

IN THE MATTER OF The Environment Canterbury
(Temporary Commissioners and
Improved Water Management) Act
2010 and the Resource Management
Act 1991.

AND

IN THE MATTER OF The hearing of submissions on the
Proposed Canterbury Land and Water
Regional Plan.

BY Synlait Milk Ltd and Synlait Farms Ltd.

**SUPPLEMENTARY EVIDENCE OF BRUCE McCABE ON BEHALF OF
SYNLAIT MILK LIMITED AND SYNLAIT FARMS LIMITED**

Dated: 10 May 2013

1. INTRODUCTION

Qualifications and Experience

- 1.1. My full name is Bruce McCabe. I have described my qualifications and experience in my evidence dated 4 February 2013.

Background

- 1.2. Following the presentation of my evidence on 24 April 2013, I was asked to provide clarification on the following question of Commissioner Ellison “Your paragraph 4.26 suggests that at the depth 50-60 mbgl, variations in groundwater nitrate concentration can be expected to be very small and setting a mean nitrate-N value of ½MAV is not necessary to ensure that MAV is not exceeded. Ms Hayward’s analysis shows that a mean of not greater than ½MAV provides a sensible guideline”. Ms Hayward’s evidence is contained in her Group 2 evidence dated 28 March 2013 at paragraphs 6.10 to 6.12.

- 1.3. The apparent disagreement between my recommendation that specification of a groundwater sampling depth, consistent with the New Zealand Drinking Water Standards, is required in Table 1c when determining compliance with the New Zealand Drinking Water standard nitrate-N MAV of 11.3 mg/L, and the Group 2 evidence provided by Shirley Hayward on behalf of Dairy NZ is discussed below.

2. SCOPE OF EVIDENCE

- 2.1. In responding to this request for clarification of this apparent disagreement with the evidence of Ms Hayward, I have provided in Section 3, an analysis of the different approaches taken between my and Shirley Hayward's evidence to determine the soundness of the proposed standards in Table 1(c) relating to shallow groundwater and to identify standards that will provide the level of groundwater protection sought in the plan.
- 2.2. In responding to this request for clarification, I have provided in Section 4, a brief review of the 2013 nitrate guideline derivation process and the effects that the revised guideline has on the recommendations contained in my evidence.
- 2.3. In responding to this request for clarification, I describe in Section 5, the link between the submissions on provisions of Table 1c relating to a recommended depth for determining compliance with the New Zealand Drinking Water Standard nitrate-N MAV and indirectly the definition of a groundwater management unit for potable water use.

3. TABLE 1C SHALLOW GROUNDWATER NITRATE-N OUTCOMES

- 3.1. The differences between the conclusions and recommendations provided in my and Ms Hayward's evidence arise through the different approaches used to assess the management of groundwater for potable use; Ms Hayward's approach being an example of how a prudent Council officer may use monitoring data to support groundwater management so that all shallow groundwater is suitable for potable consumption without treatment to remove nitrate, and my approach being to suggest that the management of a groundwater unit for potable consumption is appropriate and providing a more refined approach in defining best practice in protecting potable use within a multiple-use catchment.
- 3.2. The New Zealand Drinking Water Standards recognise that both surface and climatic influences can affect the quality of groundwater. The primary focus of section 4.5 of these standards being to ensure that only bore water not directly affected by surface or climatic influences can be classified as secure and hence

