BEFORE THE HEARINGS PANEL

IN THE MATTER OF	The Resource Management Act 1991 ("the Act")
AND	
IN THE MATTER OF	the Proposed Horizons Regional Council One Plan for the Manawatu-Wanganui Region (the Water Hearing)

STATEMENT OF EVIDENCE OF JULIAN DERICK WATTS ON BEHALF OF THE MINISTER OF CONSERVATION

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STATEMENT OF EVIDENCE OF JULIAN WATTS

1. My full name is Julian Derick Watts. I appear in connection with the submission and further submissions on the Proposed One Plan by the Minister of Conservation ('the Minister').

2. I hold an MA in Town and Regional Planning from the University of Sheffield (UK) and corporate membership of the Royal Town Planning Institute (UK). I have approximately twenty years' experience in the field of environmental planning in the United Kingdom and New Zealand, the majority of it specialising in the planning and protection of significant natural areas and landscapes. I am employed by the Department of Conservation as a Resource Management Planner in the Wanganui Conservancy Office.

3. I am currently responsible for providing advice to the Conservancy on issues under the Resource Management Act, 1991 (the Act). During the past two years this has included co-ordination of the Department's involvement in the Proposed One Plan. The Horizons Region includes parts of four Lower North Island Conservancies, with the largest part lying within the Wanganui Conservancy.

4. I have read the Code of Conduct for Expert Witnesses (section 5 of the Environment Court Consolidated Practice Note 2006). I agree to comply with this Code of Conduct. This evidence is within my area of expertise, except where I state 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.

OUTLINE OF THIS EVIDENCE

5. My evidence will cover the following matters:
   - Approach taken in this evidence
   - Water management framework in the Proposed One Plan
   - Water quality
   - Water quantity
   - River and lake beds
   - Conclusions and recommended amendments.

APPROACH TAKEN IN THIS EVIDENCE

6. For the most part the Minister's submissions expressed strong support for the Proposed One Plan and in particular the approach which the Council proposes to take to address the 'Big Four' issues which the plan identifies, two of which - water quality, and increasing demand for water – are being considered at this hearing.

7. My understanding is that in the light of submissions and the technical and planning reports which have subsequently been prepared including Mr Carlyon's section 42A report, the Officers' Report is recommending that the general approach and framework set out in the plan as notified be maintained. I agree with that approach. Based on Mr Brown's evidence, I also agree with most of the recommendations in the section 42A Planning Report by Ms Barton and Ms James relating to water quality and water quantity and allocation matters .

8. For these reasons I do not intend in my evidence to reiterate in depth the analyses and recommendations in the officers' reports where I agree with them, and will focus on what I regard as the outstanding issues.

9. I will however make general comments relating to the overall framework and approach of the One Plan with respect to water quality and water allocation matters, and on issues where I disagree with the

recommendations. If matters relating to the Minister's submission are raised either through evidence from other parties or otherwise through the prehearing process then I will present further supplementary evidence on them to the Hearing.

WATER MANAGEMENT FRAMEWORK IN THE PROPOSED ONE PLAN

10. The general framework for managing issues relating to water quality and water demand is based on:
    - A statement of the values which apply to water bodies within water management zones which underpin the management objectives for each zone, and in terms of which the management of the resource will be assessed. These include environmental, cultural, social and economic values regarded as fundamental to the sustainable management of the resource.
    - A set of measurable standards which are to be applied to provide for the safeguarding, maintenance or achievement of the identified values.
    - A set of objectives, policies and methods to provide for the safeguarding, maintenance or achievement of the identified values.

11. This approach could be contrasted with approaches applied elsewhere, and previously applied in the Horizons Region, which place more reliance on a providing general or generic policies and standards which are applied on more of a case by case basis. On the basis of the technical evidence presented and Mr Brown's evidence I consider it reasonable to conclude that the approach previously applied in the Horizons Region has not been effective in achieving the purpose of the Act, and a different approach is therefore justified.

12. As I understand it the intent of the Proposed One Plan (as notified) is to invest in a long term foundation for sustainable management in the region which will address water quality issues. This is to be achieved through the combined use of the latest scientific understanding and

technology at both the research and implementation stage; best practice in land use management, focussing particularly on erosion-prone farms and intensive farming operations which have been clearly identified as a major source of sediment, nutrients and other contaminants entering water bodies; and on improvements to point source discharges which do not meet the standards, including municipal waste water treatment plants.

13. Based on the technical evidence from the Council and Mr Brown's evidence in my opinion both the values identified for water management zones and the standards to be applied to them are appropriate and robust and reflect the current state of scientific knowledge of the effects of contaminants on aquatic ecosystems. This is not to say that such scientific knowledge is perfect; however the standards are tailored to the characteristics of water body, and in particular the geography, degree of modification and adjacent land uses, and the life supporting capacity which it would be reasonable to provide for in such circumstance, rather than to some other 'ideal' state.

14. The purpose of the Act includes safeguarding the life-supporting capacity of water and ecosystems, both now and in the future, and in my opinion the values and standards provide for this. The inclusion of Sites of Significance (both Aquatic and Riparian) also enables the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna to be recognised and provided for where this relates to such habitats and areas associated with the region's rivers, in a complementary manner to that provided for terrestrial and wetland habitats and areas in Chapters 7 and 12 of the Proposed One Plan. In my opinion this is an appropriate means of addressing section 6(c) RMA matters.

15. However it is also clear from the evidence of Mr Brown that the threatened status of native fish occurring in the region is a matter for increasing concern, and the need for further research to provide more

comprehensive coverage and determine significant habitats and areas for other animal and plant species is also clearly identified in his evidence. I therefore agree with the inclusion of the methods to address this for both Sites of Significance – Aquatic, and Sites of Significance- Riparian.

WATER QUALITY

16. My evidence with respect to water quality covers the following matters:

- Approach to water quality
- Objective 6-1 Water Management Values / Policy 6-4 Enhancement where water quality standards are not met
- Objective 6-2 : Water Quality

Approach to Water Quality

17. The opening section of the Minister's submission indicated strong support for the approach taken in the Proposed One Plan for addressing water quality issues. I will repeat the words used in the submission because they form the basis for my evidence which follows:

> *"The approach taken by the Regional Council to addressing this key issue for resource management in the region is strongly supported. The Council is commended for its thorough and scientific assessment of the state of water quality in the region, which indicates severe degradation of the rivers' ecosystems, both in absolute terms and when 'benchmarked' against international standards for comparable rivers. The effects of non-point discharges are a particular concern, given the proportionate impact which they have on nutrient enrichment. Current practice is clearly not sustainable in terms of the Act and the Department is supportive of the efforts in the plan to address this."*

18. As noted above, from a planning perspective and in the context of the Minister's submissions I would agree that the framework proposed is appropriate and would not agree with the suggestion that the values or standards should be relegated to the status of guidelines. Both the Plan

and the Act provide for the application of the relevant plan provisions on a case by case basis and in the context of the Act by classifying point source discharges which do not meet the standards as discretionary activities over most of the region. The provisions to manage the effects of non point source discharges also in my opinion provide for appropriate discretion to be exercised by decision-makers.

Justification for a regulatory approach

19. Further issues have been raised in submissions relating to the use of regulatory versus non-regulatory methods, and the 'affordability' of providing for the identified values or meeting the standards. I comment on the latter issue in my evidence below on Objective 6-1 and related provisions.

20. Clear evidence has been provided that the continuing contamination of the region's water bodies from point source and non point source discharges is compromising the life supporting capacity of the region's rivers and their ecosystems and having significant adverse effects on the environment. Moreover, according Dr Roygard's section 42A report (p.97) there is considerable potential to increase the distribution and extent of intensive farming activity in the region. This is not an issue in itself except where the increasing inputs required for intensive farming become 'outputs' into sensitive receiving environments which are unable to assimilate them without compromising other values, including the values identified in section 5(2)(b) of the Act.

21. In addition many of the towns and smaller settlements in the region have declined in terms of population or income in recent decades, which raises the question of 'affordability' when it comes to financing improvements to discharges from wastewater treatment plants which significantly contribute to pollution.

22. It is my general opinion that reliance on a voluntary approach to resolving the issue is unlikely in my opinion to be successful. This is, at least in part, because there is no system in place to co-ordinate any voluntarily agreed reductions, or 'allocate' acceptable pollution loads between polluters, but also because the sources of pollution are not required to meet the costs, or directly suffer the consequences.

23. Furthermore, in relation to intensive farming practices, the private benefits to be derived from intensification are likely to be much greater than that derived from reducing pollution loadings, even allowing for reduced cost of fertiliser inputs.

24. Whilst there may be evidence for voluntary improvements on individual farm basis, future drives to increase productivity and to intensify farming across the region is also likely to lead to in increasing reliance on external 'inputs' and substantial investments in infrastructure and farm development, which, will then require productivity and farm income to be maintained in order to provide a viable return on investment or to service debts. If a non-regulatory approach is not successful in managing the effects of existing and new discharges then in my opinion there is a serious risk that either the values and standards which the Proposed One Plan is seeking to establish will be seriously compromised or farms businesses will fail if the required regulatory measures are introduced.

25. There would in my opinion be less likelihood of this situation occurring, and greater certainty that the purposes of the Act will be met, under a regulatory approach. Such an approach would be more likely to be taken into account before investments in intensification were made.

26. In terms of the current 'track record' of success of non-regulatory approaches, I note, with reference to Mr Brown's evidence, that the Clean Streams Accord has only met with partial success, and that

measures to address non-point source pollution problems on farms on the Taranaki Ring Plain have not achieved their intended outcomes.

27. In the light of the above I would consider that a regulatory approach to non-point source discharges is more likely to achieve the outcomes sought in One Plan, and the risks associated with a non-regulatory approach would not in my would in my opinion be justified.

28. In relation to point source discharges, I note with reference to Ms McArthur's report that of the seven discharges listed in Table 16 as contributing to poor water quality in the Manawatu River catchment, all are non-complying with the operative MCWQRP standards in Rule 2 for phosphorus and/or periphyton biomass and cover. The intention to apply these standards was made clear well in advance of them coming into effect, thus allowing time for discharges to be voluntarily brought up to standard before the relevant rule came into effect. The failure of this approach in my view also lends support to the arguments against a non-regulatory approach. It is also relevant to the issue of whether long lead-in times should occur before standards take legal effect. This is discussed ion my evidence below.

Objective 6-1 Water Management Values / Policy 6-4 Enhancement where water quality standards are not met.

29. In my understanding Objective 6-1 is the overarching objective for the management of surface water quality in the region. It is the primary basis upon which effect will be given to achieving the management objectives in Schedule D (Schedule Ba as recommended in the Officer's report) and to safeguarding or attaining the values set out in that Schedule.

30. Water quality is one of top four natural resource management issues facing the Horizons Region. Issue 6-1 as recommended in the Water Officer's report says:

> "The quality of ~~most~~ 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 seepage 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 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."

31. Based on the evidence of Mr Roygard's report and other council technical reports, many of the region's rivers do not meet accepted water quality standards, and the need to both prevent further decline and provide for enhancement of water quality is therefore a matter of the utmost importance if the issue is to be addressed.

32. The Minister, along with a number of other parties, submitted in strong support of the Council's approach to water quality matters, including the recognition of the need to improve the quality of the region's rivers. This included support for Objective 6-1 and Policy 6-4 which is the primary policy guiding situations where water quality standards are not being met.

33. My main concern relates to the recommended addition of a target date of 2030 in Objective 6.1 and the implications of this for Policy 6-4 and related rules. As amended by the officers' recommendation Objective 6.1 would state:

> "Surface water bodies are managed in a manner which ~~sustains~~ safeguards their life-supporting capacity and recognises and provides for the values set out in Schedule ~~D~~ Ba by 2030."

34. Policy 6-4 as amended by the officers' recommendation would state (italics my emphasis):

> "Policy 6-4: Enhancement where water quality standards are not met
>
> (a) In each case where the existing water quality does not meet the relevant water quality standard within a W~~w~~ater M~~m~~anagement S~~s~~ub-zone, as shown in Schedule D, *activities shall be managed in a manner which maintains or enhances existing water quality in order to meet the water quality standard* for the W~~w~~ater M~~m~~anagement S~~s~~ub-zones shown in Schedule D.
>
> (b) For the avoidance of doubt, subsection (a) applies:
>
> (i) in circumstances where the existing water quality of a W~~w~~ater M~~m~~anagement S~~s~~ub-zone does not meet any of the water quality standards for the sub-zone (in which case ~~subsection~~ (a) applies to every water quality standard for the sub-zone)
>
> (ii) in circumstances where the existing water quality of a W~~w~~ater M~~m~~anagement S~~s~~ub-zone does not meet all of the water quality standards for the sub-zone (in which case ~~subsection~~ (a) applies only to those standards not met)".

35. In my understanding the provisions for managing discharges to surface water need to be seen as an integrated set aimed at addressing the stated issue in the Plan, and not in isolation or in relation to one specific interest. In my opinion the Proposed One Plan as notified met this requirement by including (amongst other provisions):

- An overall objective for the outcome sought, linked to clear and well-founded standards for achieving it. (Objective 6-1)
- Policies or other guidance providing for the maintenance of existing standards (where met) and improvement towards achieving them (where not). For non point source discharges I would expect such provisions to include reviews of consents (where provided for) and new consents. Policy 6-4 (as notified) provides for this.
- Policies or other guidance for consideration of the practical and economic feasibility of improvements, and allowance for appropriate time frames for their introduction. Policy 6-8 subparagraph (a)(iv) allows for the consideration of: "*the need*

to allow reasonable time to achieve any required improvements". This clearly provides (for point-source discharges) for such matters as the cost to industry/municipals in treatment and/or use of alternative discharge options to be considered on a case by case basis

- Provision for common consent expiry dates. Policy 2-2 (renumbered as Policy 11A-5 as recommended) provides for an integrated approach..

36. Through the above, the regime in the POP as notified (and where noted as recommended) strikes a reasonable balance between the following considerations, all of which I would consider necessary and desirable with respect to management of point source discharges;

- The need for a reasonable degree of certainty that water quality would be gradually improved over time to the extent that it would adequately provide for the life supporting capacity (and other values) of the water body for which it is to be managed, taking account of the nature and characteristics of the water body. This in my view reflects the purpose of the Act and the high level of importance attached to enhancement of water quality by the community.
- The ability to consider the particular circumstances of individual discharges, including their effects, the sensitivity of the receiving environment, and reasonable methods and timeframes for achievement of the standard, as part of a consenting process. This would also allow (through the wording of clause (a) of Policy 6-8, as recommended) for consideration of the extent to which a particular activity contributes to the failure to meet the standard.
- The ability to consider and manage combined and aggregated effects, at the appropriate zone or catchment scale, and to determine priorities for allocating 'rights to pollute' up to maximum allowed for by the standard.

