diadromous species is found in a particular location in a river system, then all reaches downstream must be used by that species at some stage during its lifecycle. I realise that it may be impossible to classify the main stem of the Manawatu as a reach of significance for shortjaw kokopu, for example. But there should be recognition of the value of lowland rivers as migratory pathways for these 'significant' fish. The Proposed One Plan has addressed this issue in Chapter 16 by noting fish passage as an aspect of the life supporting capacity value, so that water quality and activities in the beds of rivers and lakes should not affect migration.
42. In relation to the water quality standards report, the relationship between invertebrate communities and particulate organic matter (POM) that was referred to is associated with discharges from oxidation ponds, not with natural sources of POM. I am not convinced that POM needs to be measured, or standards set, throughout the Region in the One Plan. However, given that discharges could potentially occur anywhere in the future, I support Dr Quinn's suggestion that a Region-wide standard of 5 g/m³ at flows less than median be applied.

Water quality guidelines needed to maintain trout fishery values

43. I am the co-author of a report that summarised the literature on appropriate water quality standards that could be applied in the Proposed One Plan to protect trout fishery values (Hay *et al.*, 2006).
44. The four key parameters for the protection of adult trout are water temperature, dissolved oxygen, water clarity/turbidity, and food supply, represented by the Macroinvertebrate Community Index (MCI). Temperature and dissolved oxygen have direct effects on fish metabolism, while water clarity can influence foraging efficiency for trout.
45. For spawning and egg incubation, the main issues are also temperature and dissolved oxygen, and also a need to maintain a relatively low amount of fine sediment in the substrate. Standards relating to water clarity and the MCI could act as surrogate controls on fine sediment loads, since direct measurement of fine sediments is problematic.

46. Excessive growth of periphyton commonly results in a change in aquatic invertebrate community composition, with large, drift-prone, EPT taxa (that is mayflies, caddisflies and stoneflies) being replaced by small (chironomids, algal piercing caddis) or non-drifting taxa (worms, snails). These changes potentially affect the food base for trout, with negative consequences for growth and carrying capacity, and affect angling success and satisfaction by fouling anglers' lures and reducing aesthetic values.
47. The most applicable guidelines relating to periphyton biomass and cover for the protection of trout fishery values are contained in the New Zealand Periphyton Guidelines (Biggs, 2000 – Appendix 1). However, these guidelines may need to be adjusted in light of improved understanding of the inter-relationships between periphyton biomass, invertebrate drift, and trout growth and abundance. Although high densities of invertebrates may be associated with high algal biomass, there is now evidence that these invertebrates may not be as readily available to drift-feeding trout.
48. The periphyton guidelines for trout fisheries suggested in Biggs (2000) (Appendix 1) may be sufficient to protect fishery values in lowland fisheries. However, algal biomass at such levels would be seen as a significant reduction in the 'pristine' natural character of many headwater fisheries. In the sites in Horizons' Region recognised as outstanding fisheries, the guidelines proposed by Biggs (2000) to protect benthic biodiversity values (Maximum chlorophyll a 50 mg/m²) would provide better protection of trout habitat, benthic invertebrate habitat and aesthetic values. I support the use of the latter guideline in the Proposed One Plan for rivers recognised as outstanding fisheries.

4. REFERENCES

- Ausseil O & Clark M 2007. Recommended water quality standards for the Manawatu-Wanganui Region. Technical report to support policy development. Horizons Regional Council.
- Biggs BJB 2000. New Zealand Periphyton Guidelines: Detecting , monitoring and managing enrichment of streams. Ministry for the Environment, Wellington. 122 p.
- Clapcott JE & Young RG 2009 – in preparation. Temporal variability in ecosystem metabolism of rivers in the Manawatu Region. Prepared for Horizons Regional Council. Cawthron Report No. 1672. 31 p. [This report will need to be revised using the updated metabolism calculations]

Hay J, Hayes JW & Young RG 2006. Water quality guidelines to protect trout fishery values. Prepared for Horizons Regional Council. Cawthron Report No. 1205. 17p.

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Wilcock RJ, Biggs BJF, Death RG, Hickey CW, Larned ST & Quinn JM 2007. Limiting nutrients for controlling undesirable periphyton growths. Prepared for Horizons Regional Council. NIWA Client Report HAM2007-006. 38 p.

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APPENDIX 1

Provisional biomass and cover guidelines for periphyton growing in gravel/cobble bed streams for three main instream values (from Biggs, 2000)

Instream value/variable	Diatoms/cyanobacteria	Filamentous algae
<i>Aesthetics/recreation (1 November – 30 April)</i>		
Maximum cover of visible stream bed	60% >0.3 cm thick	30% >2 cm long
Maximum AFDM (g/m ²)	N/A	35
Maximum chlorophyll a (mg/m ²)	N/A	120
<i>Benthic biodiversity</i>		
Mean monthly chlorophyll a (mg/m ²)	15	15
Maximum chlorophyll a (mg/m ²)	50	50
<i>Trout habitat and angling</i>		
Maximum cover of whole stream bed	N/A	30% >2 cm long
Maximum AFDM (g/m ²)	35	35
Maximum chlorophyll a (mg/m ²)	200	120