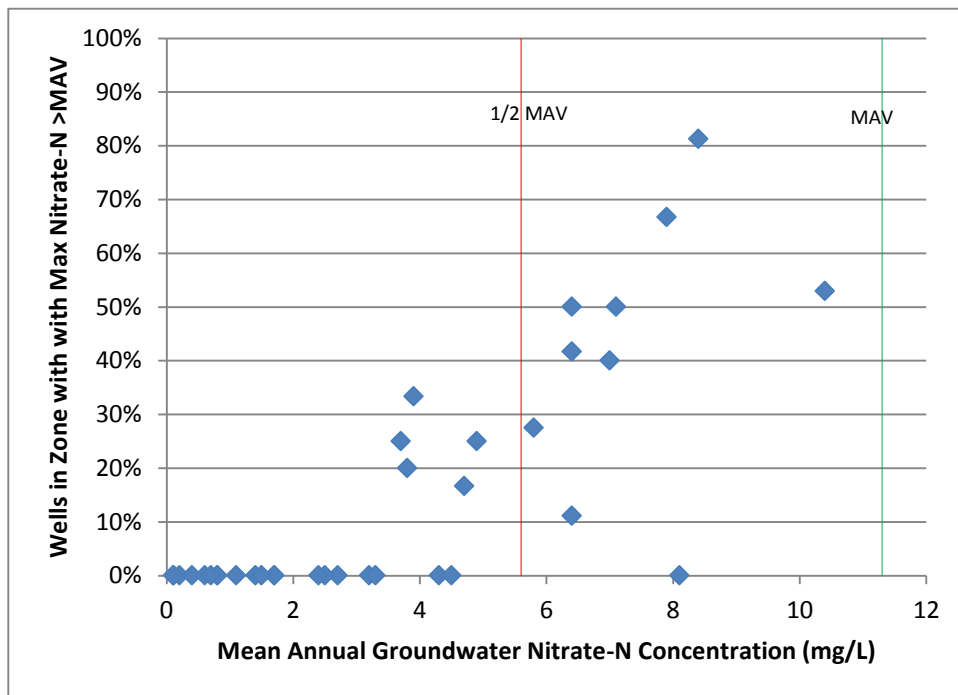
not requiring treatment for potable consumption. It is my recommendation that such an approach is used to identify a groundwater management unit for potable use.

- 3.3. ECan groundwater monitoring data and nitrate-N monitoring data contained in my evidence show that groundwater in the Region may be directly affected by surface or climatic influences down to a depth of 50 metres below ground level. The magnitude of the direct effects of surface or climatic influences on groundwater diminish with depth in the aquifer, with the concentration of pathogens and the concentration and variability of nitrate-N concentration decreasing with depth in the aquifer. ECan data show that a minimum depth of 50 metres below ground level is required before groundwater is consistently pathogen free across the Region.
- 3.4. In my evidence I have recommended that based on the ECan groundwater data, the groundwater management unit that is appropriate for protection for potable consumption is groundwater greater than 50 metres below ground level. For determining compliance with the nitrate-N MAV, I have accordingly recommended that a depth of 50 to 60 m below ground level be used.
- 3.5. In my evidence I concluded that if a compliance sampling depth is set that is consistent with the New Zealand Drinking Water Standards, the imposition of a ½ MAV standard would result in the effective imposition of a groundwater nitrate-N standard that is numerically less than the nitrate-N MAV.
- 3.6. Ms Hayward, in her Group 2 evidence, provides a good example of how the analysis of the available ECan data may be used to systematically and transparently determine nutrient allocation zone status. This analysis was undertaken on the basis that all shallow groundwater should be suitable for potable consumption and did not take into account depth-related pathogen presence and variability of nitrate concentration in shallow groundwater. This analysis provides a good first cut evaluation of nutrient allocation zone status that could be advanced through the inclusion of a defined groundwater management unit for potable consumption, as recommend in my evidence.
- 3.7. Within a scenario of developing and intensifying multiple land and groundwater use within the Region, the identification and management of groundwater management units and the analysis of targeted groundwater monitoring data is seen by both authors as being necessary for the efficient and effective utilisation of groundwater and the regions soil and other resources.
- 3.8. In paragraph 6.9 of her evidence, Ms Hayward correctly identifies that it is Council's intention, through applying the nitrate-N MAV as a minimum standard for shallow groundwater, to ensure that "*all groundwater in the region is suitable*

for potable water supplies without treatment for nitrate contamination". She also concludes that the reason an average of $\frac{1}{2}$ MAV is included in Table 1c was on the assumption that if the average nitrate-N concentration (either in an individual well or at a zonal level) is below $\frac{1}{2}$ MAV, then seasonal and interannual peaks in concentration should remain below the MAV.

