pLWRP Variation 2 Officers Reply Questions and Errata

Para 1.3 Is the reference to Fish & Game Council North Canterbury intended to refer to the submitter on V2, viz Central South Island Fish and Game?

Response from Mr McCallum-Clark:
Yes.

Para 3.30 Who is referred to as 'Mr Marshall'? Could that have been intended to refer to Dr JDM Fairgray?

Response from Mr McCallum-Clark:
Yes.

Para 4.2 Do these issues involve questions of law? If they do, should the hearing commissioners explain their understanding of how the questions of law are to be resolved?

(a) Ngāi Tahu argued that the law does not entitle continuation without restriction of an existing activity. Is that correct in law?
(b) Whether Variation 2 has regard to Central SI Fish and Game Management Plan?
(c) Whether claimed impossibility of reducing N loss (BCI legal subs paras 32-37; DHL legal subs paras 9.2 &17.1) is a relevant consideration?
(d) Exclusion of livestock from watercourses?
(e) Classification of drains
(f) Whether original s32 report was valid
(g) Consistency of Variation 2 with LWRP
(h) Targets and limits

Response from Mr Maw:
It is submitted that each of these issues does involve a question or questions of law, and that the Hearings Commissioners should set out their understanding of how the questions of law are to be resolved.

Case law has established the following four identifiable categories of questions of law. That a decision maker has either:[1]

(a) Applied a wrong legal test (by misinterpreting the law or incorrectly applying the law);

(b) Came to a conclusion without evidence or one to which, on the evidence, it could not reasonably have come;

(c) Took into account matters which it should not have taken into account; or

[1] *Countdown Properties (Northlands) Ltd v Dunedin City Council* [1994] NZRMA 145 (HC) at 153. See also *Bryson v Three Foot Six Ltd* [2005] NZSC 34, [2005] 3 NZLR 721 and *Hawkes Bay and Eastern Fish and Game Councils v Hawke's Bay Regional Council* [2014] NZHC 3191 at [94].

(d) Failed to take into account matters which it should have taken into account.

Questions of the jurisdiction of a decision-maker are also generally accepted to be questions of law.

The Supreme Court has made it clear:[2]

> *"An appeal cannot however be said to be on a question of law where the fact finding Court has merely applied law which it has correctly understood to the facts of an individual case. It is for the Court to weigh the relevant facts in light of the applicable law. Provided that the Court has not overlooked any relevant matter or taken account of some matter which is irrelevant to the proper application of the law, the conclusion is a matter for the fact-finding Court, unless it is clearly insupportable."*

Challenges to factual findings by a decision maker face a very high hurdle before they may be considered to raise a true question of law.[3] *The finding must lack evidential underpinning to such an extent that it simply could not reasonably have been reached.*[4]

Para 4.20 What is the basis for saying the holding of a resource consent cannot be considered a 'condition'? Does it look like a condition in which a farming activity qualifies as a permitted activity (RR 13.5.21 and 13.5.24); or in which a farming activity is eligible for consideration as a discretionary activity (R13.5.22)?

Response by Mr Maw

On reflection, there is no basis for saying that the holding of a resource consent cannot be considered a "condition". In the context of distinguishing the Courts decision in Queenstown, it is submitted that it is largely irrelevant whether the resource consent is considered a "condition", "requirement" or "permission". In Queenstown the Court found that the rules were ultra vires insofar as they required compliance with a resource consent which was not a standard, term, or condition that was specified in the plan change (using the language of section 77B).[5]

The distinction between the rules considered in Queenstown and rules 13.5.21, 13.5.22 and 13.5.24 (the Variation 2 rules) is that the Variation 2 rules do not require compliance with the resource consent held for a different type of activity. The Variation 2 rules simply require that the effects arising from the associated activity are separately authorised under the relevant rules, which may or may not require a resource consent.

---

[2] *Bryson v Three Foot Six Ltd* [2005] NZSC 34, [2005] NZLR 721 at [25].
[3] *Horticulture New Zealand v Manawatu-Wanganui Regional Council* [2013] NZHC 2492; *Friends of Pakiri Beach v Auckland Regional Council* [2009] NZRMA 285 (HC) at [19].
[4] *Centrepoint Community Growth Trust v Takapuna City Council* [1985] 1 NZLR 702 (CA) at 706.
[5] *Queenstown Airport Corporation Limited v Queenstown Lakes District Council* [2014] NZEnvC 93 [183]

Para 4.25 What is it about a regional plan that classifies as permitted activities that would otherwise require resource consent under section 15 which makes it inappropriate to apply the reasoning that has prevailed in planning law for 3 decades[6] that a permitted activity (formerly called a predominant use) is to be defined without any subjective or discretionary element or value judgment?

Response from Mr Maw:
Rule 13.5.24 is a rule that permits the discharge of nutrients in certain circumstance on the condition that the land use activity associated with the discharge is authorised under rules 13.5.8 to 13.5.20 (Nutrient Management, Sediment and Microbial Contaminants).

It is submitted that compliance with those rules does not require any subjective or discretionary element or value judgment. The requirement that the land use activity is authorised under rules 13.5.8 to 13.5.20 is capable of objective ascertainment.

There is a long line of authority, extending back to the Town and Country Planning Act, that a Council cannot reserve itself a discretion as to whether an activity is permitted or not. A rule cannot reserve by subjective formulation a discretion to decide whether or not an activity is permitted.[7]

Whether a discharge is authorised under rule 13.5.24 is defined by the rules in Variation 2. Once the status of the land use activity has been determined, and consent is held for that activity if necessary, there is no subjective or discretionary judgment involved in ascertaining whether the discharge associated with the land use is permitted.

In respect of rule 13.5.21, the use of land for a farming activity is a permitted activity if the property is irrigated with water from an irrigation scheme or a principal water supplier, and that scheme or supplier holds a discharge consent granted under Rule 5.61, 5.62 or Rule 13.5.22. Resource consents are available as a matter of public record and therefore it is easily ascertainable whether or not the proposed use of land for farming would be permitted under this rule without the need for any value judgment.

It is submitted that rules 13.5.21 and 13.5.24 do not go against the reasoning that has prevailed in planning law for 3 decades that a permitted activity (formerly called a predominant use) is to be defined without any subjective or discretionary element or value judgment.

