BEFORE THE ENVIRONMENT COURT

In the matter of	appeals under clause 14 of the First Schedule to the Resource Management Act 1991 concerning proposed One Plan for the Manawatu-Wanganui region.
between	**FEDERATED FARMERS OF NEW ZEALAND** **ENV-2010-WLG-000148**
and	**MINISTER OF CONSERVATION** **ENV-2010-WLG-000150**
and	**DAY, MR ANDREW** **ENV-2010-WLG-000158**
and	**HORTICULTURE NEW ZEALAND** **ENV 2010-WLG-000155**
and	**WELLINGTON FISH & GAME COUNCIL** **ENV-2010-WLG-000157**
	Appellants
and	**MANAWATU-WANGANUI REGIONAL COUNCIL** *Respondent*

STATEMENT OF TECHNICAL EVIDENCE BY PETER TAYLOR ON THE TOPIC OF SURFACE WATER QUALITY – NON-POINT SOURCE DISCHARGES ON BEHALF OF MANAWATU-WANGANUI REGIONAL COUNCIL

Dated: 2nd February 2012

Solicitor: John W Maassen/Nicholas Jessen

Administrator: Sharon Belk

Address: 11-15 Victoria Avenue
Private Bag 11025
Palmerston North 4442

Telephone: (06) 952 2800
Facsimile: (06) 952 2929
Email: sharon.belk@horizons.govt.nz

STATEMENT OF TECHNICAL EVIDENCE BY PETER TAYLOR ON THE TOPIC OF SURFACE WATER QUALITY – NON-POINT SOURCE DISCHARGES ON BEHALF OF MANAWATU-WANGANUI REGIONAL COUNCIL

Introduction

My qualifications/experience

1. My full name is Peter Harold Taylor and I am employed by the Manawatu Wanganui Regional Council (MWRC) initially as Coordinator Plan Implementation, now as Manager Rural Advice. I began employment in August 2008. Initially my role was completing the testing of Farmer Applied Resource Management Strategies as proposed in the Notified Version of the Proposed One Plan (NV POP) and more recently my role has evolved to providing on farm advice to dairy farmers and in particular, implementing Rule 13-1B of the One Plan which controls the new use of land for dairy.

2. Prior to joining MWRC I was employed by Fish and Game New Zealand for twenty seven years based in Manawatu. My role was Senior Fish and Game Officer providing technical advice to the Fish and Game Council on sports fish and game bird management, and resource management advice for the protection of sports fish and game bird habitats for the lower North Island. I have therefore been participating in regional plan and resource consent submissions and negotiations since the inception of the Resource Management Act 1991. Before this I had eight years with the New Zealand Wildlife Service and four years working on farms.

3. I have read the Environment Court's practice note 'Expert Witnesses – Code of Conduct' and agree to comply with it.

Scope of Evidence

4. In my evidence I will:

   i. Explain Rule 13-1B of the Proposed One Plan as Amended by Decisions (DV POP), focusing on new standards introduced to control non point source contamination of water.

ii. Describe my experience with the processing of nine applications made and granted pursuant to this Rule.

iii. Present farm data showing that the new Rule's standards were met, how comfortably they were met on some farms, and what mitigation options were required to ensure they were met on other farms.

iv. Analyse the position of 18 dairy farms I presented information on (Technical Evidence Bundle (TEB), Volume 4, pages 1757-1824) against the cumulative nitrogen leaching maximum values in the proposed rule which will be attached to Ms Barton's evidence.

Executive Summary of Evidence

New dairy farming land use

5. Rule 13-1B has controlled activity status and its purpose is to control non point source contamination of water from land being converted to dairy farming. It introduces new standards on activities never previously regulated within the MWRC region which require the preparation of Nutrient Management Plans that demonstrate compliance with nitrogen leaching limits and stock exclusions from water ways and water bodies.

6. Nine applications under this Rule have been granted since DV POP was given effect to in August 2010.

7. The locations of these farms cover a wide geographical area, with highly variable rainfall and Land Use Capability classes. Farm size and herd size range from 48 to 406ha and 100 to 1,200 cows respectively.