- 3.9. In Table 4 (paragraph 6.12) of her evidence, a summary of shallow, unconfined groundwater nitrate-N concentrations for each zone for the period 2002 to 2012 is provided. My analysis of these data, which is provided in Figure 1, shows that the proposed $\frac{1}{2}$ MAV standard is not a reliable indicator of whether groundwater complies with the MAV standard. In particular:
- a) There are seven zones where the mean nitrate-N concentration is less than $\frac{1}{2}$ MAV where significant numbers of wells do not comply with the MAV standard, and
 - b) There is one zone where the mean nitrate-N concentration is significantly greater than $\frac{1}{2}$ MAV and the groundwater in all wells complies with the MAV standard.
- 3.10. Ms Hayward's analysis of groundwater data shows that the mean $\frac{1}{2}$ MAV standard is not robust, cannot be relied upon to determine compliance with the MAV standard, and can result in the erroneous determination of non-compliance with the MAV standard.
- 3.11. Should a groundwater management zone be defined that is protected for potable water supply, as recommended in my evidence, by setting a depth for compliance, the proposed mean nitrate standard would be redundant and could be removed from Table1c.

Figure 1 Mean Annual and Maximum Groundwater Nitrate-N concentration for Groundwater Bores within Zones of Canterbury Region (after Hayward 2013)



3.12. Commissioner van Voorsthuysen asked for clarification as to whether it is possible to manage land use so that Table 1 guidelines can be met at a depth of 20 metres. My oral response was that it is not possible to control land use as the effects are both anthropogenic and natural. In this regard a number of other factors are important determinants of shallow groundwater including depth to groundwater, which may vary seasonally, and soil texture, structure and permeability at and up-groundwater gradient of a well.

3.13. Depth to the groundwater surface and the depth below the groundwater surface at which water is abstracted are both interrelated and extremely important determinants of groundwater quality. At a depth of 20 mbgl, if the groundwater table is high and the soil texture and structure are such that a high proportion of soil drainage enters groundwater via quick flow through larger voids in the soil profile, contaminants, including pathogens and nitrate will be transported into the aquifer without renovation resulting in very variable and degraded water quality in the upper (top 50 m) part of the aquifer. Similarly if the groundwater table were to be seasonally low, then for the same soil conditions, water quality at a depth of 20 mbgl would be expected to be degraded and variable as very little dispersion and renovation would have occurred within the aquifer.

3.14. It is the variability in these natural factors across the Region and their effects on groundwater quality that will make it impossible, to meet the Table 1 guidelines at a depth of 20 mbgl through the management of anthropogenic activity.

4. NITRATE TOXICITY GUIDELINE

4.1. Commissioner van Voorsthuyen asked me to consider whether and what effects the 2013 revision of the nitrate guidelines has on the recommendations contained in section 5 of my evidence and specifically whether I would make any changes to my evidence after having considered the 2013 revision.

4.2. In paragraph 5.8 I questioned the suitability of the revised (2009) chronic nitrate toxicity guidelines for the protection of fish that may inhabit specific water bodies in Canterbury such as coastal lakes on the basis that the very nitrate-sensitive species used in the derivation were not representative of the species that may inhabit these water bodies, resulting in chronic toxicity guidelines that are overly conservative.

4.3. The revised (2013) proposed chronic nitrate toxicity guidelines are a clear improvement on the 2009 chronic guideline and result not only in an increase in the chronic toxicity guidelines but also in a move to a two-tier approach in determining whether ambient nitrate concentrations may pose a risk to fish and other aquatic organisms. This two number guideline approach incorporates a “grading” value based on mean annual data to provide protection from chronic toxicity and a “surveillance” value based on the annual 95th percentile value to provide protection from seasonal peaks in nitrate concentration. A comparison of the numerical values of the two proposed guidelines is provided below in Table 1.

Table 1: Comparison of Revised 2009 and 2013 Chronic Nitrate Toxicity Guidelines for Freshwater Aquatic Species.

