Proposed
Hurunui and Waiau River Regional Plan

And Proposed Plan Change 3 to the Canterbury Natural Resources Regional Plan

Section 42A Report
September 2012

Historical Background and Process to Develop the Proposed Hurunui and Waiau River Regional Plan

Prepared by

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Kaunihera Taiao ki Waitaha

1. Introduction

1.1 Author

1. My name is Andrew Parrish. I am a Principal Planner employed by the Canterbury Regional Council.

2. I have worked as a planner for local authorities for approximately 7 years, including the Ruapehu District Council, Hurunui District Council and the Canterbury Regional Council. My work has involved community planning processes such as Long Term Council Community Plans, and statutory planning processes such as district plan review and plan changes.

3. At the Hurunui District Council, I managed the initial development of the Waipara River Management Strategy, a non-statutory strategy to manage activities which occur within the Waipara River bed, such as shooting, four wheel driving, picnicking and camping.

4. I have worked at the Canterbury Regional Council for the past three years and have been involved in various planning work streams in the Hurunui and Waiau Catchment since March 2009.

5. I have also been involved in the development of the following planning processes in other catchments:

    a. Waipara Environmental Flow and Water Allocation Regional Plan

    b. Pareora Environmental Flow and Water Allocation Regional Plan

    c. Variation 7 and Plan Change 2 to the NRRP for Conway River Tūtae Putaputa

    d. The development of flow and allocation regimes for the Ashburton, Orari and Waihao Rivers, and Wainono Lagoon Catchment which are intended to be included in the Land and Water Regional Plan.

6. I have attended the majority of meetings of the Hurunui Waiau Zone Committee.

7. Although this is a Council Hearing, I have read the Code of Conduct for Expert Witnesses contained in the Environment Court's Consolidated Practice Note dated 1 November 2011. I have complied with that Code when preparing my written statement of evidence and I agree to comply with it when I give any oral evidence.

8. The scope of my evidence relates to providing a summary of the historical background to the development of the proposed Hurunui and Waiau River Regional Plan (HWRRP), including the process that has occurred and the reasons why the HWRRP was developed in its current shape. I confirm that the issues addressed in this statement of evidence are within my area of expertise to the extent that they relate to the process that was followed to develop the HWRRP. Where I have obtained the information from another source then these sources are referenced.

9. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

10. The literature or other material which I have used or relied upon in support of my opinions is listed on pages 12 to 16 of the Summary of the Section 32 Analysis.

1.2 Content of the officer's report

11. This report, and all of the others prepared in relation to the HWRRP, have been prepared under the provisions of section 42A of the Resource Management Act 1991 (RMA). The provision of a report is not a mandatory requirement. It is treated in a similar manner to any other evidence that is provided by submitters, and does not bind the commissioners' decision.

12. There are a number of Section 42A reports which include legal submissions, this historical background report, reports on the CWMS collaborative planning process, technical assessments of the plan provisions and provision by provision analysis. These are listed as follows:

    a. Historical background and process to develop the proposed Hurunui and Waiau River Regional Plan – Andrew Parrish (Principal Planner Environment Canterbury)

    b. Legal Submissions – Wynn Williams

    c. Canterbury Water Management Strategy – Christina Robb (Programme Manager – Water Environment Canterbury)

    d. Zone Committee Process John Faulkner (Deputy Chairperson Hurunui Waiau Zone Committee)

    e. Hydrology – Dr Jeff Smith (Senior Water Quality Scientist – Environment Canterbury)

    f. Groundwater Quantity - David Poulsen (Hydro-geologist – Environment Canterbury)

    g. Changes to river flows and consequences for periphyton Ton Snelder (Senior Principal: Water Resource Management - Aqualinc Research Limited)

    h. Salmon and jet boat passage and river bird habitat - Maurice Duncan (Hydrologist NIWA)

    i. Assessment of effects of different flow regime scenarios on native riverbed nesting birds of the Hurunui and Waiau rivers – Professor Dr Kenneth Hughey (Lincoln University)

    j. Effects of mid-range flow changes on fish migration Dr Donald Jellyman (Freshwater Ecologist NIWA)

    k. Sediment transport and geomorphology Dr Darryl Murray Hicks (Geomorphologist – NIWA)

l. Implications for Water Quality - Edward Norton (Water Resource Management Consultant – NIWA)

m. Creating Nutrient Headroom Ian Brown – Principal Strategy Advisor – Land – Environment Canterbury)

n. Potential of wetlands to reduce nutrient loads from the Lowry Peaks and St Leonards Drains – Dr Chris Tanner (Principal Scientist - NIWA)

o. Planning Report – Liz White (Senior Planner – Environment Canterbury)

13. A number of documents have been provided to the hearing commissioners as background material. This information is listed as follows:

a. Proposed Hurunui Waiau Regional Plan

b. Summary of the section 32 analysis

c. Hurunui Waiau Zone Implementation Programme

d. Hurunui River – instream values and flow regime – Mosley R02/1

e. Waiau River – instream values and flow regime – Mosley

f. Hurunui River Management Regime – Familton – U07/60

g. Waiau River Hydrological Information – Smith – U10/11

h. Hurunui River Hydrological Information – Smith R11/53

i. Land Use and Water Quality Report (title is Nutrient Management in Hurunui: A case study in identifying options and opportunities)

j. Canterbury Water Management Strategy: North Canterbury Storage Options Report # 09821-A

k. Hurunui irrigation reliability and production modelling: Aqualinc Memorandum to Environment Canterbury (2011)

l. Affect on irrigation reliability from removing Waiau allocation bands: Aqualinc Memorandum to Environment Canterbury (2011)

m. Waiau stock water and storage requirements: Aqualinc Memorandum to Environment Canterbury (2011)

n. Waiau River irrigation reliability: Peter Brown, Aqualinc Research Limited (2011)

o. The Effects of Alternative Hurunui River Allocation Regimes on Abstractive Users: Matthew Morgan, and revised by Ian Lloyd Aqualinc Research Limited (2005)

1.3 Explanation of terms and coding used in the report

ASM	Audited Self Management
CRC	Canterbury Regional Council or Environment Canterbury (ECan)
CWMS	Canterbury Water Management Strategy
DIN	Dissolved Inorganic Nitrogen
DRP	Dissolved Reactive Phosphorous
Headroom	Means the amount of room created below a specified limit. This term is applied to the water quality load limit. The headroom is the difference between the measured load and the load limit specified in the HWRRP.
HWRRP	Proposed Hurunui and Waiau River Regional Plan
HWZ	Hurunui Waiau Zone or Waiau Hurunui Zone (the area defined in the CWMS as the Hurunui Waiau Zone or Waiau Hurunui Zone. These terms have historically been used interchangeably; the Waiau Hurunui Zone is identical to the Hurunui Waiau Zone)
IDP	Infrastructure Development Plan
L/s	Litres per second
m^3/s	Cumec (A measure of river flow. One (1) cumec is the equivalent to one (1) cubic metre per second or alternatively 1,000 L/s)
MALF or MALF7d	Mean Annual Seven Day Low Flow
NPSFM	National Policy Statement on Freshwater Management
NRRP	Natural Resources Regional Plan
PRPS	Proposed Canterbury Regional Policy Statement
RPS	Operative Canterbury Regional Policy Statement
ZC	Hurunui Waiau Zone Committee (established under the Canterbury Water Management Strategy)
ZIP	Zone Implementation Programme

2 Historical Background

2.1 Introduction

14. The proposed Hurunui and Waiau River Regional Plan ("HWRRP"), together with the Hurunui Waiau Zone Implementation Programme ("ZIP"), integrate a number of long running processes undertaken to address issues relating to

the taking and using water from the Hurunui and Waiau Rivers, primarily for agriculture. An understanding of these historical processes and the interaction of historical planning regimes is important in understanding the reasons for the objective, policy and rule framework contained in the proposed HWRRP, and why they are an appropriate response to achieve the purpose of the RMA.

15. There are three major work streams which the HWRRP manages. These are:

    a. Water Quantity

    b. Water Storage Locations

    c. Water Quality

16. Each of these strands has historically been managed by discrete, separate, albeit inter-related planning processes. The Zone Committee has been the primary body which has integrated these planning processes and this is discussed in John Faulkner's evidence.

17. My evidence discusses the historical community and statutory RMA planning processes under the three strands above. These processes created an information base that was drawn on to develop the ZIP and the HWRRP. Many of these historical processes were initiated in isolation of other planning processes to develop specific solutions to specific issues faced within the Hurunui and Waiau catchments. Alongside and sometimes intertwined with these catchment specific processes has been the regional planning process associated with the Natural Resources Regional Plan ("NRRP"). The NRRP became operative in June 2011, with its review having culminated in the drafting and notification of the Land and Water Regional Plan ("LWRP"), which is intended to replace Chapters 1 and 4 to 8 of the NRRP.

18. The Canterbury Water Management Strategy ("CWMS") was developed along a similar timeline to the NRRP, beginning in 2001 as the Canterbury Strategic Water Study. The CWMS describes a new way of managing the Canterbury Region's fresh water resources (*CWMS Strategic Framework* 2009 p7).

19. Figure One below shows the inter-relationship between the documents described above in relation to water quantity, water storage and water quality.

