BEFORE CANTERBURY REGIONAL COUNCIL
AT CHRISTCHURCH

In the matter of	the Resource Management Act 1991
And	
In the matter of	Proposed Variation 2 to the Proposed Canterbury Land and Water Plan
And	
In the matter of	a submission by Te Rūnanga o Ngāi Tahu

STATEMENT OF EVIDENCE OF LYNDA MARION WEASTELL MURCHISON ON BEHALF OF TE RŪNANGA O AROWHENUA TRUST AND TE RŪNANGA O NGĀI TAHU DATED 15 MAY 2015

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INTRODUCTION

1. My name is Lynda Marion Weastell Murchison.

2. I hold a Master of Arts degree in geography (First Class hons) from Canterbury University and certificates of proficiency in Natural Resource Law (LAWS 304) and Advanced Resource and Regional Planning (ERST 604) from Canterbury and Lincoln universities respectively. I also hold a National Certificate in Agriculture (Level 3) from the Open Polytechnic of New Zealand. I am a full member of the New Zealand Planning Institute and an accredited hearings commissioner.

3. I currently hold the Roper Scholarship from Canterbury University for study towards a PhD in science. My chosen field of study is traditional environmental knowledge among farmers in Canterbury and how this can be used to improve environmental policy-making and management.

4. I have worked in the field of resource management for over 20 years, holding senior and managerial positions for Selwyn District Council, The Canterbury Regional Council (Environment Canterbury), where I was Planning Manager Air and Rivers and then Principal Planning and Consents Advisor (2008-2012), and Te Rūnanga o Ngāi Tahu. I have also run my own consultancy. I currently lecture a post-graduate course in Environmental and Resource Management in the Geography Department at Canterbury University and undertake contract planning work, principally for Te Rūnanga o Ngāi Tahu.

5. I have worked extensively in drafting district and regional plans and plan changes, and processing resource consents; including freshwater plans and permits. I drafted Chapter 7 Freshwater of the Canterbury Regional Policy Statement **(CRPS)** as notified; and led the drafting of four regional catchment plans and the early development of the proposed Land and Water Regional Plan **(pLWRP)**. I led the processing of amendments to the National Water Conservation Orders for the Hurunui River (2009), Te Waihora/Lake Ellesmere (2010), and the Rakaia River (2011) and moratoria on the Hurunui and Waiau catchments under the Environment Canterbury (Temporary Commissioners and Improved Water Management) Act 2010 **(ECan Act).**

6. I have also worked as a sheep and beef farmer in partnership with my husband for 15 years and served as an elected farmer representative on the

Executive Council of the North Canterbury Province of Federated Farmers. I am not employed by either North Canterbury Federated Farmers or Federated Farmers of New Zealand Inc as an environmental advisor. The southern boundary of the province of North Canterbury Federated Farmers is the Rakaia River and North Canterbury Federated Farmers is not a submitter on this plan change.

7. I am familiar with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note (2014) and confirm that I have complied with it in preparing this evidence. In particular I confirm that my evidence is within my area of expertise and the opinions I have expressed are my own except where I have stated that I have relied on the evidence of other people. I have not omitted any facts known to me that may be material in influencing my evidence.

8. I am familiar with the Hinds catchment.

EXECUTIVE SUMMARY

9. In summary:

   (a) Overall I support the identification of the Hekeao/Hinds Lower Plains Area as over-allocated for water quality and abstraction, considering nitrogen concentrations in lowland streams and groundwater and low flows in lowland streams.

   (b) I support the approach in Variation 2 of addressing these issues in parallel with providing for additional irrigation and land use development in the catchment, as giving effect to the CRPS.

   (c) I recommend provisions be added to Variation 2 to recognise and provide for the cultural significance of the Hekeao/Hinds Catchment to Ngāi Tahu.

   (d) A regime to manage nitrogen losses from farming activities in this catchment is necessary, but I prefer the approach suggested in the Ngāi Tahu submission, subject to some amendments.

   (e) I believe additional provision needs to be made in Variation 2 to manage effects on water quality from the discharge of sediment and phosphorous.

(f) I do not believe Variation 2 adequately manages issues with low flows in lowland streams and abstraction of groundwater sufficient to give effect to the NPS Freshwater.

(g) The review of minimum flows in lowland streams should be part of a more comprehensive review of groundwater management; the first step being to update the water balance budget for this catchment.

Scope of Evidence

10. I have been asked to give evidence on behalf of Te Rūnanga o Ngāi Tahu and Te Rūnanga o Arowhenua on Variation 2 to the pLWRP. My evidence will address the following matters:

(a) The framework for preparing a regional plan or variation;

(b) The cultural significance of the Hekeao/Hinds Catchment to Ngāi Tahu;

(c) The provisions to manage nitrogen loss and other water quality issues; and

(d) The approach to managing groundwater and low flows in lowland streams.

11. In preparing my evidence I have considered:

(a) The pLWRP, proposed Variation 2 to the pLWRP (Section 13 - Ashburton) and the accompanying Section 32 Report.

(b) The Resource Management Act 1991 **(RMA)**, in particular its purpose and principles (s5-8), the functions of regional councils (s30), and the provisions relating to preparing regional plans (s32, 63 and 65-68).

(c) The Canterbury Regional Policy Statement **(CRPS)** and the National Policy Statement for Freshwater (2014) **(NPS Freshwater)** – being matters which a regional plan must give effect to under the RMA (s67(3)).

(d) Te Whakatau Kaupapa Resource Management Strategy for Canterbury, Te Rūnanga o Ngāi Tahu Freshwater Policy and the Iwi Management Plan of Kati Huirapa-Arowhenua (1992) - being iwi management plans which the Council must take into account when preparing a plan or plan change (s66(2A)(a)).

(e) The Canterbury Water Management Strategy **(CWMS)**, in particular the vision and principles - a matter which the council must have particular regard to under the Environment Canterbury (Temporary Commissioners and Improved Water Management) Act **(ECan Act)** 2010 (s63).

(f) The Ashburton Zone Implementation Programme **(ZIP)** Addendum Hinds Plains Area, dated March 2014 – a management strategy prepared under another Act that the council shall have regard to (s66(2)(c)(i)).

(g) The s42A Officer's Report and relevant submissions.

12. I understand the Ashburton ZIP Addendum is not a document which Variation 2 must give effect to under the RMA. However it is a useful resource for identifying the outcomes sought by the Ashburton Water Management Zone Committee in its recommendations to Environment Canterbury for Variation 2, and the thinking behind those recommendations.

13. Where I suggest changes or additions to the relief sought in the Ngāi Tahu submission in my evidence, these changes are shown against the original relief sought in the submission with ~~strikethrough~~ of old text and **bold** for new text.

PLANNING FRAMEWORK AND KEY MATTERS TO CONSIDER

14. Variation 2 is a variation to the pLWRP to introduce catchment-specific policies and rules to manage issues with water quality and quantity in the Hekeao/Hinds catchment. In particular:

(a) Provisions to manage nitrogen concentrations in groundwater and in lowland streams while providing for the irrigation of an additional 30 000 hectares of land; and

(b) Provisions to manage low flows in lowland streams.

15. Variation 2 does not propose any changes or additions to the objectives in the pLWRP.

16. In my opinion there are three key matters that need to be considered in preparing Variation 2 or any regional or district plan under the RMA:

(a) The relevant provisions of the RMA including the provisions for preparing plans and the functions of the council;

(b) The existing environment and current and reasonably foreseeable uses of natural and physical resources; and

(c) The quality and accuracy of information available.

17. Variation 2 is subject to the ECan Act 2010. I am advised by legal counsel that this statute amends some of the provisions in the RMA for preparing a regional plan in Canterbury, but it does not affect the provisions I discuss below.

Relevant Provisions of the RMA

18. The RMA provides for regional councils to prepare and implement regional plans to assist a regional council to carry out any of its functions in order to achieve the purpose of the Act (s63).