Para 4.66 Last sentence says that as at 1 September, Variation 2 must be treated as if it were a change to the pLWRP. Is it correct that on and from that day, the LWRP is (with minor exceptions)

[6] Eg: *Ruddlesdon v Kapiti Borough* (1986) 11 NZTPA 301 (Davison CJ); *Fairmont v Christchurch City* (1989) 13 NZTPA 461 (HC); *McLeod v Countdown* (1990) 14 NZTPA 362 (Mc Gechan J).
[7] *Twisted World Limited v Wellington City Council*, W024/2002, 8 July 2002, Judge Sheppard, at [63].

no longer a proposed plan, but an operative plan? If so, should that sentence refer to a change to the LWRP, rather than a change to the pLWRP?

Response from Mr Maw:
Yes. On and from 1 September 2015, the (currently proposed) LWRP will be a partly operative plan. Therefore, paragraph 4.66 should be amended to read:

> *"Accordingly, as at 1 September 2015, Variation 2 must be treated as if it were a change to the LWRP"*

Paras 4.82 to 4.85 In these paragraphs the officers are advising us that we need to consider the environment the subject of the variation /plan change as affected by potential exercise of certain resource consents that expire in 2018. Specifically in respect of the BCI consents, would it be correct application of the law to allow for the fact that those consents apply to an area that extends beyond the Hinds Plains area to which the variation/plan change is to apply? Is there any evidence for finding that all, or even any, of potential future implementation of those consents, before they expire, will be within the variation/plan change area? Does the evidence before us support finding that implementation of the consents may substantially be outside the Hinds Plains variation/plan change area?

Response from Mr Maw:
It is submitted that the fact that BCI's consents apply to an area that extends beyond the Hinds Plains area to which the variation/plan change is to apply, is an appropriate matter for the Panel to consider. This is of particular relevance when determining the scale of the activities which are authorised by those consents, and the extent to which they form a part of the background environment against which Variation 2 falls to be assessed.

In his Statement of Evidence on behalf of BCI, Mr Thomas stated that BCI's resource consent CRC143165 allows for the irrigation of up to 40,000ha in areas 1 to 8 and/or on any land between the Rakaia and Rangitata Rivers covered by a separate consent to use water (if required).[8] Further, BCI's consent CRC147697 specifies a nitrogen leaching limit of 1,232 tonnes per year, being the total load applying to all of areas 1 to 8 and there being no further restriction on where the load may be applied.[9] Mr Thomas also stated in his evidence that BCI is currently supplying water to approximately 4,629 ha located in the Hinds Plains area.[10]

Figure 1 attached to Mr Thomas's evidence shows areas 1 to 8 of the BCI Scheme. Mr Thomas also stated that if regard is had to areas 1 to 8 in Figure 1, the Hinds Plains area represents around a third of the total area that is able to be irrigated by BCIL.[11]

[8] Statement of Evidence of Mr Thomas on behalf of BCI dated 15 May 2015, at [9].
[9] Statement of Evidence of Mr Thomas on behalf of BCI dated 15 May 2015, at [12].
[10] Statement of Evidence of Mr Thomas on behalf of BCI dated 15 May 2015, at [10].
[11] Statement of Evidence of Mr Thomas on behalf of BCI dated 15 May 2015, at [23].

Para 5.13 Where in the 'tracked changes' version of Variation 2 does that recommended DRP limit appear?

Response from Mr McCallum-Clark:
With apologies, Table 13(j)(a) was inadvertently omitted from the tracked changes version, and should read:

Table 13(j)(a): Limits for Hinds/Hekeao Plains Area surface waterbodies

Surface Waterbody type	*Type*	*Measurement*	*Limit (mg/L)*
Hill-fed Upland(1)	*Dissolved Reactive Phosphorus (DRP)*	*Annual median*	*0.02*

1. Measured immediately upstream of the Rangitata Diversion Race siphon on both North and South branches of the Hinds River.

Para 5.21 Please remind me what the rationale was for the zone committee to recommend 30,000 hectares for intensification given that there was much debate about this in their deliberations?

Response from Mr McCallum-Clark:
Zone committees work collaboratively to develop effective water management solutions that deliver economic, social, cultural and environmental outcomes which align with what their local community wants.[12] They are guided by the Targets established under the Canterbury Water Management Strategy. The Targets address a range of economic issues, including increasing the amount of irrigated land and increased production through the application of water.

The Ashburton Zone Implementation Programme (ZIP) Addendum – Hinds Plains Area identifies the desired outcomes the recommended package of actions in the ZIP Addendum is to achieve. This reads: "Irrigated area increased by up to 30,000 ha from current irrigated land".

The ZIP Addendum also states that the "30,000 ha of new intensive, irrigated land use could contribute an additional $104 million GDP and 232 new jobs per year to the regional economy".

Para 5.22 If intensification is to be limited to existing irrigation scheme consents which, from my recollection of the evidence all contain nitrogen loss limits of one form or another, why is Table 13(i) still required?

Response from Mr McCallum-Clark and Dr Vattala:

[12] Sourced from http://ecan.govt.nz/get-involved/canterburywater/committees/Pages/Default.aspx

The existing irrigation scheme consents were granted during the Variation 2 planning process. Both consents were issued for a short term to enable any replacement resource consents to align with the decision on Variation 2.

Table (13(i)) provides the planning framework to allocate nitrate for the new consents after expiry, based on irrigated land prior to and after the plan notification. For land irrigated prior to 1 October 2014, the framework in Policy 13.4.13 could possibly address "Row A" of Table 13(i). The table could be dispensed with entirely, by:

1. *Adding a specific reference to irrigation schemes into Policy 13.4.13(ba); and*
2. *Changing the reference in Rule 13.5.22(2) from "will not exceed the nitrogen load calculated in accordance with Rows A and/or B in Table 13(i)" to "will not exceed the nitrogen load calculated in accordance with Policy 13.4.13".*

However, there may be greater certainty and clarity in specifying a formula to enable a limit to be calculated through Table 13(i), as opposed to relying on a policy.

- Do all of the existing irrigation scheme consents expire in 2018? For example, Consent CRC121664 attached to the evidence of Benedict Curry expires on 26 May 2019?