Guideline Type	2009	2013	
	Nitrate-N Trigger Value (mg/l)	Grading Nitrate-N (mg/L)	Surveillance Nitrate-N (mg/L)
99% species protection	1.0	1.0	1.5
95% species protection	1.7	2.4	3.5
90% species protection	2.4	3.8	5.6
80% species protection	3.6	6.9	9.8
Method of Comparison		Annual median	Annual 95th percentile

- 4.4. However, my original comments made regarding the 2009 revision remain valid for the 2013 guideline revision if it is intended that the guideline will be applied as an environmental bottom line across all water bodies in the region. For water bodies such as Te Waihora where the six most nitrate-sensitive species used in the guideline derivation are not present in the lake, the derived guidelines will be overly conservative and can be expected to result in restrictions on nitrate concentration to protect fish and ecosystems that are not justified, based on the science used to derive the guideline and the caveats contained in the guideline.
- 4.5. Of particular importance when applying these guidelines will be the assumptions and recommendations made in the guidelines:
- a) The authors of the revised (2013) guidelines made the basic assumption that the species used when deriving the guidelines are in fact representative of the “ecosystem” of species present in the range of receiving environments to which the guidelines may be applied. In many instances this assumption will not be correct and the guidelines cannot be relied upon to provide a dynamically efficient means of managing nitrate inputs to protect aquatic ecosystems as required by the National Policy Statement for Freshwater Management 2011.
 - b) The guidelines are, by the nature of their derivation, conservative and protective of aquatic species; as a consequence where guideline values are exceeded, this should trigger further investigation to identify what if any risk an above-guideline nitrate concentration actually poses to aquatic ecosystems before the need for remedial action is considered.
 - c) Where nitrate-sensitive fish species that significantly influence the derivation of the guideline values are not present in a water body, such as in the case for Te Waihora where Lake trout, Chinook salmon, Lahontan cutthroat trout, Coho salmon, Lake whitefish and American toad are not present, it is important that a site-specific guideline value is derived to minimise the cost to the community of protecting the fish and other aquatic species that actually inhabit this lake.
 - d) The nitrate guideline values are based on a two number approach – a “grading” value that is derived from NOEC data designed to provide ecosystem protection for average long-term exposure, for which annual median data is required to determine compliance; and a “surveillance” value based on Threshold effect concentration data, designed to provide ecosystem protection for seasonal maximum concentrations, for which an annual 95th percentile will need to be calculated from monitoring data. The

implementation of these guidelines requires monitoring regimes that will provide data suitable for this purpose.

5. DEFINITION – REASONABLE MIXING ZONE

- 5.1. Commissioner van Voorsthuizen asked for clarification in respect of the recommendation made in paragraphs 6.2 and 10.3(d) of my evidence where I recommend the inclusion in the plan of a definition for a Reasonable Mixing Zone” for point and diffuse discharge to groundwater”.
- 5.2. The requirement for a zone of reasonable mixing from any point or diffuse discharge to groundwater arises in relation to an ECan expectation that all shallow groundwater should be suitable for potable consumption without the need for treatment to remove nitrate (Table 1c outcomes) and the submissions made in relation to the outcomes contained in this Table.
- 5.3. In a catchment where there is competing land and groundwater use, a mixing zone is required between a zone of reasonable influence of nitrate leaching from intensive land use and a zone that meets the community expectation that shallow groundwater can be accessed at any depth throughout the Region for potable consumption without the need to treat water for the removal of nitrate.
- 5.4. Clearly, given the extent and intensity of development that has and will occur in the future in the Region, it is no longer realistic to assume that all shallow groundwater will be of potable standard, not requiring treatment for potable consumption. In any event, application of the potable water standard must take cognisance of the presence of pathogens in shallow groundwater.
- 5.5. It is suggested that the zone of reasonable mixing would occupy that volume of the aquifer below and around the activity where notwithstanding the use of best nutrient management practices on the land, groundwater would not be expected to suitable for potable consumption without treatment to reduce nitrate concentration.
- 5.6. Subject to further refinement based on actual monitoring data I envisage a reasonable mixing zone around a land-based activity extending laterally for up to 2 km of the discharge and vertically down to the depth in the aquifer where groundwater quality is managed for potable use (50 meters below ground level)
- 5.7. Commissioner van Voorsthuizen also asked for clarification as to whether “the Synlait situation” would be typical across the Canterbury region so that the recommended numbers in relation to that zone are universally applicable in that region.
- 5.8. The “Synlait data” is collected from an intensively developed catchment where the soils are light, stony and free draining. As such the findings based on the

“Synlait data” provide a reasonable estimate of a groundwater mixing zone for farming activity that could reasonably be applied across the region.