19. The functions of a regional council in relation to managing freshwater are set out in the RMA (s30). They include:

(a) The function to control the use of land for the purposes of the maintenance and enhancement of: the quality of water in water bodies and coastal water (s30(1)(c)(ii)); the quantity of water in water bodies and coastal water (s30(1)(c)(iii)); and ecosystems in water bodies and coastal water.

(b) To control discharges of contaminants into or onto land, air or water (s30(1)(f)).

(c) To control the taking, use, damming or diversion of water (s30(1)(e)).

(d) To allocate some specified natural resources, including freshwater (s30(1)(fa)).

20. The RMA includes functions and duties for regional councils in preparing regional plans and any changes or variations to them. Such functions include:

(a) The requirement to give effect to, take into account, or have regard to, other planning documents (s66) The content of a regional plan, including the requirements for objectives to achieve the purpose of the

RMA, policies to achieve the objectives, and rules, if any, to implement the policies (s67).

(b) The duty to evaluate the appropriateness of the objectives and any proposal to achieve the objectives (s32).

21. From a planning perspective, I believe that provisions in a regional plan should regulate activities which have the same or similar effects consistently, and in a way which is commensurate with their effects on the environment, in this case freshwater. The costs of compliance should reflect the nature and degree of potential effects of the activity.

22. In my opinion these factors are fundamental prerequisites for any plan that is prepared to achieve the purpose of an Act which has, as one of its core tenet, the management of the adverse the effects of activities on the environment. Otherwise rules in plans may be viewed as 'picking winners' between activities or land uses, an outcome I understand is not the intent of plans prepared under the RMA.

23. From my experience, the preparation of a plan under the RMA should be a cyclic process. The usual starting point is to clearly identify the issues, considering both the purpose of the Act and the councils functions under the Act; identify the options available to address the issues and evaluate their appropriateness considering their efficiency and effectiveness; and then decide whether and to what extent each issue should be addressed to achieve the purpose of the Act.

24. In this case, some of that preliminary decision-making has already occurred through the development of the NPS Freshwater and in particular the National Objectives Framework **(NoF)**. My understanding is that the NoF sets minimum standards for water quality that must be met; and a regional plan must give effect to the NPS Freshwater (s67(3)(a)).

25. The NPS Freshwater also sets clear direction around the management of water quantity. It requires councils, through regional plans, to set allocation limits that achieve the objectives of the NPS Freshwater (Policy B1). Objective B2 seeks to avoid any further over-allocation of freshwater and to phase out existing over-allocation, and Policy B5 directs that councils shall not make any decisions which will over-allocate or further over-allocate a catchment for abstraction.

26. In relation to both water quality and quantity, the NPS Freshwater also directs that where a catchment is already over-allocated, the council must set out in a regional plan a defined timeframe and methods to phase out over-allocation (Policy A2 and Policy B6).

27. As Variation 2 does not propose any changes to the pLWRP objectives, I believe, any proposal to address issues with freshwater in Variation 2 must also achieve the objectives of the pLWRP.

The Existing Environment

28. A regional plan is not created in a vacuum. Rather there are existing, often conflicting uses and values associated with the natural and physical resources in an area that give rise to resource management issues.

29. The Ashburton ZIP Addendum and the s42A Report describe the Hekeao/Hinds catchment: its geography and freshwater resources; the history of Ngāti Huirapa in the area and the cultural significance of the catchment; and the drainage and modification of the lower catchment for farming.

30. In my opinion the key issues for managing freshwater in this catchment today include:

    (a) Mahinga kai and the need to address the quality and flow of water in the lowland streams to enable Ngāi Tahu to exercise kaitiakitanga.

    (b) The existing and potential socio-economic benefits from agriculture in the catchment including the irrigation of additional land.

    (c) The need to significantly reduce nitrogen concentrations in groundwater and lowland streams in the Lower Pains Area, without compromising agricultural productivity.

    (d) The need to address the over-allocation of water for abstraction from groundwater and some surface water bodies, without rendering unviable the farming operations which have obtained irrigation permits based on the rules at the time and are reliant on that water

31. Dr Scott's evidence describes the role nitrogen plays in plant production and how nitrogen losses can occur in various farming systems. From my reading of this evidence it would seem that nitrogen is a crucial component in plant production and therefore animal health and agricultural productivity; and that

not all sources of nitrogen are sources of nitrogen leaching. Rather when and how nitrogen is added to soil (including urine patches), soil type, and how land is irrigated, are all important factors in determining the propensity for nitrogen leaching to occur.

32. Based on my own professional planning and farming experience, I have listed below three other observations about farming I think are important to consider in developing a planning framework to regulate effects from farming activities.

    (a) Not only are there differences in farming systems as Dr Scott describes, but farms within a 'system' differ substantially. In my experience, most farming operations have characteristics unique to the property and the farmer.

    (b) Few farms are in a 'steady state' of operation year to year. Farmers are constantly changing practices to accommodate changes in the natural environment, production systems and market demand.

    (c) Flexibility in land use is essential to the viability of farming. New Zealand farmers do not receive any form of guaranteed pricing for their produce; if global market demand or prices change, they must adapt.

33. I understand from legal counsel that once a rule is made operative in a regional plan, lawfully established existing activities have six months to comply or apply for a resource consent (s20A). Therefore the impact of regional rules on existing, lawfully established, activities must be considered in establishing any planning regime.

34. One of the difficulties in dealing retrospectively with over-allocation in a catchment is that the land uses causing the effects are lawfully established and may have been operating for some time. . These issues may not be quickly resolved if they require significant changes to land use practices or investment in infrastructure.

35. I am not suggesting existing activities should be exempt from any new regulatory regime; to do so would severely hamper the ability to address over-allocation as required under the NPS Freshwater. Rather, the situation may lend itself to a regime whereby additional time is allowed for existing activities to meet new standards for the discharge of nitrogen or for irrigation, depending on the degree of change required to existing practices.

Information Available

36. Another factor I would consider in preparing a plan is any limitations on the accuracy of modelling or information available to identify issues, or limitations on being able to measure and monitor effects.

37. In his evidence, Dr Dudley describes the uncertainties that exist in the modelling relied on for Variation 2 relating to:

    (a) The likely estimated nitrogen losses from various land uses in the Hekeao/Hinds catchment;

    (b) The attenuation of nitrogen from the soil profile into groundwater and lowland streams; and

    (c) The measures for nitrogen concentrations in lowland streams.

38. Dr Dudley (para 35) suggests the modelling used and information available is valuable in indicating trends in nitrogen losses and concentrations in the catchment, but not in establishing or applying absolute numbers.

39. In my opinion the lack of precise information is not a reason not to manage effects of land uses on the environment; there will always be a case for better information and more precise modelling. However I do believe the quality of the information that is available, including assumptions and limitations, needs to be factored into the planning regime.

40. Similarly, in his evidence Dr Scott describes some of the limitations in Overseer^{TM}. Again I do not think these limitations provide a reason to avoid the use of Overseer^{TM} in planning frameworks per se, but these limitations need to be recognised and the model used in a way which is appropriate given those limitations. For example, I understand that Overseer^{TM} is more accurate in estimating relative differences in nitrogen loss from the same farming system resulting from changes in farm practice, than giving an accurate estimate of nitrogen loss from the farm system as an absolute number.

Conclusions on Overall Approach

41. The state of the catchment in terms of both water quality (nitrogen concentrations) and quantity (flows in lowland streams), and the scale of reductions required to phase out over-allocation in the Hekeao/Hinds catchment means there are few quick fixes.

42. This situation should not be an excuse to do nothing, but it does influence how the issues are tackled. The Ngāi Tahu concept of *continual improvement over time* may be the key to addressing issues with water quality and flows in this catchment. This notion is recorded in Recommendation 4.2 of the ZIP Addendum (p.11) and I believe should be included in the policies for Variation 2 as discussed in paragraphs 59-60 below.