  Response from Mr McCallum-Clark and Dr Vattala:
  No. Barhill Chertsey Irrigation Limited expires in 2018 and RDR expires in 2019. 2018 was inadvertently used as the expiry date in the s42A reply report.

- Can you list the relevant existing irrigation scheme consents being referred to (by consent holder and consent number) and their expiry dates?

Number	*Holder*	*Expiry*
CRC147697	*Barhill Chertsey Irrigation Limited*	*09 Sep 2018*
CRC121664	*Rangitata Diversion Race Management Limited*	*26 May 2019*

- Can you explain how the recommended 'tracked changes' amendments to Variation 2 preclude intensification / new irrigation, other than that allowed by existing irrigation scheme consents, from occurring? 13.5.21

  Response from Mr McCallum-Clark:
  The tracked changes recommendations do not seek to preclude intensification across the whole of the Hinds/Hekeao Plains Area.

  In the Upper Hinds/Hekeao Plains Area, Rules 13.5.9 and 13.5.12 are essentially unchanged from that notified, and prevent any increase in nutrient discharge.

  In the Lower Hinds/Hekeao Plains Area, previous Rule 13.5.14 provided for intensification on up to 30,000 ha of land. This rule has been recommended to be

deleted. However, in Rules 13.5.15 and 13.5.16, limited intensification is recommended to be provided for on those properties with low levels of nitrogen leaching. This is most likely to occur in the area of heavier soils to the east of State highway 1.

Some intensification on individual properties could also occur through the farming enterprise rules.

- Would it be more certain if the existing irrigation scheme consents were listed and it was clearly stated that intensification / new irrigation was limited to that allowed under those consents?

  Response from Mr McCallum-Clark:
  Yes, that would add certainty.

- How would such an option (listing existing irrigation scheme consents) be reflected in amendments to the policies and rules?

  Response from Mr McCallum-Clark:
  The primary adjustment would be to Rule 13.5.22. There have been some resource consents granted to individual farmers to intensify under Rule 13.5.14. Therefore is not recommended that Policy 13.4.13(ba) be limited to these irrigation scheme consents.

  Rule 13.5.22(3) could be adjusted to read:
  3. The total area of the land supplied with water by the irrigation scheme has not increased beyond that irrigated under resource consent CRC147697 on 09 Sep 2018 and resource consent CRC121664 on 26 May 2019.

Para 5.30 what are the implications for the planning regime if MAR is not successful – in other words – how and when will the planning requirements adapt to address nutrient contamination especially given what the Dairy NZ/Fonterra alternative nutrient management regime proposes?

Response from Mr McCallum-Clark:
MAR is an integral part of the Zone Committee's solution package and the Variation 2 planning regime, including in any recommended changes in the reply report. If MAR is not successful, the community outcomes will not be met, for both water quality and water quantity. Nor will a path be set to achieve the objectives of the National Policy Statement for Freshwater Management 2014.

The principle alternative considered by the Zone Committee was "Advanced Mitigation 3" or "AM3" in the technical reporting. This required more significant on-farm nutrient reductions. The technical reporting considered that this would result in widespread economic harm and failure of many existing farm businesses and systems.

The recommended changes to Variation 2 do not include a monitoring regime to determine the success of MAR (other than the general water quantity and quality limits), or a regime should MAR not be successful. Such a situation would require a comprehensive review of options and the planning regime for the Hinds/Hekeao Plains Area.

Any failure of MAR and consequent need for such a review is likely to be apparent before the further review scheduled under the Canterbury Regional Council's staged programme for implementing policies A1, A2, A3, B1, B2, B5, B6, CA1, CA2, CA3 and CA4 of the National Policy Statement for Freshwater Management 2014. This programme states that a sub-regional section for integrated land and water management in Hinds River/Hekeao and Ashburton-Rangitata groundwater zone will be notified by 2023/24.

Para 5.38 Is not clear to me specifically the second part of the second sentence starting with "However ..... which inherently produces something of a lower level below which further reductions are not required…" please clarify?

Response from Mr McCallum-Clark:
Paragraph 5.38 reads: "It is clear that dairy and, to a lesser extent, dairy support are some of the highest emitting and wide-ranging activities in the Lower Hinds/Hekeao Plains Area. However, with an allowance for low-leaching activities to increase, which inherently produces something of a lower level below which further reductions are not required, and the GMP start position, a framework requiring equal reductions below GMP appears easier to implement and had the support of the majority of submitters and witnesses."

The recommended changes to Policy 13.4.13(b) identify that the time staged reductions are not required for properties leaching less than 20 kg/ha/pa N. This is in response to a number of submissions that sought clarity on this issue, and aligns with the recommended policy and rule framework that enables low leaching farms to discharge up to 15 kg/ha/pa N, for farms leaching less than 20 kg/ha/pa N to seek resource consent to increase to that level.

If provision is made for these low leaching farms to increase, in forming he recommendations, it was then considered unreasonable to require farms leaching just above these levels to reduce below – hence the reference to an inherent lower level. A 'floor' is a colloquial term sometimes used in this situation.

Para 5.43 Is there provision for the existing consents to be reviewed if the flow regime is changed in 2020 to achieve an environmental benefit for the lowland water bodies?

Response from Mr McCallum-Clark:
Variation 2 is silent on this matter. The Regional Council has discretion to conduct a review of the conditions of these resource consents, after the Variation is made operative, under section 128 of the RMA:

128 Circumstances when consent conditions can be reviewed
(1) A consent authority may, in accordance with section 129, serve notice on a consent holder of its intention to review the conditions of a resource consent—
(a) …
(b) in the case of a coastal, water, or discharge permit, when a regional plan has been made operative which sets rules relating to maximum or minimum levels or flows or rates of use of water, or minimum standards of water quality or air quality, or ranges of temperature or pressure of geothermal water, and in the regional council's opinion it is appropriate to review the conditions of the permit in order to enable the levels, flows, rates, or standards set by the rule to be met; or
(c) …

Para5.51 What is the average depth of 'deep' groundwater wells in this sub-region?