37. For non-point source discharges I agree that there may need to be a different type of approach which includes an initially selective focus on particular catchments and setting of timeframes (since, essentially, a new regime is being introduced) but all discharges should still be managed under the umbrella of an over-riding objective (Objective 6-1) with a reasonable degree of consistency of approach.

38. The Officers' Report (page 96) indicates that including the 2030 date in Objective 6-1 is intended to reflect a time for "completion" and ties in with the "goals established for monitoring and benchmarks for improvement" in the common expiry/review dates. The common expiry dates (Policy 15-5 and Table 11A.1) are from 2009 – 2019. The dates for bringing farming activities within a regulatory regime (Table 13-1) are from 2009 to 2015. It is acknowledged that these timeframes will mean improvements are not achieved immediately. These dates provide for a progressive system to improve water quality over time.

39. I consider that the introduction of the 2030 target date, combined with the amendment to Policy 6-4 to include "maintains" would seriously undermine the ability of Plan to address Issue 6-1. This is primarily on the basis that with no target date, the Objective comes into effect immediately, and the relevant standards apply. The speed with which the standards are met and the Objective achieved is then determined in consent decision making with reference to the other relevant plan provisions, particularly the policies relating to circumstances where the standards are not met. This enables consents to be considered on a case by case basis rather than imposing timeframes which are either unreasonably long (in terms of achieving the purpose of the Act) or unreasonably short (in relation to the nature and benefits of the activity and its effects, and the practicability of meeting the standard).

40. The target date of 2030 is a long way off and no justification has been given for selecting it. It appears to assume that there is little or no

urgency for meeting the standards, and that all catchments are to be treated equally.

41. This is a fundamentally different approach to that adopted for non-point source discharges, and in my opinion is not consistent with it and may indeed even undermine it. I question whether setting a target date 20 years hence is likely to achieve the intended purpose, particularly with no interim target. The experience with the Lower Manawatu River Water Quality Plan (noted above) suggests that setting a target date well in advance is not likely to provide any greater certainty that it will be achieved. Indeed management of resources so as to safeguard life-supporting capacity is a requirement of section 5(2)(b) of the Act and should not be delayed, neither should management so as to recognise and provide for the relevant values (which ties in with section 6 of the Act).

42. The argument that such a distant target date is necessary to address 'affordability' issues is not in my opinion justified because the Proposed One Plan already includes a policy to consider such matters. It also appears to be based on an assumption that the affordability issue carries so much weight that it should over-ride other considerations (including the wide range of other objectives and policies which link to and relate to the achievement of Objective 6-1). In my understanding no evidence has been provided by existing consent holders to substantiate such claims or to indicate why this is an issue of affordability as against financial priorities. It could also be argued that an activity which continues to occur with significant adverse effects should not be regarded as sustainable and nor should an objective which shifts the burden of compliance costs onto the next generation.

43. The lack of certainty that a 2030 target date will be achieved is compounded by the recommended amendment to Policy 6-4 ("activities shall be managed in a manner which maintains or enhances existing water quality in order to meet the water quality standard …").

This would remove the onus on applicants to undertake improvements to meet the standard. An applicant could simply seek a renewal of an existing consent with an expiry date of 2029. Providing that the discharge does not lead to further deterioration in water quality it would be consistent with the Policy.

Recommendations

44. On the above basis I would recommend that a target date of 2030 is not introduced into Objective 6-1 and that the Objective reads:

> ***"Objective 6-1: Water management values***
> *Surface water bodies are managed in a manner which ~~sustains~~ safeguards their life-supporting capacity and recognises and provides for the values set out in Schedule ~~D~~Ba"*

45. I further recommend that clause (a) of Policy 6-4 be retained as notified in the Proposed One to read as follows to

> ***"Policy 6-4: Enhancement where water quality standards are not met***
> *a) In each case where the existing water quality does not meet the relevant water quality standard within a Water Management Sub-zone, as shown in Schedule D, activities shall be managed in a manner which enhances water quality in order to meet the water quality standard for the Water Management Sub-zones shown in Schedule D."*

Objective 6-2: Water Quality

46. The Minister's submission supported the wording of this policy as notified but sought amendment to sub clause (a)(iii) relating to water quality in lakes. Ms. Barton's S42A report recommends that the submission be accepted in part and agree with that recommendation.

47. I also agree with the recommended change to sub-clause (a) to read:

> *"Water quality is maintained or enhanced at a level which supports the values of the water bodies"*

on the basis that this is consistent with the Minister's submission and provides clarity that the intent is for the values and the associated

management objectives and standards to be applied in all circumstances.

WATER QUANTITY AND ALLOCATION

48. My evidence with respect to water quantity and allocation covers the following matters:
    - General approach to water quantity and allocation
    - Objective 6-3 Water quantity and allocation / Policy 6-19 Apportioning, restricting and suspending takes in times of low flow
    - Objective 6-3: Water Quantity and Allocation – other matters
    - Rule 15-5: Surface water takes complying with core allocations

General approach to water quantity and allocation

49. The POP and technical reports indicate that demand for surface water from some of the water bodies in the region currently exceeds supply. However for much of the region this is not yet the case.

50. In addition, with the notable exception of the Tongariro Scheme, the regions' rivers have not been subject to large scale damming for power generation purposes. Hence, in comparison with other regions at least, there have not been such major issues relating to the modification of natural flow regimes arising from takes and diversions and the effects of such modifications on natural character and ecosystem values.

51. As noted above, this situation may not continue into the future in terms of increasing demand for takes for irrigation and stock watering purposes, and for takes and diversions for hydro schemes.

52. In this situation the preparation of the One Plan provides the opportunity to plan in advance for future increases in demand in a sustainable manner rather than seeking to reverse a situation of unsustainable management.

53. In my opinion, in a likely situation of increasing competition for scarce resources (ie the region's water), the Proposed One Plan as notified and as recommended in Ms Barton's report is an appropriate planning and regulatory framework for managing water quantity and allocation. It provides certainty that environmental bottom lines will be safeguarded and clear guidance on how available resources above these bottom lines are to be allocated. This approach is in my opinion more likely to provide for sustainable management under the Act than a system which relies on more ad hoc decision-making on a case by case basis.

54. The Minister's submission strongly supported the One Plan provisions. Particular support was given to the commitment to maintain the life-supporting capacity of rivers during periods of low flow and the setting of appropriate 'bottom lines' for core allocations.

55. Support was also given to the management of supplementary takes in the manner proposed (Policy 6-18), providing that provisions were also included to maintain flow variability and a reasonably natural flow regime. As noted in Mr Brown's evidence the maintenance of flushing flows is essential for removal of periphyton growth and reducing the smothering effect of sediment and is particularly important for native fish. Flushing flows are also important for maintaining floodplain connectivity, diversity of river bed habitats and for the preservation of natural character, as discussed in Mr Fuller's evidence. The Minister's submission seeking provisions for this requirement in Policy 6-18 has been accepted in Ms Barton's recommendations and I agree with that recommendation.

56. It is also my understanding, based on Mr Brown's evidence, that generalised statements regarding the habitat requirements of native fish species, or comparison with the habitat requirements of trout, is likely to be misleading, since native species have varying requirements which

overlap to a greater or lesser extent with those of trout. Certainly it is not reasonable to assume flow requirements for native fish can be subsumed under those for trout. As noted in Mr Brown's evidence it is important that this is taken into account when considering appropriate methodologies for establishing ecological flow requirements.

57. The Minister's submission also supported the emphasis given to improving efficiency in the use of water (Policy 6-13). This is essential if the maximum benefit is to be derived from this resource. However the Minister's submission raised concerns regarding the allocation of water at times of low flow, particularly in relation to industry takes and the lack of adequate measures to safeguard the life supporting capacity of native fish and other aquatic species. This concern is further discussed in paragraphs 62-71 of my evidence below, along with my other specific comments on this section of the plan.

Objective 6-3 Water quantity and allocation / Policy 6-19 Apportioning, restricting and suspending takes in times of low flow

58. Objective 6-3 of the Proposed One Plan as notified as it related to surface water states:

> **"Objective 6-3: Water quantity and allocation**
> Water 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) minimum flows and allocation regimes are set for the purpose of maintaining the existing life-supporting capacity of rivers and providing for other values of rivers as necessary
> (ii) in times of water shortage, takes are restricted to those that are essential to the health or safety of people, communities or stock, 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 and Local Water Conservation Notices are upheld."

59. The Minister submitted that the meaning of the phrase "at times of water shortage" was unclear in clause (a)(ii) of the Objective. For example, the phrase could mean when rivers reach or go below minimum flows, when they meet a point close to minimum flow, or when the Council issues a water shortage direction.

60. The Minister's submission also sought the addition of the words 'reasonable alternative sources of water are considered as a priority, and' after 'in times of water shortage and '. In Objective 6-3 (a) (ii)

61. Ms Barton's report in relation to these provisions does not recommend clarifying this phrase or adding the phrase requested, instead recommending that the provision be amended as follows:

> **"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~~ providing for the following[12]:
> (a) For surface *water*^:
> (i) minimum flows and allocation regimes are set for the purpose of maintaining or enhancing the existing life-supporting capacity of ~~rivers~~ *water bodies*^ and providing for other identified values of ~~rivers as necessary~~ *water bodies*^[12]
> (ii) in times of *water*^ shortage, takes are restricted to those that are essential to the health or safety of people, communities or stock, for drinking water[12] 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*^ ~~and Local Water Conservation Notices~~[12] are upheld."

62. The Minister also submitted on Policy 6-19 of the Proposed One Plan, which, as I understand it, supports Objective 6-3 and goes further in setting out the way in which takes from rivers are to be managed in times of "low flow". The concerns which were raised by the Minister related to the need for clearer guidance on the need to justify the taking of water

'during times of low flow', the need to provide adequate safeguards for life supporting capacity and significant ecosystem values, and the inappropriately wide and uncertain definition of 'essential' industry takes which would be allowed to continue taking water regardless of flow.

63. Ms Barton's report has recommended amendments to this policy to read as follows. However, in my opinion these recommendations do not resolve the issues raised in the Minister's submission. As with the Objective it is unclear when the Policy applies. As notified the first sentence of the Policy states "During times of low flow, takes from rivers shall be managed in the following manner:…".

64. It is possible that the term "low flow" is intended to equate to "minimum flow" as specified in Schedule B Table B1. The Policy would apply where flow is at or below the minimum flow requirements. "Minimum flow" is used throughout the Proposed One Plan to characterise the flow at which core allocation takes are required to cease abstraction (Dr Roygard's section 42A report page 35). If Policy 6-19 is intended to apply only when minimum flow is reached then the phrase "minimum flow" should be used.

65. Alternatively "low flow" could mean a flow somewhat above low flow say a point at which there is particular concern that the river could reach minimum flow.

66. In my opinion, the precise application of Objective 6.3(a)(ii) and Policy 6-19 must be clarified. The implications of the takes permitted by Policy 6-19 could be very different depending at which Point the Policy takes effect. It is my view that great care should be taken before equating "low flow" and "times of water shortage" with "minimum flow". Policy 6-19 lists a wide range of activities as "essential" which appears to have the effect of permitting them regardless of river flow. I discuss this further below.

67. Clause (b) of Policy 6-19 of the Proposed One Plan states "Essential takes – The following core water allocation takes shall be deemed essential and shall be managed in the manner described". It goes on to list a range of particular takes all of which shall be allowed to continue regardless of river flows. In my view a number of issues arise in relation to this part of the Policy:

- The list of takes is very wide and includes a many more takes than those provided for in section 14(3)(b) of the Act. This is supported by the fact that Objective 6-3 (as recommended in the Officer's report) provides that in times of water shortage, takes are **restricted to those that are essential to the health or safety of people, communities or stock, for drinking water and other takes are ceased** (my emphasis)**.** However without further clarification of the circumstances under which this policy would apply it is in my view impossible to assess the appropriateness of the list.
- There is no reference to the effects of ongoing takes. This is in stark contrast to the provisions of section 14(3)(b) which allows certain takes but "the taking or use does not, or is not likely to, have an adverse effect on the environment". Indeed there is no policy or objective direction to addressing the effects on life supporting capacity of takes below minimum flows in rivers. Objective 6.3 discusses the life-supporting capacity only in relation to setting minimum flows. In contrast clause Objective 6-3(a)(iii) "the amount water taken from lakes does not compromise their existing life supporting capacity".
- There is no reference to users making efforts to minimise the amount of water taken except in relation to takes required for the operation of industries.
- The heading of Policy 6-19 is "Apportioning, restricting and suspending takes in times of low flow" however there is no reference to apportionment within the Policy. Rather the Policy simply allows some takes to continue at times of 'low flow'

and requires other takes to cease. In my view there are more sophisticated methods that can be adopted such as shared reductions across a catchment.

68. I further note that if the Council intends to rely on its separate statutory power under section 329 of the Act to "coerce" restrictions on essential takes in a water shortage situation, the wording of Policy 6-19 in allowing such takes to continue "regardless of river flow" may be raised by those parties affected as an indication from the Council that takes will never be required to be restricted.

69. The intent of the Ministers submissions were in my opinion clearly stated, but the matters of concern have not been addressed in Ms Barton's recommendations. It is however very difficult for me to recommend an appropriate decision without clarification being provided on the circumstances under which the objectives and policies are intended to apply. This is not clear from either the explanatory text or the officers' reports, and I find Dr Roygard's and Ms Barton's reports on this matter to be contradictory.

70. In my view any outcome should provide for the following:

- Clarification of the terms 'times of 'water shortage', 'times of low flow' and 'minimum flow' as used in the plan.
- Measures to provide for apportionment of takes or other methods to avoid or minimise the requirement for further takes below 'low flow', 'minimum flow' or at a time of water shortage
- A requirement that all takes with potential adverse effects on life supporting capacity for aquatic life or sites of significance be subject to a consenting process which considers adverse effects on these values and provides for discretion to decline consent.
- Clear criteria in the policy regarding which (if any) industries are classed as 'essential' under the policy, with strict

limitations in the scope of application (dependent on the circumstances under which the policy applies).

