

IN THE MATTER

of the Resource Management Act 1991

AND

IN THE MATTER

of appeals lodged against proposed Plan Change 2
to the Manawatu-Whanganui One Plan

JOINT WITNESS STATEMENT OF PLANNING EXPERTS

17 April 2023

INTRODUCTION

1. This joint expert witness statement relates to the appeals lodged against proposed Plan Change 2 (**PC2**) of the Manawatu-Whanganui One Plan which focuses on existing intensive farming land use activities within targeted water catchments in the region.
2. At mediation held on 15 March 2023 the parties agreed in principle the amended PC2 provisions attached as Annexure 'A' to the 15 March 2023 mediation agreement. The amended PC2 provisions include an alternative controlled activity consent pathway based on a risk assessment approach recommended by the farm systems experts. The parties agreed in principle at the 15 March 2023 mediation to pursue the risk assessment approach for pastoral and commercial vegetable growing intensive farming land uses. The agreement in principle is subject to Fish & Game, Forest & Bird and Andrew Day having an opportunity to further consider the proposed risk assessment frameworks.
3. At paragraph 13 (a) of the 15 March 2023 mediation agreement, the parties agreed that further work would be done on definitions and explanations for the risk assessment frameworks and the planning experts would then incorporate these into the PC2 policy and rule provisions. The further work by the farm systems experts generated draft explanations and definitions for the pastoral and commercial vegetable growing risk assessment frameworks.
4. The planning experts held a second expert conference on Friday 31 March 2023 at 9.30 via Teams AVL to consider and finalise the content of draft schedules intended to set out the methodology for the risk assessment frameworks. The planning experts attending the conference were:
 - (a) Sue Ruston (**SR**) for Horticulture New Zealand;
 - (b) Gerard Willis (**GW**) for Federated Farmers New Zealand;
 - (c) Greg Carlyon (**GC**) for Ngāti Turanga and Wellington Fish and Game Council; and
 - (d) Christine Foster (**CF**) for Horizons.

CODE OF CONDUCT

5. This joint witness statement is prepared in accordance with section 9.5 of the Environment Court Practice Note 2023.
6. We confirm that we have read and complied with the Code of Conduct for Expert Witnesses.

PURPOSE AND SCOPE OF CONFERENCING

7. The purpose of this conferencing session is to:

- (a) Consider the material supplied by the farm systems experts prior to the conferencing;
- (b) Identify any outstanding matters or further work required to finalise draft schedules; and
- (c) Otherwise finalise and agree on the content of the draft One Plan Schedules for circulation to and consideration by the parties.

AGREED MATTERS

8. The planning experts agreed the following matters:

- (a) The planning experts recommend that the version of Schedule [X] contained in **Annexure A** be included in the One Plan together with the PC2 provisions, subject to further refinement resulting from the further work specified in (c) to (i) below.
- (b) The planning experts recommend that the version of Schedule [Y] contained in **Annexure B** be referred to the commercial vegetable growing experts for final review prior to inclusion in the One Plan together with the PC2 provisions.
- (c) In the draft pastoral Schedule [X], Topic 1 (Stock Management) sub practice (d) (Wintering Practices) the Fonterra Nitrogen Risk Scorecard Manual details a process whereby the score is determined according to the percentage of time the sub practice is employed. The planning experts seek further advice from the pastoral farm systems experts about whether this needs to be more fully explained in (d) and whether the example set out on page 9 of the Fonterra Nitrogen Risk Scorecard Manual (or similar example) should be included in (d).
- (d) The planning experts are aware that the pastoral farm systems experts have not concluded their discussion on whether Topic 6 (Irrigation Management) should be included in draft Schedule [X]. The pastoral farm systems experts are understood to have conferred but not finalised their recommendation on this matter as at 14 April 2023. If Irrigation Management is to be included in Schedule [X], Christine Foster will circulate to the planning experts as soon as practicable the wording recommended by the pastoral farm systems experts.
- (e) The planning experts note Professor Horne's advice that it is not practicable to devise a numeric scorecard for the mitigation 'bioreactors'. The planning experts agree that the presence of, or commitment to construct, bioreactors should be considered as a positive mitigation when considering applications for consent and considered whether any additions to the rule or policy framework are necessary to facilitate this. The planning experts agree that removing bioreactors from the Scorecard means that a farmer with such a device would not get 'credit' for the mitigation in terms of whether the farm passes the controlled activity gateway test. However, the planners suggest that having a bioreactor could still be

considered as part of the assessment without further change to the plan provisions because Policy 14-6 is referenced in the controlled activity rule (reserved matter number i) and clause (f) (ii) of Policy 14-6 requires consideration of the predicted reduction in risk of nitrogen leaching. Policy 14-6 must also be considered for any restricted discretionary or discretionary activity application under Rules 14-2 and 14-3.