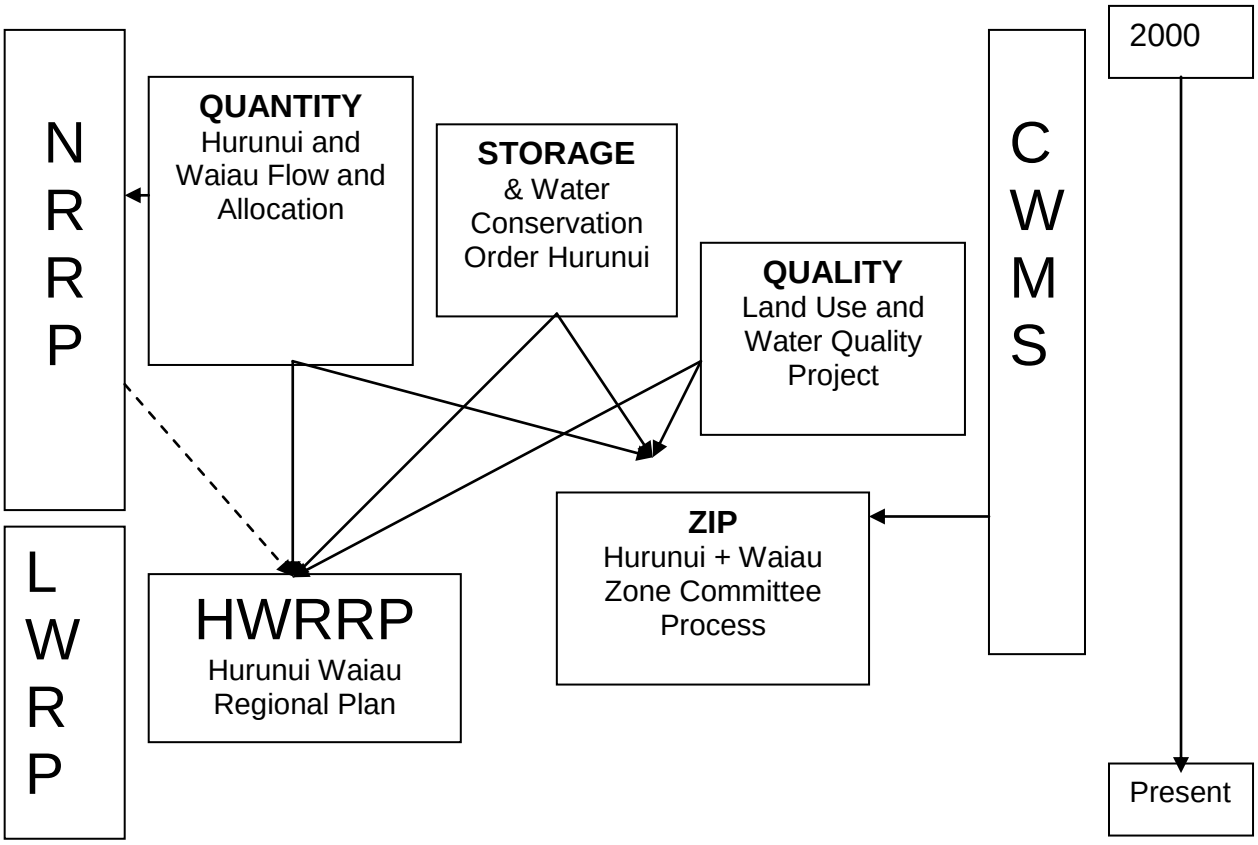

FIGURE ONE – Diagrammatic representation of the work streams used to develop the HWRRP

20. The process to develop the CWMS is described by Christina Robb in her evidence. The other elements shown above are discussed below.

2.2 Natural Resources Regional Plan (NRRP)

21. This section of my evidence describes the timeline the NRRP followed from notification to decision.

22. The NRRP was developed to provide a single regional plan to manage natural resource use, landward of the coastal marine area in the Canterbury region.

23. When notified on 1 June 2002 the NRRP contained three chapters - Chapter 1 (Overview), Chapter 2 (Ngai Tahu and the management of natural resources) and Chapter 3 (Air quality). Further chapters were added later through the plan variation or change procedures provided in the RMA.

24. Chapter 1 and Chapter 3 were made partly operative, and Chapter 2 was made operative, from 27 October 2009.

25. The following chapters 4 to 8 were notified as Variation 1 in 2004:

    a. Chapter 4 Water Quality

    b. Chapter 5 Water Quantity

c. Chapter 6 Beds of Lakes and Rivers

d. Chapter 7 Wetlands

e. Chapter 8 Soil Conservation

26. Further amendments to these chapters were made via variations 2, 4 and 14 and were incorporated into the hearing process with Variation 1. The decisions for these four variations were released together allowing for the balance of Chapters 1 and 3, and all of Chapters 4-8 to be made operative on 11 June 2011.

27. Chapter 5 of the NRRP set up the following 3 pronged flow and allocation framework for rivers and streams in the region:

a. Where a river had a catchment specific framework in Schedule WQN1. These flow and allocation frameworks were developed in consultation with the community. When the NRRP became operative it contained catchment specific regimes for the following rivers:

i. Ashley River / Rakahuri

ii. Avon River / Otakaro and Heathcote River

iii. Motunau River

iv. Kaikoura Rivers (Some)

b. Where resource consents had been granted to take water but no catchment specific flow and allocation planning process had been undertaken the minimum flow on the consent was included in Appendix WQN1 and the size of the allocation block was determined in accordance with Schedule WQN2.

c. Where a river or stream had no catchment specific framework in Schedule WQN1 or minimum flows in Appendix WQN1 then the minimum flow would be determined by resource consent to achieve the outcomes in Policy WQN3.

28. In addition to the management framework in the NRRP, management of the flow of the many of the larger rivers in the Region is managed by a number of various planning documents, listed as follows:

a. By water conservation order:

- National Water Conservation (Rakaia River) Order 1988
- National Water Conservation (Ahuriri River) 1990
- National Water Conservation (Te Waihora/Lake Ellesmere) Order 1990
- Water Conservation (Rangitata River) Order 2006

b. By catchment specific regional plan:

- Opihi River Regional Plan 2000
- Waimakariri River Regional Plan 2004
- Waitaki Catchment Water Allocation Regional Plan 2005

2.3 The Land and Water Regional Plan

29. The proposed Land and Water Regional Plan ("LWRP") was notified on 11 August 2012, with submissions due to close on 5 October 2012.

30. The LWRP builds on the framework set out in chapters 4 to 8 of the NRRP, but aligns the planning framework much more closely with the outcomes sought in the CWMS. It also updates the planning framework to be more responsive to the current resource management issues in the region.

31. When operative, the LWRP will replace Chapters 1 and 4 to 8 of the NRRP and catchment specific plans will be incorporated into the LWRP framework over time. It is envisioned that in the future the HWRRP will be incorporated into the LWRP framework, but this would occur as a future variation or plan change, subject to the RMA prescribed process, and is not part of this plan hearing.

32. In comparison with the NRRP, it is my view that the LWRP is a more simplified document. It is contained in one volume, rather than the eight chapters in the NRRP, and is drafted to specifically be a consenting document. Like the HWRRP it contains no methods other than rules. As a general rule, policies have been drafted to provide guidance to decision makers on consent applications, rather than the process type policies that were contained in the NRRP[1].

3 Large Scale Water Storage

33. The use of water for storage in the Hurunui and Waiau Catchments has been considered for some time. The National Hydro-electric Resource Assessment undertaken by the Ministry of Works and Development, for the Marlborough and North Canterbury area in 1988[2] identified a range of sites in the Hurunui and Waiau Catchments for potential hydroelectric power development, including a diversion of water from the Clarence River.

34. However, it was not until the early 2000's when large scale water storage for irrigation was discussed in earnest, with the identification through stage 1 of the Canterbury Strategic Water Study (CSWS) of the economic potential of the Hawarden area if reliable irrigation could be delivered to this area. This was part of a wider study to investigate if it was possible for amount of irrigated land in Canterbury to be increased to 500,000ha. This initial study prompted a number of individuals and groups in the Hurunui District to start considering opportunities for further land intensification through irrigation.

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[1] For example Policy WQN3 describes the matters to consider when the Council develops flow and allocation regimes for river. Policy WQN4 describes how the Council will review minimum flows on existing resource consents and include a regime in Schedule WQN1.

[2] East Harbour Management Services 2004 *Waters of National Importance Identification of Potential Hydroelectric Resources*

35. During stage 1 of the CSWS it was identified that 63,000ha of additional land could potentially be irrigated in the Hurunui Catchment and around 10,000ha could be irrigated in the Waiau Catchment.

36. Since 2002, a collection of land owners and groups including Ngai Tahu Property, Mainpower and the owners of Eskhead Station have been assessing the feasibility of a water storage scheme including possible locations and options in the Hurunui District. This group was known as the Hurunui Community Water Development Project and it operated as a Working Group until it became a limited liability company and became known as the Hurunui Water Project.

37. he Hurunui Water Project Limited (HWP) was formed in June 2008 by four founding shareholders: Hurunui Irrigation and Power Trust, Ngai Tahu Property Limited, MainPower New Zealand Limited and David Teece (the owner of Eskead Station).

3.1 Proposed Natural Resources Regional Plan Framework

38. When Variation 1 to the NRRP was notified in 2004, proposed policies WQN1 and WQN2 created, in my view, a restrictive framework for storage in the upper Hurunui Catchment.