43. To implement *'continual improvement over time'* I think Variation 2 should:

    (a) Identify the cause(s) of the current situation;

    (b) Set the outcomes sought, even if those outcomes will not be achieved within the typical 10-year planning horizon of an RMA plan;

    (c) Develop planning provisions that incentivise people to have lower nitrogen and water footprints; and

    (d) Send clear signals about the changes that will be required from those activities with higher nitrogen or water footprints, with timeframes commensurate with the extent of change required.

44. Numerical targets can provide useful indicators that things are trending in the right direction, but to my mind it is real improvements "on the ground" in water quality and flows that are important. It is with these factors in mind I have undertaken my planning assessment of Variation 2.

CATCHMENT OBJECTIVES & RECOGNITION OF NGĀI TAHU VALUES

Submission Point

45. The submission by Te Rūnanga o Ngāi Tahu and Te Rūnanga o Arowhenua (the Ngāi Tahu submission) requests two objectives be added to Variation 2 that read:

    (a) The freshwater resources of the Hinds/Hekeao catchment support a prosperous land-based economy; and water quality and flows in the Upper Hinds/Hekeao Plains Area are maintained and in the lower Hinds/Hekeao Plains Area they are improved.

    (b) Ngāi Tahu is able to exercise kaitiakitanga in the Hekeao/Hinds catchment.

46. The reason given in the Ngāi Tahu submission is to ensure the provisions in Variation 2 focus on balancing the social, economic, cultural and

environmental issues and to provide the justification for the policies and rules.

47. The Ngāi Tahu submission also requests a new policy be added to Variation 2 which recognises the cultural significance of the Hekeao/Hinds catchment, including the status of the river as an Area of Statutory Acknowledgment under the Ngāi Tahu Claims Settlement Act 1998.

Assessment – New Objectives

48. The s42A Report does not appear to comment on these decisions requested.

49. I understand a similar request for a catchment-specific objective was made by Ngāi Tahu in a submission on Variation 1 to the pLWRP. In its decision on that submission, the Hearings Panel considered whether the additional objective covered any matters that were not addressed in objectives of the pLWRP. I appreciate this Hearings Panel is not bound to follow this approach but in my opinion it is appropriate given the Council's duties under s32 of the RMA.

50. Section 3 Objectives of the pLWRP (as amended by decisions on submissions) contains 24 objectives. Objectives 3.1 and 3.2 recognise Ngāi Tahu's relationship with land and water and the ethic of ki uta ki tai. Kaitiakitanga is not referred to in the objectives or region-wide policies.

51. Objectives 3.5, 3.10 and 3.11 deal with the use of water for socio-economic activities. Objective 3.5 addresses the need for the development and change of land uses and Objective 3.10 provides for the use of water for abstraction within allocation limits. Objectives 3.8, 3.16 and 3.18 set outcomes to ensure the health of fresh water bodies in the management of water quality and quantity.

52. The main difference I see between the objectives in the pLWRP and the first objective requested in the Ngāi Tahu submission is that the latter explicitly requires the management of freshwater resources for agricultural land uses and environmental improvement occur together. To that end, I believe it gives effect to the CRPS Objective 7.2.2.

53. The proposed objective also identifies more explicitly whether water quality and flows in the catchment are to be maintained or improved; citing that those in the Upper Plains Area are to be maintained while those in the Lower Plains Area are to be improved.

54. Relying on the evidence of Ms Holme, my understanding is that kaitiakitanga is more than a passive recognition of Ngāi Tahu's relationship with land and water. It is the active management of the resource by those who have inherited the duty of kaitiaki, to ensure the resources are kept healthy if they are in a healthy state, and improved if they are degraded. Kaitiakitanga encompasses both the end state of the resource – an outcome, and the process to get there.

55. My understanding is that the ability to exercise kaitiakitanga is very important to Ngāi Tahu whānau in the Hekeao/Hinds catchment due to the value of the catchment both historically and contemporarily for mahinga kai. Ms Holme describes the culturally historic significance of the large Hekeao/Hinds wetland as mahinga kai; and the on-going importance of the catchment after it was modified to create the streams and drains that make up the modern lower Hekeao/Hinds catchment.

56. In my opinion provisions recognising the cultural significance of the Hekeao/Hinds Catchment and the exercise of kaitiakitanga should be included in Variation 2. Kaitiakitanga is a matter to have particular regard to in achieving the purpose of the Act (s7(a)); and needs to be recognised to give effect to Objective 7.2.4(4) of the CRPS. In addition Objective 1D of the NPS Freshwater requires councils to ensure tangata whenua values and interests are identified and reflected in the management of fresh water.

57. In the decision on Variation 1, the Council's Hearings Panel also expressed some reservation about the language used in that proposed objective – in particular what the term 'prosperous land-based economy' meant and whether it could be achieved through the plan policies. Bearing that requirement in mind, I suggest an amendment to the wording proposed in Ngāi Tahu's submission so the proposed objectives read:

> *~~The~~* ***Freshwater resources*** *~~of the Hinds/Hekeao catchment support a prosperous land-based economy;~~* ***are available for abstraction to support a range of land uses*** *in the Hekeao/Hinds catchment; and* ***at the same time*** *water quality and flows in the Upper Hinds/Hekeao Plains Area are maintained and water quality and flows in the lower Hekeao/Hinds Plains area are improved.*
>
> *Ngāi Tahu ~~is~~* ***are*** *able to exercise kaitiakitanga in the Hekeao/Hinds catchment.*

58. If the Headings Panel does not consider catchment-specific objectives are necessary, I still strongly recommend the inclusion of the requested new policy to Variation 2 discussed below.

Assessment - New Policy

59. The Ngāi Tahu submission has requested a new policy for Variation 2 which reads:

> *Recognise the cultural significance of the Hekeao/Hinds River to Ngāi Tāhū and enable Ngāi Tahu to exercise kaitiakitanga and mahinga kai in the catchment through:*
>
> *(i) Continual improvement in the flows in lowland streams and springs over time;*
>
> *(ii) Continual reductions in the concentrations of nitrogen in groundwater over time;*
>
> *(iii) Minimising the potential discharge of contaminants into water through land use practices, riparian management, and waterway and drain maintenance; and*
>
> *(iv) Encouraging the protection or restoration of natural wetland areas and other mahinga kai.*

60. In my opinion, the proposed Ngāi Tahu policy performs three important functions:

(a) Firstly, it provides a policy framework that shows how the various provisions in Variation 2 work together to address water quality and flow issues in the Hekeao/Hinds catchment.

(b) It identifies the significance of the Hekeao/Hinds catchment to Ngāi Tahu and the actions required to give effect to their relationship with land and water in this catchment; and

(c) It introduces the concept of continuous improvement which, as discussed in paragraph 42 of my evidence, may be the key to addressing environmental issues in this catchment.

WATER QUALITY

Variation 2 as Notified

61. Variation 2 seeks to address elevated concentrations of nitrogen in groundwater and lowland streams in the Lower Hekeao/Hinds Plains Area while providing for an additional 30 000 hectares of dryland to be irrigated. It also seeks to maintain current water quality in the Upper Hinds/Hekeao Plains Area. It adopts the following actions:

    (a) Setting a catchment load of 3400 tonnes/yr of nitrogen which will result in an estimated nitrogen concentration of 9.2mg/L in lowland streams.

    (b) Reducing nitrogen concentration from 9.2mg/L to 6.9mg/L through managed aquifer recharge using up to 4 cumecs of water.

    (c) Maintaining existing water quality in the Upper Hekeao/Hinds Plains Area.

62. The reduced nitrogen load is to be achieved by:

    (a) Allowing a maximum increase of 214 tonnes/yr of nitrogen loss from the irrigation of an additional 30 000 hectares of land with a maximum loss rate of 27kg/ha/yr.

    (b) Preventing any increase in nitrogen losses from farming activities other than those in the new irrigation area, or properties in the Upper Hekeao/Hinds Plains Area if the property is less than 5 hectares in size and nitrogen is less than 20kg/ha/yr.