- (f) The planning experts recommend that the definitions included in draft Schedules [X] and [Y] should be included only in the Schedules (for the purpose of the Schedules) and do not need to be replicated or listed separately in the One Plan Glossary.
- (g) The planning experts have included in draft Schedule [X] a Part C (Stock unit equivalents) sourced from Beef+Lamb NZ and seek advice from the pastoral farm systems experts on whether this stock unit benchmarking table, or some other table, is appropriate for inclusion in Schedule [X].
- (h) The text and tables contained in **Annexure C** (nitrogen leaching risk limit tables) should be included in the PC2 provisions immediately following Table 14.2.
- (i) Draft Schedule [Z] contained in **Annexure D** appropriately explains how the risk scorecards should be applied where a farm property comprises more than one soil type or rainfall category in the nitrogen leaching risk limit tables 14.2A and 14.2B and should be included together with the PC2 provisions in the One Plan.
- (j) The planning experts recommend that the two maps on which the risk assessment frameworks rely ('profile available water' and 'rainfall') should be included as pdf plans attached to the PC2 provisions and should be available as a GIS layer in the publicly accessible Horizons website GIS map set. Christine Foster has sent an email request [31 March 2023] to Professor David Horne to provide the relevant GIS files.
- (k) The planning experts recommend the following amendments to the PC2 provisions discussed at the 15 March 2023 mediation:

In Rule 14-1, Condition (d) (ii) the word 'for' should be replaced with 'of' and reference to Schedules [X] and [Y] should be included as follows:

'(ii) the nitrogen leaching risk ~~for~~ of the activity, calculated in accordance with Schedules [X] and [Y], will not exceed the *nitrogen leaching risk limit** specified in Table 14.2A (for pastoral farming) or Table 14.2B (for commercial vegetable growing).'

OTHER MATTERS

9. GC, GW and CF consider that public notification of discretionary activity applications is more likely than not on evaluation of the amended PC2 policy provisions, noting that the determination in relation to notification must consider the individual facts of each application.

DISAGREEMENTS

10. GC considers that implementation of the PC2 plan provisions is a relevant matter for consideration by planners via conferencing. He has raised implementation matters on a number of occasions through conferencing. In his view completion of an implementation plan prior to settlement would provide the confidence and certainty required for appellant parties. In that vein, he particularly notes the benefits of independent expert review associated with decision making on consents once the proposed provisions are operative. This review would occur in relation to farm systems assessments and planning assessments. Addressing this matter would need to occur during development and completion of the implementation plan. This matter has not been agreed between the planners.

Date: 17 April 2023

Sue Ruston

Gerard Willis

Greg Carlyon

Christine Foster

ANNEXURE A

HORIZONS ONE PLAN PC2

DRAFT ONE PLAN SCHEDULE [X]

PASTORAL FARMING NITROGEN LEACHING RISK ASSESSMENT METHOD

Schedule [X]: How to determine the *nitrogen leaching risk of existing *intensive farming land uses** (Pastoral farming)**

Applying the Nitrogen Leaching Risk Scorecard

A pastoral farm's *nitrogen leaching risk** shall be determined by:

1. Using the Nitrogen Leaching Risk Scorecard set out below, and in accordance with the explanations and definitions provided, assigning points for the sub practices under the each of the six topics listed, to the extent they are relevant to the farming system; and
2. In the case of Topic 1 Stock Management, adjusting the Sub practice (a) points by the applicable percentage in Sub practice (c);
3. Summing the total number of Sub practice positive points and deducting the sub practice negative points for each Topic to generate 6 Topic scores; and
4. Summing all [6] Topic scores to provide a Part A aggregate Topics score; and
5. Determining what, if any, mitigations under Part B are applicable and applying the points and/or percentage adjustments applicable to the Part A aggregate Topic Score to generate the score that is *nitrogen leaching risk**.

Commented [c1]: Whether this is 6 or five depends on the farm systems experts' recommendation on irrigation management.