39. Proposed Policy WQN1 identified water bodies within and adjacent to the Southern Alps Area of the Crown Reserve (administered by the Department Of Conservation), and Lake Sumner, Lake Taylor, Lake Sheppard and Loch Katrine as being "*natural state water bodies*". As such, the taking, using, damming and diverting of water was directed under this policy to have no more than minor effects on these water bodies.

40. Proposed Policy WQN2 of the NRRP identified the mainstem of the Hurunui River to Lake Sumner and tributaries of the Hurunui River upstream of the Mandamus River, (but not including the Mandamus) as well as the Waiau River and all tributaries upstream of the confluence of the Hope River as "*high naturalness water bodies*". These water bodies were listed in proposed Schedule WQN5 of the NRRP. Policy WQN2(2a) sought to maintain the high naturalness of these water bodies by preventing damming of the mainstems of the Hurunui, Waiau, Hope & Boyle rivers. Policy WQN2(2b) sought to prevent damming of any water bodies defined in Policy WQN2, not covered in Policy WQN2(2a), where such damming would significantly impact on the values in the area to be dammed. This strong policy position was to be implemented through proposed Rule WQN43, which made applications to dam the water bodies described in Policy WQN2(2a) a prohibited activity, while Rule WQN42 made those water bodies described in Policy WQN2(1) and not further described in Policy WQN2(2a), a non-complying activity.

41. The taking or diverting of large amounts of water, or those diversions not associated with infrastructure maintenance, in natural state and high naturalness water bodies (i.e. those identified in Policy WQN1 or WQN2) was proposed as a non-complying activity under Rule WQN11. This rule did not apply to drinking or stock water takes, or small scale takes for other purposes. A large number of submissions were received on the policies and rules

outlined, and I note that these were modified through the submission and hearing process as a result.

3.2 Hurunui Water Conservation Order Application

42. In August 2007 an application for a Water Conservation Order (WCO) on the Hurunui River was made by the New Zealand and North Canterbury Fish & Game Councils and the New Zealand Recreational Canoe Association.

43. Following the submission period, and prior to the appointed Special Tribunal making their recommendation on the WCO, in June 2009 Hurunui Water Project made an application to Environment Canterbury to develop a dam on the South Branch of the Hurunui River and a weir on Lake Sumner to manage the lake's level. This was intended to provide a sufficient supply of water to irrigate 42,000ha of land in the Hurunui and Waipara Catchments.

44. On 5 August 2009 the Special Tribunal provided its recommendation to the Minister for the Environment. The Special Tribunal recommended that the North Branch, Lake Sumner, Loch Katrine, Lake Marion, the Upper South Branch and the Hurunui River from the Lake Sumner outlet to the confluence of Surveyors Stream with the Hurunui Mainstem at the bottom of Maori Gully should be preserved in their natural state. If the Minister for the Environment had accepted the recommendation the weir and subsequent management of the Lake Sumner outlet would not have been able to be consented. The South Branch[3] of the Hurunui River, while identified as having high values, was not considered of such significance that a Water Conservation Order was warranted for protection.

45. At this time the CWMS was beginning to gather momentum, with Environment Canterbury receiving the Strategic Framework document in November 2009. Zone Committees were established, with the Hurunui and Waiau Zone Committee being the first. As stated in John Faulkner's evidence, the Zone Committee had their first meeting on 26 July 2010.

46. It is my understanding that at their inaugural briefing the then Minister for the Environment Dr Nick Smith informed the Zone Committee that it was their job to "*sort out*" the tensions in relation to the four planning processes that were at that time occurring in the Hurunui Catchment:

- The WCO recommendation from the Special Tribunal
- The Hurunui Water Project resource consent application
- The Zone Committee implementation of the CWMS vision and principles and development of the Zone Implementation Programme.
- NRRP decisions which were due to be released on 23 October 2010

47. Environment Canterbury Commissioners were also cognisant of the tensions and issues relating to these multiple planning processes, and recommended

[3] The upper South Branch, upstream from the confluence of Masons Stream, was recommended as being worthy of protection in its natural state and was included in the recommendation by the special tribunal for a water conservation order. This area is upstream of the proposed South Branch dam site.

to the Minister for the Environment that a moratorium be established for the Hurunui Catchment.

48. The Minister for the Environment accepted the recommendation and imposed the moratorium on 2 August 2010.

49. The moratorium applied to any activity involving the taking, use, damming or diverting of surface water or stream depleting groundwater (known as hydraulically connected groundwater) within the Hurunui Catchment.

50. Because of this moratorium, the processing of Hurunui Water Project's consent application ceased and the application essentially was placed on hold until 1 April 2012 (six months after the 1 October 2011 lifting of the moratorium). When the moratorium was imposed the New Zealand and North Canterbury Fish & Game Councils and the New Zealand Recreational Canoe Association withdrew their WCO application.

3.3 Zone Committee Process – Water Storage

51. The location of major water storage dominated the initial period of Zone Committee meetings. Because of the attention that the WCO and Hurunui Water Project consent application had received, all Zone Committee members were aware of the historical process that had led to the formation of the Committee.

52. The Zone Committee received presentations on this subject from stakeholder groups, development interests, runanga representatives and individual community members, as well as receiving many technical reports. Over time, this led to the Committee forming their collective position, which is expressed in the ZIP and is discussed below.

53. It is important to note that while this evidence largely discusses water quantity, locations for water storage and water quality separately, the Zone Committee was very conscious that these matters were related and needed to be managed in tandem. On this basis, the ZIP recognises that an integrated approach to land and water management is required, with land use guidelines, water quality standards, environmental flows and the introduction of new water created by water storage projects being directly related to each other (p6, ZIP). It is my opinion that this interrelationship needs to be considered when discussing large scale water storage.

Location of major water storage

54. From my observation of the Zone Committee process, it is my understanding that one of the first questions the Zone Committee asked themselves was 'is more water needed?' The Committee agreed that in order to achieve the most CWMS targets, "more water" from storage and inter-catchment transfers would be required in order to deliver the economic and social targets and some of the cultural, environmental and recreational targets (p6, ZIP).

55. While the Committee considered that some additional irrigation water could come from additional groundwater takes, efficiency gains and the use of small-scale storage, the additional irrigated area from these activities is likely

to be minor (p42, ZIP). Therefore the Committee accepted that major water storage would be required if there is to be substantial land-based economic development in the zone.

56. The options for storage within the Zone, and the Zone Committee's consensus position on these are detailed in pages 42 – 45 of the ZIP. While reference should be made to the more detailed discussion in the ZIP which is attached to the evidence of Mr Falkner, and noting the background reports and discussions that feed into the ZIP, it is my opinion that the key points to note are:

    a. That the consensus view of the Committee is that major water storage in the Waitohi River is a key component of an integrated more water solution for the Zone. This is for a number of reasons that in my opinion take into account and balance environmental, recreation and amenity values, as well as commercial considerations.

    b. While the Waitohi option is the Zone Committee's preferred location for major water storage in the Hurunui catchment, the Committee recommended that options for water storage using Lake Sumner or the South Branch of the Hurunui River, be provided for as a back-up option, and subject to any proposal achieving a number of identified matters. It is my view that their position is cognisant of the potential inability to deliver some of the CWMS targets if the preferred option does not come to fruition.

    c. I also note that an independent assessment of three options for storage in the Waitohi area was completed in December 2011, which included an assessment of the options in relation to the CWMS the ZIP, and affordability. This concluded that the options considered were at the high-end of affordability ($7,500/ha).

    d. The Committee considers that dams should be prohibited (for reasons identified in the ZIP) on the mainstem of the Waiau River and, the upper Waiau River and tributaries above the Hope confluence; and on the mainstem of the Hurunui River below the confluence with the South Branch.

    e. In my opinion, the provisions of the HWRRP are consistent with the ZIP, and as such, the HWRRP provides a statutory framework for consideration of proposals that is in line with the integrated approach of the ZIP.

4 Water Quantity Hurunui River

57. In 1980, the North Canterbury Catchment Board and the Regional Water Board developed, prepared and adopted a Water Management and Allocation Plan (the 1980 Plan) for the Hurunui River. This was prepared under the Water and Soil Conservation Act 1967. At that time there was very little abstraction from the Hurunui River Catchment, however it was known that the Ministry of Works was planning the Balmoral Irrigation Scheme to irrigate approximately 5000ha of the Culverden Plains as part of an integrated

scheme with that already being undertaken by the Amuri Irrigation Scheme taking water from the Waiau River.

58. The 1980 Plan set the following monthly minimum flows:

    a. 10 m^3/s January to July

    b. 11 m^3/s in August

    c. 13 m^3/s in September

    d. 17 m^3/s in October

    e. 16 m^3/s in November and

    f. 11.5 m^3/s in December.

59. Under the 1980 Plan, the total allocation block size was limited to 7.5 m^3/s, and a 1:1 flow sharing regime was required so that if the flow was above the minimum only half the flow above the minimum flow could be taken for abstraction. For example if the minimum flow is 15 m^3/s and the river was flowing at 20 m^3/s only 2.5 m^3/s could be abstracted.

60. To the best of my knowledge the 1980 Plan had a life of 10 years, and when it expired in the mid 90's it was not renewed nor was the life of the Plan extended in any formal way.