- 5.9. Commissioner Shepherd requested identification of where in the original submissions, the requested change could be found.
- 5.10. The concept of reasonable mixing zone is implicit, but not explicit, in the submissions made by Synlait in respect of Policy 4.1 (Synlait Milk Ltd submission at page 8).
- 5.11. I note that this term is used in the evidence of a number of experts and submitters such as Shirley Hayward in her Group 2 Rebuttal evidence at paragraph 4.5.
- 5.12. As noted in Ms Hayward’s Rebuttal evidence, “There was an **implicit assumption** that because these standards were intended to relate to point source discharges, attenuation of the discharge would occur **beyond the mixing zone**” (emphasis added).
- 5.13. The definition of reasonable mixing zone is suggested as a way of clarifying in real terms within this region, a term that is implicit in virtually all experts’ analysis of management of the interface between point and diffuse discharges and reasonable water standards.

6. RELATIONSHIP BETWEEN NPS FM, RMA AND CWMS

- 6.1. Commissioner Shepherd asked for clarification in respect of the relationship of my evidence to the NPSFM , the RMA and the CWMS as to:
 - (a) To safeguard the life-supporting capacity of freshwater and particularly, Policy B7(1)(b) of the NPS FM “the extent to which it is feasible and dependable that any adverse effect on the life-supporting capacity of fresh water and of any associated ecosystem resulting from the change would be avoided;
 - (b) Part 2 of the RMA and specifically s5(b) “safeguarding the life supporting capacity of air, water, soil and ecosystems”;
 - (c) The CWMS has referred the key question of setting of environmental limits on freshwater quality and quantity to 10 sub-regional zones;
- 6.2. The common theme is safeguarding the life supporting capacity of freshwater and the associated ecosystems. However the NPS, RMA and CWMS all acknowledge that this objective (or purpose in the case of the RMA) is subject to the following caveats:
 - a) The feasibility and dependability of avoiding any adverse effects on freshwater;

- b) Protecting resources “in a way, or at a rate that enables people and communities to provide for their social, social, economic and cultural wellbeing;
 - c) The CWMS is a dynamic process which requires factual and sub-regional scientific information to determine the extent to which improvements in land management practices and water allocation efficiency will achieve improvements in water quality and quantity.
- 6.3. All of these legal requirements are subject to provisions which require that water quality and quantity limits are based on best available scientific information and any limitations are efficient, effective or “feasible and dependable” in terms of their implementation and achievement of objectives.
- 6.4. The submissions made in my evidence regarding Table 1 outcomes all question the efficiency, effectiveness and feasibility of these outcomes using the Selwyn-Waihora as an example to highlight the deficiencies of these outcomes; to identify why that should not be applied across all sub-regional zones as interim outcomes in the absence of a sub-regional plan and the need for objectives, policies and rules to be based on local scientific data and economic considerations.



Dr. Bruce McCabe
10 May 2013

Report

Environmental Management

Land & Water Policy Changes [REG13012]

Job No: 50204#02

Date: 7 May 13

Clarification and Link between submission and evidence.

In February 2013, Synlait Milk Ltd and Synlait Farms Ltd (“Synlait”) both submitted on the Proposed Canterbury Land and Water Regional Plan (“the Proposed Plan”) and in April 2013, Synlait gave evidence to the hearing on the Proposed Plan.

The Proposed Plan provides the framework for water management in Canterbury and is a response to both the National Policy Statement on Freshwater Management 2011 (“NPSFM”) and the (non-statutory) principles and targets of the Canterbury Water Management Strategy (“CWMS”) as well as providing for the statutory need for a plan to meet the requirements of the RMA and the already operative Canterbury Regional Policy Statement (“the RPS”).