PART A: Nitrogen Leaching Risk Scorecard - Pastoral land management practices

Topic 1: Stock Management

(a) Stock Management: Stocking Rate	Points
This sub practice addresses the number of grazed animals on the land, recognising that a high stocking rate is a key driver for increased nitrogen leaching on farm. The area (hectares) used in the calculation of the stocking rate is the effective area of the dairy farm. For the purpose of this Scorecard the effective area is the area of land used for grazing livestock (including the milking platform), cropping or as sacrifice paddocks. Dairy farm is the area of land used for <i>dairy farming*</i>. The stocking rate used for the calculation shall be the peak stocking rate. The peak stocking rate is the highest stocking rate on the farm over the 12-month period. The stock unit (su) values for farmed animals are as listed in Part C of this Schedule.	
≤ 16 su/ha	0
>16 - ≤20 su/ha	20
>20 - ≤28 su/ha	30
>28 - ≤32 su/ha	40
>32 su/ha	50

(b) Stock Management: Pasture Eaten	Points
The Scorecard moderates the stocking rate risk by assessing the total amount of dry matter eaten. It is acknowledged that stocking rate alone as a method of assessing nitrogen loss risk does not account for differences in size and age of animals, both of which will contribute to differences in total dry matter eaten. This sub practice accounts for differences in amount of dry matter eaten and therefore the amount of nitrogen ingested and returned to pasture as urinary N and N in excreta.	
The expression T DM/ha used below refers to tonnes of dry matter per hectare.	
≤ 10 T DM/ha	5
>10 – ≤12 T DM/ha	10
>12 – ≤14 T DM/ha	20
>14 – ≤16 T DM/ha	40
>16 – ≤18 T DM/ha	60
>18 T DM/ha	80

(c) Stock Management: Wintering Off the Milking Platform	Reduction of peak stocking rate points
This sub practice moderates the stocking rate risk (sub practice (a)) by reducing the points attributed to that Sub practice. This is calculated using the percentage of time animals spend off farm between the months of May – August.	
For the purpose of this Scorecard, milking platform (MP) means that part of any dairy farm that is used for grazing lactating dairy cows during the milking season and includes the animal effluent disposal area. For the avoidance of doubt, it excludes land used for grazing heifers or the wintering-off of dairy cows.	
>80 - ≤100% animals off MP	-50%
>60 - ≤ 80% animals off MP	-40%
>40 - ≤60% animals off MP	-30%
> 20 - ≤40% animals off MP	-20%
> 0 - ≤ 20% animals off MP	-10%

(d) Stock Management: Wintering Practices:	Points
This sub practice considers that extent of time stock are fed using different winter grazing practices. The risk is determined by allocating points on a pro rata basis according to the percentage of time (total hours) animals are kept on, and/or fed, using the listed systems.	
For the purpose of this Scorecard break feed fodder crop means feeding of stock within an area of pasture or crop-	
(a) within a paddock in which the fence is moved regularly to allow the stock to graze another area of pasture or crop within the paddock; or	
(b) within a paddock that is subdivided into cells or grid using temporary fencing; and where the stock as moved regularly.	
An extensive fodder crop means a form of grazing on crop that is not break feed fodder crop.	

Commented [c2]: The planning experts have a question for the farm systems experts about whether further explanation is required here to make it clear that the risk score requires calculation of the percentage of time the practices are employed. And a question about whether the -20 and +20 points rows are relevant.

Barn or wintering pad means any hard structure used for feeding livestock from which effluent is captured and directed to an authorised effluent management system.	
Off pasture (barn or wintering pad)	-40
On pasture	0
Extensive fodder crop	20
Break feed fodder crop	40

Topic 2: Nitrogen Fertiliser:

(a) Nitrogen Fertiliser: Total N	Points
This sub practice assesses the level of risk associated with nitrogen fertiliser application. The total amount of nitrogen used per annum is the main driver for the nitrogen management risk factor. This is calculated by summing the total amount of nitrogen fertiliser applied annually (kg / ha) across the effective area .	
N Fertiliser applied ≤ 50 kg/ha	0
N Fertiliser applied $>50 - \leq 100$ kg/ha	10
N Fertiliser applied $>100 - \leq 150$ kg/ha	30
N Fertiliser applied $>150 - \leq 175$ kg/ha	50
N Fertiliser applied $>175 - \leq 200$ kg/ha	60
N Fertiliser applied $>200 - \leq 225$ kg/ha	70
N Fertiliser applied $>225 - \leq 250$ kg/ha	90
N Fertiliser applied $>250 - \leq 300$ kg/ha	150
N Fertiliser applied >300 kg/ha	200

(b) Nitrogen Fertiliser: Conversion Efficiency	Points
The conversion efficiency calculates how many kilograms of milk solids are produced per kilogram of nitrogen (N) applied. This sub factor is calculated by simply dividing the total amount of milk solids (kg MS) produced by the total kilograms of nitrogen applied via fertiliser.	
kgMS/kgN Fertiliser >25	-40
kgMS/kgN Fertiliser $>13 - \leq 25$	-20
kgMS/kgN Fertiliser $>9 - \leq 13$	0
kgMS/kgN Fertiliser $>5 - \leq 9$	20
kgMS/kgN Fertiliser ≤ 4.5	40