61. In the mid 1990's when the Balmoral Irrigation Scheme consent expired and required renewal, a new set of minimum flow conditions were applied, and the 1:1 flow sharing requirement removed. This regime applied to the current consent for the Balmoral Irrigation Scheme following this renewal can be summarised as follows:

    a. 12 m^3/s in January to July

    b. 13 m^3/s in August

    c. 15 m^3/s in September

    d. 19 m^3/s in October

    e. 18 m^3/s in November

    f. 13.5 m^3/s in December

62. I note that the minimum flow for the Balmoral Irrigation Company was 2 m^3/s higher than other abstractors; however the removal of the 1:1 flow sharing resulted in an improved reliability of supply for their scheme.

63. In 2002 Dr Paul Mosley completed a report on the Hurunui catchment which identified the values present within the catchment and recommended a proposed minimum flow regime to protect these values.

64. A derivative of the regime recommended by Dr Mosley was included as a minimum flow condition on a limited number of resource consents, granted between 2002 and 2007. This regime has much higher minimum flows than both the 1980 Plan and the Balmoral scheme, and subsequently lower

reliability. The inclusion of this minimum flow regime was not consistent with the process described in the NRRP to set a minimum flow and allocation block size, which is discussed more fully in section 5 on the Waiau Catchment.

65. It is my understanding that the flow regime proposed by Dr Mosley was applied to consents as a pragmatic move because at the time it was expected that the regime notified for the Hurunui River would be notified with minimum flow restrictions similar to that recommended by Mr Mosley. Therefore, including Dr Mosley's minimum flows was expected to reduce the number of consent reviews that would be needed to implement the revised flow and allocation regime.

66. In 2004, alongside notification of the NRRP, investigations were undertaken to assess the effect of further abstraction on the ecological, economic, cultural and recreational values of the Hurunui River. This included NIWA being commissioned to carry out a 2 Dimensional Modelling study, and a range of technical reports were prepared which summarised the values present within the catchment.

67. A Community Advisory Group was established at a public meeting on 23 February 2004 and the Community Advisory Group met 6 times between 2004 and 2007. In addition an agricultural interest group and a recreational/environmental interest group meeting were held in 2004 and 6 public meetings were held between 2004 and 2007.

68. The Community Advisory Group feedback was utilised to develop Variation 8 to the NRRP, which proposed a revised allocation regime for the Hurunui River.

69. Variation 8 separated the Hurunui River mainstem into two reaches. The Amuri Plains Reach from the upstream of the Mt Palm Gorge to the headwaters and the Domett Plains reach which extended from the Mt Palm Gorge to the mouth of the Hurunui River. The A Block allocation limit was restricted to 6.7 m^3/s in the Amuri Plains Reach and 2 m^3/s in the Balmoral Reach.

70. The proposed minimum flow for both reaches was the same; however the monitoring site for the Amuri Plains Reach was set at the Mandamus Minimum flow recorder while the State Highway 1 flow recorder was used for the Balmoral Reach of the Hurunui River. Like the earlier regimes the minimum flow varied monthly as follows:

    a. 15 m^3/s in January

    b. 12 m^3/s in February and March

    c. 15 m^3/s in April

    d. 12 m^3/s from May to July

    e. 13 m^3/s in August

71. A B Allocation Block was proposed for both the Domett and the Amuri Plains reach. This was set at between 7.5 and 10 m^3/s in the Amuri Plains reach, but up to 15 m^3/s could be allocated if the flow was above 40 m^3/s. this provided for a total annual allocation limit of 90 million m^3/s from 1 May to 30 September. The allocation limit for the B Allocation Block was set at 2 m^3/s for the Domett Plains Reach with the same B Block minimum flows as the Amuri Plains Reach.

72. Under Variation 8, the Policy and Rule framework in chapters 4 and 5 of the NRRP would still be used to manage storage locations, groundwater allocation limits and the effect of groundwater takes on surface flow and water quality. The Community Advisory Group discussed these issues but only Schedule WQN1 was modified by Variation 8.

73. Variation 8 was notified on 25 August 2007. In 2009 it was identified that:

    a. The B Block in the Amuri Plains Reach overlapped with the A Block, which could result in too much water being abstracted at times of low flow to protect values

    b. Several submissions on the variation had been summarised incorrectly.

    c. The summary in Variation 8, which described the way that the regime operated, was inconsistent with the table which would eventually be incorporated into Schedule WQN1.

74. Once these issues were identified it was decided that Variation 8 could not progress to a hearing and either a subsequent variation would need to be notified to address these issues or Variation 8 would need to be withdrawn and a new variation promulgated which addressed these issues.

75. When the Moratorium on resource consent applications for water takes was applied to the Hurunui Catchment, Variation 8 was withdrawn.

5 Water Quantity Waiau River

76. In 1975 the North Canterbury Catchment Board and the Regional Water Board developed, prepared and adopted a Water Management and Allocation Plan (the 1975 Plan) for the Waiau River. At that time there was very little abstraction from the Waiau River Catchment with abstraction limited to 44l/s for domestic (urban and rural) drinking water supplies, 430l/s for stock drinking water and 570l/s for irrigation (which included the Waiareka Downs Irrigation Scheme). However at this time the Ministry of Works had already applied to the National Water Authority to take 11m^3/s to irrigate 15,000ha of the Waiau Plains (this is now the Amuri Irrigation Company's Amuri irrigation scheme) with plans in place to irrigate 4,500 additional hectares of the Emu Plains and 2,700 additional hectares in Spotswood. At this time, it appeared that irrigation would be the dominant consumptive use of water within the Waiau Catchment.

77. The North Canterbury Catchment Board proposed and adopted the management strategy that total water abstraction would not exceed 15m^3/s upstream of the Stanton and 3m^3/s downstream of the Stanton confluence.

78. It also adopted a policy that:

    a. In the months of October, November and December flows in the Waiau would not be reduced by abstraction to less than 60% of the natural flows at Marble Point or 25m^3/s whichever is the greater;

    b. In the months of January the flows in the Waiau would not be reduced by abstraction to less than 60% of the natural flows at Marble Point or 20m^3/s whichever is the greater;

    c. In the months of February and March flows in the Waiau would not be reduced by abstraction to less than 60% of the natural flows at Marble Point or 15m^3/s whichever is the greater;

    d. Abstractions below the Stanton confluence should not at any time exceed 10% of the pre-abstraction flow at Marble Point.

79. Therefore in the Waiau Catchment the minimum flow was:

    a. 25 m^3/s from May to December

    b. 20 m^3/s January and April

    c. 15 m^3/s February and March

80. This policy also created a very different restriction regime on the Waiau River compared to the Hurunui River. Where the Hurunui River had 1:1 flow sharing, meaning restrictions started at the minimum flow plus twice the allocation block, the Waiau River had a restriction regime based on leaving a percentage of the natural flow in the river. The restriction policy was also applied to consents inconsistently so some consent holders such as AIC essentially had the restriction applied to their consent rather than across the allocation block. The effect of the different restriction regimes has resulted in consents to take water on the Waiau River having a much better reliability of supply than those on the Hurunui River.

81. Included with the 1975 Plan were the available flow statistics and the level of restrictions that would result from the imposition of the Plan's conditions.

82. The life of the Plan was from 1975 to 1985 subject to review at an earlier date if required. The Plan was not (to the best of my knowledge) reviewed, nor was the life of the plan extended. Despite this the allocation regime contained in the 1975 Plan was used as the allocation regime applied as conditions to resource consents to take water as demand for the water resource increased in the late 1990's and early 2000.

83. When the NRRP was notified, surface water abstraction (including stream depleting ground water) was managed by two main planning mechanisms: the Resource Management Act (RMA) itself which requires resource consent unless the activity is allowed in an operative regional plan and the proposed NRRP.

84. Proposed Policy WQN14 (now Policy WQN13) of the NRRP provided guidance for the allocation regimes for surface water and ground water. Part 5 of the proposed Policy allowed Environment Canterbury to develop an interim allocation block, when an allocation regime had not yet been provided in Schedule WQN1 or when a standalone plan had not been developed. Proposed Policy WQN14 referred the reader to Schedule WQN2 which provided guidance as to how the interim allocation block should be developed, unless there was insufficient data in which case a precautionary approach should be taken.

85. While the proposed NRRP set an alternate size of allocation block, it was not able to be calculated because the allocation block size was different depending on whether or not the January or February minimum flow was used. Therefore, it is my understanding that the Allocation blocks specified in that 1975 Plan continued to be utilised as the 'interim' allocation block instead of the block specified in by Schedule WQN2 of the NRRP.

86. Appendix WQN2 includes a reference to the 1975 Plan developed by the North Canterbury Catchment Board. This has provided Council with the opportunity to continue to utilise the minimum flows that were specified in the 1975 Plan as the minimum flow conditions for most takes.

87. Like the rest of Canterbury, demand for water continued to increase over the early and mid-2000's, albeit at a slower pace than the central Canterbury plains. This has resulted in the allocation limits described in the 1975 Plan being exceeded. It is my understanding that over-allocation occurred without knowing that the allocation limits were being exceeded. The major reason for the over-allocation occurring is due to our understanding improving as to how shallow and near river groundwater takes impact on surface water flows, resulting in a higher proportion of groundwater takes being assessed as having an rapid effect on surface water flows. Therefore, in the Waiau and Hurunui Rivers over allocation primarily occurred due to change in how the effect of shallow groundwater takes on river flows is calculated, which is now described in Policy WQN7 of the NRRP.