    (c) Requiring all farming activities to adopt the Good Management Practices listed in Schedule 24a or a Farm Environment Plan which meets the requirements of Schedule 7 of the pLWRP.

    (d) From 01 July 2017, requiring a resource consent for farms which have nitrogen loss rates exceeding 20kg/ha/yr and requiring a staged reduction in nitrogen loss rates for dairy and dairy support farms as set out in Table 13(h).

63. The reductions in nitrogen losses are described in Table 13(h) as being percentage reductions above the ‘good practice nitrogen loss rates calculated on the baseline land use’ and range from 15% for dairy and 10% for dairy support by 2020, to 45% and 25% respectively by 2035. There are

no figures for ‘good practice nitrogen loss rates’ specified in Table 13(h). Rather they are anticipated to become available on completion of a project known as the Matrix of Good Management (MGM) by the end of 2015.

64. A new definition of ‘baseline land use’ is introduced as meaning the land use or uses on the property from 01 July 2009 to 01 July 2013, which are used to determine the nitrogen baseline for the property as defined in section 2.9 of the pLWRP.

65. The ZIP Addendum states that sedimentation in lowland streams is also a water quality issue in this catchment. However there are no provisions in Variation 2 to deal specifically with this issue. Rather the ZIP Addendum (p.18) states that “*Nitrogen (in the form of nitrate) is the best general indicator or cumulative effects on water quality from land use in the Hinds Plains."*

66. The Ngāi Tahu submission requests changes to the policies and rules to manage nitrogen concentrations in the Hekeao/Hinds catchment. The key differences between the regime in Variation 2 and the Ngāi Tahu approach are:

    (a) Changing the starting point for managing nitrogen losses from ‘no increase from the baseline land use 2009-2013’ to introducing a minimum threshold of nitrogen loss that people can operate up to as a permitted activity (this is sometimes called a flexibility cap);

    (b) Replacing the nitrogen reduction regime in Variation 2 with one based on the quantum of nitrogen leached rather than the type of land use (ie not specific to dairy or dairy support); and

67. Refining the rules around calculating nitrogen losses so that once a nitrogen baseline is established, additional nitrogen loss calculations are only required if land uses are changing. ‘Change of land use’ is defined in the submission and incorporates those activities likely to result in an increase in potential nitrogen losses. The submission requests the use of a banding system for nitrogen loss:

    (a) An ‘A’ band – where farming activities may lose nitrogen as a permitted activity up to a limit of 15kg/ha/yr in the lower Hekeao/Hinds Plains Area and 10kg/ha/yr in the Upper Plains Area, or whatever other limits are deemed appropriate.

(b) An allowance for nitrogen losses above the 'A' band limits in the Lower Plains Area with a maximum limit of 27kg/ha/yr and a total maximum allocation of 214 tonnes/yr This allowance is known as the 'B" band.

(c) A "C' band for existing land uses which have nitrogen losses above the 'B' band limit of 27kg/ha/yr. Land uses in the 'C' band are required to implement a nitrogen reduction plan in accordance with the new schedule of nitrogen loss rates to be developed and introduced by way of a plan change once the MGM project is finished; or if that does not occur, to adopt best practicable options to minimise nitrogen losses.

68. The submission seeks changes to the rules and definitions which require an Overseer^{TM} estimate be run every year, with a requirement to run an Overseer^{TM} estimate initially to establish a nitrogen baseline, and again should a change of land use occur.

69. "*Change of land use*" is defined in the submission as being an increase in irrigation water; or an increase in the number of weaned cattle grazed on the property; or an increase in the amount of effluent, sewage, biosolids or other organic material spread or disposed of on the site.' I understand that these changes reflect the '*changes in land use*' that are most likely to trigger a potentially substantial increase in nitrogen losses.

70. The submission also requests a new policy to reduce phosphorus and sediment losses to waterways implemented through rules requiring the identification of areas prone to sediment and phosphorous losses and a rule requiring the development of Farm Environment Plans as a controlled activity.

Assessment

71. The s42A Report suggests there are some uncertainties with this alternative approach to nitrogen management and invites the submitter to present more information (para 9.21, p.108). It goes on to dismiss the Ngāi Tahu option on the basis that it differs from the solution in the ZIP Addendum and it is an option that was already canvassed as part of the planning process (para 9.24, p.108).

72. I cannot find any options in the Section 32 Report that look like the approach suggested by Ngāi Tahu. The options in the s32 Report start from the premise that everyone will be restricted to their nitrogen losses from their 2009-2013 baseline land use; with some sort of reduction regime on top.

The ZIP Addendum states *"The Hinds Plains area is considered a nutrient management 'red zone' under the LWRP which means there can be no increase in nitrogen leaching relative to the 2009-2013 nitrogen baseline"* (p.19).

73. In my opinion the presumption in the ZIP Addendum that Variation 2 must start with the same rules as the 'red zone' in the pLWRP is wrong. My understanding is that the water quality zones and provisions in the pLWRP are intended to be an interim or holding mechanism until such time as catchment-specific planning provisions can be developed.

74. My reading of strategic policies 4.9 and 4.10. of the pLWRP is that the catchment-specific sections may have quite different provisions for managing water quality than the region-wide rules; that is the point of them. The only limit appears to be in Policy 4.10, that the sub-regional sections are not to make changes to the objectives and strategic policies of the pLWRP, but rather implement them.

75. There is nothing in the objectives or strategic policies which states that catchment management must start with the premise that no one may increase their nitrogen baselines. If it did, then the provisions in Variation 2 allowing for nitrogen increases as part of the irrigation of an additional 30,000 hectares of land could not occur.

76. If I am wrong, I also note that the Red Zones in the pLWRP do not start from the premise of no increase in nitrogen baseline. Rule 5.43 allows increases in nitrogen loss up to 10kg/ha/yr as a permitted activity.

77. I do not agree deviating from the approach in the ZIP Addendum is a reason to dismiss the alternative approach asked for in the Ngāi Tahu submission. The role of the statutory planning process is to ensure any party has a right to request alternatives, which must be considered on their merits. I understand from legal counsel that the ZIP Addendum is a document which the Hearings Panel may have regard to under the RMA (s66(2)(c)(ii)) but is not bound by it. The final form of Variation 2 can and should deviate from the solutions in the ZIP Addendum if the Hearings Panel finds an alternative proposal better achieves the purpose of the RMA and better gives effects to the NPS Freshwater.

78. Considering the ZIP Addendum, s32 Report and the evidence of Dr Scott, I consider Variation 2 has correctly identified the principal cause(s) of increase

nitrogen concentrations in the Lower Hinds/Hekeao Plains Area. The general management strategy in Variation 2 of avoiding any new land use with high potential nitrogen losses and seeking reductions from existing land uses with high nitrogen losses, is appropriate in my opinion. However I do not agree that the provisions as written are the most appropriate proposal. I prefer the alternative approach requested in the Ngāi Tahu submission, subject to some amendments, for the reasons outlined below.

No Increase in N Baseline

79. Restricting farming operations to no increase in their nitrogen losses from their 2009-2013 land use baseline, no matter how small that baseline is, severely limits the ability of low nitrogen loss farmers to modify their operations. This affects their ability to deal with changes in markets or growing conditions, year to year; while those with a large nitrogen baseline have flexibility to undertake a wide range of land use changes. This approach imposes the greatest costs on those farmers who have contributed least to the water quality issue; and creates a planning regime which incentivises people to have the highest nitrogen loss footprint possible to ensure they do not foreclose future land development options. The approach manages activities which are having the same or similar effects on the environment inconsistently. An increase in nitrogen loss up to 27kg/ha/yr is allowed for new irrigation, but a dryland farmer wanting to put in additional Lucerne stands, or alter the sheep to deer or sheep to cattle ratio on farm can have no increase in nitrogen loss, even if that increase is a fraction of that loss with irrigation. In my opinion this is a difficult proposal to justify considering the functions of the council under the RMA and its duties under s32.