71. There may be opportunity to discuss this matter further through a pre-hearing process. For that reason I have refrained from making a recommendation at this stage and will provide supplementary evidence in the light of any further discussions.

Objective 6-3: Water Quantity and Allocation – other matters

72. In addition to the matters discussed above, the Minister submitted on two further aspects of clause (a)(i) of Objective 6-3, in relation to improvements to flows for life supporting capacity where values are not being provided for, and in relation to natural character.

73. The submission sought that sub-clause (a)(i) be amended to read

> **"Objective 6-3: Water quantity and allocation**
>
> Water 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) minimum flows and allocation regimes are set for the purpose of maintaining and improving the ~~existing~~ life-supporting capacity of rivers as set out in Table D:4, preserving the natural character of rivers and their margins and providing for other values of rivers as appropriate ~~necessary~~"

74. Ms Barton's report recommends that the sub-clause be amended to read:

> **"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~~ providing for the following[12]:
>
> (a) For surface *water*^:
>
> (i) minimum flows and allocation regimes are set for the purpose of maintaining or enhancing the existing life-

supporting capacity of ~~rivers~~ ***water bodies***^ and providing for other identified values of ~~rivers as necessary~~ ***water bodies***^"

75. Although I agree with the reference to enhancement in my opinion the amendment recommended by Ms Barton does not adequate address the Minister's concerns.

76. The Minister's submission was firstly intended to provide better consistency and alignment with Objective 6-1, which, through Schedule D (now Ba) sets standards which are not currently being met, including standards to provides for life supporting capacity for aquatic life. Therefore the reference to 'existing' life supporting capacity' is not appropriate. It is the life supporting capacity identified in Schedule D(Ba) which is relevant.

77. In addition, on the same basis and to be consistent with both the wording change which Ms Barton recommends with respect to Objective 6-2 noted above, and achievement of Objective 6-1 (the overarching objective), Objective 6-3 should ensure that minimum flows and allocation regimes relate to the values set out in Schedule D (Ba) through a process of maintenance (where the values are already provided for) ***and*** enhancement (where they are not), rather than either maintenance ***or*** enhancement. Otherwise this part of the objective (as recommended by Ms Barton) can be taken to mean that values for life-supporting capacity may or may not be provided for, whereas the 'other identified values of water bodies' are to be provided for in all circumstances. In my opinion that is not the intent of the objective.

78. In addition, as noted elsewhere in my evidence, the values in Table 6-2 do not specifically refer to natural character. As indicated in Dr Fuller's and Mr Brown's evidence (and consistent with Mr Anstey's recommendations on Chapter 7) the flow regime of a river is part of its natural character and interacts closely with physical or morphological components of its natural character. For those reasons I would

recommend that the reference to natural character, as sought in Minister's submission, be provided, in order to give proper effect to Section 6(a) of the Act.

79. In conclusion, on the above basis I recommend that clause (a)(i) of Objective 6-3 be amended to read:

> **Objective 6-3: Water quantity and allocation**
>
> Water 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) minimum flows and allocation regimes are set for the purpose of maintaining and enhancing the ~~existing~~ life-supporting capacity of rivers as set out in Table D:4, preserving the natural character of rivers and their margins and providing for other values of water bodies~~rivers as necessary"~~

Rule 15-5

80. I note that Ms Barton's report recommends the inclusion of a new condition or standard in Rule 15-5 (which applies to surface water takes complying with core allocations) which provides that:

> *"takes or portions of takes for stock drinking water and domestic needs, or public water supplies **predominantly** for domestic use may continue below minimum flows, provided the rates and volumes of takes do not exceed the maximum takes of low flow set out in Policy 16-19." (emphasis added).*

The activity would be a controlled activity in circumstances where the take complies with core allocations.

81. However Ms Barton's report (p.279-281) does not, from my reading of it, provide any reasons for including this new standard or refer to any submissions which have requested it.

82. Leaving that issue, as noted above in relation to Policy 6-19, the Minister's submission sought restrictions on takes for industrial

purposes at times of low flow. I am unaware of any justification for takes for this purpose to be treated differently according to whether or not they are provided through a private or a municipal supply. If that is the intent of this new standard then I do not agree with that part of the recommendation. However, in my opinion the deletion of 'predominantly' and addition of 'are reasonably necessary' would clarify that only the proportion of public supply taken for reasonable domestic or stock drinking purposes would fall within the ambit of this standard and would suffice.

83. On that basis I recommend that the standard be amended to read:

> *takes or portions of takes for stock drinking water and domestic needs, or public water supplies ~~predominantly~~ for domestic use may continue below minimum flows, provided the rates and volumes of takes are reasonably necessary and do not exceed the maximum takes of low flow set out in Policy 16-19.*

ACTIVITIES IN THE BEDS OF RIVERS AND LAKES

84. The Minister submitted in support of a wide range of provisions in Chapters 6 and 16 of the Proposed One Plan relating to activities in the beds of rivers and lakes. The Minister also made further submissions in opposition to submissions of other parties seeking to amend or delete the provisions of the proposed plan as notified.

85. My evidence focuses mainly on matters relating to natural character and the biodiversity of river corridors. These in turn relate to the requirements of section 6(a), section 6(c) and section 7(d) of the Act and the functions of regional councils with respect to the maintenance of biodiversity (section 30(1)(ga)). In my understanding Chapter 7 of the Proposed One Plan sets out the general approach to natural character, protection of significant habitats and maintenance of biodiversity, with more detailed provisions for terrestrial habitats and wetlands provided in Chapter 12. Chapter 6 should be read in conjunction with Chapter 7 and further applies the relevant provisions

of the Act) to rivers, including activities carried out within the beds of rivers, which may have potential effects on the river and its wider environment.

86. This part of my evidence focuses particularly on matters relating to activities in the beds of rivers carried out for drainage, erosion or flood management purposes. This includes the relevant activities carried out by Horizons' Operations Group. However although much of the Minister's submission related to drainage, erosion and flood control activities, the submission should be considered as part of a wider concern about the way the Proposed One Plan manages matters relating to the natural character of rivers and their margins, and the biodiversity of river corridors in general, particularly where these are affected by activities in the beds of rivers for drainage, erosion or flood management.

87. I am focussing on such activities not because they are carried out by the regional council but because, taken together, they form part of a wider purpose or function – flood and erosion control and drainage - which occurs throughout much of the region, and affects natural character and biodiversity at a variety of scales and in a wide range of ways, as described and the evidence of Dr Fuller, Mr Williams and Mr Brown.

88. My evidence covers the following matters:

- current approach of the Proposed One Plan and weaknesses in this approach;
- Chapter 6: RPS framework for activities in beds of rivers – provision for natural character and biodiversity matters;
- Recommended amendments to Chapter 6 to address natural character and biodiversity matters;
- Recommended amendments to Chapter 6 to address other matters relating to activities in the beds of rivers and lakes raised in the Minister's submission

- Chapter 16.

Current approach of the Proposed One Plan

89. The Act provides that the purpose of the One Plan is, with respect to the regional policy statement:

> *"…to achieve the purpose of the Act by providing an overview of the resource management issues of the region and policies and methods to achieve integrated management of the natural and physical resources of the whole region"* (section 59)

and with respect to the regional plan:

> *"to assist the regional council to carry out any of its functions in order to achieve the purpose of the Act."* (section 63)

90. Section 6.1.5 of the Proposed One Plan as notified acknowledges that modifications to river (and lake) beds for flood and erosion control and other purposes have *"negatively altered the character and ecology of most waterways in the Region, impacting on cultural values attributed to waterways and leading to the loss or fragmentation of indigenous plant and animal populations"*

91. Issue 6-3 of the Plan as notified acknowledges that *"These types of uses and developments, in conjunction with gravel extraction…. continue to modify the physical characteristics and ecology of many of the Region's waterways".* Further, through subclause (e) of Policy 6-27 (which covers general management of the river and lake beds), Chapter 6 of the Plan cross-references to the natural character provisions in Chapter 7. Sub-clause (d) of Policy 6-27 also provides that:

> *"Activities in, on, under or over the beds of rivers and lakes shall generally be managed in a manner which … avoids any significant reduction in the habitat diversity, including the morphological diversity, of the water body"*

92. This policy also provides a degree of guidance on natural character, in as far as this relates to habitat diversity, but provides no guidance on the other components of natural character noted in Chapter 7 or discussed in Dr Fuller's evidence, or how natural character is to be identified or assessed.

93. The objectives and policies of Chapter 7 (as recommended) provide in general terms for the preservation of the natural character of the region's rivers, and their margins, and the restoration and rehabilitation of natural character where appropriate. However Chapter 6 provides no guidance on the restoration or rehabilitation of natural character of rivers and their margins in relation to activities in the beds of rivers, particularly as might be applied in situations such as where natural character has been degraded and where existing approaches to river management are not proving to be effective (as discussed in Dr Fuller's and Mr Williams' evidence).In my opinion and based on their evidence such guidance is necessary..

94. I also note that Chapter 6 does not include an objective relating to the natural character of rivers and that Table 6-2 and Schedule ~~D~~Ba only refer to specific ecological components of natural character and not natural character referred to in the wider sense above. Furthermore Policy 6-29 also indicates that, in water management zones within a flood control or drainage scheme (which encompasses a very large proportion of the region) "other values" associated with the waterbody will be maintained *"unless functional constraints make this impractical"*. To my mind this implies that the extent to which 'other values', including life supporting capacity and sections 6(a) and 6(c) matters, are to be safeguarded or provided for is dependent upon how the phrase 'functional constraints' is interpreted. In my opinion this does not provide adequate certainty that the purpose of the Act will be achieved or that the matters to which I refer will be safeguarded and provided for.

95. The Objectives and Policies in Chapter 16, the relevant chapter of the regional plan, provides no further guidance of note, beyond cross-references to the provisions of Chapters 6 and 7.

96. As notified, there are no specific methods in Chapter 6 to address issues relating specifically to activities in the beds of rivers, and no anticipated environmental results. The final method in the chapter (as notified) relating to 'fluvial resources' alludes to such matters but as notified appears to me to apply more generally.

97. Whilst Chapter 16 includes rules for a range of activities in the beds of rivers and lakes where carried out by other agencies, activities relating to river management works carried out by the Operations Group of Horizons Regional Council are proposed to be regulated primarily through an Environmental Code of Practice ('ECOP') which is incorporated into the Plan by reference. In my opinion the ECOP focuses on the operational effects of activities, at a site specific level, rather than providing the ability to assess whether individual activities in question are appropriate or to assess and address continuing and/or cumulative effects on natural character.

98. Based on the evidence below, I do not consider the One Plan approach to be adequate in terms of either achieving the wider purposes of the Act or achieving the purposes of regional policy statements and regional plans, particularly in relation to integrated management and assistance to the council to carry out its functions in order to achieve the purpose of the Act..

99. For convenience I will consider issues relating to Chapter 6 of the POP first, and then consider Chapter 16, in both cases drawing on the evidence of Dr Fuller, Mr Williams and Mr Brown.

Chapter 6: RPS framework for activities in beds of rivers - provisions for natural character and biodiversity matters

100. As indicated in the evidence of Dr Fuller, Mr Brown and Mr Williams and in the Proposed One Plan as notified, activities in the beds of rivers potentially have adverse and beneficial effects on the natural character of rivers and their margins and, related to this, the biodiversity of river, its margins and the wider floodplain to which it is hydrologically linked through groundwater connectivity and surface water flows. As a result of past and present activities in the beds of rivers, including drainage, diversion, flood and erosion control, the natural character of rivers and their margins in the Horizons region has been and continues to be progressively modified and both in-stream and out of stream biodiversity degraded.

101. I note that Mr Anstey's evidence and the tracked changes recommendations for Chapter 7, which were presented to the General Hearing recommend that natural character is described as follows:

> *Natural character is generally accepted as being an expression of:*
> - *natural landform*
> - *natural water bodies (lakes, rivers, and the sea)*
> - *vegetation cover (type and pattern)*
> - *natural processes associated with the weather and the ecology*
> - *wilderness, exposure and the natural sculpturing of the landforms and vegetation*
> - *the wider landscape context and the sites relationship to this."*

In my understanding there was general agreement with this description amongst submitters and no disagreement was raised in evidence.

102. Based on this evidence and the analysis and recommendations of and Mr Williams and Dr Fuller evidence, I conclude that :

- natural character is not simply about the extent to which a river and its margins are in a 'natural state'. It also relates to the extent to which natural processes can occur and thus express

themselves both physically and ecologically in relation to both instream and out of stream values associated with the river's hydrological system.

- the natural character of a site or part of a river should also be considered in relation to this wider landscape context. In the case of rivers and their margins I take this to imply that upstream and downstream effects, cumulative effects, and effects relating to the wider flood plan and connectivity to it should be considered, not just effects within the boundaries of the site or location.

103. Furthermore, whilst there are clearly differences of degree across the catchments of the region, the current situation of river management and its effects in my view, based on the evidence of Dr Fuller and Mr Williams, can characterised as a combination of:

- Repetitive, continuous and cumulative adverse effects on the natural character of the rivers in the region through intervention in their naturally dynamic processes.
- A continuous and long term continuing requirement to invest in new infrastructure and replacement and upgrading of existing 'infrastructure' within the river and it's margins (eg rock wall linings, stop banks).
- A continuous and long term programme of works to 'maintain' an unnatural river channel form and alignment. This includes the continuing need to erect new structures and replace existing structures and to extract large volumes of gravel to maintain a narrow and confined channel, most obviously in the river's naturally braided river systems.
- Uncertainty regarding the future dynamics of the system, particularly in the context of recent large scale flood events and uncertainty over the future effects of climate change on river geomorphology and effectiveness of existing structures which have been designed to confine the active channel during periods of high river flows.

- A lack of consideration given to methods of managing flood hazard risks which encompass the full range of options and approaches identified by Mr Williams in particular those which provide environmental benefits (and preservation, restoration and rehabilitation of natural character) whilst at the same managing flood hazard risks effectively. Such benefits might include, for example, planting schemes to enhance vegetation cover along riparian margins and across the wider catchment (which would also reduce sedimentation) and restoration of riparian wetlands to serve as 'buffers' (and also in appropriate circumstances providing out of stream water storage and recreational facilities).