(c) Nitrogen Fertiliser: Timing of Application:	Points
This sub practice assesses the timing of application of nitrogen fertilisers (which influences nitrogen leaching). The scoring of this sub practice works by grouping each of the farm's nitrogen (N) fertiliser applications into one of the three time periods and recording the highest score of those time periods. (That is, if fertiliser is applied in May -June and in September to April, then this sub practice will attract 40 points).	
N Fertiliser applied September – April	-10
N Fertiliser applied July - August	20
N Fertiliser applied May - June	40

(d) Nitrogen Fertiliser: Average Monthly Application Rates	Points
This sub practice calculates the average amount of N applied in any given month to a block by summing all monthly fertiliser applications. Total nitrogen applied is then divided across the block(s) it was applied to. For example, where an N fertiliser application is applied to multiple blocks in a month, the application is to be pro-rata across the blocks it was applied to. This is necessary because Product A (20% Nitrogen) could be applied every month across Block 1 and Block 2 but Product B (46% Nitrogen) was applied every month across Block 1 only.	
Highest N fertiliser applied is $\leq$ 25 kg/ha	-20
Highest N fertiliser applied is $>$ 25 kg/ha	0

Topic 3: Effluent Management

(a) Effluent Management: Storage	Points
This sub practice is scored according to the extent to which the recommend effluent storage capacity is installed. It is expressed as percentage of the storage calculated using the Dairy Effluent Storage Calculator (DESC). Although the scoring scale provided below in increments 10%, scores should be allocated in accordance with a sliding scale from 0 to 100 based on the percentage of required storage that is provided. That is, if a farm has 95% of the required storage it will attract 5 risk points. The DESC may be accessed at: https://www.dairynzdesc.co.nz	
100% storage	0
90% storage	10
80% storage	20
70% storage	30
60% storage	40
50% storage	50
40% storage	60
30% storage	70
20% storage	80

10% storage	90
No storage	100

(b) Effluent Management: Discharge Application Depth:	Points
The application depth is the volume of effluent discharged to soil. It is measured as the depth following a single effluent irrigation cycle.	
For the purpose of this scorecard High risk soils and Low risk soils are as described at: https://www.horizons.govt.nz/HRC/media/Media/Soil-Risk-list.pdf	
High risk soils + ≤ 10mm	0
High risk soils + >10mm	20
Low risk soils + ≤ 24mm	0
Low risk soils + >24mm	20

(c) Effluent Management: Disposal Area Without a Feed Pad	Points
The sub practice is scored according to the sufficiency of the effluent disposal area for the farm system. It is calculated simply as the area (hectares) of effluent disposal area per hundred cows, or part thereof.	
For the purpose of this Scorecard, a feed pad is an area of hard surface used for the regular supplementary feeding and loafing of cattle where the animal effluent is collected for disposal to land in accordance with the rules of this regional plan.	
Disposal area > 4 ha/100 cows (no feed pad)	0
Disposal area >3 – ≤4 ha/100 cows (no feed pad)	10
Disposal area >2 – ≤3 ha/100 cows (no feed pad)	20
Disposal area ≥1 – ≤2 ha/100 cows (no feed pad)	30
Disposal area <1 ha/100 cows (no feed pad)	40

(d) Effluent Management: Disposal Area With a Feed Pad	Points
Disposal area >7ha/100 cows (with feed pad)	0
Disposal area >5 – ≤7 ha/100 cows (with feed pad)	10
Disposal area >3 – ≤5 ha/100 cows (with feed pad)	20
Disposal area ≥1 – ≤3 ha/100 cows (with feed pad)	30
Disposal area <1 ha/100 cows (with feed pad)	40

Topic 4: Imported Feed

(a) Imported N: Total Imported N	Points
This sub practice is scored according to the total amount of nitrogen (N) introduced to the farm via all imported supplementary feed divided by the effective area of the farm.	
The N content of feed can be found at: https://www.dairynz.co.nz/feed/supplements/feed-values/	

For the purpose of this Scorecard, imported supplementary feed means any animal feed supplied to animals on a dairy farm that is not grown on that dairy farm.	
Total imported N from feed ≤ 40 kg/ha	0
Total imported N from feed $>40 - \leq 80$ kg/ha	20
Total imported N from feed $>80 - \leq 120$ kg/ha	40
Total imported N from feed $>120 - \leq 160$ kg/ha	60
Total imported N from feed > 160 kg/ha	80