80. The s32 Report assessment of Option 4 for nitrogen reductions, which looks at a universal 30% reduction beyond Good Management Practice, states *'This scenario freezes land use in its current pattern, meaning non-dairy or dairy support farmers who become unable to farm profitably as a result of meeting higher on-farm mitigation requirements would not have any options to change to more profitable options*. (p.72). In my opinion similar costs apply to any regime which has the effect of 'freezing land use in its current pattern'.

Nitrogen Increases and Reductions Based on Land Use Type

81. I agree with the approach in Variation 2 that requires nitrogen reductions to occur from higher nitrogen loss activities, but I cannot support reductions

based on land use type rather than nitrogen losses. It seems hard to justify and counter-productive, to have a regime that says a dairy farmer losing 30kgN/ha/yr must make reductions of up to 45% above their good practice number (by 2035), but a dairy support farmer must only make a 25% reduction, and an arable farmer losing the same amount of nitrogen is not required to make any reduction at all.

82. Similarly, it is hard to justify a regime that requires new irrigators to have a maximum nitrogen loss rate of 27kg/ha/yr but does not require existing activities to meet those same standards at some proximate point in time. If substantial changes in farm operations or land use are required this, to my mind, is not a reason to exempt existing activities from meeting the new standard. It may mean having to introduce timeframes to make the adjustment.

83. The fundamental difference between the approach in the Ngāi Tahu submission and Variation 2 appears to be a philosophical starting point:

    (a) Is the loss of nitrogen some sort of 'entitlement' that farmers acquire based on the land use(s) they are undertaking at a given point in time and therefore any regulations start from the premise of the 'right' they have now; or

    (b) Is nitrogen loss a contaminant or the adverse effects of a land use, which is to be regulated once it reaches a defined level in the plan?

84. My understanding is that Te Rūnanga and Te Rūnanga o Arowhenua adopt the latter approach.

85. Considering the functions of regional councils under the RMA; the purpose and principles of the Act and the duties under s32; and the premise in the RMA that there is no right to take water or discharge into water unless allowed by a rule in a regional plan or a resource consent, I believe the Ngāi Tahu approach is a better and more justifiable planning approach to managing nitrogen loss. This philosophy lends itself to providing for reasonable consistency in managing activities which have the same or similar effects.

86. In my opinion the alternative approach to managing nitrogen losses requested in the Ngāi Tahu submission better achieves the purpose of the RMA, better gives effect to the CRPS, and better implements the goals in the ZIP Addendum because:

(a) It provides some flexibility around land use change and options for famers with low nitrogen loss footprints;

(b) It requires actions commensurate to the effects of the land use on water quality and moves toward a regime of allowing consistent management for activities having similar effects;

(c) It allows for further irrigation and land use change while reducing nitrogen losses in the catchment;

(d) It incentivises people to have lower nitrogen loss footprints by moving them out of the regulatory regime; and

(e) It reduces compliance costs because new nitrogen loss calculations are only required when land use changes occur that are likely to affect long-term average nitrogen loss.

87. The approach in the Ngāi Tahu submission still relies on estimating nitrogen losses using Overseer^{TM} but the emphasis is on measuring relative change in nitrogen losses as a result of changes in land use or the implementation of nitrogen reduction plans. The absolute numbers which make up the limits in the 'A', 'B' and 'C' bands are used to direct farming activities into an appropriate level of management rather than to determine absolute compliance.

88. In addition, the nitrogen loss rules in the Ngāi Tahu approach can be applied to any land use which has the potential to leach nitrogen. Unlike Variation 1 to the pLWRP, Variation 2 does not include nitrogen loads or limits for spreading biosolids or other land uses that involve the application of material with high nitrogen content on to land.

89. My main concern with the approach requested in the Ngāi Tahu submission is that it is uncertain how much nitrogen reduction will be achieved from the 'C' band activities. I think this same difficulty occurs with Variation 2 as notified, as the baseline nitrogen loss rates from which the percentage reductions are required in Table 13(h) are not known.

90. In his evidence Dr Dudley has modelled some scenarios for catchment nitrogen loads and concentrations in lowland streams that could be achieved using this approach. In particular Scenario 4, which models a maximum catchment load using an upper limit for the 'A' band of 15kg/ha/yr and having all other land uses losing no more than the lesser of 27kg/ha/yr, or their

nitrogen loss number for good management practice on soils where nitrogen loss is unlikely to reach 27kg/ha/yr.

91. Dr Dudley's calculations show that this scenario would result in a **maximum** estimated catchment load of 3047 tonnes/yr (p.5) (using Environment Canterbury's model) resulting in nitrate concentrations of 8.7mg/L in lowland streams. I have referred to this load as a **maximum** catchment load because within this catchment there are areas of dryland hill country which are most unlikely, under conventional farming practices, to have land uses with nitrogen losses of 15kg/ha/yr. However I understand from Dr Dudley he was unable to incorporate that difference in his calculations because the Environment Canterbury model does not distinguish between slopes and flat land.

92. Based on current modelling, this outcome on its own will still not meet the NPS Freshwater NoF limit of 6.9mg/L but it is closer than the target of 9.2mg/L which is estimated to result from the nitrogen reduction regime in Variation 2.

93. A timeframe needs to be specified for when Band C activities have to achieve their nitrogen reductions. Variation 2 introduces a timeframe of approximately 20 years (to 2035) with staged reductions along the way.

94. I recommend keeping that timeframe but providing some discretion for the consent authority in assessing the nitrogen reduction plan to allow shorter timeframes for nitrogen reductions that can be achieved quickly, for example changes in pasture species and fertiliser regimes; and allowing longer timeframes when substantial investment in infrastructure or land use changes are required. I suggest adding a policy to guide decision-making on resource consent applications to this effect.

95. The rules in Table XX as written in the Ngāi Tahu submission are a little unclear about the status of land uses in Band C which are established after 27th Sept 2014. The table states they are prohibited but allows 'changes' to a land use established prior to 27th Sept 2014 as a discretionary activity provided there is no increase in the nitrogen loss calculation.

96. I suspect the rule is trying to accommodate changes to land uses in the 'C' Band where the new land use losses nitrogen above 27kg/ha/yr but no greater than the losses from the incumbent land use. I see some merit in this

approach, especially if it is a segue to making greater nitrogen reductions faster.

97. In my opinion it is consistent with the approach taken for land uses in the 'A' and 'B" bands to allow those farmers in the 'C' Band to change land uses provided there is no increase in the nitrogen loss calculation; and the nitrogen loss reductions required under the plan can be made or made even faster. I suggest an addition to the new Policy 3.4.10 and amendments to Table XX to clarify this.

98. Based on my assessment, I would make the following amendments to the relief sought in the Ngāi Tahu submission:

(a) Amend proposed new policy 3.4.10 to read:

Policy 13.4.10

(a) By 01 July 2016 include by way of a plan change a schedule of reasonable N loss rates for farm activities on soil types when working to good management practice; and a schedule of requirements for N reductions for existing land uses which have N loss estimates in Overseer which exceed the B Band limit (27kg/ha/yr).

(b) By 01 July 2017 require:

(i) All land uses which have nitrogen loss calculations above the A Band limit to reduce their N losses to no more than the applicable number for good management practice set out in the schedule under policy 13.4.10 (a); and

(ii) Require existing land uses whose nitrogen loss calculation are higher than 27kg/ha/yr as set out in the B Band in Table XX to implement a nitrogen reduction plan to reduce N losses as required in the schedule introduced under Policy (a) above; OR

If no such schedules exist, require all existing land uses with nitrogen loss calculations that exceed the ***B band limit to reduce nitrogen losses not more than 27kg/ha/yr by 2035*** ~~*A Band limit to adopt best practicable option to minimize N losses*~~

When developing nitrogen reduction plans under this policy the timeframes for making nitrogen reductions prior to 2035 shall be determined considering the complexity and cost of the changes in farm practices required, including, but not limited to, investment in infrastructure or changes in land use.