104. In my opinion river management should be considered as a continuum of risk management activities with the risks (in terms of wellbeing) ranging from temporary inconvenience and short term loss of productivity through to potential significant destruction of the environment and infrastructure and loss of life.

105. These risks should also be considered against the risks arising from river management works themselves. These involve a continuum from, temporary and localised disturbance in areas of relativity low ecological value through to modification and degradation of significant stretches of river habitat and modification of the natural character of the entire river system. However, if it is also accepted that the natural character of the river system is a dynamic process, as is clearly indicated in the evidence of Dr Fuller and Mr Williams then the risks also include the loss of opportunity to restore rivers and their wider flood plains to a more natural state and attendant benefits such as biodiversity, recreation and amenity values.

An alternative approach

106. The Minister's submission raises significant concerns relating to the ability of the Proposed One Plan (as notified) to adequately address, through the framework of objectives, policies and methods in Chapters 6 and 16, issues relating to cumulative effects on the natural character of rivers in the region, particular those occurring as a result of flood control, erosion and drainage activities. In particular the Minister's submission raised concern that

> *'The classification of a wide range of activities as permitted within the plan as proposed does not provide adequate certainty that cumulative effects on river morphology and associated biodiversity arising from changes in riffle/pool/run sequences, bed/channel width, meander patterns, flow velocity, riparian vegetation, or other natural features and processes will be addressed in terms of the Act."*

and sought that One Plan should provide for

> *"an integrated approach to sustainable hydrosystem management which incorporates preventative flood hazard management measures along with initiatives to maintain and where practicable restore and rehabilitate the natural values of the region's river systems - ideally serving both objectives."*

107. These concerns are discussed in more detail below, as they relate to specific plan provisions.

108. In general terms I do not regard the solution to this issue to be simple, quick or easy. In my opinion, and consistent with Mr Williams' conclusions, this requires a shift in emphasis away from 'management' of rivers simply as a means of rapidly conveying flood flows from land to the sea. It requires the adoption of different processes for management of rivers rather than working within these limited parameters and treating natural character as extraneous to the process.

109. In my opinion an alternative approach must address four broad issues:

- The need to identify key parameters for describing natural character in a manner which informs decision making and enables changes to natural character to be objectively assessed.

- The importance of developing better understanding of the natural character of the regions' rivers, and the effects of works in the beds of rivers on natural character, through monitoring and research.
- The necessity of finding appropriate planning mechanisms for addressing cumulative effects on natural character, particularly in relation to river morphology as part and parcel of a more integrated approach to flood plain (and wider catchment) management.
- Providing a means by which individual activities in the beds of rivers can be assessed for consistency with this wider framework through consent applications or other process.

Identifying key parameters for describing natural character

110. The evidence of Dr Fuller and Mr Williams, together with the research to which they refer, suggests that:
    - natural character should be assessed at the scale and level of detail appropriate to the activity. The river as a whole, the river management zone, and the reach would appear to be the appropriate scales.
    - The key parameters for assessing natural character are fairway width/flood plain swath; number and quality of pool, riffle, run sequences; meander pattern/sinuosity; channel width; braiding pattern.

Developing better understanding of the natural character of the regions' rivers

111. As a first step, I consider that identifying and determining the natural character of rivers in the region is important since it provides a basis for determining the effects of activities and their appropriateness. Issues concerning aspects of natural character relating to water quality and flow regime are addressed elsewhere in the Minister's submission and the One Plan and the provisions for them are in my opinion

relatively well defined in comparison to the physical characteristics or morphology of rivers.

112. As indicated above, for the more dynamic and less entrenched rivers of the region this is not a simple matter, and requires consideration at a range of scales and timeframes. Moreover as rivers move across a flood plain so too do their margins and interactions with adjacent land uses.

113. The natural dynamics of river systems and the advantages of river management approaches which accommodate and respond to this is clearly reflected in Mr Williams' and Dr Fuller's evidence. Their evidence also highlights limitations of existing approaches.

114. It is clear that rivers are highly complex and dynamic systems and it is only in recent decades that fluvial geomorphology and related sciences have developed to the point where they are capable of informing the decision-making of river engineers. However based on Mr Williams' and Dr Fuller's evidence the science-based expertise, tools and techniques for assessing natural character of rivers and integrating knowledge of natural character into predictive modelling and planning tools for catchment, flood plain and river management are becoming increasingly available. They are being applied by river engineers, at least outside New Zealand. Within the Horizons Region the relevant tools and expertise are also available locally through Massey University, and have been applied to research on at least three of the Region's rivers to date.

115. In my opinion it is important that such a science-based approach is incorporated into the long term planning and management of the rivers in the region. I therefore support the amendments to the final method in Chapter 6 (now numbered Method 6-9) as recommended in Ms Barton's and Ms James' report, but would also suggest some wording changes, as set out in paragraph 138 below, in order to further clarify

its intent and to provide for greater consistency with the decision sought in the Minister's submission.

Finding appropriate planning mechanisms for addressing cumulative effects on natural character

116. In my understanding cumulative adverse effects on the environment can be made up of a series of individual actions which of themselves may not appear to be significantly problematic. The Minister's submission raised the concern that "individual river management projects and activities for flood control and other purposes should not … be considered simply as a series of 'one off' operations, since their effects are cumulative and interdependent." This was one of the main reasons for objecting to the reliance primarily upon the Code of Practice as a means of managing such effects. This is discussed further below.

117. In my opinion it is reasonable to conclude on the basis of Mr Williams' evidence regarding the consideration given to effects on natural character and Dr Fuller's empirical evidence relating to changes which have occurred to rivers in the region, that river management activities have resulted in significant localised and cumulative adverse effects on the morphology and ecology of the region's rivers. Moreover, these effects are continuing to occur.

118. The difficulty in addressing the issue of cumulative effects, including past, present and future cumulative effects, within the Act (both generally and in particular in relation to river management works) arises at least in part because, at the consent level particularly, the Act focuses on the effects of specific individual activities. Addressing cumulative effects requires an understanding of the relationships between such activities and their effects, based on agreed factors and constraints, themselves based on an overall set of purposes and objectives which form part of a wider planning process. In my opinion addressing cumulative effects requires planning mechanisms at an intermediate scale, between the generality of RPS Policies and the

specificity of rules. Ideally, in the case of river management these would provide a combination of certainty (regarding processes, and outcomes sought for identified reaches, water management zones and catchments) and flexibility (regarding how they were to be achieved, and for adaptation to occur along the way). Concept plans or specific zoning plans and management plans attached to resource consents to my mind come closest to this in an RMA context in New Zealand.

119. Such an approach could conceivably be adopted through the regional or district planning framework either directly, or by incorporation of free-standing management plans, or the relevant aspects of them, into statutory plans by reference.

120. The information, objectives and policies included within such plans could also be taken into consideration when determining consent applications and relevant elements of the plans may be incorporated into consent conditions (for example through identification of fairway width or meander pattern to be provided for). They may also be adopted by the Regional Council either instead of or in addition to 'scheme plans' for works carried out under the Soil Conservation and Rivers Control Act, 1941, and thus provide greater confidence that such activities are, as required under that Act, subject to the Resource Management Act, 1991.

121. In some cases (eg for the Mangatainoka) management objectives relating to river form or morphology have been explicitly included within river management scheme plans and reference made to some of the key parameters noted above. However my understanding from Mr Williams' evidence is that these have generally been set on practical engineering grounds within the context of the Soil Conservation and Rivers Control Act 1941 rather than being based on a more scientific assessment of natural character or the wider objectives and purposes of the RMA.

122. The Minister's submission sought the inclusion of a policy and method to provide for and encourage the preparation of such plans and to provide for their preparation and use in resource consent processes. In my recommendations below I have suggested how this could be provided for (see paragraph 139).

Assessing individual activities in the beds of rivers for consistency with this wider framework through consent applications or other processes

123. The Minister's submission notes that many of the rivers which are subject to river management schemes are also already covered by 'global' long term consents to carry out a comprehensive range of activities over large parts of the river system (typically 20kms or longer). These consents in some instances include conditions arrived at addressing future, further effects on both physical and ecological components of natural character. However such conditions can be difficult to monitor or enforce, since there is not a clear base-line or wider planning context against which site specific or cumulative changes can be assessed and the conditions do not require a monitory or reporting system to be established.

124. The proposed research project (under Method 6-9) and river management plans (under a new method) would provide an informal basis for assessing the effects of such activities and voluntarily reviewing consent conditions. In the meantime the inclusion of a new section in the Code of Practice to monitor further effects of consented activities on the geomorphology of some of the region's rivers will also in my opinion assist in developing a more holistic approach. This is discussed further in paragraph 183 and Appendix One below.

Recommended amendments to Chapter 6 of the Proposed One Plan to address natural character and biodiversity issues

125. In my view there are a number of required to how Chapter 6 addresses the issue of activities in the beds of rivers.

Issue 6-3

126. The Minister's submission noted that the issues relating to effects of flood and erosion control are wider than those affecting 'waterways' (as the POP suggests) and I consider that this is amply demonstrated in the evidence of Mr Williams, Dr Fuller and Mr Brown. Effects certainly include the margins of rivers but also the natural character and ecology of the wider floodplain.

127. The Minister's submission sought replacement of the term 'waterways' with 'river corridors' and other wording changes to reflect this point but I accept that the term 'river corridors' is not defined or commonly used in the Act.

128. Ms Barton's report recommended the following amended wording:

> **"Issue 6-3: River and lake beds**
>
> The demand for flood and erosion control to protect many types of land use has led to significant modification of the Region's water~~ways~~ bodies. 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 water~~ways~~ bodies. These types of uses and developments, in conjunction with gravel extraction which while having beneficial effects in terms of flood mitigation[9], have modified, and continue to modify the physical characteristics and ecology of many of the Region's water~~ways~~ bodies."

129. It may be that Ms Barton was considering the matter only in relation to effects on water bodies within the beds of rivers, which to my mind is even narrower, since the definition of water bodies under the Act only relates to the water in a river, not the bed or margins. Furthermore this

part of the plan also covers effects of activities carried out within the beds of rivers on the wider environment.

130. I also note that both the Proposed One Plan and Ms Barton's recommended version of it use the term "water body" inconsistently - sometimes to refer to the water itself consistent with the statutory definition and sometimes in relation to the wider riparian corridor. In my view this matter should be clarified throughout the document. In respect of Issue 6.3 I consider that the words 'water body' should be replaced with or supplemented by the wording recommended below:

> "The demand for flood and erosion control to protect many types of land use has led to significant modification of the Region's ~~waterways~~ ~~bodies.~~ rivers and their margins, and the biodiversity of their flood plains. 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 ~~waterways~~ ~~bodies~~ rivers and their margins. These types of uses and developments, in conjunction with gravel extraction which while having beneficial effects in terms of flood mitigation, have modified, and continue to modify the physical characteristics and ecology associated with ~~of~~ many of the Region's water~~ways~~ bodies."

131. This would then provide a clearer and more factually accurate basis for the Objectives and Policies to address the issue.

Objective 6-4

132. The Minister's submission sought **a**mendments to Objective 6-4 to make it more consistent with the section 5 of the Act and to distinguish between values and objectives which relate to the two 'legs' of section 5(2). As notified and as recommended by Officers' this objective, in my opinion, gives little or no guidance to decision makers. I do not agree with Ms Barton's analysis that allowing the Minister's submission would overly-narrow the objective. I consider it appropriate that Objective 6-4 is made more consistent with the wording of the Act, but would suggest that with some minor amendments any such grounds for concern could be addressed through the recommended amendment below.

133. In addition, as noted above, the objective as it stands does not include adequate reference to natural character, since natural character is only partially dealt with in Table 6-2 and Schedule D (now Ba), which include no reference to morphological aspects of natural character. I would consider it appropriate to remedy this in order to provide better integration with the policies which follow.

134. For these reasons I therefore recommend that Objective 6-4 also be amended to read:

> **Objective 6-4: River and lake beds**
>
> The beds of lakes and rivers are managed in a manner which enables the social, economic and cultural needs of the community to be met, and significant risks arising from flood events to be addressed, while ensuring that:
> - the life supporting capacity of rivers and their margins is safeguarded and their biodiversity is maintained
> - the natural character of rivers and their margins is preserved and where appropriate is restored or rehabilitated.

135. The wording in the final sub-clause is, as I understand it, consistent with the Officers' tracked changes recommendations to the General Hearing in relation to Natural Character and the Minister's submission on that chapter.

Policy 6-27: General management of river and lake beds

136. In my opinion the following amended wording for clause (e) of Policy 6-27 would go some way towards addressing the Minister's concerns by making more explicit reference to cumulative effects (in order to emphasise their particular relevance) and to restoration and rehabilitation of natural character (in order to enable greater emphasis to be given to these considerations in consent decision-making and other planning processes):

> **Policy 6-27: General management of *river* and *lake beds***
> Activities in, on, under or over the beds of rivers and lakes shall generally be managed in a manner which:
> (e) provides for the restoration and rehabilitation of the

natural character of lakes, rivers and their margins where appropriate and otherwise manages *effects* on natural character, including in particular cumulative effects, and public access in accordance with the relevant policies in Chapter 7

Recommended new Policy 6-27A

137. In light of the above evidence I consider that there is clear justification for including an additional policy as requested by the Minister. This policy would provide further guidance in consent decision making, encourage the development of integrated management plans, and provide for a clear linkage to the new methods which follow. I suggest that this policy be worded as follows:

> **Policy 6- 27A: provision for preservation, restoration and rehabilitaton of natural character**
> In considering matters relating to the preservation, restoration or rehabilitation of the natural character of rivers and their margins particular regard will be given to:
> - the natural 'style' and dynamic processes of the river, including its natural meander pattern, characteristic bed style and width, quality and quantity of bed habitat and connectivity with its flood plain at the appropriate geomorphological scale (whole river, water management zone, and reach)
> - the desirability of an integrated approach to flood and erosion hazard management , including the preservation, restoration or rehabilitation of natural character
> - the need for appropriate science-based research and planning mechanisms (including management plans) to support decision making".

Section 6.5 Methods

138. In response the submissions from the Minister and others Ms Barton recommends the inclusion of a revised method to promote better understanding of the natural character of rivers in the region. I agree with this recommendation for the reasons noted above. However I consider it important that the research also has an 'applied' component in line with the recommendations in the evidence of Mr Williams and Dr Fuller, and that explicit consideration is given to the management

implications arising from it. I therefore recommend the following amendments to the recommended Method 6-9.