8. The experience gained from the implementation of this Rule has resulted in a very workable process and outcome for farmers.

Existing dairy farming land use

9. A proposed new Rule (which will be attached to Ms Barton's evidence) sets out the same mechanism used in Rule 13-1B for establishing the cumulative nitrogen leaching maximum for existing dairy farms in certain Water

Management Zones. For farms that exceed their limit, a step down reduction over three years is proposed.

10. Using 18 dairy farms described in my TEB, Volume 4, pages 1757-1824, I calculate the limits and reductions required for these farms should this Rule apply to them.

11. Ten of these farms would need to reduce N leaching. Three of these farms would achieve this by the end of year one, two by the end of year two, leaving five to be compliant by the end of the third year.

12. For the majority of these farms achieving these reductions would be relatively easy. For two farms it would be possible but with some difficulty and for three farms very difficult.

13. The mitigation options for reducing nitrogen leaching to the extent identified exist: The greatest barrier is likely the farms financial ability.

14. The proposed new Rule sets out an alternative regime to enable farms meeting certain criteria (high rainfall and high proportion of high Land Use Capability Class) to reduce N leaching. Two of the FARM Strategy farms would meet the criteria, one each in the moderately challenged and highly challenged groups.

Background

New dairy farming land use

15. Rule 13-1B has controlled activity status and its purpose is to control non point source contamination of water from land being converted to dairy farming. It introduces new standards on activities never previously regulated within the MWRC region. The new standards are:

    a. A "*Nutrient Management Plan* must be prepared..."

    b. That the Nutrient Management Plan "...must demonstrate compliance with the *cumulative nitrogen leaching maximum* for the *land* used for *"dairy farming.*"

c. "Dairy cattle must be excluded from…

i. *wetlands* and *lakes*…"

ii. "*Rivers* that are permanently flowing or have an *active bed* width greater than 1m…"

iii. "*Rivers* that are permanently flowing or have an *active bed* width greater than 1m, that are crossed by more than 1350 dairy cattle movements per week, must be bridged or culverted…"

16. Nine applications under this Rule have been granted since DV POP was given effect to in August 2010.

Existing dairy farming land use

17. Rule 13-1 of the DV POP seeks to control existing dairy farming in certain Water Management Zones, particularly with respect to minimising contaminant loss from dairy farms and stock exclusion from lakes, wetlands and rivers. This Rule was appealed by some parties. As a result of mediations with appellants, MWRC proposed a revised Rule regime (refer to Ms Barton's evidence) to control nitrogen loss from existing dairy farms within certain catchments. The revised Rule proposes the existing cumulative nitrogen leaching maximum (Table 13.2, DV POP) as the basis for calculating an acceptable loss from these farms.

18. Detailed in my TEB, Volume 4, pages 1757-1824, are the implications to 18 dairy farms of the Notified Version Proposed One Plan (NV POP) Rule 13-1. Fundamental to Rule 13-1 was the preparation of a Farmer Applied Resource Management Strategy (FARMS) that sought to identify and manage nutrient, sediment, and faecal bacteria loss from specified farms, including dairy. The implications I refer to are the assessment of existing farms and to what extent they would comply with the proposed nitrogen leaching limit, and if they exceeded their limit what mitigations, with what relative ease or difficulty, could be used to enable compliance.

Evidence

Processing of applications made pursuant to Rule 13-1B

19. Upon receiving an enquiry regarding a possible dairy conversion the following steps were taken:

    i. I organised a meeting with the farmer and/or their consultant at which, an information package containing Nutrient Management Plan Information Requirements and the Conditions/ Standards/Terms of Rule 13-1B was provided and discussed.

    ii. In most instances farm maps showing location and area of LUC Classes were prepared at regional scale (1:50,000) to provide the farmer with a guide to the N leaching limit for the property.

    iii. If after these discussions the farmer wished to proceed, a choice of people suitably qualified to prepare a Nutrient Management Plan (NMP), and their contact details, was provided.

    iv. I usually had a number of discussions with the consultant(s) preparing the NMP and commented on at least one draft prior to application being made.

    v. Once application was received Consents staff prepared draft consent conditions which were sent to the applicant.

    vi. Consents staff organised at least one meeting, which I attended, with the applicant and their consultant(s) to discuss the draft conditions.

    vii. Consents staff then granted the consent once conditions were mutually agreed.