(c) To allow people to change land uses in accordance with the nitrogen loss limits set in Table XX and, in the case of Band C, the nitrogen reductions to be made from the new land use occur at the same or a faster rate than those set out in the nitrogen reduction plan for the existing land use.

(b) Amend proposed new Table XX as follows.

Band	Limit	Status
A - Upper Hinds/Hekeao Plains Area	Up to ~~10~~ **15**kgN/ha/yr	Permitted activity
A – Lower Hinds/Hekeao Plains Area	Up to 15kgN/ha/yr	Permitted activity
B – Lower Hinds/Hekeao Plains Area	>15kgN/ha/yr – 27 kgN/ha/yr And if land use established after 27th Sept 2014 – maximum cap of 214 t/yr	Restricted discretionary activity
C – all areas Land uses established prior to 27th Sept 2014 **Land uses established prior to 27th Sept 2014**	Over 27kgN/ha/yr **No increase in nitrogen loss calculation.** **Increase in the nitrogen loss calculation.**	**Discretionary activity until 01 July 2035, then prohibited activity** **Prohibited activity** **Discretionary activity if no**

Land uses established after 27th Sept 2014		**increase in nitrogen loss calculation and reductions to 27kg/ha/yr can still be achieved in the same or faster timeframe otherwise a prohibited activity.** ~~Discretionary if activity is established before 27th Sept 2014 or if activity changes but no increase in nitrogen loss calculation~~ ~~Prohibited if activity is established after 27th Sept 2014.~~

Calculating Nitrogen Losses

99. Variation 2 requires farmers to establish a nitrogen baseline calculation for their land use baseline from 01 July 2009-01 July 2013, and then calculate a nitrogen loss annually based on the most recent four years of farming activity. This requires an Overseer™ budget every year.

100. My understanding is that nitrogen losses will fluctuate every year on a farm, depending on a variety of factors relating to plant and livestock production including changes to crops, pasture species, fertiliser, lambing and calving times and stock finishing times. I do not believe that these small fluctuations in nitrogen loss are an issue. Rather it is cumulative effects of many farmers making land use changes that result in gross changes in potential nitrogen loss that needs to be managed.

101. Relying on Dr Scott's evidence, I understand the likely precursors to potentially large changes in nitrogen loss include: the application of irrigation water or additional irrigation water; an increase in the number of cattle grazed on a property; or an increase in the application of effluent, sludge or other organic material with high nitrogen concentrations.

102. I have been told by farmers and farm advisors that the cost of undertaking an Overseer™ budget currently can range from around $1000-1500 for a very simple operation with no feed supplements or fodder crops, to $5 000 - 10

000 for more complex arable and mixed farming operations. It would seem to me that once a nitrogen baseline is established for a property, it would be more efficient and effective to require a new nitrogen loss calculation to occur when there is a change in land use which has the potential to substantially alter nitrogen loss. Therefore I support the change requested to the rules for nitrogen loss calculations suggested in the Ngāi Tahu submission.

Use of MAR & Direct Stream Augmentation

103. The nitrogen reduction regime proposed in Variation 2 is predicted to result in nitrogen concentrations in lowland streams of 9.2mg/L. Variation 2 proposes to meet the NoF limit of 6.9mg/L through the use of Managed Aquifer Recharge (MAR) using up to 4 cumecs of water. In their evidence, Mr Thorley and Mr Goff describe the level of uncertainty around the likelihood of MAR delivering the results anticipated in the ZIP Addendum to give effect to the NPS Freshwater. Mr Thorley suggests there may be other alternatives including direct stream augmentation.

104. Given the uncertainty around its potential success, I am not sure relying on MAR to achieve the nitrogen concentrations required in the NoF fully complies with the requirements to identify timeframes and methods to address over-allocation as required under Policy A2 of the NPS Freshwater.

105. However given the uncertainty in current assumptions around estimating nitrogen losses, attenuation and nitrogen concentrations in fresh water, and the enormity of the task in this catchment, I think any proposal to address over-allocation will need to be reviewed and refined over time. I believe a policy along those lines should be included in Variation 2 to help give effect to Policy A2 of the NPS Freshwater.

106. Policy 3.4.14 in Variation 2 provides for the use of MAR and direct stream augmentation to improve flows and decrease nitrate concentrations in springfed streams and groundwater. The Ngāi Tahu submission supports the policy but asks for slight amendments to wording to make it clear that the effects listed in the policy are to be avoided, remedied or mitigated.

107. I prefer the revised wording suggested in the Ngāi Tahu submission. I think it is clearer. I suggest amending Variation 2 as follows:

    (a) Add a new policy to Variation 2 that reads:

Monitor trends in nitrogen concentrations in groundwater and lowland streams in the Hekeao/Hinds catchment and review the appropriateness of the nitrogen reduction regime in this plan both singularly and in combination with any use of Managed Aquifer Recharge, direct stream augmentation or other measures to ensure nitrogen concentrations in lowland streams give effect to the NPS Freshwater.

(b) Amend Policy 3.14.4 to read:

Allow the use of targeted stream augmentation or managed aquifer recharge to improve flows ***and decrease nitrogen concentrations*** *in the Hinds/Hekeao springfed waterbodies and groundwater levels in the Lower Hinds/Hekeao Plains Area provided all of the following effects are avoided, remedied or mitigated:*

(a) Any adverse effects on cultural values including mahinga kai and any unnatural mixing of waters;

(b) Any adverse effects on community drinking water supplies;

(c) Any adverse effects on fish passage;

(d) Any adverse effects on people and property from raised groundwater levels and higher flows;

And the inundation of natural wetlands is avoided or where it cannot be avoided is offset by wetland restoration or enhancement so there is no net loss of biodiversity habitat or significant indigenous biodiversity.

Phosphorous and Sediment

108. Variation 2 does not include allocation limits to manage the effects of sediment and phosphorous losses from farming activities on water quality. The ZIP Addendum (p.18) identifies the issue and states "*Nitrogen (in the form of nitrates) is the best general indicator of cumulative effects on water quality from land use in the Hinds Plains."*

109. Policy 3.14.10 in Variation 2 identifies the need to reduce discharges of microbes, phosphorous and sediment in the catchment. The policy is

implemented through rules for stock exclusion, the Good Management Practices in Schedule 24a, and Farm Environment Plans.

110. The Ngāi Tahu submission requests that land areas vulnerable to sediment and phosphorous losses are shown on the Planning Maps and a new policy inserted to replace Policy 3.14.10 seeking to reduce losses of sediment and phosphorous in areas. The policy is to be implemented by a rule making farming activities in these zones a controlled activity.

Assessment

111. Relying on the evidence of Dr Dudley and Dr Burrell, sediment and phosphorous losses are an issue in lowland streams in the Lower Hekeao/Hinds Plains Area. The s42A Report observes that it is technically possible to identify areas in the zone which are vulnerable to sediment and phosphorous losses. In my opinion, the question is whether the provisions in Variation 2 are adequate to address the issue or whether a more targeted approach is required.

112. My understanding is that nitrogen and sediment/phosphorus typically find their way into water by different paths; nitrogen principally by leaching through the soil profile while sediment and phosphorous are associated with rainfall run-off from heavier soils to waterways, and erosion from banks or sloping land. Therefore it would seem that the area's most prone to risk of phosphorous or sediment loss in the Hekeao/Hinds catchment would be those areas in the catchment which are least likely to have high risk of potential nitrogen leaching.

113. I understand that sediment and phosphorous loss risks are best managed site-by-site; identifying potential risk sources on a property and mitigation measures to reduce those risks. The use of Farm Environment Plans lends itself to this approach.

114. Under Variation 2 all farming activities are required to adopt either the Good Management Practices in Schedule 24a or a Farm Environment Plan prepared in accordance with Schedule 7 of the pLWRP. From 01 January 2017 farming activities that lose more than 20kgN/ha/yr will require resource consent and a Farm Environment Plan is a condition of the rule. Farming activities which lose less than 20kgN/ha/yr will remain a permitted activity subject to a condition requiring they adopt either a Farm Environment Plan or the Good Management Practices in Schedule 24a.