88. The summer of 2008 was very dry in North Canterbury; this resulted in the Waiau River dropping to low levels. At this time there was a fault with the Marble Point flow recorder which resulted in incorrect readings meaning that abstractors did not realise that the river was low and they needed to restrict their take. As a result the river dropped to very low levels in the braided section of the river adjacent to Waiau Township and at the State Highway One Bridge. Two public meetings were held where the community expressed strong reservations about the current management regime. There were two key outcomes from those initial public meetings, first a community advisory group was established[4] and secondly it was identified that there was a lack of technical information available on the Waiau River.

[4] 74 individuals put their names down to be part of the Community Advisory Group and another 80 individuals indicated that they would like to be kept informed of the process. Over the course of consultation period a core group of about 20 individuals emerged who attended all meetings.

89. Environment Canterbury committed to undertaking two pieces of technical work. The first was a 2 Dimensional Modelling Study carried out by NIWA, which is discussed in the evidence of Mr Maurice Duncan, and the second was 5 technical assessments on 17 Waiau River Tributaries, from which an ecological report was prepared by Dr Greg Burrell of Golder Associates and a Cultural Values Assessment prepared by Dianna Jolly on behalf of Te Runanga o Nagi Tahu. The majority of this work was completed in May 2009.

90. In late 2008 it was identified that the A Allocation Block in the Culverden stretch of the River, upstream of the Stanton River confluence was fully allocated. Following this, applicants for new consents were then given the opportunity to accept interim B Block water at a very high minimum flow (approximately 74m^3/s) or put their applications on hold and see if the flow and allocation process identified additional A Block water which could be allocated. It was my understanding at the time that most consent applicants choose to put their applications on hold.

91. Two public meetings were held in Culverden and Cheviot to update the community on the progress that had been made over the preceding 12 months and also to reconfirm that the Community Advisory Group would be discussing options to manage the flow in the Waiau River to develop a flow and allocation regime by 31 June 2012.

92. The Community Advisory Group met 7 times between August 2010 and October 2011. Four additional meetings were held with abstractors taking from tributaries of the Waiau River. At the final meeting the Community Advisory Group were presented with a proposed flow and allocation regime for the Waiau River[5] by Environment Canterbury Staff.

93. This proposed regime capped the size of the A Allocation Block at 18m^3/s, and included all takes within the catchment. Tributary takes would have a lower tributary specific minimum flow but would also have to comply with the mainstem minimum flow. This was done to:

    a. recognise that the gauging sites for tributaries in the Waiau catchment were infrequently gauged which may limit when abstractors go on restriction and then a delay until the site is re-gauged before restrictions are lifted.

    b. recognise that the minimum flow on the Waiau River is only 1 m^3/s above the lowest ever recorded flow. So when this is reached the in-river values are stressed. The upper catchment is fed by nor-west rainfall patterns while the lower catchment where tributary catchment flow occurs are fed by southerly and south-easterly rainfall events.

94. Under the proposed regime, the artificial separation between that area above the Stanton and below the Stanton River was to be removed. The two reach

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The community advisory group was made up of abstractors, conservationists, specific interest groups and concerned residents. However the majority of the group represent abstractive interests.

[5] See Appendix One

system used in the Hurunui was considered, but discounted because there was not a large inflow into the Waiau River.

95. The minimum flow proposed was $20m^3/s$ all year round. This was recommended to:

    a. Minimise the risk of river mouth closure

    b. Maintain salmon passage

    c. Maintain jet-boat passage

96. Groundwater takes within the 'River Zone[6]' (were proposed to be managed as surface water takes, unless it could be shown by way of a site specific investigation that the NRRP framework in Policy WQN7 was more appropriate. Revised groundwater allocation zone volumes were also proposed.

5.1 Specific Concerns identified in the Waiau Catchment

97. As explained above, during stage one of the CWMS investigations were undertaken to assess the amount of potentially irrigable land, and in relation to the Waiau Catchment, an additional 10,000ha was identified. However, during consultation on the proposed flow and allocation regime for the Waiau River, it became apparent that these irrigable land areas did not align with the local knowledge expressed by members of the Community Advisory Group. Environment Canterbury therefore commissioned Aqualinc to reassess the amount of irrigable land within the Waiau Catchment. This report indicated that there was 35,785ha of land that could potentially be irrigated, broken down into various sub-catchments. This identified that the largest area of un-irrigated land within the catchment was located in the lower Waiau catchment area around Cheviot, including the Parnassus, and Leamington / Spotswood areas, as well as the Jed Catchment, and included around 8500ha of land. It was estimated that irrigation of this area, at an application rate of 0.6l/s/ha would require approximately 5 cumecs of water, assuming that this was irrigated from run of river irrigation.

98. Consultation with the members of the lower Waiau community identified strong concern that while this area received the adverse environmental effects of additional irrigation, they were not receiving the economic benefits that irrigation provides. However, there was also a strong feeling that the Jed River and other lower Waiau Tributaries were too small to provide reliable irrigation for this area.

99. There was also concern expressed by members of the Community Advisory Group that with the current minimum flow in February and March of 15 cumecs the Waiau mouth constricted or was closed. This was considered to be anecdotal evidence because there were no published scientific reports on mouth closure. While several community members mentioned the mouth closing, no-one could provide dates when closures had occurred or

[6] The River Zone is an area based on the Q1 and Q2 alluvial gravels where groundwater interacts rapidly with surface water flows. This is discussed more fully in the evidence of Mr David Poulsen.

photographic evidence to prove mouth closure. Never the less there was a strong desire to ensure that the Waiau River mouth did not close.

100. Dr Paul Mosley in his 2004 report indicated that the Waiau River was likely follow a similar closing pattern to that of the Hurunui River, which is known to close or constrict when flows drop below around 10 cumecs at Mandamus and 13.5 cumecs at the mouth. Due to the larger size of the Waiau River Mosley estimated that around 15 cumecs would be needed to keep the mouth open, but this was dependent on sea and wind conditions which could cause the mouth to close at higher flows.

101. Dr Jeff Smith (Water Resource Scientist at Environment Canterbury) undertook a regression analysis to predict the flow at the mouth when a given flow is known at Marble Point. This was undertaken using both recent gauging data and utilising the new flow recorder at the mouth as well as data collected between 1990 and 1995 when a flow recorder was present just upstream of the mouth. This identified that under the existing irrigation, when 19.5 cumecs was flowing at Marble Point, approximately 20 cumecs can be expected at the mouth with current irrigation.

102. If more takes were permitted from tributaries of the Waiau River and these takes are not required to reduce or cease abstraction from the River when the minimum flow at Marble Point is reached, there would be less water that reaches the mouth.

103. This same logic was applied to the Hurunui Catchment, so all takes from the Hurunui Catchment would need to cease when the minimum flow at the Mandamus Flow Recorder is reached. In my view this is a more tenuous position because the Pahau River provides significant inflows into the Hurunui River below the Marble Point flow recorder. Mosley 2002, based on work by Docherty (1979), indicates that a flow of 10 cumecs at the Mandamus flow recorder will cause the mouth to close and it will not reopen until flows are above 15 cumecs at the Mandamus flow recorder. Mosley does however quantify this statement by saying that this is dependent on a range of sea conditions and river flows.

104. No B Block was proposed for the Waiau Catchment because of the debate that was occurring at the time as to the need for a ‘gap’ between the A and any potential B Block, many agricultural interests were suggesting that the proposed gap would make the water too unreliable, while conservation and environmental groups saw the gap as being essential to provide for flow variability. The need for a gap is discussed in the evidence of Ton Snelder. It was also identified at this time that the newly formed Hurunui Waiau Zone Committee would eventually make a recommendation to Environment Canterbury as to the preferred integrated solution for the Hurunui and Waiau catchments in the ZIP and this would inform the desired B Block allocation regime.

105. The proposed regime was not universally endorsed by members of the Community Advisory Group, with the major areas of concern relating to:

a. The effect on reliability of supply from removing the 'banding' of consents by having a single allocation block;

b. The proposed increase of the minimum flow, from the 1975 Plan, from 15m^3/s to 20m^3/s in February and March;

6 Zone Committee response to flow and allocation in the Hurunui and Waiau Rivers

6.1 Introduction

106. It is my observation that the Zone Committee, when it began to consider the flow and allocation regime for the Hurunui and Waiau Rivers, made a concerted effort to build on the significant community effort that had gone into these processes.

107. I note that many of the individuals who were appointed to the Zone Committee were also active members of either the Hurunui or Waiau community advisory groups, such as John Faulkner, Tony Hawker, Winton Dalley and Andrew Harris on the Waiau Community Advisory Group and Mike Hodgen and Winton Dalley on the Hurunui Community Advisory Group. Some members of the Zone Committee were also active technical contributors to reports commissioned by Environment Canterbury, such as Professor Ken Hughey's input into the 2D modelling work and Tony Hawker's input into the recreational assessments which were carried out on the Hurunui[7] and Waiau[8] Rivers. It is therefore my view that there was an impressive understanding around the Zone Committee table as to the ecological and economic effects of various minimum flow options.

108. Therefore the Zone Committee did not start with a blank sheet of paper, rather it was my observation that the they inherited a package, with many issues already resolved, but a consensus solution yet to emerge for some of the more complex, challenging or controversial issues.