The principles underlying the NPSFM, RMA, CWMS, and the RPS is that limits should be imposed on both the discharge of nutrients in order to protect and/or maintain water quality and water quantity in certain specified areas. The underlying thread to these 4 plans, is that the limits that are imposed, beginning in 2017, should be both efficient and effective in achieving water quality and quantity outcomes for Canterbury.

In the hearing, Commissioners David Shepherd, Edward Ellison and Rob van Voorthuysen asked for clarification in respect of the following matters:

(a) Depth at which potable water is free of adverse microbiological effects

Commissioner Shepherd asked for clarification in respect of the depth at which microbiological activity and pathogens are present in groundwater in Canterbury rivers and streams. This in many ways goes to the heart of the assumptions behind both the RPS and the Proposed Plan. It is assumed that drinking water should be able to be abstracted directly from “rivers and streams... without treatment”.¹

(b) Relationship between impaired water quality and nutrients: Nitrogen or Phosphorus?

A further assumption in relation to water quality, aside from being able to abstract potable grade water from every water body in the region, is nitrate levels in surface and low-lying groundwater being attributed to impaired water quality in various water bodies such as the culturally significant Te Waihora/ Lake Ellesmere.

It is acknowledged that s.15(1)((a)-(b)RMA requires resource consents for the discharge of any contaminant into water or onto land where that contaminant may enter water. The RMA definition of water does not distinguish between *inter alia* surface, groundwater or coastal water. However under the RPS, objective 7.2.2(3) RPS requires: “the restoration or enhancement of degraded freshwater bodies and their surroundings”. In the Proposed Plan this is translated to a fixation on Nitrogen as the sole contaminant of concern in relation to impaired water quality in significant and water bodies in the region.

¹ E.g. Page 52, CRPS “ Many rivers and streams and some groundwater in the region cannot be used for human drinking water without treatment”

Para in evidence	PLWRP	Amendments proposed by Expert Witnesses NB: s 42a recommendation in italics; changes proposed in bold.	Submission
Dr Bruce McCabe Paras 5.1 – 5.4 Note: Add new category for Te Waihora as for Coopers Lagoon in coastal lakes	Table 1b. Outcomes for Canterbury Lakes	Lake SPI [min grade] Fair	SML Policy 4.2 and page 8.
Dr Bruce McCabe Paras 5.1 – 5.4 Note: Add new category for Te Waihora as for Coopers Lagoon in coastal lakes	Table 1b. Outcomes for Canterbury Lakes	Eutrophication Indicator Trophic Level Index (TLI) [max score] 6.5	SML Policy 4.2 and page 8.
Dr Bruce McCabe Paras 4.1 – 4.12 4.16 - 4.27 10.3 (b)	Table 1c. Default outcomes for nitrate-N	Table 1c. Nitrate – nitrogen concentration (mg/L) Max. <11.3 Compliance depth of 50-60 mbgl.	SML Policy 4.2 and page 8.
Dr Bruce McCabe Paras 4.1 – 4.12 4.16 – 4.27 10.3 (a)	Table 1c. Default outcomes for nitrate-N	Table 1c. Nitrate – nitrogen concentration (mg/L) Average <5.6	SML Policy 4.2 and page 8.
Dr Bruce McCabe Para 6.3	No definitions – shallow groundwater – reference in Table 1c and Policy 4.1..	Shallow groundwater means for the purpose of determining compliance with the plan objectives, groundwater at a depth of between 50 and 60m below ground level.	SML Policy 4.1 and page 8.
Andrew Barton Para 54	New Objective 3.3 in s42A.	<i>Water is recognised as an enabler of the social and economic wellbeing of the region.</i> Supported	SFL Page 4