Response from Mr Bower and Mr Durney:

Firstly, we believe it is important to define what we mean by 'deep' groundwater wells. We consider a well screened deeper than 80 m below ground level to be a 'deep' well. We have looked at all wells screened deeper than this depth to provide the "average depth of deep groundwater wells".

As the groundwater system varies spatially, we have looked at average depth for areas upgradient and downgradient of State Highway 1. There are 229 active wells in screened deeper that 80 m (deep well) category. Of these 57 are in the area coastward of State Highway 1, and these have an average top of screen depth of 97 m below ground level. Inland of State Highway 1 there are 172 inland wells having an average screened depth of 103 m below ground level.

Therefore the average depth for 'deep' groundwater bores ranges from 97m to 103 m below groundwater level.

Para 5.57 The 3rd sentence says that the 50-percent surrender framework allows some flexibility for higher-value uses of transferred water. May we have a brief explanation of how the surrender framework does that, please?

Response from Mr McCallum-Clark:

This paragraph is poorly worded. The recommended changes to the transfer provisions in Variation 2 provide for, through a restricted discretionary activity resource consent process, the transfer of any water, whether "higher-value" or not.

However, it is the officer's expectation that this may discourage some water from being transferred, or make that water more costly, particularly when being transferred from one party to another for payment, as a result of the economic consequence of intervention in a normally operating market. In this circumstance, the officers considered it likely that water that had more than one use or benefit would be considered "higher-value" and therefore more likely to be transferred. Such multiple uses or benefits may be the securing of irrigation water that also has sufficiently high reliability to prevent crops dying, or that would enable less reliable surface water to be efficiently used.

Para 5.65 If a person was to gather kai from a publically accessible water body, and they get sick because of an indirect uptake of a herbicide, and signage isn't within the immediate area where the person could read it - who would be responsible for this, from a legal perspective? And is this process the appropriate forum to inform the EPA – the gaps in their criteria for applying hazardous substances to water bodies (ie) mitigating risks to mahinga kai.

Response from Mr Maw:
The Hazardous Substances and New Organisms Act 1996 ("HSNO Act") and the RMA are both relevant to hazardous substances.

The HSNO Act regulates all substances that are classified as hazardous in New Zealand and applies where a substance has one of more of the hazardous properties defined by the HSNO Act, and where the level of hazard is above a defined threshold (section 2 of the HSNO Act; Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001; and, Hazardous Substances (Classification Regulations 2001).

The HSNO Act requires anyone who imports into New Zealand, or manufactures, a hazardous substance, to obtain approval from the Environmental Protection Authority ("EPA") (section 25 of the HSNO Act). Some substances have their own individual approval (e.g. petrol, LPG) and other substances are approved under a group standard approval. These approvals may have controls around the use and application of the substance. For example, herbicides for aquatic pest plants, whereby permission is required from the EPA and an annual report provided, that includes evidence of specified persons being notified.

A person who breaches the HSNO Act (and any regulations under it) commits an offence and, if convicted, can be subject to a maximum fine of NZ$500,000.00 plus NZ$50,000.00 per day for continuing offences, and a prison term of no more than three months. The Court may order the convicted person to take steps to mitigate or remedy adverse effects caused by or on behalf of the person, or pay the costs of the same (sections 109 and 114 of the HSNO Act).

Liability is not limited to the party that actually commits the offence. The HSNO Act extends liability to any employee or agent who allows the offence to take place. Therefore, if a body corporate, company employee, or contractor is convicted of an offence against the HSNO Act, a director, trustee, employer, or any person concerned in the management of that party can also be held liable for that offence (section 115 of the HSNO Act).

Under the RMA, local authorities may also regulate hazardous substances and discharges of contaminants. The particular regulatory requirements for hazardous substances will depend on the rules in the relevant plan.

Para 5.66 Please remind me - where are the provisions that will mitigate the risks from applying glyphosate?

Response from Mr McCallum-Clark and Dr Vattala:
The recommended changes to Variation 2 separate the requirements for different chemicals, depending on whether there are specific requirements under the HSNO Act. The recommended changes do not provide mitigation of risk for any specific chemical. rather it intends to provide information on any chemical spraying on waterbodies.

For glyphosate, it is understood that there are no requirements for signage under the HSNO Act. Therefore, the provisions of Rule 13.5.7 would require signage at the entrance to properties where the waterbody is on private land, and at all public access points within 2km, where the waterbody is on public land.

Para 5.75 What does this suggestion mean in terms of amendments to the provisions of Variation 2?

Response from Mr McCallum-Clark:
Para 5.75 relates to the specification of the monitoring methodology for limits. While the issues with specific relief sought in submissions remains, additions, based on the information in Technical Memoranda 7 - Monitoring of limits, could include:

- *Footnoting of Table 13(j) with: "Monitoring of Hill-fed Upland is at the Canterbury Regional Council's monthly surface waterbodies monitoring sites upstream of the Rangitata Diversion Race siphon on both North and South branches of the Hinds River. For other surface waterbodies, at the Canterbury Regional Council's monthly surface waterbodies monitoring sites."*
- *Footnoting of Table 13(k) with: "Groundwater quality is determined as the median concentration across the Canterbury Regional Council's quarterly groundwater monitoring bores (screened <30 metres below water table)."*

Appendix A – Technical Memoranda

Memoranda – Dairy NZ/Fonterra (1), Low leaching flexibility and Zone Boundary changes – 30 July 2015

Summary (pg 2) I too would like to know that if an individual farm intensifies up to 15kg/ha/yr – are they then allowed to move to tier 2 and intensify an additional 5kg/ha/yr to 20 kg/ha/yr?

Response from Mr Bower and Mr McCallum-Clark:
The Hinds Plains technical team is similarly uncertain as to the position in the DairyNZ/Fonterra evidence.

However, the recommended rule framework in the s42A reply report does allow a person to move form 'tier 1 to 'tier 2', but that would be under a discretionary activity resource consent framework.

Page 6 second paragraph "… from an increased period of sustained high nitrate concentrations well above the chronic effect thresholds throughout the period … " - does this mean that nutrient contamination will have an acute/lethal effect on aquatic biota?

Response from Dr Meredith:
The paragraph reads: "The likely ecological responses to this result from an increased period of sustained high nitrate concentrations well above the chronic effect thresholds throughout the period up to 2035."