109. From my observations, and as recorded in the ZIP, the Zone Committee recognised that any solution must be integrated, with as far as practicable the same rules applying to an abstractor in the Waiau Catchment as the Hurunui Catchment. In late 2010 when the Zone Committee began grappling with the issues there were significant policy differences between the position taken in Variation 8 and the position presented to the Community Advisory Group for the Waiau River.

6.2 Minimum Flow for the Hurunui River

110. The ZIP records the position reached by the Zone Committee in relation to flow and allocation regime for the Hurunui River, which I have summarised below. These recommendations have formed the basis for the flow and allocation regime proposed in the HWRRP:

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[7] Crossman 2011 Hurunui Conservation / Recreation Stakeholder Analysis – Workshop and Field Assessment

[8] Parrish 2011 Waiau Conservation / Recreation Stakeholder Analysis – Workshop and Field Assessment

a. The Committee considered there was reasonable support for the minimum flows proposed in Variation 8, both from the farming and recreational community and from the analysis of the 2D model from NIWA, except for minimum flows proposed for January, and particularly April, because of impact that these higher flows would have on the reliability of supply of existing consent holders. On this basis they recommended that the minimum flow for January be 15m^3/s because there was only a limited impact on reliability of supply but the minimum flow in April be set at 12 m^3/s, with an increase to 15m^3/s being required following development of storage (p. 27, ZIP).

b. The use of water out of the catchment should not come at the expense of potential in-catchment users, including those in the lower Hurunui who had expressed concerns about missing out on water (p. 28, ZIP).

c. The Committee considered, based on analysis of the 2D model, that a lower minimum flow would be acceptable in winter for non-consumptive takes, recommending a reduction from 12 m^3/s to 10 m^3/s in June, July and August.

111. During the development of the flow and allocation regimes in the ZIP, the Zone Committee spent a great deal of time explicitly considering the effect that changes to the minimum flow and allocation block would have on the existing users reliability, the additional cost that higher minimum flows or smaller B and C allocation blocks would have on any new water storage proposal, while at the same time considering the effect of lower minimum flows and higher allocation blocks would have on the in-stream values and ecosystems and the negative effect that lower river flows would have on the recreational uses of the rivers.

6.3 Reliability of Supply

112. I note that the effects on reliability of supply for current abstractors was a matter considered by the Zone Committee, and is referred to in the ZIP. In particular I note that the Committee considered that the changes recommended to the minimum flows of Waiau and Hurunui Rivers prior to storage being developed would not have significant impact on reliability of supply for current abstractors.

113. In addition to this, the Zone Committee was also aware that current abstractors are grouped into a number of priority bands such that some abstractors face water restrictions before others. It is my experience that in practice priority banding is difficult to implement and does not assist in progressively managing water restrictions, in part because of the lack of real-time water-use data.

6.4 C Allocation Blocks Hurunui and Waiau Rivers

114. I note that both the Hurunui and Waiau Community Advisory Group processes discussed the size of the B Allocation Block. In both cases the recommended size of the block was set to provide a high level of certainty that environmental values would be protected. The modelling undertaken was based on all the water allocated to an activity taking that water all the time.

115. As is noted in the ZIP, the "more water" options considered within it in the Hurunui and Waiau catchments will require substantial water takes if they are to be economically viable.

116. At the time the ZIP was formulated, there were limited technical investigations available to assess the in-river impacts of very large water takes from Hurunui and Waiau Rivers. On this basis, the Zone Committee identified a range of in-river outcomes that they considered additional water takes should achieve, that are listed in the ZIP (p. 24 & p.29) and as follows, and which form the basis for Policy 3.5 in the HWRRP:

    a. Maintain or enhance river mouth and coastal processes;

    b. Maintain the extent of active floodplains;

    c. Maintain or enhance the mauri of the Hurunui River and/or Waiau River;

    d. No net loss of braided river bird habitat;

    e. No net loss of natural high quality and large wetlands;

    f. No net loss of important indigenous plant communities;

    g. Maintain native fisheries and valued introduced fish species;

    h. Maintain or enhance mahinga kai access and resource;

    i. Maintain the diversity and quality of water-based recreation and amenity.

117. Following the public release of the draft ZIP, the Zone Committee was informed through subsequent technical investigations that if the amount of water sought to be taken for irrigation and hydro-electric generation was taken all of the time then it was unlikely that the values they described in the ZIP would be achieved. These investigations were not based on an assessment of individual projects and I note that these may be able to achieve the outcomes listed in the ZIP by not taking all of the allocation block all the time.

118. In order to provide for consideration of the allocation of more water for an individual project to enable major storage, while still achieving the outcomes sought for these rivers, a C Allocation Block has been proposed in the HWRRP. Applications for this water will however need to be assessed against Policy 3.5 As such, it is my view that the onus will be on applicants to provide technical investigations that show how C Block takes will not compromise in-river ecological, cultural and recreational outcomes.

6.5 Use of water for irrigation and hydropower generation

119. The ZIP identifies that irrigation development is considered to be a significant driver of economic development, and that the Zone Committee considers that hydro-generation is likely to be an integral part of any major irrigation development in the Zone (p. 32). However, the Committee recommended through the ZIP that the use of water for irrigation should have higher priority than the use of water for hydropower generation (without associated irrigation development), so that the long-term irrigation development goals of the Zone would not be compromised by the use of water for hydropower generation alone (refer p. 33, ZIP).

120. In my opinion, this position is reflected in the HWRRP in Objective 6 and its related policies and rules, including the requirement for consent applications to take and use water to submit an Infrastructure Development Plan.

6.6 Taking of Water in the Lower Waiau River

121. The ZC considered it important that any flow and allocation regime that was developed reserved some water for irrigation of the lower Waiau area. This was proposed at $6m^3/s$ because it was accepted that this water would be too unreliable to use as run of river irrigation. Dr Jeff Smith modelled irrigating an additional 5,700ha under a range of scenarios, all of which included an 18 m^3/s gap between the A and the B Block, and this modelling identified that with a 22,000,000m^3 storage facility, reliable irrigation water could be provided. While that analysis has not been repeated with the smaller gap size of $2m^3/s$ proposed in the HWRRP, it was considered by the ZC that given the unknowns around the size of storage facility and uncertainties around the take up of irrigation, that reserving 6 m^3/s would provide future proofing for this area to take up the option of irrigation.

7 Water Quality

7.1 Background to water quality in the Hurunui River Catchment

122. In the late 1990s, concerns were raised about the quality of water in the lower Hurunui River. This was because the lower reaches of the river frequently had

high nutrient and indicator bacteria concentrations which compromised its suitability for contact recreation, such as swimming, in the summer months.

123. In 2000, during January to March, after a long period of stable flows in the Hurunui River, periphyton blooms occurred that resulted in concern being expressed about nutrients in the Hurunui River. Hayward (2006) estimated that the Pahau and its tributaries contributed 77% of the phosphorus and 85% of the nitrogen to the Hurunui mainstem concentrations.

124. As a result of this, the '*Pahau Enhancement Group*' (PEG) was established to manage activities on farms within the Pahau area. The PEG has been particularly successful[9] in reducing the level of phosphorus in the Pahau River, and as a result, reducing this in the mainstem of the Hurunui River. At the time CRC resource care officer Emma Stone said the "*response from farmers had been outstanding. They have really embraced the need for changes and have carried out some pretty major work in some cases*.[10]"

125. In July 2007, the planning report developed for the notification of Variation 8 to the NRRP (Hurunui Flow and Allocation Regime) made specific mention of the improvements made by the PEG. While the Variation 8 process was limited in scope to only considering the flow and allocation regime, because of the concern about water quality, consideration was given within this regime to increasing minimum flows to dilute nutrients in the Hurunui Mainstem. However this approach was discounted by the Community Advisory Group because calculations at the time showed that an increase in minimum flow to 20 cumecs would only dilute nutrients by 25% of what was needed to achieve the proposed NRRP water quality objectives. Instead it was recommended that the most appropriate approach to manage water quality was to manage the loss of nutrients from on farm sources.

7.2 Land Use and Water Quality Pilot Project

126. The land use and water quality pilot project (LUWQPP) was undertaken in 2010. This was a pilot study of how the cumulative effects of land use on water quality should be managed. The pilot project included 3 work streams which considered policy, science and community issues in the catchment. These three work streams were overseen by the LUWQPP governance group. The governance group membership was selected from the partner organisations; its membership is as follows:

Name	**Organisation**
Ken Taylor (Chairperson)	Environment Canterbury
Rick Pridmore (Deputy Chairperson)	DairyNZ
Don Rule	Environment Canterbury
Bruce Thorrold	DairyNZ

[9] Familton 2007 Planning Report, Hurunui River and Tributaries: Environmental Flow and Water Allocation. U07/60.
[10] Dairy Exporter Magazine 1/3/2001

Simon Tucker (from August 2011)	DairyNZ
Neil Deans	Fish and Game
Chris Todd	Forest & Bird
David O'Connell (Up to October 2011)	Ngai Tahu
Richard Ball (from October 2011)	Ngai Tahu
Cathy Begley	Ngai Tahu
Murray Doak	Ministry Of Agriculture
John Hutchings	Fonterra
Nick Pyke	Foundation for Arable Research
Chris Keenan	Horticulture NZ
Ken Hughey	Lincoln University
Vince Bidwell	Lincoln Ventures
Clive Howard-Williams	NIWA
Phil Smith	Culverden farmer
Michael Morrow	Federated farmers

127. The Hurunui Catchment was chosen for the pilot study because of the mixture of existing land uses, the reasonable level of information available for the catchment and because of existing relationships that ECan staff had with land owners.