20. Initially consent conditions relating to farming under the cumulative nitrogen leaching maximum were viewed as too constraining given the climatic variables that challenge farm management. The consent conditions were reviewed and a revised set of conditions prepared focusing on the outcome to be achieved rather than mimicking the inputs described in the NMP. This

approach was accepted by the applicants a template of which is in Appendix 1.

Summary information on the conversion farms

21. Table 1 provides relevant information on each farm and in particular:

    i. shows the nitrogen leaching limit each farm had to meet as calculated from the farms Land Use Capability classes and Table 13.2 values (see paragraph 29 of this evidence);

    ii. the amount of nitrogen leached according to the farms NMP; and

    iii. the extent to which each farm had to exclude dairy cattle from waterways and other at risk or threatened habitats.

22. The other information is presented to show the wide geographical coverage and range in rainfall, farm size, and cow numbers of the conversions.

Table 1: Overview of farms converted to dairy under Rule 13-1B, Proposed One Plan as Amended by Decisions.

Farm	Location	Catchment and rainfall	Total farm area (ha)	Maximum number of cows	Cumulative nitrogen leaching maximum (kg/ha/year)	NMP N-loss amount as modelled by Overseer® (kg/ha/year)	Specific N-loss mitigations identified in the NMP*	Stock exclusion
Hare	Cheltenham	Kiwitea 980mm	406	1200	25	25	None	2ha native bush fenced
McArley	Waikawa	Waikawa 1082mm	138	250	21	16	None necessary	200m stream 2.6ha native bush fenced
Murdoch	Maxwell	Ototoka 1180mm	111	225	20	20	125 cows wintered off for 10 weeks	6,050m stream bank fenced. 2 culverts installed
Oliver	Feilding	Oroua 943mm	123	350	27	19	None necessary	3,200m stream bank fenced. 1 culvert installed
Richfield and Gee	Tokomaru	Tokomaru 1000mm	98#	270	25	25	None	4,630m stream bank fenced. 1 bridge installed.
Seymour	Opiki	Lower Manawatu 949mm	108	300	28	21	None necessary	2,380m river bank and 1,600m drains fenced. 3.8ha oxbow wetland fenced.
Sievwright	Waituna West	Kiwitea 943mm	86	200	27	16	None necessary	None required
Smyth	Maxwell	Okehu 915mm	48	100	23	22	None necessary	62m stream bank fenced
Te Tarata Trust	Waimiha	Ongaruhe 1508mm	396	625	19	19	390 cows wintered off for 10 weeks.	29,435m of wetland perimeter and 20,548m stream bank to be fenced. 1 bridge installed.

***** Not applying nitrogen during winter months is considered a mitigation option. All farms stated they would follow this practice. Also, two of the farms, Hare and Richfield and Gee, while not identifying specific mitigations, may have limited N use (for example) to ensure they achieved their leaching maximum.

This farm converted 28.8ha of new land to dairy to add to an existing dairy unit of 69.6ha. The farmer opted to apply the NMP and Rule 13-1B requirements to the whole property.

Discussion

23. All nine applications received pursuant to Rule 13-1B have been granted as controlled activities. That is, none had to be assessed under Rule 13-1C as Restricted Discretionary activities. An example of an application, including the NMP, is in Appendix 2. The practice of working with farmers and consultants through this exercise has been useful and while in some cases management practices are required to minimise nitrogen leaching, the conversions went ahead and consents granted. Initially there was a degree of perplexity expressed by the farmers with the new requirements and concern regarding costs of preparing an NMP. Latterly, concerns were expressed regarding the overly restrictive nature of the draft consent conditions which led to the conditions being revised. Overall this was a useful learning experience for the Council where initial concerns were allayed and resolution of consent conditions mutually agreeable.