Potentially "yes". The concentration could have an acute/lethal effect but only because it is sustained over a long period of time. While the nitrate toxicity criteria are chronic criteria, such criteria are only tested over short periods of time and so test short term responses (days to weeks) and are then adjusted to account for annual exposure (as annual medians or 95%iles). However, if such chronic levels are exceeded for very long periods of time (many years to decades) the ultimate responses may lead to species loss or extinctions (or individual or species lethality). The context of very long duration of exposure has not been adequately dealt with in development of criteria to date, and so long cumulative exposure could result in more acute effects at the community/population level.

Bullet points bottom of Page 7 In the summary bullet points bottom of page 7 beginning of page 8 (b) and (c) use the word "can" (ie) "…. can have a significant effect on aquatic biota. Are these effects not certain enough to be able to use the words "likely to" to provide more certainty for us in our decision-making.

Response from Dr Meredith:

Yes, I consider the term "likely to" to be a more appropriate term than "can" in describing a response that is "probable" rather than "possible" in terms of effects of sustained or prolonged nitrogen concentrations on aquatic biota. This is particularly so, given the high elevation of concentrations often double the concentration of the National bottom line (where 20% of tested species will be affected). At the higher concentrations in Hinds/Hekeao waterway (10+ mg/L), sustained here for decades, a higher percentage of species (higher than 20%) are predicted to be affected by the concentration relationships in the published toxicity methods.

Page 7 of 10, third paragraph, last line Would the reduction in overall species abundance and fitness recover and if so over what time period might that recovery be expected to occur?

Response from Dr Meredith:
Loss of species abundance and fitness would be the result of long cumulative periods of short term chronic effects. Some components of those communities could recover in-situ so long as they had continued to persist over the extended period of effects. Others would have to re-establish themselves as new recruitment to catchment waterways. Therefore we are considering two mechanisms:

- *Recovery of impaired populations of species that still existed in catchment waterways, and*
- *Recruitment of new populations of species to waterways once concentrations had adequately reduced.*

Recovery of present, but impaired, populations may be relatively rapid (months to years) from a removal of toxic responses in a simplistic sense, but it should also be considered that there are also functional changes to the whole aquatic community. Functional changes such that the previous stable assemblage of species may not readily reoccur. The whole aquatic community may already have established a new trophic or structural balance that will not readily readjust back to the past (2005) healthy conditions.

Where species or communities are lost, recovery is not so certain because recruitment mechanisms back to these spatially disparate or isolated waterways will be difficult. These independent spring-fed waterways are entirely separate, so mechanisms for recruitment are very limited. There is no capacity for downstream recruitment from unaffected upstream sources (as they are spring-fed), and most discharge independently to the sea, so there is no capacity for recruitment from the receiving water body (the sea) or between waterways. Even aerial dispersion of aquatic insects (during brief flight stage breeding) are unlikely because most waterways are spaced kilometres apart and in an intensified

agricultural landscape there are few obvious pathways to encourage successful aerial passage between waterways. Where the abundance of species had reduced by localised extinctions recovery is not guaranteed to occur.

Overall, there is a high likelihood that aquatic communities may not fully recover if high contaminant concentrations occur for long periods of time (decades). Some tolerant components that persisted may recover quickly (months to a few years) but other more sensitive species may never recover.

Page 9 of 10, second paragraph Is it therefore fair to say that, in hindsight, based on groundwater quality data the area adjacent to the Rangitata River (shaded green in the LWRP and red in Variation 2) should not have been categorised as green in the first place? Can you remind me of the implications, if any, for existing farms in that area from changing from a green to a red zoning?

Response from Mr McCallum-Clark and Mr Bower:
The relevant paragraph reads: "The coloured nutrient allocation zones in the pLWRP were a simple and preliminary partitioning of nutrient loss risk throughout Canterbury. In particular, the delineations along the edges of the major alpine rivers were not rigorous assessments of nutrient loss pathways to or away from these major rivers. As such, it was anticipated that these boundaries and areas may need to be reassessed in sub-regional planning processes such as Variation 2 to ensure

The pLWRP Nutrient Allocation Zones were based on the best available information at the time. Current catchment knowledge, supported by the last few years of monitoring data indicates that many areas such as those adjacent to large braided rivers possibly should not have been graded 'green' and possibly should have been included with the rest of the plains catchment. This area adjacent to the Rangitata River is one where such monitoring data and improved understanding of the catchment suggests a revision of the boundary is appropriate.

In the Green zone, permitted activities include:

- *Farms leaching less than 20kgN/ha/yr*
- *Farms leaching more than 20kgN/ha/yr, provided:*
    - *the property is smaller than 50ha, or*
    - *increases in leaching are less than 5kgN/ha/yr.*
    - *Resource consent required if farms cannot comply with the above.*

It would be a reasonable expectation for properties located in a green zone that existing farming situations could continue, and that there would be a strong prospect of intensification through the resource consent process. Over the last

few years, intensification may have occurred, but would be under a resource consent framework.

In the Red zone, in the Variation 2 area, the property would be subject to the full suite of provisions in the Variation, including GMP and time-staged reductions below that for many farms. The prospect of intensification is very limited, unless it is already a low leaching property.

In recognition of intensification that has occurred, it would be possible to modify the definition of 'nutrient baseline' and 'baseline land use' to include more recent years and changed farming activities, in the areas that have changed to Red zone as a consequence of the Variation 2 process.

Memorandum from BOB BOWER (GOLDER), LISA SCOTT (ENVIRONMENT CANTERBURY) titled DairyNZ/Fonterra (2) and dated 30 July 2015

Page 2 of 5, cause (e) I do not understand this paragraph. I had understood from the evidence that on-farm mitigations for both the ECan and Fonterra/Dairy NZ options are designed to reduce groundwater nitrate-nitrogen to 9.2 mg/L and the further reduction to 6.2mg/L in both options relies on MAR and TSA. Is that not correct?