128. The science work-stream identified that the catchment was dominated by sheep and beef farming, but dairying (on the dairy platform) made the most significant impact on water quality in terms of N and P losses. However dairying had the lowest N loss per dollar of profit.

129. A number of development scenarios were assessed including:

    a. Current Land Use – no additional intensification

    b. Business as Usual – intensification in line with current historical trends

    c. Extensive Irrigation – full irrigation of all suitable land

    d. Conservative – based on all productive land converted to forestry

    e. 1990 – 1995 water quality – land use change and mitigation with an aim to meet the water quality from 1990 – 1995.

130. Each scenario assumed the flow and allocation regime in Variation 8, because while consideration was being given to changing this regime, no decisions had been made and it was considered the best information available. As discussed further in the evidence of Mr Edward Norton, the

reliance on this regime is important because if the flow is reduced but the load kept the same then concentrations increase, and the likely chance of nuisance periphyton growth also increases.

131. The science work-stream information was fed into the community work-stream. In this workstream members of the community who represented a range of stakeholder interests were invited to attend a number of meetings where each scenario was debated and deliberated.

132. Community members who attended these meetings were organised into focus groups. Each focus group represented a stakeholder interest. The interests covered by the focus groups were as follows:

    a. Iwi

    b. Primary sector: pastoral, arable and horticulture

    c. Rural Woman

    d. Rural advisors and suppliers

    e. Environmental NGOs

    f. Recreationists

    g. Energy

    h. Tourism

    i. Hurunui District Council

    j. Hurunui Zone Committee

133. This deliberation process resulted in intense debate around the most appropriate development scenario. While no agreement could be reached by members of the focus groups or the governance group on a preferred scenario, it is my opinion that there was general acceptance that an appropriate management approach would be one that would probably achieve land intensification aspirations, while still achieving environmental outcomes most of the time, accepting that there would be occasional breaches of these outcomes.

134. The LUWQPP highlighted that farming, like all businesses, must continue to improve productivity to remain viable, and a reduction in viability would affect not just the local area but the wider regional economy (Harris 2010[11]). Therefore a key question identified was:

> *"how can we provide for further development of the Hurunui Catchment whilst providing the community confidence that the adverse environmental effects can be appropriately managed*?[12]"

135. The LUWQPP strongly suggested[13] in the conclusion of the report that the solution must be based on:

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[11] Harris S 2010 Socio-economic information. Presentation to the land use and water quality (LUWQ) technical workshop 1.

[12] Nutrient Management in Hurunui: A Case Study in Identifying Options and Opportunities.

a. Setting Load Limits in full knowledge of all the costs and benefits

b. Fully considering all options to meet water quality objectives, not just managing land use development and nutrient loss. Inevitably other strategies, such as managing flow regimes and influencing water temperature through shading, will be important to meet periphyton objectives.

c. Taking an audited self-management and adaptive management approach that includes industry and land owners taking a high level of responsibility for on farm and sub catchment scale mitigation (tailored to individual properties) coupled with monitoring and commitment to change management practices and/or load targets if identified environmental outcomes are not being met.

136. The LUWQPP recommended that to take the approach forward in the Hurunui River catchment, the following actions should be implemented:

a. That further steps be taken to confirm an agreed development scenario and nutrient limits for the tributaries. These steps should include a more fine grained analysis of costs and benefits and should include a further deliberation stage.

b. That where there is sufficient certainty with load calculations, nutrient load limits should be included in the Hurunui and Waiau River Regional Plan. Where there is sufficient uncertainty (as will likely be the case for the tributaries) load limits should remain interim[14] and sit outside the regional plan.

c. That following the conclusion of the process described in 1 and 2 above management objectives be established (including load limits, environmental enhancement and future development).

d. That the Zone Implementation Programme be the primary vehicle for co-ordinating water quantity and quality management with the management of land use effects.

e. That Environment Canterbury take the lead in negotiating a local partnership agreement with the primary sector and other stakeholders.

7.3 Zone Implementation Programme

137. As noted above, the LUWQPP recommended that the ZIP be the primary implementation vehicle for delivering land use and water quality outcomes. Therefore the Zone Committee was required to make key recommendations as to how to manage water quality. The ZIP summarises the consensus position on this matter that was reached by the Zone Committee as follows:

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[13] Nutrient Management in Hurunui: A Case Study in Identifying Options and Opportunities.

[14] The LUWQPP did not define what interim meant, however I understand that the Zone Committee, when considering the findings of the LUWQPP understood 'interim' to be a non-statutory limit outside a regional planning framework.

a. Water quality of Hurunui River should be maintained at or about its current state, or improved (ZIP, p. 35).

b. Water quality outcomes sought for the mainstem of major rivers (e.g. Hurunui and Waiau Rivers) are (ZIP, p. 39):

- Achieve in most years periphyton limits as identified in NRRP (that is, four years in every five);
- Maintain or enhance the mauri of the river;
- Safe for contact recreation;
- Toxin producing cyanobacteria shall not render the river unsuitable for recreation or animal drinking water;
- Nutrients (particularly nitrate and phosphorous) will decrease over time at a sufficient rate and to a level such that additional irrigation development can occur without compromising water quality outcomes for the river (i.e. reduce current loads to create "headroom" for new irrigation development).

138. Water quality outcomes sought for tributaries of major rivers (e.g. Pahau and Waitohi Rivers) are (ZIP, p. 39):

a. Achieve in most years periphyton objective as identified in NRRP;

b. Maintain or enhance the mauri of the tributary;

c. Safe for contact recreation;

d. Toxin producing cyanobacteria shall not render the river unsuitable for recreation or animal drinking water;

e. Have nitrate concentrations that protect fish;

f. Contribute to achievement of the mainstem water quality outcomes, in particular to reducing current loads where required to create "headroom" for new irrigation development;

g. Achieve ecosystem health outcomes agreed for the particular tributary through a collaborative community-based process.

139. In my view, these outcomes are reflected in the Objectives and Policies of the Proposed HWRRP, to the extent that they seek, in the long term, to maintain the current long term load of Nitrogen and Phosphate in the Hurunui River.

140. During the first schedule consultation process with statutory bodies on the HWRRP, concern was raised as to whether the Plan considered sufficiently the overall package contained in the ZIP, because there was a belief amongst some of the statutory bodies consulted that the nutrient load limits in the Plan *would not* allow for the irrigation of up to 100,000ha of land to be achieved within these limits.

141. As a result of this, at the August 2011 Zone Committee meeting, the Committee considered two options. The first was to maintain the status quo in terms of nitrate and phosphorus annual loads for the Hurunui River at State Highway 1 bridge. The second was to set load limits at State Highway 1 bridge at a level that maintained status quo phosphorous levels only, while managing nitrate levels to protect against the effects of nitrate toxicity. The second option was based on the presumption[15] that phosphorus is the limiting chemical for periphyton growth in the Hurunui River. Expert scientific advice given to the Committee at this meeting was that both options would be consistent with the ZIP outcomes.

142. Because the Zone Committee did not reach consensus on nutrient load limits at this August meeting, no recommendation was made to the Council on which option to follow in the HWRRP. The Council therefore determined, for the purpose of notification, to allow for the nitrogen load limit to be set at 120% of the current load, until 2017, in order to allow for additional headroom to be created while large scale storage was being consented and developed.

143. However, this decision caused significant public concern which included several letters to Environment Canterbury Commissioners and the Christchurch Press. Therefore at the October and November Zone Committee meetings, and through a workshop, the Committee considered the load limits proposed within the HWRRP again. A consensus position was reached on the matter, and this position formed the basis for a recommendation to the Council, that in turn informed a submission by the Canterbury Regional Council on the HWRRP.

144. It was my observation that the Zone Committee discussion which culminated with a recommendation that CRC lodge a submission on the HWRRP (Submission 81) was focused on the following areas:

    a. Periphyton cover and nuisance algal growth is likely to be the most difficult factor in Objective 5.1 to achieve, and if nutrient levels rise, periphyton is likely to be the first factor in Objective 5.1 to be breached.

    b. Given the risk and uncertainty around whether or not the water quality outcome will be achieved it is important to use all the tools in the water quality tool box, these include:

        i. Education and other non-statutory tools, such as the proposed ASM and environmental management strategy development as described in Schedule 2 of the HWRRP;

        ii. A statutory load limit that can be apportioned across all properties in the catchment;

        iii. A limit on the concentration of Nitrogen and Phosphorous in the river;

[15] Hayward 2011 Discussion paper- Alternative water quality limits for the Hurunui case study area.

iv. Enabling new development proposals to show how they can still achieve the outcomes sought in the ZIP and the HWRRP by other methods such as the release of flushing flows, stream and river shading through riparian planting or the development of on farm or catchment scale mitigation measures, such as those described in the evidence of Dr Chris Tanner.

c. Periphyton levels were low in 2010-11 when annual N and P loads were 941t and 10.9t respectively. Therefore while the long term load of Nitrogen and Phosphorous strongly correlates with periphyton growth, the load of Nitrogen and Phosphorous in any given year may not.

d. While the lowest risk approach is to manage both nitrogen and phosphorous, evidence is available that points to phosphorous being the limiting nutrient for periphyton growth in the Hurunui River,

7.4 Approach Taken in HWRRP

145. The approach taken in the HWRRP in relation to water quality is outlined more fully in the evidence of Mrs White. My evidence explains the planning context which relates to the historical background outlined above.