Para in evidence	PLWRP	Amendments proposed by Expert Witnesses NB: s 42a recommendation in italics; changes proposed in bold.	Submission
Dr Bruce McCabe Para 7.1-7.2 Para 10(f)	Objective 3.5 in original Objective 3.12 as recommended by s42a.	Outstanding freshwater bodies and hapua and their margins are maintained in their existing state or restored where degraded to a defined ecological state if it can be established that such a state can be achieved within the timeframe specified in the NPSFM at a cost that is not unacceptable to the community”.	SML. Page 5.
Dr Bruce McCabe Para. 8.1 Dr John Penno Para 6.7	Policies 4.1 and 4.2	4.1 Lakes rivers, wetlands and aquifers will meet the freshwater outcomes set in Sections 6-15 <i>within the specified timeframes</i> . If outcomes have not been established for a catchment, then each type of lake, river or aquifer will meet the outcomes set out in Table 1 by 2023- 2030 . 4.2 The management of lakes, rivers, wetlands and aquifers will take account of the cumulative effects of land uses, discharges and abstractions in order to meet the freshwater outcomes in accordance with Policy 4.1. Rationale: NPSFM requires achievement by 2030.	SFL & SML. Page 6.
Dr Bruce McCabe 6.1 Support report s42a	Definition.	Nutrient discharge means <i>nutrient loss from the property by surface runoff or leaching below the rootzone</i> .	Pge 36. Remove reference to Overseer.
Dr Bruce McCabe Para. 8.2	Policy 4.29	Support recommendation of s42a report.	SML Page 9
Dr Bruce McCabe Para. 8.3 Dr John Penno Oral presentation –	Policy 4.31	<i>“ or that advanced mitigation practices are applied such that the property operates in the top quartile of nutrient minimisation practices when measured against practices in the relevant farming industry, and that in</i>	SML page 10

Para in evidence	PLWRP	Amendments proposed by Expert Witnesses NB: s 42a recommendation in italics; changes proposed in bold.	Submission
Lead with Pride		<p><i>any event</i></p> <p>Rationale: impossible to determine. Synlait Lead with Pride programme provides farmers with financial incentives to become ISO registered and achieve highest environmental compliance.</p>	
<p>Dr Bruce McCabe Para 8.4</p> <p>Dr John Penno Paras 9.1 – 9.8 Dr John Penno Oral presentation – Lead with Pride</p>	Policy 4.32	<p><i>“a changed or new farming activity will be required to show that there is no net increase in nutrients discharged from the property or that advanced mitigation practices are applied such that the property operates in the top 10% of nutrient discharge minimisation practices when measured against practices in the relevant farming industry.</i></p> <p>Rationale: impossible to determine. Synlait Lead with Pride programme provides farmers with financial incentives to become ISO registered and achieve highest environmental compliance.</p> <p>Farming is not the only nutrient discharging activity in the catchment.</p>	SML page 10
<p>Dr Bruce McCabe Para 8.4</p> <p>Dr John Penno Paras 9.1 – 9.8 Dr John Penno Oral presentation – Lead with Pride</p>	Policy 4.33	<p><i>In areas where regional water quality outcomes are not being met, as shown by a red colouring on the Series A planning maps, priority will be given to collaborative catchment management practices that culminate in the promulgation of plan changes to set local water quality outcomes, and methods and timeframes to achieve those outcomes, including nutrient discharge allowances, pro-rata reductions in discharges, or other methods beyond good practice.</i></p>	SML page 11

Para in evidence	PLWRP	Amendments proposed by Expert Witnesses NB: s 42a recommendation in italics; changes proposed in bold.	Submission
		<p>Rationale: Assumes that N is the limiting factor for all catchments. In NZ, 86% of all catchments are P limited- not N.</p>	
Dr Bruce McCabe Para 8.4 Dr John Penno Paras 9.1 – 9.8 Dr John Penno Oral presentation – Lead with Pride	Policy 4.34	<p><i>To minimise the loss of nutrients to water where the land owner holds a.. that as a minimum enables compliance with the nutrient management conditions and ensures good practice is being achieved.</i></p> <p>Support 42a recommendation</p>	SML Page 11
Dr Bruce McCabe Para 8.5 Dr John Penno Paras 9.1 – 9.8 Dr John Penno Oral presentation – Lead with Pride	Policy 4.37 (4.36 in s42a)	<p>All activities shall achieve the nutrient load limit and nutrient <i>discharge</i> allowance or shall comply with an alternative collaboratively agreed mitigation method for the catchment <i>where a load limit or nutrient discharge allowance is set</i> in Sections 6-15 of this Plan.</p> <p>Rationale: impossible to show how an individual activity can affect the specified outcomes in Ss 6-15 of the plan.</p>	SML Page 11
Dr Bruce McCabe Para 8.5 Dr John Penno Paras 9.1 – 9.8 Dr John Penno Oral presentation – Lead with Pride	Policy 4.38 (4.37 in s42a)	<p>If the measured or predicted nutrient load from land uses and discharges exceeds the nutrient load limit for the catchment <i>where a load limit or discharge allowance is set</i> in Sections 6-15 of this Plan, the loss to water of nutrients from land uses in the catchment will be reduced to achieve the nutrient load limit or mitigated to meet collaboratively agreed outcomes for the catchment.</p> <p>Rationale: Support focus on “land uses” and absence of reference to farming per se.</p>	SML Page 11