Response from Dr Scott:
The relevant paragraph reads: "During the evidence and submissions on Variation 2, there seems to be a consistent misunderstanding of what the original target for nitrate-nitrogen was for Variation 2. Hayward evidence states: "I have set out in the table below a summary of how, in my opinion, the DairyNZ/Fonterra solution can achieve the target of 9.2 mg/L root zone nitrate-nitrogen concentration by the same time as that required by Environment Canterbury." The target concentration for the Hinds/Hekeao Plains lower catchment was set at 6.9 mg/L which is only achieved by reducing on-farm nitrate-nitrogen leaching and adding additional clean water recharge through MAR. This solution was designed (to include MAR) in lieu of the farmers having to reduce their leaching concentrations down to 6.9 mg/L (which could only be achieved with Advanced Mitigation Level 3 mitigation) to achieve the groundwater target. MAR was used as the mitigation allowed less on-farm reductions while still achieving the overall target concentration of 6.9 mg/L."

It is correct that ECan and the Fonterra/Dairy NZ proposals are both estimated to reduce average nitrate concentrations to a 'root zone' leaching concentration value of 9.2 mg/L by on-farm mitigations. What is different is the estimated level of on-farm mitigation needed to get there. DairyNZ/ Fonterra are proposing that with less new irrigation development, farmers also need to do less mitigation to achieve the same root-zone concentration. If that is the case, then the ECan 'target' would likely have been set at a lower concentration, closer to the real

groundwater target of <6.9 mg/L, because the zone committee deliberated intent was to achieve the maximum possible catchment-scale reductions through economically-sustainable on-farm mitigation.

The root-zone concentration of 9.2 mg/L was never intended as a target. It was merely the estimated outcome of a set of on-farm mitigation measures that ECan was advised were the maximum economically-sustainable level. This was determined from the Macfarlane Rural Business (MRB) work on farm nutrient management and economic modelling. Our advice was that most farm systems would become unprofitable beyond GMP, but Dairy and Dairy Support systems had the capacity to apply on-farm mitigations at Advanced Mitigation Levels (AM1 and AM2). From an early stage in the process, the final target concentration was set at <6.9 mg/L, but the only way to achieve the needed leachate reductions was through on-farm mitigation at Advanced Mitigation Level 3 (AM3, as defined by MRB). This was not consistent with the economic objectives for the catchment so MAR was introduced as additional, more cost effective mitigation. MAR also provided a catchment-scale mitigation to help manage the water quantity issues for reliability and improved baseflows, and therefore provided a multi-purpose mitigation tool for the zone committee's solution package.

If the new irrigation area in the catchment was only 15,000 ha instead of 30,000 ha, ECan's modelled solution would have been aiming for a root-zone nitrate concentration of 8.8 mg/L before adding MAR to reduce down to the groundwater target, as shown in Figure 5 of the Ashburton ZIP Addendum (Hinds Plains Area Nutrient Decision Tool).

Page 3 of 5, second paragraph, fifth line Can you please remind me of the rationale for targeting low-emitting dairy and dairy support farms?

Response from Dr Scott:
The paragraph reads: "Flexibility caps, conversion caps etc. do make some difference to the catchment load, but the size of the reduction to the leaching load from existing dairy and dairy support plays by far the biggest role in whether or not water quality can be improved. DairyNZ/Fonterra's version targets all high emitters (>20 kg/ha/yr) for reduction while our version targeted dairy and dairy support farming (whether low or high emitting). Our approach was based on advice from Macfarlane Rural Business (MRB) that there was no room (technically or economically) for arable or sheep/beef farmers to move beyond Good Management Practice as defined in their nutrient budget and economic modelling report. DairyNZ/Fonterra's 20 kg/ha/yr flex cap may get many of the dairy and dairy support farms on poorly-drained soils out of having to reduce, but it could catch about 10,000 ha of irrigated arable farms on light soil, which are above this leaching rate in our model."

The rationale was not driven by targeting low-emitters, but rather by which farm systems we thought were capable of applying higher levels of mitigation while still remaining profitable. Dairy and dairy support were singled out across all soil types (i.e. the high and low emitters together) because of our advice from MRB (mentioned above) that these were the only farm systems in the catchment which could move beyond GMP without a substantial impact on their economic viability. These farming platforms also made up the bulk of the overall catchment load, making any changes they were able to implement, have the most overall impact on reducing the catchment load.

Page 3 of 5, second paragraph, tenth line Can you please explain the reference to 10,000ha of irrigated arable farms? Do you mean these currently leach less than 20kgN/ha/year but they could increase to 20kgN/ha/year under a flex cap arrangement?

Response from Dr Scott:
No. What I meant was that 10,000 ha of arable farming on light soil are currently estimated to leach over 20 kgN/ha/yr (i.e. 25 kgN/ha/yr in our model). Under ECan's proposals they could continue to do so if operating at GMP, but in DairyNZ/ Fonterra's model they would be required to make reductions to 20 kgN/ha/yr.

Page 3 of 5, seventh paragraph, first line, Footnote 9 The evidence of Gerard Willis (his Table 1 on page 19 of his primary Evidence and his tracked change version of Table 13(i)B) shows that the Fonterra/Dairy NZ option includes a 27KgN/ha/year limit on land use change/intensification. Why do you think that the Fonterra/Dairy NZ option does not include a kgN/ha/year cap on intensification?

Response from Dr Scott:
I was basing my assessment on Dairy NZ/Fonterra's Proposed Solution (Section 3 of their legal submission) and the evidence of Shirley Hayward neither of which mentioned a cap to my knowledge. I was unsure from this evidence whether or not a cap was proposed. If Mr. Willis has included this cap in his evidence, then I accept that the Fonterra/Dairy NZ package does include a cap.

Page 3 of 5, seventh paragraph, fifth line So if we assume that the Fonterra/Dairy NZ option does include a 27KgN/ha/year cap on new irrigation, would the Fonterra/Dairy NZ option result in a catchment load of 3528 t/yr compared to the ECan option of 3400 t/yr (both at year 2035)?

Response from Dr Scott:
If I had used a 27 kgN/ha/yr cap for 15 000 ha of new irrigation, the Fonterra/Dairy NZ proposal comes out at 3555 t N/yr load for the Lower

Catchment estimated with ECan's model. This is compared to the ECan solution which includes 30 000 ha of capped new irrigation and has an estimated total annual load of 3241 t/yr by 2035.

Can you remind me of the estimated modelling error on the ECan 3400 t/yr value, namely it is plus or minus how much t/yr?