> Method 6-9
> The aim of this ~~–~~method is to develop an integrated research, monitoring and reporting programme.~~–~~The focus ~~–~~will be to assess ~~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 habitat and wetland^ areas. The method will also seek to measure patterns of stability and instability in bed morphology departure from natural state and changes in natural character, including habitat and morphological diversity.
> An assessment will be made of the implications for long term sustainable flood plain management, including potential for maintenance and restoration of natural character whilst continuing to manage significant erosion and flood hazard risks
> The outcomes will link into monitoring undertaken by the River Works Environmental Code of Practice and support~~s~~ delivery and refinement of ~~existing~~ related policies, objectives and methods~~,~~. The outcomes will also guide~~s~~ implementation planning and allow~~s —~~implementation effectiveness to be assessed.

Recommended New Method 6-10

139. In addition, consistent with the Minister's submission, my analysis above, and the evidence of Mr Williams I consider it important that new planning mechanisms to promote integrated catchment management, and flood plain management are introduced through the One Plan in time. This should in my opinion initially be on a trial basis, focusing on a limited number of catchments. Following a similar format to the other One Plan methods, I recommend that the method be worded as follows:

> Method 6-10
> The aim of this method is to promote an integrated approach to flood plain and wider catchment management which considers long term options for sustainable management which incorporate land use, environmental restoration, water storage and recreational and amenity objectives in addition to the approaches which have typically formed part of schemes prepared under the Soil Conservation and Rivers Control Act 1941. A limited number of pilot catchments will be selected and a planning and implementation framework developed in

conjunction with local communities, riparian landowners and other key stakeholders which draws on the outcome of Method 6-9, and incorporates input from the Regional Councils' farm-based land use initiatives, biodiversity enhancement programmes and flood and erosion protection processes (including 'scheme plans').
Who: Regional Council, Territorial Authorities, Tangata Whenua, landowners and community groups, and other interested parties including Fish and Game, Forest and Bird and the Department of Conservation.
Links to Policy: This links to Policies 6-27 to 6-31
Targets: Pilot projects will be at the implementation stage for at least 2 catchments within 10 years of this Plan becoming operative.

Recommended amendments to Chapter 6 of the Proposed One Plan to address other matters relating to activities in the beds of rivers an lakes raised in the Minister's submission

140. Having considered those aspects of the Minister's submission relating specifically to natural character, my evidence now covers other changes to the parts of Chapter 6 relating to the beds of rivers and lakes sought in the Minister's submission and referred to above or in Mr Brown's evidence. These relate in particular to the way in which values are attached to river management works and the weight given to these values in the relevant policies. My recommendations flow in particular from the Minister's submission and the initial conclusions drawn in paragraphs 104-105 above relating to the role of rivers in a more integrated approach to flood and erosion risk management rather than simply as a means of conveying flood flows.

141. The protection of human life, property and infrastructure is of course an essential function. However, I do not agree that this necessitates elevating the ability of a river to convey flood flows to an absolute value, as is proposed in Table 6-2 and elsewhere in the Proposed One Plan. This is because there are other 'preventative' methods of managing flood hazard risks such as land uses which reduce rates of run off (e.g. afforestation) or provide buffering (e.g. riparian wetlands) or methods which reduce or minimise impacts such as regulation of

new building and managed retreat, as occurs in the coastal environment.

142. In addition, according to Dr Fuller's and Mr Brown's evidence, 'flooding' is a natural cyclical process which enables connectivity between the river channel and its flood plain and is part of the process of channel migration and associated processes. This is desirable from an ecological standpoint and for the preservation of natural character and biodiversity, for example for completing the life cycle of certain native fish, and allowing for channel-forming flows. 'Ability to flood' is therefore also a value.

143. I note that the section 42A Planners' report recommends that Policy 6-27(b) be amended to refer to management of flood hazard risks rather than ability of a river to convey flood flows. This is consistent with the amendment sought in the Minister's submission to Policy 6-27(b) and the wording of Policy 6-29 (as notified) and I agree with the recommendation. However other amendments sought by the Minister which would be consistent with this recommendation have not been accepted. I will consider these in turn.

Table 6-2: The value of rivers for flood and erosion protection

144. With respect the values in Table 6.2 (and consequentially applying to Objective 6-4 and provisions relating to Schedule ~~D~~Ba) the Minister sought amendments to that the individual values and management objectives relating to the integrity of existing flood and riverbank erosion protection structures and existing infrastructure not being compromised. I certainly agree that it is generally appropriate to protect such structures, especially where there would otherwise be significant risk to life or property and relocation is not a feasible option. However, there are likely to be particular instances where this is not the preferred option, for example where maintaining existing groynes is no longer regarded as sustainable, or where it would be more appropriate to close or relocate a bridge or a road rather than

protecting it. The wording used in Table 6.2 to my mind closes off such alternatives, or at least make it difficult to attach appropriate weight to them. This situation is compounded by the wording of Objective 6-4 which refers to recognising and providing for *all* values and Objective 6-1 which refers to *recognising and providing for* the values in Schedule D (now Ba0.

145. The Minister's submission sought that Table 6-2 be amended to reflect the underlying intent of the Objectives and recommended change to Policy 27(b) (as noted above) rather than maintenance of structures and infrastructure for their own sake.

146. I therefore recommend that the following (tracked change) amendments be made to Table 6-2 (and consequential amendments to Schedule D (now Ba)). In my opinion the proposed rewording renders the separate identification of Individual Values D and EI unnecessary, unless objectives other than flood and erosion hazard risk management can be identified.

> FC Flood and Erosion Control Flood and erosion hazard risk management (including risks to existing drainage structure and other existing infrastructure) ~~The integrity of existing flood and riverbank erosion protection structures~~ is not compromised
>
> ~~D Drainage The integrity of existing drainage structures is notompromised~~
> ~~EI Existing Infrastructure The integrity of existing infrastructure is not Compromised~~

147. Alternatively, if risks to existing infrastructure arising from sources other than flooding and erosion (which are not obvious to me) were to be identified, I consider it would be reasonable to refer to the management of those risks as well..

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

148. The Minister made further submissions in support of this policy as notified and opposed submissions which sought to weaken the protection to sites of Significance Aquatic which it provided. The

Planners' report recommends that the latter submissions be accepted in part and that the policy be amended to read as follows (emphasis added).

> **"Policy 6-28: Activities in *water bodies*^ with a Value of Natural State, Sites of Significance -Cultural, or Sites of Significance - Aquatic**
>
> In those W*ater Management Sub-zone*s* [1] with a Value of Natural State, Sites of Significance -Cultural, or Sites of Significance -Aquatic, as shown in Schedule Ba [1], activities in, on, under or over the *beds* of *rivers* and *lakes*^ shall be managed in a manner which:
>
> (a) avoids ***or mitigates*** [36] adverse effects on these values
>
> (b) maintains the habitat and spawning requirements of the species identified in Schedule Ba [1] as being significant within the subject W*ater Management Sub-zone*s* [1] ."

149. I do not consider that the amendment proposed is consistent with the level of protection which should appropriately be given to these values and the achievement of the objectives which relate to them. The amendment appears to provide applicants with a choice of options - either avoid or mitigate adverse effects – and I agree with Mr Brown's evidence that mitigation is not necessarily an equivalent or adequate alternative. When "avoiding, remedying or mitigating adverse effects", as identified in subsection 5(2)(c) of the Act, the emphasis should in this instance be placed on avoiding adverse effects. "Avoids adverse effects" gives clear and appropriate policy direction that only activities with effects that are no more than minor should be allowed in beds of the water bodies. In my opinion therefore this wording is appropriate and should be retained. I therefore recommend that sub-clause (a) of Policy 6-28 remains worded as notified.

Policy 6-29: Activities in water bodies valued for Flood Control or Drainage

150. The Minister's submission sought a number of changes to Policy 6-29. In relation to clause (a) the submission sought that the relevant activities be managed in a manner which enables the level of flood

hazard and erosion control existing at the time of notification of this plan to be "sustainably managed" within river and drainage scheme areas rather than "maintained". The Officers' Report recommends that no change be made to this clause.

151. The Minister's submission was based on similar reasoning to that discussed above, i.e. that it may not be feasible or appropriate in all cases to maintain the existing level of flood hazard and erosion control. In addition it is not clear this part of the policy would be applied. For example is the existing level to be maintained at the site, reach, management zone, catchment or regional scale, or all of them?

152. In my opinion clause (a) of Policy 6.29 implies a degree of certainty or rigidity of application which is not appropriate and cannot be reasonably implemented. Therefore the submission proposed that the different form of words be used to reflect the purpose of the Act. I therefore recommend that the Minister's submission on this point be allowed, but would be willing to discuss alternative wording which appropriately addresses the above concerns as part of the pre-hearing process.

153. The Minister's submission also sought amendments to Policy 6-29 sub-clause (b) as notified. This part of the policy, as recommended in the section 42 report, reads:

> "In those W~~w~~*water* *M~~m~~anagement* *Ssub-zones** within a *water body*^ valued for Ff~~l~~ood C~~c~~ontrol or D~~d~~rainage ~~scheme~~ as shown in Schedule ~~I~~Ba20 , activities in, on, under or over the *beds*^ of *rivers*^ and *lakes*^ shall be managed in a manner which:
>
> (b) maintains other values associated with the *water body*^, unless functional constraints make this impractical, in which case adverse *effects*^ on other values shall be mitigated ~~or~~ and may be offset or compensated by way of a financial contribution in accordance with the policies in Chapter 18."

154. The Minister's submission sought the following wording:

> "(b) avoids, remedies or mitigates adverse effects on the natural character, indigenous biodiversity and ecosystem functions of rivers and their margins. Where it is not possible to adequately avoid, remedy or mitigate the effects of the activity at the site, the Council may consider the use of financial contributions as a means of offsetting or compensating for adverse effects in accordance with the policies in Chapter 18."

155. In my opinion the latter version better provides for adverse effects on natural character to be addressed (and hence to give effect to section 6(a) of the Act), since, as noted above, values relating to natural character have not been adequately incorporated into Table 6-2 or Schedule D (now Ba) as part of the "other values associated with the water body". Secondly in relation to the use and application of the phrase "unless functional constraints make this impractical" there may well be situations in which there are 'functional constraints' on an activity, but the activity itself is inappropriate in terms of achieving the purposes of the Act or the availability of alternative means of achieving the plan's objectives. The policy does not provide for such circumstances.

156. For these reasons I recommend that the Minister's submission be accepted and that clause (b) of Policy 6-29 be amended to read:

> "(b) avoids, remedies or mitigates adverse effects on the natural character, indigenous biodiversity and ecosystem functions of rivers and their margins and other values associated with the water body. Where it is not possible to adequately avoid, remedy or mitigate the effects of the activity at the site, the Council may consider the use of financial contributions as a means of offsetting or compensating for adverse effects in accordance with the policies in Chapter 18."

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Policy 6-30: Activities in water bodies with other values

157. The Minister's submission opposed the wording of clause (b) of this policy primarily on similar grounds to clause (b) of Policy 6-29, and sought a similar wording change. The recommendations in the section 42A Report go some way towards addressing the Minister's concerns and I recommend that they be accepted.

Gravel extraction (Policy 6-32 and Tables 6-3 and 6-4)

158. As discussed in Dr Fuller's evidence, the accretion and movement of gravel is part of the natural cycle of many of the region's rivers, and an important element of their natural character. Ms Barton's report (p. 52) recommends the addition, to Issue 6-3, of recognition that the removal of gravel from the beds of rivers performs an important role in flood and erosion risk management. I do not disagree with that amendment. However it is also recognised in Section 6.1.5 that the activity has potential adverse effects on the environment, and if not effectively managed may also increase flood and erosion hazard risks (Section 6.1.5, first paragraph).

159. The evidence of Dr Fuller, Mr Williams and Mr Brown taken together describe the adverse effects in some detail, including from local disturbance and release of sediment into aquatic ecosystems, disruption of the feeding and nesting cycles of threatened bird species, modification and destruction of instream habitat, large-scale alteration of the morphology and associated natural character of the river and its margins, and loss of flood plain connectivity.

160. On that basis I do not agree with the significant amendments which have been recommended in the Officers' report (pages 155-159) relating to the above provision for gravel extraction. In particular the significant increases in quantity provided for (which in some cases are multiples of the original figures as notified) and the change from treating the figures in the table from upper limits to annual averages. These are fundamental changes for which I can find no clear justification in either the technical or planning reports (including Mr Blackwood's report). Moreover, although I note that there were submissions on the matter other than the Minister's, they do not appear to seek the changes which are now being recommended.

161. I therefore recommend that:

- any recommended increases in volumes over above the volumes which were notified be deleted from Table 6-4 (as recommended);
- that Policy 6-32 be retained as notified (and the recommended changes in the S42 report not be allowed); and
- that the heading to Table 6-4 be reworded as *"~~Annual~~ Allocable volumes of gravel"*

Chapter 16: Regional Plan Objectives, Policies and Rules

162. The Minister submitted or made further submissions on Table 16-1 and seven of the rules in Chapter 16 of the Proposed Plan. With the exception of submissions on part of Rules 16-4 and 16-12 and Rule 16-13 the section 42A report recommend that the submissions be allowed in whole or part and I agree with those recommendations (as included in Appendix Two).

163. The submissions on Rules 16-4, 16-12 and 16-13 all related to works carried out in flood control and drainage schemes and in particular the permitted activity status for activities "undertaken in accordance with the Environmental Code of Practice for River Works, Horizons Regional Council April 2007". The remainder of this part of my evidence focuses on these matters.

Environmental Code of Practice for River Works

Scope and relationship to the One Plan

164. An Environmental Code of Practice for River Works (ECOP) was, as I understand it, prepared in April 2007 and incorporated by reference into the Proposed One Plan when that plan was publicly notified in June 2007.

165. The section 42A report recommends the POP be amended to refer to a revised version of the ECOP (dated August 2009). I understand the status of material incorporated into the POP by reference (such as the ECOP), the material's relationship with the Plan and the mechanism for updating it was addressed in the Overall Plan Hearing. The Planning Evidence and Recommendations Report to that hearing stated at 4.3.2 that:

> "Material incorporated by reference in a plan or proposed plan has legal effect as part of the plan, and this has been specifically provided for by part 3 of schedule 1 of the RMA."