Para in evidence	PLWRP	Amendments proposed by Expert Witnesses NB: s 42a recommendation in italics; changes proposed in bold.	Submission
		Allows specified mitigation measures to be agreed in each sub-region.	
Andrew Barton Para 19	Policy 4.48	Existing hydro- <i>electricity</i> generation, and irrigation schemes, and their water takes and significant individual investment in groundwater infrastructure are recognised...	SFL para 11
Andrew Barton Para 32- 34 Para 39	Policy 4.50	Any change to abstract surface water for irrigation as a “run of river” take to a “take to storage” is subject to the following conditions to mitigate any adverse effects: (a) A seasonal or allocation limit subject to efficient use ; [Or delete: (a) A seasonal or allocation limit	SFL Page 11-12
Andrew Barton Paras 41- 43	Policy 4.58	The direct cumulative interference effect from new groundwater takes on existing groundwater takes is minimised by limiting the drawdown of any existing bore within a 2 km radius to no more than 20% of the available drawdown or to effects on neighbouring wells that are minor , <i>calculated in accordance with the method in Schedule 12.</i>	SFL Page 12
Andrew Barton Para 35 Para 39	Policy 4.60 (b)	(b) A maximum volume based on reasonable efficient use over the period the water is required <i>except for hydro-electricity generation activities</i> subject to an allowance for more water to be taken in the event of a demand year that exceeds 90%.	SFL page 13
Andrew Barton Para 37 and 39	Policy 4.66	The rate, volume and seasonal duration for which water may be taken will be reasonable efficient for the intended use.	
Andrew Barton Para 20-21	Policy 4.76	Resource consents for the use of land for farming activities ... groundwater allocation zones that are over-allocated will generally be	SFL Page 15

Para in evidence	PLWRP	Amendments proposed by Expert Witnesses NB: s 42a recommendation in italics; changes proposed in bold.	Submission
Dr John Penno Paras 5.1 – 5.8		subject to a 15 five year duration if the land use and associated nutrient discharges ... may impede the ability of the community to find an integrated solution to manage water quality and the over-allocation of water and the integrated solution is an economic proposition for an existing user relative to their existing water supply.	
Dr Bruce McCabe Para 8.8	Ruler 5.43 – 5.45		SML Page 19
Andrew Barton Para 40	Rule 5.96	The taking and use of water from a river or lake is a restricted discretionary... 2. Unless the proposed take is the replacement of a lawfully established ... set in sections 6-15 fpr that surface water body and/or whether water will be used efficiently”	SFL Page 23
Andrew Barton Paras 29-31	Rule 5.104	The taking and use of groundwater that does not meet one or more of conditions 2 and 3 in Rule 5.101 is a prohibited non-complying activity where the taking and use of water in excess of an interim limit in this Plan and a prohibited activity where the taking and use of water is in excess of a limit set by sections 6-15 of this Plan.	SFL Page 24
Andrew Barton Paras 51-52	Rule 5.107 Clause 5	In a catchment where the surface and/or groundwater allocation limits... [Delete in its entirety]	SFL Page 26
Dr Bruce McCabe Para 10d	New definition	New definition: Zone of reasonable mixing: A zone of reasonable mixing for point-source discharges to groundwater up to 2 km down groundwater gradient of s discharge up to a depth of 50 m below ground level over this area.	SML Policy 4.1 and page 8.