(b) Imported N: Average N Content of Imported Supplements	Points
This sub practice is scored according to the average N content of the imported supplementary feed. The average % of nitrogen in the total amount of imported supplementary feed is calculated on a pro rata basis.	
Imported Feed with average N % ≤ 1.0	0
Imported Feed with average N % $>1.0 - \leq 1.5$	3
Imported Feed with average N % $>1.5 - \leq 1.75$	6
Imported Feed with average N % $>1.75 - \leq 2.0$	9
Imported Feed with average N % $>2.0 - \leq 2.25$	12
Imported Feed with average N % $>2.25 - \leq 2.5$	15
Imported Feed with average N % $>2.5 - \leq 3.0$	18
Imported Feed with average N % > 3.0	20

(c) Imported N: Conversion Efficiency	Points
This sub practice calculates the conversion efficiency of nitrogen (N) introduced via imported supplementary feed to product. This measures the efficiency of nitrogen from imported supplementary feed converted into kilograms of milk solids (kg MS).	
Kg MS / Kg N from supplements: >50	-40
Kg MS / Kg N from supplements: $>30 - \leq 50$	-20
Kg MS / Kg N from supplements: $>20 - \leq 30$	0
Kg MS / Kg N from supplements: $>10 - \leq 20$	20
Kg MS / Kg N from supplements: ≤ 10	40

Topic 5: Cropping and Cultivation

(a) Cropping and Cultivation: Minimum Tillage	Points
This sub practice assesses the risk of release of mineral nitrogen resulting from cultivation. The total percentage of the farm cultivated using minimum tillage is calculated as the area of minimum tillage divided by the total effective area of the farm.	
$\leq 2\%$ of farm cultivated annually	0
$>2\% - \leq 4\%$ of farm cultivated annually	5
$>4\% - \leq 6\%$ of farm cultivated annually	10
$>6\% - \leq 8\%$ of farm cultivated annually	15

>8% – ≤10% of farm cultivated annually	20
>10% – ≤15% of farm cultivated annually	30
>15% – ≤20% of farm cultivated annually	40
>20% of farm cultivated annually	50

(b) Cropping and Cultivation: Conventional Cultivation	Points
This sub practice assesses the risk of nitrogen leaching associated with conventional cultivation. The total percentage of the farm cultivated using conventional cultivation is calculated as the conventionally cultivated area divided by the total effective area of the farm.	
>0 - 2% of farm cultivated annually	10
>2% – ≤4% of farm cultivated annually	20
>4% – ≤6% of farm cultivated annually	30
>6% – ≤8% of farm cultivated annually	40
>8% – ≤10% of farm cultivated annually	50
>10% – ≤15% of farm cultivated annually	70
>15% – ≤20% of farm cultivated annually	90
>20% of farm cultivated annually	120

(c) Cropping and Cultivation: Season of Forage Crop Grazing	Points
This sub practice considers the higher risk of leaching associated with winter harvesting. The season of grazing is taken directly from the harvest date recorded for each crop.	
Crop grazing (summer) 1 October – 31 March	-30
Crop grazing (winter) 1 April – 30 September	30

(d) Cropping and Cultivation: Fertiliser Applied in Winter	Points
This sub practice considers whether nitrogen fertiliser is applied to crops during high-risk winter months.	
No fertiliser applied during 1 May to 31 August	0
Fertiliser applied during 1 May to 31 August	30

Topic 6: Irrigation Management

(a) Irrigation: Irrigation Method	Points
This is scored on a pro rata basis calculated by the percentage of each irrigation method in use on the farm based on the area of land irrigated.	
Pivot or linear	40
Rotary boom, gun or K-line	60
Border dyke or wild flood	90

Commented [c3]: The planning experts are awaiting confirmation from the farm systems experts as to whether the irrigation management topic is to be included in Schedule [X].