166. The report set out the legal grounds for, and requirements surrounding, the incorporation of external documents into plans via reference as set out in part 3 of schedule 1 of the Act. The report set out the process that would need to be followed to amend the Code as follows:

> "Clause 31 of Schedule 1 now makes it clear that if there is a change to the standard or code then there must be a variation or plan change using the same process outlined above before that amendment to an external document has effect as part of the plan.
>
> Therefore it is inappropriate for the plan to refer to 'the most recent version' or 'any amended version' of standards as may be sought by some submitters."

167. As the ECOP was incorporated by reference there was no ability to submit on the content of it through the submission and further submission process on the POP. The Minister's submission therefore responds to the ECOP in a general manner. Further, there may be limited ability for the Council, through this hearing process to make decisions on the content of the ECOP as it is a stand alone document.

168. In my opinion the August 2009 is an improvement on the April 2007 version, but would consider that it is in need of further amendment if it is to be incorporated into the One Plan.

169. The Minister's submission supported the concept of an ECOP in principle, but sought deletion of the rules (or parts of rules) which referred to it, for a number of reasons, including the following:

- the potential scale, frequency or duration of the activities permitted by the rules
- the adverse effects, including cumulative effects, of the activities permitted by the rules;
- inconsistencies between the wording of the ECOP and the Act;
- lack of certainty regarding processes for compliance with the ECOP.

170. In addition it was submitted that there is no clear justification given for why the Regional Council should be subject to different rules to other resource users.

171. My evidence covers these reasons in turn, with reference to outstanding issues with the latest (August 2009) version of the ECOP. Specific concerns about Rule 16-13 are also discussed. In the light of further discussion with Horizons Operations Group staff and noting the process issues outlined in paragraph 167 above, my evidence includes recommendations on what further changes in my opinion need to be made to the ECOP if that document was able to be amended to address the Minister's concerns.

The potential scale, frequency or duration of the activities concerned

172. As noted in the evidence of Mr Williams, Dr Fuller and Mr Brown, river management activities can have potential adverse effects in a range of ways and I will not repeat their evidence here.

173. It is, in my opinion, generally accepted that the risk of adverse effects is likely to increase with scale, duration and frequency, particular if it is known that the activity has potential to cause such effects (which applies to all of the activities covered in the ECOP). In the case of

river works this is also likely to apply to effects occurring upstream and downstream of the operational site, which are not generally covered under the ECOP.

174. Of the 19 separate activities covered by the ECOP, the document only includes limits on scale, frequency or duration which, if exceeded, would require a resource consent before they could be undertaken in respect of two activities (gravel extraction and gravel management) Activities not subject to such limitations include erection of lateral walls, bank shaping, placement of concrete rip rap and erection of stop banks (within the river bed).

175. In my opinion reasonable limits on the scale, frequency or time period over which an activity can occur without consent should be established so that proper effect can be given to the objectives and policies of the Proposed One Plan and to the purposes of the Act.

176. It is not within the scope of my expertise to determine the precise details of what such thresholds should be, but I note that they are commonplace in other regional plans dealing with similar issues.

177. I consider the absence of thresholds relating to scale, frequency and duration of activities as one of the most significant, if not the most significant, shortcoming of the Code of Practice and do not consider that the above activities should be classified as permitted under the One Plan until this issue has been addressed. For the sake of certainty for plan users I also consider it appropriate to include such thresholds in the relevant One Plan rules as well as the Code of Practice.

The adverse effects, including cumulative effects, of the activities concerned

178. In my opinion the management of localised effects arising from the management of on-site operations (ie the details of *how* an activity is carried out) is one of the stronger elements of the ECOP. For the most

part the relevant standards reflect consent conditions which are generally applied to manage such effects. I have however recommended a number of specific changes to the standards and these are included in the attached Appendix One.

179. I do note that a significant number of the standards do not relate to matters which would normally be considered relevant in terms of managing adverse effects on the environment. However, I do not intend to comment on these further in my evidence except in general terms in the Appendix below.

180. I also recommend that the headings for 'standards for good practice' are reworded as 'performance standards' for greater consistency with the Act and to avoid any suggestion that there may be any discretion over whether or not, or the extent to which, they are to be applied.

181. I recommend that the description of the individual activities be clarified (in some instances) and in all cases be separated out from the background text in Part One and Two to provide greater certainty over what activities are or are not covered by the standards (and referenced from the relevant Rules). Suggested wordings are included in Appendix One to my evidence below. It should also be clearly noted in the ECOP that activities which do not fit these descriptions require resource consent.

182. I regard the performance standards in the ECOP as useful for determining how activities can be appropriately carried out. However, one of the main shortcomings of relying on these standards on their own is that they do not provide guidance on whether the activity itself is appropriate at the proposed location in the first place, in terms of ongoing or cumulative effects on natural character in particular. This has been discussed at length in the evidence of Dr Fuller and Mr Williams and in my evidence above. The recommendations in

paragraphs 138 and 139 above may begin to provide a solution to this problem during the life of the One Plan.

183. In the meantime the revised version of the ECOP includes a new section on Morphological Characteristics (Part One, Section 1.2). In my opinion this section has the potential to address some of the Minister's concerns on an interim basis, if implemented in conjunction with the other changes which I am recommending and if amended as recommended in Appendix One of my evidence below.

Inconsistencies between the wording of the ECOP and the Act

184. The introductory sections of the ECOP include aspirational statements such as the "Operations Group Pledge" (Section 2.4) and other material which is not within the scope of material which may be incorporated by reference in a plan (Clause 30, Schedule 1 of the Act). Whilst these may be matters which the Operations Group wishes to adopt for its internal management purposes or as guidance for contractors, I do not consider that any weight should be given to such matters in RMA decision-making processes or that there should be any uncertainty on this issue.

185. It is not therefore in my view be appropriate to include them by reference into a regional plan. I have made recommendations in Appendix One on how this might be addressed by distinguishing between those parts of the ECOP which are to be incorporated by reference into the Proposed One Plan and those which are not. This could be effected through insertion of the appropriate wording into the relevant Rules (in including a clear statement to the same effect within the ECOP itself).

Lack of certainty regarding processes for compliance with the ECOP in all circumstances

186. In addition to the uncertainties noted above, the ECOP also includes a range of performance standards which in my opinion are either not relevant to or not enforceable.

187. These matters have been substantially resolved in discussion with the Horizons Operations Group in as far as they have a bearing on the matters raised in the Minister's submission. Any outstanding matters are discussed in Appendix One.

Other anomolies

188. In addition to the above matters there are two further and significant anomolies in the ECOP which in my opinion need to be addressed.

189. Firstly, I note that both the ECOP and Rule 16-11 of the Proposed One Plan contain different performance standards for culverts. I agree that it may be appropriate for the ECOP to include additional standards which may, for example, provide more detailed guidance on how the general standards should apply, but I am not aware of any justification for applying two sets of different or contradictory standards to essentially the same activity. For example, there are a number of performance standards in Rule 16-11 relating to maximum dimensions, which in the ECOP are simply referred to as "matters to be considered".

190. Secondly, the ECOP contains standards for stop banks located both within and outside the beds of rivers. In the latter case Rules 16-4, 16-12, and 16-13 cannot apply as their scope is restricted to the listed activities in the beds of rivers or lakes. This is not made clear in the ECOP and no distinction is made between stopbanks in the beds of river and those outside it.

191. In Appendix One below I recommend that all culverts in the beds of rivers be subject to Rule 16-11 and that activities relating to stopbanks outside river beds be excluded from the ECOP (although in my opinion it may also be possible to address this issue in other ways).

Matters relating to SOS-As

192. The ECOP also includes standards relating to activities carried out in Sites of Significance, or affecting whitebait migration and inanga spawning sites. These are considered in Mr Brown's evidence.

CONCLUSIONS AND RECOMMENDED AMENDMENTS TO THE PROPOSED ONE PLAN (as notified)

193. The Minister's submission was strongly supportive of the approach taken to management of water quality and water quantity/allocation issues in the One Plan, as notified. This is reflected in the relatively small number of amendments sought in the light of the S42A Planners' report. In a number of those cases I have recommended that the wording in the notified version of the plan be retained.

194. However the submission sought a relatively small number of fundamental changes to the section relating to activities the beds of rivers and lakes to enable a more integrated approach to flood plain management to be taken in the region. Some of these have, in my opinion been adequately addressed the section 42A report, but others have not.

195. There are some outstanding issues which may be resolved through a pre-hearing process. Where I have commented on those matters in my evidence I have left my recommendations open, but referred to them in the table below, along with a summary of my recommended amendments to the One Plan.

Summary of recommended amendments to the Proposed One Plan (as notified, unless otherwise stated) with tracked changes

Plan Provision	Recommended amendments (and any consequential amendments)
Issue 6-3 River and lake beds	**"Issue 6-3 River and lake beds** The demand for flood and erosion control to protect many types of land use has led to significant modification of the Region's ~~waterways~~ bodies. ~~r~~rivers and their margins, and the biodiversity of their flood plains. Structures required to be locate~~d~~ within the beds of rivers and lakes, including bridges, culverts, water intake and discharge pipes and hydroelectricity structures, also affect the natural character of ~~waterways~~ ~~bodies~~ rivers and their margins. These types of uses and developments, in conjunction with gravel extraction which while having beneficial effects in terms of flood mitigation, have modified, and continue to modify the physical characteristics and ecology associated with ~~of~~ many of the Region's water~~ways~~ bodies."
Objective 6-1: Water management values	**"Objective 6-1: Water management values** Surface water bodies are managed in a manner which ~~sustains~~ safeguards their life-supporting capacity and recognises and provides for the values set out in Schedule ~~D~~Ba"
Objective 6-3: Water quantity and allocation – clause (a)(i)	**"Objective 6-3: Water quantity and allocation** Water 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) minimum flows and allocation regimes are set for the purpose of maintaining and enhancing the ~~existing~~ life-supporting capacity of rivers as set out in Table D:4, preserving the natural character of rivers and their margins and providing for other values of water bodies~~rivers as necessary"~~
Objective 6-3: Water quantity and allocation – clause (a)(ii)	**Recommendation deferred (see paragraph 70-71)**
Objective 6-4: River and lake beds	**"Objective 6-4: River and lake beds** The beds of lakes and rivers are managed in a manner which enables the social, economic and cultural needs of the community to be met, and significant risks arising

	from flood events to be addressed, while ensuring that: -the life supporting capacity of rivers and their margins is safeguarded and their biodiversity is maintained -the natural character of rivers and their margins is preserved and where appropriate is restored or rehabilitated."
Policy 6-4: Enhancement where water quality standards are not met – Clause (a)	Retain wording as notified (subject to minor amendment) i.e **"Policy 6-4: Enhancement where water quality standards are not met** a) In each case where the existing water quality does not meet the relevant water quality standard within a Water Management Sub-zone, as shown in Schedule D, activities shall be managed in a manner which enhances water quality in order to meet the water quality standard for the Water Management Sub-zones shown in Schedule D."
Policy 6-19 : Apportioning, restricting and suspending takes in times of low flow	**Recommendation deferred (see paragraphs 70-71)**
Policy 6-27: General management of river and lake beds – Clause (e)	**"Policy 6-27: General management of river and lake beds** Activities in, on, under or over the beds of rivers and lakes shall generally be managed in a manner which: (e) provides for the restoration and rehabilitation of the natural character of lakes, rivers and their margins where appropriate and otherwise manages *effects* on natural character, including in particular cumulative effects, and public access in accordance with the relevant policies in Chapter 7 "
Policy 6-28: Activities in water bodies with a Value of Natural State, Sites of Significance - Cultural, or Sites of Significance - Aquatic	Retain wording as notified, i.e. **"Policy 6-28: Activities in *water bodies*^ with a Value of Natural State, Sites of Significance -Cultural, or Sites of Significance - Aquatic** In those W*ater Management Sub-zone*s* [1] with a Value of Natural State, Sites of Significance -Cultural, or Sites of Significance -Aquatic, as shown in Schedule Ba [1], activities in, on, under or over the *beds* of *rivers* and *lakes*^ shall be managed in a manner which: (a) avoids adverse effects on these values

	(b) maintains the habitat and spawning requirements of the species identified in Schedule Ba[1] as being significant within the subject W*ater* *M*anagement *Sub-zone*s*[1] ."
Policy 6-27A ***(new policy)***	**Policy 6-27A: provision for preservation, restoration and rehabilitation of natural character** In considering matters relating to the preservation, restoration or rehabilitation of the natural character of rivers and their margins particular regard will be given to: • the natural 'style' and dynamic processes of the river, including its natural meander pattern, characteristic bed style and width, quality and quantity of bed habitat and connectivity with its flood plain at the appropriate geomorphological scale (whole river, water management zone, and reach) • the desirability of an integrated approach to flood and erosion hazard management , including the preservation, restoration or rehabilitation of natural character • the need for appropriate science-based research and planning mechanisms (including management plans) to support decision making".
Method 6-9	"**Method 6-9** The aim of this method is to develop an integrated research, monitoring and reporting programme. The focus will be to assess ~~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 habitat and wetland^ areas. The method will also seek to measure patterns of stability and instability in bed morphology departure from natural state and changes in natural character, including habitat and morphological diversity. An assessment will be made of the implications for long term sustainable flood plain management, including potential for maintenance and restoration of natural character whilst continuing to manage significant erosion and flood hazard risks The outcomes will link into monitoring undertaken by

	the River Works Environmental Code of Practice and supports delivery and refinement of existing related policies, objectives and methods. The outcomes will also guides implementation planning and allows implementation effectiveness to be assessed."
Method 6-10 ***(new method)***	"**Method 6-10** The aim of this method is to promote an integrated approach to flood plain and wider catchment management which considers long term options for sustainable management which incorporate land use, environmental restoration, water storage and recreational and amenity objectives in addition to the approaches which have typically formed part of schemes prepared under the Soil Conservation and Rivers Control Act 1941. A limited number of pilot catchments will be selected and a planning and implementation framework developed in conjunction with local communities, riparian landowners and other key stakeholders which draws on the outcome of Method 6-9, and incorporates input from the Regional Councils' farm-based land use initiatives, biodiversity enhancement programmes and flood and erosion protection processes (including 'scheme plans'). **Who:** Regional Council, Territorial Authorities, Tangata Whenua, landowners and community groups, and other interested parties including Fish and Game, Forest and Bird and the Department of Conservation. **Links to Policy:** This links to Policies 6-27 to 6-31 **Targets:** Pilot projects will be at the implementation stage for at least 2 catchments within 10 years of this Plan becoming operative."
Table 6-2	"FC Flood and Erosion Control Flood and erosion hazard risk management (including risks to existing drainage structure and other existing infrastructure) The integrity of existing flood and riverbank erosion protection structures is not compromised D Drainage The integrity of existing drainage structures is notompromised EI Existing Infrastructure The integrity of existing infrastructure is not Compromised"
Policy 6-29: Activities in water bodies valued for Flood Control or Drainage – Clause (b)	Amend Clause (b) to read: (b) avoids, remedies or mitigates adverse effects on the natural character, indigenous biodiversity and ecosystem functions of rivers and their margins and

	other values associated with the water body. Where it is not possible to adequately avoid, remedy or mitigate the effects of the activity at the site, the Council may consider the use of financial contributions as a means of offsetting or compensating for adverse effects in accordance with the policies in Chapter 18.
Policy 6-32 Gravel extraction	Retain wording of Policy 6-32 as notified in the Proposed One Plan
Tables 6-3 and 6-4	• No increases in allocable volumes be provided, over and above those identified Tables 6-3 and 6-4 of the Proposed One Plan (as notified);. and • Heading for Table 6-4 to be reworded as "Annual Allocable volumes of gravel"
Rule 15-5 Takes and uses of surface water complying with core allocations – Recommended new standard	**"Rule 15-5** takes or portions of takes for stock drinking water and domestic needs, or public water supplies ~~predominantly~~ for domestic use may continue below minimum flows, provided the rates and volumes of takes are reasonably necessary and do not exceed the maximum takes of low flow set out in Policy 16-19."
Rules 16-4, 16-12 and 16-13	Outstanding issues relating to thresholds for permitted activities in relation to scale, frequency and duration, and the way in which the ECOP (or relevant parts of it) are referenced from the Rules. Recommendation deferred (see paragraph 176-177)

NB Recommended changes to the Environmental Code of Practice for River Works are attached in Appendix One.