146. In my view it is important to note that the HWRRP is the first regional plan in Canterbury to propose managing water quality by way of an explicit limit on the mass of nutrients in the system.

147. The NRRP sets numeric water quality Objectives in Table WQL1 (rivers) and WQL2 (lakes). These Objectives set clear water quality targets. Point source discharges can be measured and assessed against the water quality objectives and this is supported by a comprehensive Policy and Rule framework for a range of point source discharges.

148. However the NRRP does not, in my view, provide a good framework for managing the non-point source discharges which may affect water quality.

149. Policy WQL10 seeks to minimise the non-point source discharges to land which many affect groundwater by requiring the use of best practice so that:

a. Nitrogen inputs match plant requirements

b. Accumulations of nitrogen and other contaminants in the soil that have a high potential for leaching are avoided

c. The loss of contaminants from the soil profile to groundwater are limited.

150. Policy WQL10 is implemented by a number of methods, listed as follows:

a. Education and promotion

b. Investigations (such as the LUWQPP)

c. Responding to complaints and enquiries

d. Regional Rules (which set a permitted activity threshold for fertiliser application Rule (WQL19) and stocking rates (Rule WQL20))

e. Resource Consents (where the permitted activity framework in Rule WQL 19 and 20 are not complied with)

f. Compliance monitoring and enforcement

151. Concern was expressed by a number of Environment Canterbury staff including myself, that the NRRP framework would not give effect to the National Policy Statement for Fresh Water Management 2011 because while it set clear targets in the Objective WQL1, these targets were not related to specific limits in either the Policies or Rules which would achieve these Objectives.

152. It is my view that the HWRRP takes a different approach. Objectives 5.1 and 5.2 describe an environmental end state in terms of a narrative description. These objectives are to be implemented through a range of policies and rules that include the specification of a load limit in Schedule 1.

153. The approach taken in the HWRRP in relation to management of water quality through this nutrient load limit, is based on the outcome of the LUWQPP, which suggested that limits should be based on an overall load of nutrients.

154. It is my understanding that there were two key reasons for using load limits. The first was that recreational values such as trout fishing, which requires a river to be predominately clear of periphyton, are able to be compared to ecological values such as nitrate toxicity (which requires a nitrate concentration of <1.7mg/l for 95% protection). Both values can be converted into a total load of nitrate and phosphate in terms of total tonnes of nitrate and phosphate per year.

155. The second reason was that a total load of nitrate or phosphate can be easily converted into a kg/ha limit on farm which could then be compared to outputs from on-farm nutrient models such as Overseer.

156. Currently only those properties upstream of the SH1 monitoring site in the Hurunui Catchment are captured by the load limits in Schedule 1 of the HWRRP. Land uses in other parts of the catchment will not have to comply with this requirement, but it is expected that Environment Canterbury will address this deficiency, with budget provided and investigation work scheduled in the LTCCP to notify changes by mid-2018.

7.4 Development of LWRP

157. Since notification of the HWRRP, the proposed Land and Water Regional Plan (LWRP) has been developed, and was notified on 11 August 2012.

158. The LWRP sets a regional default approach, but allows for a different approach in the sub regional section of the LWRP. Each sub-regional chapter is able to take a different approach if that is deemed appropriate when each sub-regional chapter is developed in consultation with the community.

159. The method that is currently being used to develop the sub regional chapter for the Selwyn / Te Waihora Chapter can trace its roots directly back to the approach taken in the LUWQPP.

160. The regional default section of the LWRP (Section 4 (regional policies) and Section 5 (regional rules)) takes a similar approach to that in the HWRRP whereby prior to 2017 all existing farming activities must keep nutrient records and must prepare farm plans in accordance with Schedule 7 of the LWRP. Post 2017 if land management practices do not achieve the values in Schedule 8 of the LWRP then resource consent will be required for changes in land use.

161. Schedule 8 of the LWRP is currently blank. It is envisioned that prior to 2017 this schedule will be established to articulate industry developed best practice allowances. Where I consider the LWRP approach differs from the HWRRP is that Schedule 8 does not envision a single load limit at a monitoring site. Rather any regional nutrient limit is likely to be in the form of a nutrient discharge allowance, measured on a per property basis.

8 Scenario Development

162. As can be seen from the discussion above, the HWRRP has been developed utilising the findings of a number of very long running planning processes. Each major information stream, whether it is water quantity and the flow and allocation regime, to location of large scale water storage or the management of water quality, has been developed over a time period which often did not allow the consideration of or integration with other work streams.

163. In particular, a number of submitters have identified concerns as to whether or not:

    a. The large quantity of water allocated by the C Block is reasonable.

    b. The water quality Objectives (5.1 and 5.2) can be achieved if all the A, B and potentially C Block water is allocated.

164. To test whether or not the position taken in the HWRRP in its totality would enable the Objectives of the Plan to be achieved, a number of scenarios were investigated and have been discussed in the evidence of Snelder, Norton, Hughey, Hicks, Duncan and Jellyman.

165. While the hydrological nature of each scenario is discussed in the evidence of Snelder in some depth, this evidence describes why the scenarios were chosen.

166. Scenarios for the Waiau River are shown below:

Scenario name	A-block (m^3/s)	Gap (m^3/s)	B-block (m^3/s)
Scenario 1	18		
Scenario 2	35		
Scenario 3	71		
Scenario 4	18	2	11
Scenario 5	18	2	53

167. Scenarios for the Hurunui River are shown below:

Scenario name	A-block (m^3/s)	B-block (m^3/s)	C-Block (m^3/s)
Scenario 1	7		
Scenario 2	7	10	
Scenario 3	7	10	16.5 (Autumn and Spring) 33 (Winter)
Scenario 4	7	10	33 (All year)

168. Scenario 1 for both the Hurunui and Waiau Rivers was chosen because it describes a very similar scenario to the current allocation regime. The remaining allocation scenarios were chosen for each river to test the effect of higher allocations.

169. In the Waiau, the scenarios were chosen based on an earlier NIWA report[16] which was considered by the Zone Committee. This report was one of the key reference documents used by the Zone Committee in considering how much water should be allocated. I believe the Waiau scenarios allow for the consideration of the effects on in-stream values resulting from further abstraction, if:

a. The current level of abstraction continues – Scenario 1

b. More A Block water was allocated – Scenarios 2 and 3

c. A and B Block water was allocated – Scenario 4

[16] Booker et al 2011, Waiau River Mid-Range Flows – the importance of flow variability

d. All the water allocated in the HWRRP was taken (note the B block referred to in the table includes the C Block from the Plan) – Scenario 5

170. In the Hurunui, unlike the Waiau River, a specific report was not prepared prior to the notification of the HWRRP that considered the effects on flow variability from a range of allocation scenarios. Instead the Zone Committee held a workshop with other parities where the economic, social, cultural and environmental implications of further allocation beyond the B Block was discussed.

171. The investigative science was undertaken post notification of the HWRRP therefore the Hurunui scenarios are slightly different. I believe the Hurunui scenarios allow for the consideration of the effects on instream values resulting from further abstraction, if:

a. The current level of abstraction continues – Scenario 1

b. The level of abstraction envisioned in Variation 8 (the A and B Block in the HWRRP) occurs – Scenario 2

c. The A and B Block were taken all the time but the full C Block was only taken in winter and half the C Block was taken in autumn and spring - Scenario 3

d. All the water specified to be abstracted from the Hurunui River in the HWRRP was taken – Scenario 4

172. The scenarios were chosen, not to show the effects of any single project, development proposal or resource consent application. Rather the scenarios were developed to enable consideration of the likely magnitude of effects of taking different quantities of water from the Hurunui and Waiau Rivers and how this would likely affect the values identified in the policy framework of the HWRRP.

9 Conclusion

173. There is a long history of planning processes in the Hurunui and Waiau Catchments. In many cases intervention by the catchment board or CRC has been undertaken to address a particular issue. For example the initial flow and allocation planning was undertaken to enable the development of the Amuri and Balmoral Irrigation schemes, while initial water quality work such as the Pahau Enhancement Group was formulated to address a specific water quality issues, namely the high phosphorous concentration in the Pahau River which was affecting water quality in the Hurunui River. However in my opinion these past planning processes have not considered issues in an integrated manner.

174. The formation of the Zone Committee and subsequent development of the ZIP has provided the opportunity to consider water quantity, water quality and locations for water storage in a holistic and integrated manner. By planning in this holistic and integrated way the Zone Committee has been able to take into account the social, economic, cultural and economic benefits and costs

across the Hurunui, Waiau and Jed catchments. It is my opinion that this process has enabled the Zone Committee to develop a vision for the Hurunui, Waiau and Jed catchments that achieves sustainable management of the water resources within the catchments, in a way that enables people and communities to provide for their social, economic and wellbeing.

175. It is also my opinion that the Zone Committee vision has been well tested through a rigorous public consultation process, which is outlined in the evidence of Mr John Falkner. This does not mean that the vision is universally supported, but that it represents a consensus view and takes into account the views of various different parties with differing interests.

176. The HWRRP represents a culmination of various historic planning processes including the Zone Committee process and provides a statutory framework to manage the water resources in a sustainable way while enabling the community to provides for its environmental, economic, social and cultural wellbeing.

A Parish

24 September 2012