Response from Dr Scott:
We did not have a numeric estimate of the modelling error because there are multiple assumptions and estimates that feed into the model and there is no robust way to distil these all into one final aggregated error. We also have no way to validate the answer with real measurements. We would suggest that other models (and numerical estimates of their errors) are also limited by this same issue of determining an aggregated error.

The absolute error is less significant when comparing results generated by the same model for different scenarios (e.g. ECan proposals vs DairyNZ proposals) than if we were comparing with results from a completely different model. That is why we used the ECan model to assess DairyNZ/Fonterra's proposals. The catchment loads estimated for both proposals by the same model have the same sources of error, making it possible to compare the loads in a relative sense even if we cannot quantify the absolute error.

Memorandum from ADRIAN MEREDITH (ECAN), BOB BOWER (GOLDER) titled Water Quality - Limits and Upper Hinds phosphorus and dated 30 July 2015

Page 2 of 12, third paragraph, fourth line. How much headroom was allowed?

Response from Mr Bower-
During the load setting process, we utilised a similar approach to the Lower Hinds Plains catchment, to estimate loads for Upper Hinds Plain area. The memo titled Modelling Hinds Upper catchment nutrient loads using Overseer and GIS Spatial Analysis (Bower, et Al., 2013) documents this approach. Modelling was not conducted to allow for any 'headroom' per se, but instead utilised an estimate of what we thought the current land use activities (e.g. stock rates, farm types, etc) and associate leaching rates were to establish a final Upper catchment load. We elected to pursuit this methodology (e.g. using Overseer) in order to remain consistent with the lower catchment. This work resulted in a modelled average upper catchment loss rates 10.4 kgN/ha/yr. This indicated no headroom was allowed for and plan loads reflect a 'maintain current load' stance.

Response from Dr Meredith – Headroom relative to in-situ measured instream concentrations

The water quality monitoring of the upper Hinds catchment showed ambient water quality concentrations in the South branch of the Hinds River varied from an annual median Nitrogen concentration of 0.2 mg/L in 2011/12 to 0.58 mg/l in 2012/13. This data indicates the current ambient Nitrogen limit would be 0.6 mg/L N as a rounding of the maximum annual median nitrogen concentration (the limit referred to in the evidence of Dr Burrell). On the basis of this data our target limit of 1.0 mg/l Nitrate-N therefore implicitly allows for a 40% increase in concentration compared to the current 2012/13 condition, and if flow yield from the catchment remains similar then this also equates to approximately 40% load headroom. This is a valid approximation because measured in-stream N concentrations account for all of the loss processes between a property load loss exported from the catchment in surface water ('attenuation' and 'assimilation').

Variation 2, Table 13(j). What nitrate-nitrogen load (in t/yr) results from the difference between Dr Burrell's recommended DIN limit of 0.6 mg/L and the Variation 2 Table 13(j) Hill-fed Upland annual median nitrate toxicity limit of 1.0 mg/L?

Response From Dr Meredith - The Upper Hinds/Hekeao catchment nitrogen load limit in Table 13(g) is 114 tonnes per year. This was based on the Table 13(j) target limit of 1.0 mg/l nitrate nitrogen. Both DIN and Nitrate-N are both calculated as "nitrogen equivalents" so the load calculations are equivalent/comparable. Therefore, if the limit was to be adjusted back to Dr Burrell's recommended limit of 0.6 mg/L N, then the load limit would only be 60% of the previous limit, or 68.4 tonnes per year instead of 114 tonnes per year.

Memorandum from BOB BOWER (GOLDER), AND PATRICK DURNEY (CRC) titled Groundwater Limits and dated 19 August 2015

Page 1 of 5, fourth paragraph I am not sure I understand. Are you saying that the volume of additional deep groundwater abstracted will be matched by MAR?

Response from Mr Bower and Mr Durney:
The relevant paragraph reads: "We have conducted a revised analysis of the amount of potential surface water allocation that would need to be transferred to into the groundwater allocation. An earlier memo developed for the Section 42A report provides an answer to the general question of 'is there sufficient deep groundwater to allow these transfers?' The answer to that question was predicated on the MIKE SHE modelling work which indicated that this transfer of surface water to groundwater could be sustainably managed with the increased net artificial recharge (resulting in restoration of historically available groundwater storage) by enabling a groundwater replenishment scheme using the tools of MAR."

Under the solutions package (MIKE SHE Iteration #2, 7.5 m^3/s MAR), the modelling indicated that even with additional groundwater pumping (from substituted surface water), further irrigation efficiencies and conversions from border dyke to spray, that the amount of MAR was sufficient so that both groundwater levels (storage) and baseflows in the spring-fed waterbodies would improve over the life of the plan (CRC Report R14/64).

Therefore the answer is 'yes', that under this scenario the MAR volumes exceeded the amount needed to account for the abstraction of this deeper groundwater.

Page 2 of 5, second to last paragraph Can you please explain what the 'waiver' process for the metering of bores is?

Response from Mr Bower and Mr Durney:
The relevant paragraph reads: "Furthermore, in our opinion, limiting the transferrable surface water consents to only those active from 2009 to 2013, may undermine the 'waiver' process for metering of bores, which would likely create issues for holders of those consents."

Firstly, there is a correction text required, as the reference to "bores" is an error and should be replaced with "surface water takes". While all takes must be metered, the waiver programme generally is most applicable to surface water takes.

The national metering regulations came into effect in 2012. Prior to this date, only a few consent holders metered their usage data. In 2012, many users' reliability of supply for surface water takes was so low that they did not regularly use their consented take. These consent holders either surrendered their take or applied for a temporary waiver of their metering compliance requirement with the proviso that if and when they started using their take, they would get a meter fitted.

Page 3 of 5, Summary Is the recommended 'T Bock' allocation of 19.5 to 28.3 Mm^3/yr for the Mayfield-Hinds GAZ additional to or included in the now recommended limit for that GAZ of 126.1 Mm^3/yr? The same question for the Valetta GAZ?

Response from Mr Bower and Mr Durney:
For both the Mayfield-Hinds and Valetta GAZs, these 'T blocks' would be considered additive. For the Mayfield-Hinds, this would be added to the 126.1 Mm^3/yr. For Valetta it would be added to the current allocation volumes.