115. If my understanding of the rules is correct, farming activities which are permitted activities due to lower nitrogen loss numbers may still have sediment or phosphorous loss risks due to heavier soils or hill country. The question is whether the current provisions, in particular the Good Management Practices in Schedule 24a, are sufficient to manage this issue.

116. In my opinion the provisions for identifying and managing potential sediment and phosphorous losses are more comprehensive in the Farm Environment Plan requirements in Schedule 7 to the pLWRP than the Good Management Practices in Schedule 24a. However sediment and phosphorus risk areas have not been mapped in Variation 2 as notified, so adopting the relief sought in the Ngāi Tahu submission may require a further variation to enable people in the affected areas to make submissions.

117. An alternative approach could be to require any property that has surface waterways in or adjoining it, or which has slopes over a certain degree, to develop and implement a Farm Environment Plan that incorporates sections 5(c) and (e) of Part B of Schedule 7 (being those parts which deal with soil erosion and waterway management). This approach would require a small change to rules 13.5.8 and 13.5.9.

118. If possible, my preference would be to include the rules as a condition on a permitted activity (unless resource consent is required for other purposes). I believe better environmental outcomes may be achieved if the money required for the resource consent process was spent on the Farm Environment Plan and mitigation measures if necessary.

119. My suggested amendments to Variation 2 would be:

    (a) Add a new condition to Rule 13.5.8 which reads:

    "If any waterway runs through or adjoins the property, a Farm Environment Plan is prepared in accordance with Part A or Part B sections 5(c) and (e) of Schedule 7, to identify any potential risks of sediment and phosphorous loss to waterways and any proposed mitigation measures, and supplied to Canterbury Regional Council on request."

    (b) Amend Rule 13.5.9 condition 2 to read:

    "The practices in schedule 24a are being implemented and the information recorded in accordance with Schedule 24a and

supplied to the Canterbury Regional Council on request ***and, if any waterway runs through or adjoins the property or the property contains land which is more than 15^{o} in slope, a Farm Environment Plan is prepared in accordance with Part B sections 5(c) and (e) of Schedule 7, to identify any potential risks of sediment and phosphorous loss to waterways and any proposed mitigation measures, and supplied to Canterbury Regional Council on request; or…"***

WATER QUANTITY

Variation 2

120. The ZIP Addendum identifies as an issue low flows in lowland streams of the Lower Hinds/Hekeao Plains Area. Causes are attributed to a combination of less recharge from irrigation up-stream as schemes have moved from border dyke to spray operations, and an increase in the number of groundwater abstractions for irrigation (p.34)

121. Variation 2 addresses the issue in the following ways:

    (a) Prohibiting any additional abstraction from the Valetta and Mayfield-Hinds Groundwater Allocation Zones (except renewal of existing resource consents).

    (b) Encouraging surface water takes and highly connected stream depleting groundwater takes to be substituted for groundwater takes with moderate or low connectivity.

    (c) To review the minimum flows in the lowland streams by 2020.

    (d) To require 50% of the allocated volume of water be surrendered if a water permit is transferred from site to site in the catchment.

Ngāi Tahu Submission

122. The Ngāi Tahu submission questions whether Variation 2 has an adequate plan to address over-allocation of groundwater and associated low flows in lowland streams. In summary, the submission requests:

    (a) Variation 2 recognises the interconnectivity of surface water and groundwater in the Lower Plains Area, and manages them together for allocation purposes.

(b) A review of the allocation limits for the Valetta and Mayfield-Hinds Groundwater Allocation Zones, given the current limits are those from the Natural Resources Regional Plan (NRRP) set in 2004.

(c) A new allocation system for groundwater, splitting allocation between that which may be made available to ensure sufficient reliability in any average rainfall year and transferred; and that which can be sourced at the discretion of the Regional Council during dry years to ensure reliability in 9 years out of 10.

123. The submission challenges the substitution of groundwater takes for surface water or shallow stream-depleting groundwater as a means to reduce low flows, if those groundwater takes are still hydraulically connected to surface water. The submission requests a new policy and an amended Rule 13.5.31 to ensure that groundwater takes are only substituted for surface water takes where there is no hydraulic connection.

124. The Ngāi Tahu submission also queries the merits of the provisions requiring 50% of allocated water be surrendered if a water permit is transferred site-to-site as a way to reduce over-allocation of groundwater.

Assessment

Interconnectivity of Surface and Ground Water

125. Relying on the evidence of Mr Thorley, Dr Burrell and Ms Holme, I think Variation 2 has correctly identified an issue with over-allocation of water for abstraction in the Lower Hinds/Hekeao Plains Area which is resulting in adverse effects on flows in lowland streams.

126. I do not agree that the approach taken in Variation 2 is sufficient to address this issue. The approach to managing groundwater in this catchment is essentially the same as in the NRRP in 2004, with the same groundwater allocation limits.

127. The ZIP Addendum acknowledges the connectivity between surface water and groundwater. It says (p.21) "*The groundwater and surface water bodies of the Hinds Plains Area are interconnected. Apart from the Hinds River itself all springfed waterbodies originate from the discharge of groundwater.*"

128. The s42A Report recommends rejecting the changes to managing groundwater resources sought in the Ngāi Tahu submission because that it is

‘not how groundwater has been managed to date' (para 10.86, p.108). I do not agree that is, in itself, a valid reason under the RMA. In my opinion Variation 2 should explicitly recognise and manage the interconnectivity of surface water and groundwater in the Lower Hinds Plains Area for the following reasons:

(a) Objective C1 of the NPS Freshwater and Objective 7.2.4 of the CRPS both provide for the integrated management of freshwater resources. Objective 7.4.2(2) of the CRPS specifically identifies 'the interconnectivity of surface water and groundwater.’ The regional plan must give effect to the NPS Freshwater and the CRPS.

(b) Objective 3.13 of the pLWRP recognises the role of groundwater in supporting base flows in lowland springs and streams. The provisions of Variation 2 must achieve the objectives of the pLWRP.

(c) Variation 1 to the pLWRP recognises and manages surface water and groundwater as a single resource with a single allocation block in the Selwyn-Waihora catchment, so it is possible.

129. The Ngāi Tahu submission includes a request for a new policy and recalculation of the allocation limits in Table 13(f) to incorporate surface and groundwater allocation into one block.

130. The submission requests the allocation limits in Table 13(f) combine surface and groundwater allocations. In his evidence Mr Thorley (para 24, p.10) recommends a review of the water balance budget for this catchment as a first step due to changes in rainfall data, abstraction rates, irrigation practices and recharge rates since current limits were set.

131. I agree the policy is appropriate but considering Mr Thorley’s evidence suggest the allocation limits in Table 13(f) should be amended after a review of the water balance budget for the catchment. Therefore Variation 2 should be amended to include a new policy which reads:

> *Manage groundwater and surface water as a single resource to ensure flows in the Lower Hinds/Hekeao Plains Area are improved ~~and the allocation limits set in Table 13(f) are met~~.*

Substituting Surface Water Takes for Groundwater

132. Rule 13.5.31 in Variation 2 provides for the *'substitute of an existing surface water or groundwater permit with a direct, high or moderate stream depleting effect'* as a restricted discretionary activity subject to conditions. The conditions include *'(b) the groundwater take will not have a direct or high stream-depleting effect.'*

133. The Ngāi Tahu submission opposes this rule because of concerns that the groundwater takes can still have moderate or low hydraulic-connectivity to surface waterbodies and therefore may not reduce the effects of groundwater abstraction on base flows in lowland streams. The submission requests a new policy and an amended Rule 13.5.31 to ensure the 'substituted' groundwater is not hydraulically connected to surface water bodies.'

134. The s42A Report opposes the amendments sought in the Ngāi Tahu submission on the basis that all groundwater takes will have some connectivity to surface flow in springfed streams (para 10.152, p.216).