(b) Irrigation: Irrigation Scheduling Method	Points
If a farm has multiple irrigation scheduling methods, points are to be allocated on a pro rata basis based on the area of land subject to each method.	
Soil moisture tapes/soil moisture budget	-15
Visual assessment or when water is available	30

(c) Irrigation: Irrigation Application Method	Points
If a farm has multiple methods of irrigation, points are to be allocated on a pro rata basis based on the area of land subject to each method.	
Variable rate irrigation	-10
Deficit irrigation	0
Fixed depth & return	30

PART B - Pastoral Farming Mitigations

(a) Constructed Wetlands	Reduction in overall risk score
Points are deducted based on the catchment area that drains to any constructed wetland on a dairy farm. A constructed wetland is a wetland that has been deliberately constructed to intercept surface and/or subsurface contaminant flows. The reference to 'catchment area' below is to the area of the farm that drains to the constructed wetland	
0.5% of the catchment area	-5
1% of the catchment area	-12.5
2% of the catchment area	-18
3% of the catchment area	-21
4% of the catchment area	-24.5
5% of the catchment area	-26

(b) Plantain: % of dry matter in diet (by mass over summer and autumn)	Reduction in overall risk score
≤10% of feed	0
>10 – ≤20% of feed	-10%
>20 – ≤30% of feed	-20%
>30% of feed	-30%

PART C: Stock unit equivalents

This following table is sourced from Beef+ Lamb NZ's benching tool which can be found at:
<https://beeflambnz.com/data-tools/benchmarking-tool>

SHEEP	STOCK UNITS
Ewes	1.0
Hoggets	0.7
Wethers	0.7
Rams	0.8
BEEF CATTLE	STOCK UNITS
Mixed Age Cows	5.5
Heifers 2.5 Yr	5.5
Heifers 1.5 Yr	4.4
Heifers Weaner	3.5
Bulls Weaner	4.5
Steers Weaner	4.5
Steers 1.5 Yr	5.0
Steers 2.5 Yr	5.5
Bull Beef 1.5 Yr+	5.5
Bulls Breeding	5.5
GRAZING DAIRY CATTLE	STOCK UNITS
Grazing Dairy Cattle	4.5
DAIRY CATTLE	STOCK UNITS
Jersey Cows	6.5
Friesian Cows	8.5
Other Jersey Stock	3.5
Other Friesian Stock	4.5
Calves	2.0
Bulls	5.0

Commented [c4]: The planning experts will check with the farm systems experts whether this table is the appropriate table.

DEER	STOCK UNITS
Hinds, breeding	1.9
Hinds, 1.5 year	1.8
Hinds, weaner	1.2
Stags, weaner	1.4
Stags, 1.5 year	1.8
Stags 2.5 year +	2.2
Stags, master	2.2
GOATS	STOCK UNITS
Female 1 year +	0.8
Female to 1 year	0.5
Male to 1 year	0.5
Male 1 year +	0.5
Buck	0.8

ANNEXURE B

HORIZONS ONE PLAN PC2

DRAFT ONE PLAN SCHEDULE [Y]

COMMERCIAL VEGETABLE GROWING NITROGEN LEACHING RISK ASSESSMENT METHOD

Schedule [Y]: How to determine the *nitrogen leaching risk
of existing *intensive farming land uses**
(Commercial Vegetable Growing*)**

Applying the Nitrogen Leaching Risk Scorecard

The *nitrogen leaching risk** of *commercial vegetable growing** shall be determined by:

1. Using the Nitrogen Leaching Risk Scorecard set out below, and in accordance with the explanations and definitions provided, assigning points for the sub practices under the each of the two topics listed, to the extent they are relevant to the vegetable growing system; and
2. For all sub-practices, risk scores are derived by multiplying the points (P) by the proportion of the productive vegetable growing area occupied by the sub-practice (%); and
3. The total *nitrogen leaching risk** is calculated by summing the total number of sub practice positive points and deducting the sub practice negative points; and
4. Where the *commercial vegetable growing** activity occurs in conjunction with any other intensive farming *land^* use, separate *nitrogen leaching risk** scores must be calculated for each intensive farming *land^* use.

PART A: Nitrogen Leaching Risk Scorecard – *Commercial Vegetable Growing land management practices**

Topic 1: Nitrogen Fertiliser Practices

(a) Nitrogen fertiliser annual application rate	Points (P)	Proportion of productive area (%)	Risk Score = P x %
N fertiliser: <100 kgN /ha	0		
N fertiliser: 100-150 kgN /ha	30		
N fertiliser: 151-200 kgN /ha	60		
N fertiliser: 201-250 kgN /ha	90		
N fertiliser: 251-300 kgN /ha	150		
N fertiliser: 301-400 kgN /ha	200		
N fertiliser: >400 kgN /ha	250		

(b) Nitrogen fertiliser application rate per application (individual)	Points (P)	Proportion of productive area (%)	Risk Score = P x %
N fertiliser: <25 kg /ha	-30		
N fertiliser: 25-50 kg /ha	0		
N fertiliser: 51-75 kg /ha	30		
N fertiliser: 76-100 kg /ha	60		
N fertiliser: >100 kg /ha	90		