APPENDIX ONE – COMMENTS ON THE ECOP (AUGUST 2009)

1. This Appendix provides more detailed comments and recommendations regarding the Environmental Code of Practice for River Works.

Introductory Sections of the ECOP (pages 1-26)

2. The first group of sections of the COP can, in my opinion, be conveniently divided into the following:

   - **Sections 1 – 3 (pages 1 – 13)** which provide a general introduction to the COP, its relationship to other documents, the work of the Operations Group, and the 'philosophy ' underlying their activities (the 'Operations Group Pledge', 'Hierarchy of Objectives' and Environmental values' including a copy of Table 3.1 from the Proposed One Plan.

   - **Sections 4 and 5 (pp 14 - 16),** which introduce the concept of standards of Good Practice for Activities, including the principles which the Operations Group has used to establish the standards for good practice. Following this, in Part 5, is a description of the Operation Group's general approach in to primary recreational opportunities (under the heading 'Recreational Values').

3. To my mind the above sections are a public statement of the principles under which the Operations Group intends to operate, primarily in terms of carrying out its functions under the Soil Conservation and Rivers Control Act 1941. They are to my mind best treated as a statement of internal policy or intent (which may or may not have been informally adopted by the Council) which is not open to scrutiny or test by other parties through any statutory processes. I do not intend to analyse the wording of these sections in detail but instead recommend that these parts of the COP should not form part of any rules in

the One Plan, in order to remove any suggestion that they are intended to provide guidance to decision makers on RMA matters.

4. **Section 6 (pages 17 – 21)** of the COP deals with a variety of procedure matters. The firstparts of section 6 refer to notification of intended programmes of works to the Department of Conservation, and consultation with tangata whenua and landowners. The remainder deals with miscellaneous matters relating to 'continuous improvements'. This includes aspirational statements such as:

> *"Staff in the Operations Group already have a thorough understanding of the environmental effects of their works. However……..…..the Operations Group undertake to enthusiastically trial any new methods that might practically achieve is environmental pledge…."*

5. Internal procedural matters such as maintenance of a complaints register and a description of a self monitoring process to ensure that works are carried out in accordance with the Code of Practice are also dealt with.

6. All of the matters covered in Section 6 reserve discretion to the Operations Group regarding how they are carried out and the standards to be met. However the procedures relating to communication and consultation with external stakeholders could, with minor amendments, in my view be enforceable under Rule 16-13 as procedural standards with a reasonable degree of certainty. They should in my view be separated out from Section 6 and put into a new section in Part One called "Procedural Performance Standards" (along with the monitoring procedures referred to in Paragraphs 13 -23 below). The remainder of Section 6, as with the previous sections, should not in my opinion form part of any One Plan rules.

7. **Section 7 (pp 23 -24)** of the COP introduces the 'Good Practice Standards' themselves. Paragraph 7 clearly states that "If any of the applicable standards cannot be met, a resource consent shall be sought". In my opinion this section should be moved to the beginning of Part One which follows it, since it appears that page 27 is the start of the COP 'proper' (ie the section which is intended to be enforceable under the One Plan rules).

Sections of the COP containing Standards

8. **Parts One, Two and Three (p 27 – 108)** provide Generic Standards, Activity – based standards, and Standards for 'Sites of Special Environmental Value'. These are in my opinion the 'core' part of the COP with respect to Rule 16 – 13 and the other rules which refer to the COP, when read in conjunction with the Scheme Maps Depicting the Works Area in relation to Site Specific Values (p 109 – 150), Schedule Ba20 of the Proposed One Plan (p 191) to which the COP as a whole applies, and the Definition of Terms (p 181 – 190).

9. I will discuss and make recommendations on Parts One and Two. Consideration of Part Three is beyond the scope of my expertise and is included in Mr Brown's evidence.

PART 1. GENERIC GOOD PRACTICE STANDARDS

Section 1.1 Planning

10. The first section of the Generic Good Practice Standards ("Planning") contains three sections (A B, and C pages 27- 28) which include a list of matters "to take account of" and "take into account' when planning river and drainage works activities. Whilst in general I consider them to be useful, quite how the matters are to be taken into account is not clear, and hence the outcome of the decision – making process is also an unknown. They appear to me to be operational policies rather than standards which are enforceable under a rule in a plan.

11. In addition, they relate primarily to efforts to 'take into account' the on site operational effects of activities at the planning stage, and are selective, rather than relating to all the considerations which are relevant to planning river works activities (such as whether activities having potential adverse effects are appropriate in the first place).

12. I consider that this section should more appropriately be moved to the earlier sections of the COP, under a new heading 'operational policies', perhaps next to Section 4 (pages 13 – 14) which appears to address similar matters.

Section 1.2 Morphological Characteristics

13. This section has been added following consultation with Fish and Game and the Department of Conservation and in response to their concerns regarding the continuing cumulative effects of river works on the natural character of rivers and their margins, in particular effects on river morphology and habitat diversity.

14. The wording of this section could be clearer and I have made recommendations on this below.

15. The three parameters for assessment of the natural character of rivers – numbers of pools and riffles (an indicator of substrate morphology and diversity); channel width (an indicator of available habitat and channel confinement or 'canalisation'); and sinuosity (an index of meander pattern) – are consistent with the parameters recommended in paragraph xx above (as new Policy 6-27A of the One Plan), and are supported by Dr Fuller's evidence. However, in the light of his evidence, and the evidence of Mr Brown, I also consider that a fourth parameter – braiding pattern- should be added.

16. In addition, in order for the monitoring process to be effective, I consider that additional changes also need to be made as to this section as per the tracked changes version below. These include points of clarification or correction of minor errors but in addition to address the following issues: -

- **Changes in three key parameters should be assessed in more detail than just for the whole river, otherwise significant changes at a finer scale may not be detected.** Reporting should occur at the whole river and River Management Zone level as a matter of routine, and at the reach level including (both upstream and downstream of the affected section) where significant river management works have been

undertaken within recent years (since 2004 is suggested) or if changes at the broader scale are detected.

- **The baseline for assessment of changes should be the individual river in question, rather than an aggregation of all rivers**. Comparison between rivers would be useful when seeking to assess the reasons for changes, but I can see no clear reason for amalgamating them in the manner suggested since their natural character and dynamics are likely to vary.
- I agree that what constitutes a 'significant shortage' or 'significant decrease' should be determined by consultation; however, a guideline figure may also be useful. I would suggest that a deviation of 10% from the baseline figure would be appropriate as a guide threshold. Although the values of parameters in question are likely to correlate with one another, I would also consider that a significant change in any of them (rather that all of the,) would be appropriate to trigger an 'informal review'

17. However, based on the evidence of Mr Williams and Dr Fuller, it appears quite possible that at least some of the rivers in question are not in a natural state of equilibrium and it may not be appropriate to maintain them in their present state. For that reason I would recommend that the purpose of the monitoring process should be to maintain *or rehabilitate* natural character where appropriate.

18. In general terms, from a planning perspective I would consider that a monitoring and review process as I have recommended would be an important step forward in achieving a better understanding of the dynamics of gravel - bed rivers in the region and the effects of intervention on their natural character. Such a procedure would also enable a better assessment to be made of compliance with consent conditions in 'global' river works consents which relate to maintenance of natural character. It would also enable other interested parties to be involved in the river management decision-making processes.

19. The process to be carried out under Section 1.2 should in my opinion be treated as a procedural standard which forms part of Rule 16-13 and included in a new section called "Procedural Standards".

20. I recommend the following new version of Part One, Section 1-2 (with tracked changes)

1.2 Morphological Characteristics

The ~~current~~ number of pools and riffles , average active channel widths, average channel sinuosity~~'s~~ and braiding pattern in the following rivers will be **maintained** or rehabilitated to a more natural state subject to the conditions ~~agreement~~ below:

- Lower Kiwitea
- Mangatainoka
- Ohau
- Oroua (Pohangina/Oroua scheme)
- Pohangina
- Rangitikei
- Upper Manawatu
- Lower Manawatu

Conditions ~~It is agreed that~~:

- This standard will only apply to the gravel-bed reaches of the above rivers within scheme areas.
- The number of pools and riffles, average active channel widths, average channel sinuosity's and braiding pattern to be maintained will be established by counts and measurements on each of the above rivers', scheme works areas (as detailed in the Code's maps), to be carried out using aerial photography of suitable quality and scale, and will be completed by June 30, 2011. Counts, and measurements using the same method, will be repeated on each river every 3-5 years. Fish and Game and the Department of Conservation will be invited by the Scheme manager to assist with the pools and riffles counts.
- The reporting of the methodology and results will be to an appropriate reporting standard, to the satisfaction of the Horizons Manager, Science.
- In assessing and comparing pool counts channel widths, sinuositiesy's, and braiding pattern from different surveys, account will be taken of non-river management activities, such as other consented activities and floods.
- Where a decrease in pool count reduction, active channel width, sinuosity or braiding pattern is reported, is attributable to

river management activities, an immediate informal review of river management practices for the affected reach of that river will be undertaken, in consultation with Fish and Game and the Department of Conservation with the objective of identifying whether the changes are attributable to river management activities and implementing changes that will redress the loss of pools and/or riffles and any reduction in active channel width, sinuosity or braiding. Also to be considered are implications of future river management practices.

21. Any '**significant shortage'** of pools and riffles, 'significant decrease' in channel width, sinuosity or braiding identified in the surveys described above~~,~~ will be specifically addressed in the subsequent Scheme review process.

22. 'Significance' in this context will be assessed on a case by case basis, but, as a guide, will be considered to occur if ~~all~~ any of the four ~~three~~ indicators of morphological change show a decreasing trend in their respective values ~~parameters~~ by a margin of 10% from the baseline measurement .

23. It is agreed that:

- The pool/riffle counts obtained from the surveys described above will be expressed for each river in relation to the average channel width for that river
- A 'significant shortage' for any river will be judged against the ratio of the frequency with which a pool occurs to the average width of the bed, averaged for each river and each river management zone for each river (as defined in Schedule B of the One Plan). ~~across all rivers~~. For the avoidance of doubt, refer to the following example:
    - Length of river managed by the Scheme is 20km;
    - The number of pools counted from the aerial photography is 200, which means that there is one pool per 100 m;
    - The bed width is measured at regular intervals from the aerial photography, producing say, an average bed width for the river of 50 m. Therefore there is one pool every two times the average bed width.

- Where a ‘significant shortage’ is identified, then that will be included as a specific issue to be addressed in the next scheduled engineering review of the scheme concerned. Where the shortage or decrease in the morphological characteristics is serious, a formal engineering review will be considered where these cannot be rectified under the “immediate informal review”.
- The engineering review will consider alternative management practices with the express objective of redressing the shortage or decrease and reinstating pools and/or riffles, ~~and~~ active channel width, ~~and~~ channel sinuosity and braiding pattern.
- Fish and Game and the Department of Conservation will be identified as a key stakeholders in the review consultation process.
- The active channel width is defined as the distance, perpendicular to the flow, between lines of permanent vegetation on either side of the river. The average width will be calculated from a minimum of 30 randomly selected measurements over the scheme works area.
- Channel sinuosity is defined as the ratio of the linear length of the thalweg line divided by the straight line distance over a given reach within the scheme works area. The number and length of reaches to be measured will vary and will be identified in consultation with Fish and Game and the Department of Conservation.
- A braiding pattern is defined as a wetted channel which splits and diverges around medial bars, where a medial bar is defined as an area of bedload-calibre sediment deposited mid-channel which is reworked during frequent flood events normally equivalent to the mean annual flood. A braiding index may be defined as twice the total length of bars within the reach divided by the mid-channel length (Ian Fuller, pers. Comm. (2009), based on Brice, (1960)).

PART 2 - GENERIC AND ACTIVITY_SPECIFIC STANDARDS (pp.31 -93)

24. Section 1.4.2 and Part Two of the ECOP include over two hundred generic and activity based standards. My general observations of these sections are that they contain a mixture of clear (and clearly enforceable) effects – related standards; internal procedural standards (with varying degrees of relevance to RMA concerns) and standards which are not clear or certain in terms of either their expression, or reserve discretion to the Operation Group regarding whether or not they have been complied with.

25. Given the sheer number of standards and their varying degrees of relevance to the concerns raised in the Ministers' submission I only intend to focus on the specific amendments which I consider most necessary to address the concerns in the Ministers' submission, and make brief comment where the recommended changes are not self-explanatory.