135. There does not appear to be any policy in Variation 2 that rule 13.5.31 implements. The ZIP Addendum identifies the ability of surface water users to switch to 'non-hydraulically connected groundwater' (p.57) as part of a package to relieve low flows in lowland streams.

136. From my own professional experience I understand that managing the cumulative effects of groundwater takes with low hydraulic-connectivity on base flows in springfed streams is challenging. However my understanding is that Environment Canterbury has been aware for some time that groundwater takes with moderate or low hydraulic-connectivity have a cumulative adverse effects on base flows in springfed streams.

137. In his evidence Mr Thorley outlines his understanding of the geohydrology of the Hekeao/Hinds catchment and the potential hydraulic connectivity between groundwater strata. Mr Thorley (para 37. Pp.13) suggests some conditions under which he believes deeper groundwater could be abstracted without affecting base flows in lowland streams.

138. At the very least, I believe Rule 13.5.31 should be amended to include groundwater takes with a moderate hydraulic-connectivity in condition b. However my preferred approach would be to include a policy in Variation 2 to guide how the substitution of surface water takes for groundwater takes may

occur, along the lines requested in the Ngāi Tahu submission; and to amend Rule 13.5.31 to incorporate Mr Thorley's suggested conditions.

(a) I recommend you add a new policy which reads:

(a) To consider the use of deep groundwater as a replacement water source for surface or stream depleting groundwater in the Valetta and Mayfield Hinds Water allocation zones provided:

(i) ~~There is no hydraulic connectivity between the deep groundwater and shallower groundwater sufficient to result in long term adverse effects on base flows in lowland springs and streams either singularly or cumulatively~~;

(ii) Moving to deep groundwater abstraction will improve ***low*** *flows in the surface water body* ***considering the effects, both singularly and cumulatively, of the hydraulic-connectivity between surface water and groundwater, and groundwater strata;***

(iii) The volume abstracted does not singularly or cumulatively exceed the rate of aquifer recharge;

(iv) The abstraction does not result in over-allocation or further over-allocation of water for abstraction from the zone;

(v) There is no adverse effect on any silent file area or site of wāhi tapu or wāhi taonga; and

(vi) Any bore interference effects are acceptable in accordance with Schedule 12.

(b) Replace Rule 13.5.31 with a rule which reads:

The taking and use of groundwater within the Valetta and Mayfield-Hinds allocation zones shall be a discretionary activity where the following conditions are met:

~~(a) The groundwater is not hydraulically connected to any surface water body; and~~

(a) The minimum well depth is 50 metres or the cumulative seasonal leakage ratio of the average annual pumping rate is less than 10%;

(b) *There will be no increase in the volume of water allocated for abstraction from that allowed by the consents replaced; and*

(c) *The consent to abstract surface water or stream depleting groundwater is surrendered.*

Minimum Flows

139. Variation 2 proposes to increase the minimum flows for a variety of surface water bodies in the Lower Hinds/Hekeao Plains Area. Under Policy 13.4.18 relevant water permits will have the minimum flows in Table 13(e) until the 30 June 2020. From 01 July 2020, relevant water permits will have minimum flows based on 50% of 7D MALF, unless alternative minimum flows have been developed and included in the plan.

140. I understand some work on alternative minimum flow recommendations has occurred including: a report and recommendations for minimum flows for Ngāi Tahu cultural values (Tipa & Associates 2013); a report and recommendations for minimum flows for ecological values (Meredith 2014); and the Hinds Drains Working Party has been charged by the Ashburton Zone Committee to come up with recommendations.

141. Having considered the evidence of Dr Burrell and Mr Thorley, it is my opinion that increasing minimum flows from surface water and high stream-depleting groundwater takes is not a particularly efficient or effective proposal to relieve low flows in lowland springfed streams, if the over-allocation of groundwater for abstraction is not addressed at the same time. I liken it to trying to fill up the tub by turning on the tap but not putting in the plug.

Water Permit Transfers

142. Variation 2 includes provisions to prohibit the transfer of water permits for surface water in the Hekeao/Hinds Plains Area and for groundwater in the Valetta Groundwater Allocation Zone. Policies 13.4.16 and 13.4.17 respectively are to '*prohibit increased use of water arising from the transfer of consented volumes of water.'*

143. Rules 13.5.33 and 13.5.34 make it a prohibited activity to transfer water permits to take and use surface water in the Hinds/Hekeao Plains Area or groundwater in the Valetta Groundwater Allocation Zone, other than transfers to new owners on the same site.

144. The Ngāi Tahu submission questions the justification for the prohibition as a means to reduce over-allocation. The submission queries the effects on over-allocation if the water to be transferred was being abstracted prior to transfer. The submission seeks amendments to the policies and rules to allow for water permit transfers provided the transfers do not result in any increase in the water abstracted. The submission also queries whether a rule in a plan can prohibit the right to make applications to transfer water permits, when an application may be made under the RMA (s136)

145. In my opinion a question arises as to whether such a rule can be justified from a planning perspective considering the effects of a transfer. There is also a second question in this case, as to whether the rule implements the policy.

146. Policy 13.4.16 and 13.4.17 are clear; the policy is to avoid transfers that may result in additional water being abstracted from catchments that are already over-allocated. Such a scenario can occur if the permit being transferred has not been utilised or fully utilised by the existing permit holder.

147. I agree that transferring water permits should not result in any increase in water abstracted from the Hinds/Hekeao River and the Valetta Groundwater Zones. These catchments are over-allocated and a decision that results in more abstraction could arguably fail to give effect to Policy B5 of the NPS Freshwater. To that end the policy may need to apply to the Mayfield-Hinds Groundwater Zone as well, given under Variation 2 there may be no further abstraction from that zone.

148. In my opinion Rules 13.5.33 and 13.5.34 go beyond the policies. They prohibit all water permit transfers, not just those that 'will likely result in an increase in water being abstracted from those catchments.' This rule could also frustrate attempts to manage water more efficiently or to reduce trigon losses. For example, if a farmer buys a second block of dryland and as part of a nitrogen reduction plan wants to transfer water and irrigate that land rather than the current block or to allocate water between the two areas of land.

149. Therefore, my suggestion is to leave policies 13.4.16 and 13.4.17 as drafted but replace rules 13.5.33 and 13.5.34 with the rule requested in the Ngāi Tahu submission. The rule would read:

In the Hekeao/Hinds Plains the permanent or temporary transfer of permits to take surface water; and in the Valetta and Mayfield-Hinds Groundwater Allocation zones the permanent or temporary transfer of permits to take surface water or ground water, shall be a discretionary activity provided the following conditions are met:

(i) The water permit has been exercised within the last two years by the existing permit holder; and

(ii) The maximum annual amount of water transferred does not exceed the lesser of the amount of water which the existing permit holder has demonstrated that they have abstracted on average each year over the last two years, or the maximum amount which is reasonable for the proposed land use calculated in accordance with Schedule 10.

Any transfer of a water permit that does not comply with Rule 3.5.33 shall be a prohibited activity.

Options for Addressing Groundwater Over-Allocation

150. The Ngāi Tahu submission suggests an alternative option to allocate water for abstraction which may help to reduce over-allocation without impacting too heavily on reliably of supply in dry years. Mr Thorley's evidence discusses other options for reducing over-allocation of groundwater.

151. Mr Thorley recommends that the first step in managing over-allocation of the groundwater resource in this catchment is to update the water balance budget. I agree with Mr Thorley. In my view the first step in developing methods and timeframes to address over-allocation is to clearly understand the existing environment; that requires up-to-date information.

152. My suggestion would be to add a new policy to revise the flow and allocation limits and require a timeframe and methods to reduce over-allocation be developed and included in Variation 2 by 01 July 2017, with the methods to reduce over-allocation to coincide with the new minimum flows. Policy 13.4.16 could be amended to read:

Review the water allocation limits in Tables 13(e) and 13(f) for the Hinds/Hekeao River and the Valetta and Mayfield-Hinds Groundwater Allocation Zones and surface water bodies within those zones by 01 July 2017.

Lynda Weastell Murchison

15th May 2015