(c) Nitrogen balance/budget	Points (P)	Proportion of productive area (%)	Risk Score = P x %
Yes	-50		
No	0		

(d) Nitrogen soil testing	Points (P)	Proportion of productive area (%)	Risk Score = P x %
Before every nitrogen fertiliser application	-50		
At the beginning of each crop cycle	-30		
One a year	0		
Never	50		

(e) Crop establishment fertiliser application method	Points (P)	Proportion of productive area (%)	Risk Score = P x %
Incorporated, GPS banded, controlled application	-20		
Surface, GPS banded, controlled application	-15		
Incorporated, banded	-10		
Surface, banded	-5		
Surface broadcast, incorporated	10		
Surface broadcast	20		

(f) Side fertiliser application method	Points (P)	Proportion of productive area (%)	Risk Score = P x %
GPS banded, controlled application	-15		
Banded	-5		
Broadcast	20		

Topic 2: Soil Health

(a) Practices between crops	Points (P)	Proportion of productive area (%)	Risk Score = P x %
Cover crop	-30		
Fallow < 4 weeks	0		
Fallow 4 – 12 weeks	25		
Fallow > 12 weeks	50		

(b) Catch crops (cut-and-carry)	Points (P)	Proportion of productive area (%)	Risk Score = P x %
Yes	-20		
No	0		

PART B: Definitions

Nitrogen fertiliser annual application rate (sub practice 1(a)): means the total quantity of elemental nitrogen fertiliser applied divided by the productive area. This should be split into the different rate bands based on the proportion of productive area (i.e., 50% at 100 – 150 kgN/ha and 50% at 151 – 200 kgN/ha). This is not a whole operation average.

Nitrogen fertiliser application rate per application (sub practice) 1(b)): means the amount of elemental nitrogen applied per hectare for a single application. This should be split into the different rate bands based on the proportion of productive area where rates vary between crops. This is not a whole operation average.

Catch crop: means any crop that is grown with the primary objective of catching excess nitrogen in soils that otherwise may be lost through leaching. At harvest this crop is exported off farm. Examples include maize and grass grown for silage or hay.

Cover crop: means any crop that is grown with the primary objective of catching excess nitrogen in soils that otherwise may be lost through leaching. Before the planting of the next vegetable crop the cover crop is mulched and/or incorporated into the soil.

Fallow: means a period of time after crop harvest where the soil remains bare.

Nitrogen soil testing (mineral N): means the use of soil mineral N testing. E.g., Quick N test or laboratory based mineral N.

Nitrogen balance/budget: means a decision support tool to help a grower understand the inputs and outputs of nitrogen for a crop growing system. Nitrogen outputs are balanced against nitrogen inputs in a graph or table, categorised by source or destination. Nitrogen budgets assist growers with appropriate nitrogen fertiliser recommendations.

Productive Area: means the total productive vegetable growing area within the boundaries of the *land*[^] (boundary to boundary). This includes the block or paddock where the crop is grown, including wheel tracks and beds that are not cropped, as well as headlands and races. This includes both owned and leased land. While the total land area cannot increase without consent, the location of leased land may change from year to year. The level of risk on the all leased land must be assessed and must not increase the overall risk level.

Productive area does not include the land occupied by buildings and yards. Productive area does not include areas that cannot be cropped such as blocks of *indigenous** vegetation, nor does it include permanent pasture (being *land*[^] in pasture for longer than 2 years).

Crop establishment fertiliser application methods:

Incorporated: means the fertiliser is applied into the soil at the time of application.

GPS banded: means the placement of fertiliser in continuous narrow ribbons, usually at specific distances from the seeds or plants, recorded using GPS.

Banded: means the placement of fertiliser in continuous narrow ribbons, usually at specific distances from the seeds or plants.

Surface: means the application of fertiliser which remains on top of the soil.

Broadcast: means the spreading of fertiliser evenly over a large area. The fertiliser then remains on the soil surface to break down.

Controlled application: means a method of applying fertiliser in a precise and targeted manner using an electronic rate controller that adjusts rates during spreading irrespective of speed.