1.4.2 Generic Standards

26. **Generic Standard 2:**

Amend as follows:

~~1.Machinery shall be kept out of water to the extent possible.~~ No machinery shall enter, operate or excavate within water, except when making river crossings or where specifically permitted under an activity standard. ~~Where this is unavoidable~~ Under such circumstances all practicable measures shall be taken to minimise bed disturbance and release of sediment (including keeping the number of crossings to the minimum necessary and ~~eg.~~ use of only one crossing point typically upstream of riffles, sediment control or minimisation measures).

Comment: It is always possible to keep machinery out of water, but this may preclude carrying out the work. The circumstances in which it is appropriate to enter the water body should be clearly stated and a consent sought if the condition cannot be met.

27. **Generic Standard 7:**

Amend as follows:

7 On completion of activity or *in the event of anticipated extended suspension of works*, all disturbed areas and access tracks, including public and recreational points, that have the potential to release sediment to water shall be reinstated.

Comment: The meaning of the italicized phrase should be more clearly defined (for example by a specific time period) so that it is possible to determine compliance with the standard.

28. **Generic Standard 14:**

Amend as follows:

All stock animals shall be excluded from works area <u>where necessary</u> <u>to enable</u> <u>establish and maintain</u> ~~until~~ vegetation. ~~is well established~~ .

Comment: Clarification required that this applies to maintenance as well as establishment of vegetation.

29. **Generic Standard 20:**

Amend as follows:

Activities shall not use any material that has a significant ecological effect on the environment, <u>including through release of sediment.</u>

Comment: The intent of the standard is appropriate but as worded it is not clear what material it applies to, the 'ecological effects' to be avoided and/or clear standards against which compliance might be assessed. For example it might refer to materials which are toxic to aquatic ecosystems; nutrients or other contaminants; other slow- degrading or inert materials which may cause smothering effects, or materials which include seeds or other plant pest material.

30. **Recommended additional generic standards:**

- A generic standard with a specific requirement for all machinery/equipment to be cleaned according to the Council's Didymo Management Plan and associated protocols, including the requirement that all equipment must be cleaned before movement between catchments.
- A general standard requiring that all reasonable measures be taken to avoid or minimise release of sediment.

- A new standard which specifies that preference will be given to replanting of native trees and other plant species naturally occurring in the locality unless functional requirements dictate otherwise.

Activity-Specific Standards

31. Firstly, in my opinion it is important that each activity is clearly described in order that it can be clearly determined which activities are or are not subject to the standard, and whether an activity falls outside the scope of the standard and therefore requires a consent. The definition of the activity is generally intermingled with (and subordinate to) the description of its purpose and other explanatory text. In some instances the description is qualified by phrases such as 'the activity normally involves…' or there is no clear statement of what the activity entails at all.

32. I recommend that a clear definition of the activity is inserted at the beginning of each section and kept separate from the explanatory text. Suggested wordings (based where possible on the existing text) are provided below.

33. Secondly, if the activity-specific standards are to form part of Rule 16-13 or other rules in my view it would be more appropriate to call them Performance Standards rather than "Standards for Good Practice" since this term is more consistent with RMA terminology and the latter implies a degree of informality and discretion over whether the standards need to be complied with.

34. I therefore recommend that the heading at the beginning of Part Two and the headings within each activity section are reworded accordingly as "Performance Standards" rather than "Standards for Good Practice".

35. Comments and recommended changes for individual activities are set out in the table below. For the most part the recommended changes are minor in nature and for clarification purposes. I do, however, have more fundamental concerns regarding the standards for culverts, works in 'modified streams' and stop banks (outside the bed of the river).

Table 1 : Environmental Code of Practice -Tracked change amendments recommended to Activity Descriptions and Standards

Heading and Activity Description (to be included in a text box or otherwise separated from the descriptive text)	**Recommended amendments to standards.**
Bank Shaping : Minor earthworks to shape the bank to create an appropriate alignment and batter shape.	
Beach Raking: The raking of exposed gravel beaches with a bulldozer or tractor mounted ripper which disturbs the top armoured layer of stones and vegetation.	
Gravel Extraction: Small scale removal of localised gravel build-ups that confine and direct the river channel, within the limits set out in Standards 12 and 13 below**.**	
Gravel Management (Including Channel Realignment and Diversions): Repositioning of gravel within the channel (ie where the diversion is fully contained within the confines of the active river channel), for the purposes of channel realignment and limited to diversions of length less than seven times the width of the channel and a lateral offset three times the width of the channel. This activity does not include the extraction or removal of gravel from the bed of a river.	7. The number of pools in any reach to be disturbed shall be recorded and reported to th Horizons team leader, compliance before work commences. On completion of works, ther shall be no reduction in the total number of pools or pool-run-riffle sequences within tha reach . 9 The activity is not to permanently shorten the channel or to cut off meanders. 10 All appropriate steps, including timing of works and use of appropriate machinery, sha be taken to avoid and minimise as far as practicable the entry of machinery or equipment int the wetted channel.

Channel Clearance: Clearance of vegetation and debris (such as logs, cars, rubbish, but excluding naturally occurring bed material) within the wetted channel, gravel beaches, riverbanks, bridges, and erosion protection structures by physical and chemical means.	
Lateral Walls: The placement of rigid structures along the lower section of riverbanks to prevent lateral erosion (including timber walls, concrete walls, sheet piling walls, and gabion baskets) and associated earthworks to shape the bank to create an appropriate alignment and batter slope .	
Concrete Rip Rap: The placement of concrete rubble directly against the lower section of a riverbank and associated minor earthworks to shape the bank to create an appropriate alignment and batter slope.	5. Concrete rip rap linings shall not be constructed in locations that are utilised for or ar readily accessible for recreational purposes or are readily visible from public roads c reserves, or where they would have adverse visual effects on the natural character of rive and their margins except as a temporary emergency protection measure and where n practicable alternatives are available. They will be replaced by an appropriate protectio structure as soon as practicable. Site specific details will be logged on the Practicable Form.
Culverts: The installation, maintenance and replacement of culvert structures including localised excavation, foundation works, installation of pre-cast concrete units and the construction of headwall structures in the watercourse. The activity also includes bed armouring carried out to reduce the risk of scour at culvert outlets. Floodgated culverts are excluded from this activity.	1. The specific Standards for Good Practice below shall be read in conjunction with th Generic Standards for Good Practice in Part One and Rule 16-11of the One Plan whic applies in addition to the standards below. ~~5. Stream or drainage channel flows shall be temporarily dammed or diverted away from th site for the duration of culvert construction where practicable. Where this is not possibl the work shall be planned to ensure that the duration of in-flow works activity is kept to minimum.~~ *Comment: The performance standards for culverts in ECOP are different from and les stringent than those applying to similar activities carried out for other purposes, which ar regulated under Rule 16-11 of the Proposed One Plan, but the potential adverse effects ar likely to be similar.*

Detention Dam Maintenance: The excavation of material from a dry ponding area using a hydraulic excavator. The activity ~~primarily involves~~ includes the clearance of accumulated sediment and the shaping of the ponding area to restore the dam to its original design capacity. It also includes repair of erosion through ~~sometimes involving~~ reforming of dam batters.	3 Excavated material ~~Material~~ removed from the dam shall be ~~is~~ disposed of in a manne that ensures it does not re-enter the channel or the dam ponding area and does not impec surface drainage.
Mechanical Cleaning of Drainage Channels~~/Modified Streams~~: The clearance of vegetation from drainage channels (as defined in the Definition of Terms) This includes ~~and~~ the eradication of undesirable plant pests , as ~~which are~~ listed in part five of this code, which cannot be controlled through the application of herbicides. [*NB No such list is provided*] and ~~However,~~ the removal of accumulated sediment and the shaping of drain banks ~~is also occasionally undertaken~~ in order to restore drains to their original design capacity.	4 All drain clearing machinery shall be thoroughly cleaned of weed and silts and i accordance with didymo protocols before leaving any work site, in order to ~~minimise~~ avoi the ~~risk of~~ spread~~ing~~ of undesirable aquatic weeds. ~~5 Special care shall be taken to minimise~~ D~~d~~isturbance to the bed of the drain during th mechanical removal of vegetation shall be kept to the minimum necessary to maintain t~~T~~h design profile of the channel ~~shall be maintained~~. ~~Note:~~ 5A In tidal areas, the grassed banks of the drains that flood at spring tide are importa areas for fish spawning, and ~~care shall be taken to~~ shall be preserve dthese sites during th works. 9 Cleaned drains shall retain habitat variability by avoiding complete rmoval of a vegetation and allowing for variability in the bed substrate ~~small imperfection~~ [Meaning?][Logan can you please supply a suitable phrase for inclusion e.g."such as "]~~e~~ ~~the bed~~ to provide some habitat diversity while not compromising the hydraulic efficiency o the channel. Comments: There appears to be some uncertainty and ambiguity of wording regarding th status of a 'modified stream' or 'modified stream' and the provisions of the Act, the Or Plan and the COP which apply to them. In my opinion the definition of a 'modified stream i the COP as "A channel that has been …modified primarily for land drainage purposes could arguably apply to many if not all water bodies course in the scheme areas since the modification from their natural state has been primarily for 'land drainage purposes

	Furthermore it is clear from the wording of the activity description and the standarc themselves that they are intended to apply to drains, since none of them refer to 'modifie streams'. I therefore recommend that the phrase 'modified streams' be deleted from th heading. In addition, there is no list of undesirable plant pests provided in Part Five. This needs to b addressed before this section can be given effect. The avoidance of spawning sites associated with tidal drains during spawning periods shoul be included in a performance standard rather than a point to note. I agree that habitat diversity should be retained in the beds of drains. However the ter 'imperfections' in Standard 9 needs to be amended to provide clearer guidance on how this to be achieved, even if this can only be in a general sense.
Grade Control Structures: The excavation of bed material followed by the construction of a rigid structure across the full width of a channel.	1. Material used in new Grade Controls shall be clean, stable quarried rock, boulders, ~~pr cast concrete units~~ or timber. Rubble shall not be used in new structures.
Groynes : The placement of structures that protrude from riverbanks and reduce flow velocity immediately adjacent to those banks. Groynes may be either permeable or impermeable and may take various forms and utilise a variety of materials.	
Permeable Mesh Units: The placement of prefabricated structural steel 'fence units' longitudinally along riverbanks and associated bed excavation, shaping of the riverbank and establishment of vegetation.	

Rock Linings: The placement and ongoing maintenance of rock directly against the lower sections of riverbanks and any associated minor earthworks necessary to shape the bank in order to create an appropriate alignment and batter shape. Establishment and reinstatement of ~~the~~ any required stockpile sites is also part of this activity.	
Stopbanks within the beds of rivers: Construction of new earth embankments or extending or upgrading existing earth embankments or other flood retaining structures ~~The purpose of this activity is to provide~~ for flood protection purposes within the beds of rivers. This includes stripping vegetation and topsoil from affected areas, importation and placement of fill material, compaction, shaping, trimming, top soiling and re-grassing.	Amend explanatory text as follows: ~~Where stopbanks cross water courses or where drainage outlet is required, floodgate culverts are installed through the embankment. This activity has the potential to cause piping failure of the stopbank if not carried out properly, and therefore requires detaile design.~~ NB Consequential amendments to this section are also required in order to delete those par of it which refer to activities outside the bed of the river. Amend Standards as follows: 4 Specific design issues to be addressed shall include: • Potential social and economic impacts on flood plain (positive and negative); • Residual risk and mitigation measures; • Recreational access, aesthetic impacts and mitigation measures; ~~and~~ • Fish passage (including access to spawning areas within and outside the bed of the rive and loss of habitat) • Other habitat impacts and mitigation measures. ~~1~~1 ~~Conclusive evidence shall be presented that shows there shall be no measurable advers flood impacts on the adjoining floodplain or upstream or downstream areas, that cann~~

	~~be mitigated.~~ ~~This shall be equivalent to a "*de minimis non curat lax*" standard. Impacts to be considere include:~~ • ~~change in flood levels;~~ • ~~velocity; and~~ • ~~duration of flooding~~ *Comments:* *i) Rule 16-13 does not apply to stopbanks located outside the bed of a river.* *ii) The use of the term 'upgrading' in this context is not consistent with its definition and us in the Proposed One Plan, as recommended in the Council Officers' report to the Genera Hearing. If adopted that definition would not provide for any increase in the dimensions o the structure or scale or characteristics of its effects.* *iii) As it standards I would consider it appropriate to apply this standard to existin stopbanks within the beds of rivers providing that it does not apply to new stop banks an only applies to minor extensions within a clearly defined threshold.* *iv) The meaning or intent of Standard 11 is not clear and should be deleted.*
Tied Tree Edge Protection (Trenched and Anchored Willows): The burying and anchoring of willow tree trunks into the riverbanks to stabilise and protect the banks from lateral erosion, and any minor earthworks to shape the bank to create an appropriate alignment and batter shape which may be required before the trees are placed.	2A The activity is to be undertaken using sterile or non-invasive willow species only. 6 The extent of bank shaping and contouring will be the minimum required to establis the plants and alignment will be on a curvature that fits the natural meander curvature of th channel.
Edge Vegetation Management, Tree Layering and Removal: The maintenance of protection plantings on riverbanks, including layering, lopping and trimming, mulching, and removal.	7 Trees of non-native species which are reducing the channel capacity or are undesirabl species such as grey or crack willow shall be removed where practicable and replace with native species to maintain plantings where appropriate and practicable. Removal o native trees shall be avoided where practicable. *Comment The recommended amendments are for the sake of clarity, to include*

	performance standard relating to removal of undesirable tree species (which is alread included in the descriptive text) and to provide for rehabilitation of natural character b replanting native rather than exotic species where there is a choice between the two.
Tree Planting: Tree planting for the prevention of lateral erosion of the riverbank and maintenance of river alignment.	Add the following to explanatory wording: It is important to note that it is extremely difficult to establish native vegetation in the hars environment that typically exists directly on the riverbank. However preference will be give to the planting of species which are native to the locality whenever circumstances permit, a a step towards restoration of natural character of the rivers of the region and their margins. 6 Planting shall aim to produce a multi-tiered canopy consisting of ground cove shrubs and trees that will reduce the opportunity for weeds to flourish and to utilise specie native to the locality as far as practicable.