If it is additional to, how is that considered to be a sustainable use of the aquifers?

Response from Mr Bower and Mr Durney:
Without the addition of MAR (new and replacement water) to offset this transferred groundwater takes, this would not be considered sustainable. This is particularly given the likelihood of continued piping of irrigation schemes, further irrigation efficiencies and reduction of incidental recharge from the Ashburton District Council stockwater race system.

Does an additional GAZ allocation of 28.3 Mm^3/yr equate to around 0.9 m^3/s of additional MAR being required?

Response from Mr Bower and Mr Durney:
That is correct, as MAR was presented as an instantaneous (year round) rate, 28.3 Mm^3/yr equals approximately 0.9 m^3/s, viewed as a simple water balance replacement quantity.

Page 5 of 5, Summary What current wording is being referred to?

Response from Mr Bower and Mr Durney:
This summary states: "We find that an arbitrary value of <50 m does not allow for the site specific variability found in the Hinds Plains area. We consider that the current wording in the plan adequately captures the capacity to assess deepened consents for and to minimise stream depletion."

The wording being referred to is the final Variation 2 tracked changes in Rule 13.5.31:

13.5.31 The taking and use of groundwater within the Valetta and Mayfield-Hinds Groundwater Allocation Zones that will substitute an existing surface water or groundwater permit with a direct, high or moderate stream depletion effect is a restricted discretionary activity provided that the following conditions are met:

1. *The use of groundwater ~~take will~~ is ~~be abstracted~~ on the same property as the existing resource consent and there is no increase in the ~~proposed~~ annual volume, or is for the sole purpose of augmenting a surface waterbody; and*
2. *The groundwater take will not have a direct or high stream depletion effect; and*
3. *The bore interference effects are acceptable, as determined in accordance with Schedule 12; and*
4. *The volume of groundwater sought, in combination with all other resource consents granted or applied for within the Valetta or Mayfield-Hinds Groundwater Allocation Zones that will substitute an existing*

surface water or groundwater permit with a direct, high or moderate stream depletion effect, does not exceed the T allocation limits in Table 13(f).

The exercise of discretion is restricted to the following matters:

1. *Whether the volume and abstraction rate of water to be taken and used is reasonable for the proposed use assessed in accordance with ~~method 1 in~~ Schedule 10; and*
2. *The timing of the surrender of the existing surface water or groundwater permit or permits; and*
3. *The effects the take has on any other authorised abstraction, including interference effects as indicated by a ~~Step~~ Aquifer Test undertaken in accordance with the requirements of Schedule 11 and well interference calculated in accordance with the method in Schedule 12; and*
4. *Where the take is less than 2 km from the coast, whether salt-intrusion into the aquifer or inland movement of the salt water/fresh water interface is prevented; and*
5. *The protection of groundwater from contamination, including the prevention of backflow of water or contaminants.*

Memorandum from PATRICK DURNEY (CRC), BOB BOWER (GOLDER) titled Valetta irrigation groundwater recharge and dated 18 August 2015

Page 6 of 7, third paragraph, first line 3,537 – 1,947 doesn't equal 298?

Response from Mr Bower and Mr Durney:
This line states: "Therefore in theory recharge, except for the extra 298 ha (3,537 ha – 1,947 ha), will remain the same under groundwater or surface water sourced irrigation."

This is an error, and should be written as: "Therefore in theory recharge, except for the extra 298 ha (2,245 - 1,947 ha), will remain the same under groundwater or surface water sourced irrigation."

Page 7 of 7 I am unclear what the overall technical recommendation to us is. Is the Valetta relief sought supported or not?

Response from Mr Bower and Mr Durney:
We believe that a conjunctive management scheme is consistent with the intent of the Ashburton Zone Committee's ZIP Addendum, and are in support of this part of their proposal.

Relative to the claims that there is a net recharge 'benefit' to the aquifer; we consider that the evidence presented appeared to be contradictory at times and

difficult to follow. From this assessment we are left with uncertainties as to its validity, and therefore cannot find a net recharge benefit. Finally, we are not supportive of a separate allocation block specifically for the purposes proposed.

Appendix B – Tracked Changes

Policy 13.4.13(ba) Can you explain the rationale for this clause? Why is it limited to 1 January 2014 to 1 December 2015? Does it apply to irrigation schemes or to individual farm properties?

Response from Mr McCallum-Clark:
The rationale for the clause is to require those properties that have been granted resource consent to intensify, or have done so under an irrigation scheme resource consent, where there has been a reasonable expectation of a requirement to have an upper limit of 27 kg/ha/pa N, to continue to operate under such an upper limit. The inclusion of 27 kg/ha/pa N in the Variation at notification was to ensure any new intensification was being done under substantial reductions below GMP at the time of being undertaken. It is acknowledged that the dates chosen are somewhat arbitrary, and these could be adjusted.

As some resource consents have been granted for individual farms to intensify, it is intended to apply to both individual properties and irrigation schemes.

Policy 13.4.13(c) What does "catchment as whole" mean? Does that include the upper and lower Hinds Plains areas?

Response from Mr McCallum-Clark:
Yes, it means the Upper and Lower Hinds/Hekeao Plains areas, and as such, this is likely better terminology to use.

Errata

During the preparation of these responses, a small number of issues have become apparent, which may require updating in the tracked changes version included in the reply recommendations.

1. Policy 13.4.14A is incorrectly numbered and should be 13.4.10A to stay in the appropriate order.

2. Rule 13.5.36 condition 1 – the number of years has not been included. The condition should read: *The discharge is part of a trial for investigative purposes and the duration of the trial will not exceed 5 years; and*

3. If Rule 13.5.22 is to be effective, reference to rules 5.61 and 5.62 may need to be deleted from Rule 13.5.21.

4. Some footnote references to Overseer calculation methodologies for fixed numbers are missing. All loads on tonnes should have a foot note of: *Calculated per the methodology explained in the Hinds/Hekeao Plains Technical Overview – CRC Report R14/79* and all references to a specific leaching rate (15, 20 or 27 kg/ha/pa) should have a foot note of: *Calculated using Overseer version 6.0.*