ANNEXURE C

HORIZONS ONE PLAN PC2

DRAFT NITROGEN LEACHING RISK LIMIT TABLES 14.2A AND 14.2B

ANNEXURE 'B'

NITROGEN LEACHING RISK LIMIT TABLES TO BE INSERTED INTO PC2

Insert the following text and tables into the One Plan, immediately following Table 14.2:

Table 14.2A: Nitrogen Leaching Risk Limits* - Pastoral

The following are the *nitrogen leaching risk limits** for pastoral intensive farming *land*[^] use activities for the purposes of Rule 14-1 and Schedule [Z]:

Profile Available Water			
Rainfall	151-350mm	61-150mm	0-60mm
Rainfall 1 <1000 mm/year	180	180	130
Rainfall 2 1000-1300 mm/year	180	150	120
Rainfall 3 1300-1600 mm/year	150	130	110
Rainfall 4 >1600 mm/year	150	120	110

Table 14.2B: Nitrogen Leaching Risk Limits* - Commercial Vegetable Growing

The following are the *nitrogen leaching risk limits** for commercial vegetable growing activities for the purposes of Rule 14-1 and Schedule [Z]. The limits prescribed in Table 14.2B apply to both the nitrogen fertiliser practices described in Topic 1 and the soil health practices described in Topic 2 of Schedule [Y]. For the purposes of Rule 14-1, the *nitrogen leaching risk** of the activity must not exceed the largest number of the range specified in Table 14.2B.

Profile Available Water			
Rainfall	151-350mm	61-150mm	0-60mm
Rainfall 1 <1000 mm/year	21 - 40	21 - 40	-
Rainfall 2 1000-1300 mm/year	21 - 40	21 - 40	-
Rainfall 3 1300-1600 mm/year	-	-	-
Rainfall 4 >1600 mm/year	-	-	-

ANNEXURE D

HORIZONS ONE PLAN PC2

DRAFT ONE PLAN SCHEDULE [Z]

**METHODOLOGY FOR DETERMINING NITROGEN LEACHING RISK WHERE LAND COMPRISES
MULTIPLE PROFILE AVAILABLE WATER AND RAINFALL CATEGORIES**

Draft Schedule Z - Calculation of Nitrogen Leaching Risk Limit*

Part A – *Nitrogen leaching risk limit** where a farm is predominantly within the parameters described by a single cell of Table 14-2A

Except as set out in Part B below, the *Nitrogen Leaching Risk limit** is as set out in Table 14-2A (for pastoral farming) and Table 14-2B (for commercial vegetable growing).

A *Nitrogen Leaching Risk limit** shall be regarded as being applicable to an intensive farming *land*[^] use if at least 90% of the area of that *land*[^] is located within the rainfall and profile available water categories described in Tables 14.2A and 14.2B as applying to that *Nitrogen Leaching Risk limit**.

For the purpose of applying Tables 14.2A and 14.2B, rainfall shall be determined by reference to Map XX and profile available water shall be determined by reference to Map YY.

Commented [c1]: Note - we are awaiting supply of these maps as GIS layers.

Part B - *Nitrogen leaching risk limit** where *land*[^] is located within multiple cells in Table 14.2A

This part applies where more than 10% of the *land*[^] occupied by an intensive farming *land*[^] use activity is located :

- (a) in one rainfall category (as specified in Table 14.2A and shown on Map XX) and the balance of the *land*[^] is located in one or more of the other categories; or
- (b) in one category of profile available water (as specified in Table 14.2A and shown on Map YY) and the balance in one or more of the other categories.

In the case of either (a) or (b) above, the *Nitrogen Leaching Risk Limit** shall be calculated as follows:

Nitrogen leaching risk limit* = % of area of the *land*[^] in each cell of Table 14.2A multiplied by the score in that cell *plus* the percentage of the area of the *land*[^] in any other cell multiplied by the score in that other cell.

For example: *Nitrogen leaching risk limit** = (%L₁ x Y) + (%L₂ x Z)

Where:

%L₁ is the percentage of the *land*[^] that has rainfall and profile available water described by a cell in Table 14.2A;

Y is the risk score in the cell of Table 14.2A to which %L₁ applies;

%L₂ is the percent of the property that has rainfall and profile available water described in a cell of Table 14.2A other than the cell referred to in %L₁; and

Z is the score within the cell of Table 14.2A to which %L₂ applies.

Illustrated Example:

Using the table below, if a 200ha farm in the 1000-1300 rainfall category has 50% of its land area in the 'medium soil' and 50% in the 'coarse soil' category, the Nitrogen leaching risk limit* is 50% x 150 (75) plus 50% x 120 (60) = a limit of 135.

Profile Available Water			
Rainfall	151-350mm ('fine soil')	61-150mm ('medium soil')	0-60mm ('coarse soil')
Rainfall 1 <1000 mm/year			
Rainfall 2 1000-1300 mm/year		50% x 150 = 75	50% x 120 = 60
Rainfall 3 1300-1600 mm/year			
Rainfall 4 >1600 mm/year			