24. The farms ranged from the sand country near Levin, to pumice type soils near Taumarunui. They ranged widely in size (100 to 1,200 cows) with the average herd size for the conversions (391) similar to the average herd size for existing dairy farms (400) in the region. There was also considerable range in rainfall (but not extreme for the region) and Land Use Capability (LUC) classes (Table 5) where it is recognised that higher rainfall and a higher proportion of high LUC classes act to make meeting a nitrogen leaching limit more difficult.

25. A critical challenge to the consent holder is to understand the consequences of various farm practices on N leaching. The impact of climatic variation especially, will demand an understanding of the use (manipulation) of farm management practices not previously needed. The dairy industry and the Council need to assist farmers with this building awareness and competency of advice.

Conclusions

26. In my opinion the experience gained consenting these nine conversions has resulted in a very workable implementation of the Rule.

27. The Rule requirements do not appear to have restricted the nature of conversions as they are geographically widely dispersed with considerable

ranges of rainfall and LUC class. Equally there has been a wide range of farm size and cow numbers.

Analysis of FARM Strategy farms against the cumulative nitrogen leaching maximum of a proposed new rule

28. The proposed rule attached to Ms Barton's evidence sets out:

i. a starting point at which farm N-loss is estimated using Overseer®; and

ii. if that amount (kg/ha/yr) is greater than the cumulative nitrogen leaching maximum then;

iii. provision is made for a 33% reduction in that amount, or 2kgN/ha/yr, which ever is greater, each year over three years to meet the amount calculated in ii above.

29. The Cumulative Nitrogen Leaching Maximum is calculated by:

i. Measuring the area of each Land Use Capability (LUC) class at farm scale within farm boundaries, including support blocks if within the same priority catchment;

ii. Multiplying each area of LUC from step one by the permissible N-loss amount for each of the LUC values in Table 13.2, (DV POP - replicated in Table 2 below) and;

iii. Adding the permissible N-loss amounts for each LUC (if more than one class), and;

iv. Dividing by the total farm area.

Table 2: Cumulative nitrogen leaching maximum by Land Use Capability Class

LUC I	LUC II	LUC III	LUC IV	LUC V	LUC VI	LUC VII	LUC VIII
30	27	24	18	16	15	10	2

Note: The numbers relate to kilograms of nitrogen leached per hectare per year (kg/ha/yr).

For example:

Table 3: Method for calculating cumulative nitrogen leaching maximum

LUC class	Area (ha)	Table 13.2 value	kg/ha/yr
1	0	30	0
2	0	27	0
3	28	24	672
4	36	18	648
5	0	16	0
6	25	15	375
7	12	10	120
8	0	2	0
Total	101	Total	1815
Cumulative nitrogen leaching maximum			18.0

30. Table 4 shows which farms are leaching nitrogen in excess of a cumulative nitrogen leaching maximum. For these farms, a 33% reduction of this excess, or 2kg N/ha/yr whichever is greater, is calculated for each of the years following demonstrating the amounts to be reduced to be compliant by the end of the third year. Two of these farms, Jala Enterprises and Janssen, would meet the criteria of >1500mm rainfall and >50% LUC class 4 or greater. The relevance of these criteria is explained in paragraph 31 of this evidence.

Table 4: FARM Strategy test farms state of N-loss assessed against the proposed new Rule 13-1 for existing dairy farms in certain Water Management Zones.

Farm Name	Farm type	N- loss (kg/ha/yr)					
		Current (whole farm)	Table 13.2 Year 1 target	Difference	Residual at end Year 2	Residual at end Year 3	Residual at end Year 4
Barrow	Dairy	25	23	-2	0		
Glenbrook	Dairy	26	22	-4	2	0	
Flockhouse	Dairy/Dry stock	18	24	+6	n/a		
Tutu Totara	Dairy	17	24	+7	n/a		
Stoney Creek Partnership	Dairy	31	20	-11	-7	-3	0
Jala Enterprises	Dairy	31	21	-10	-7	-3	0
Windwood	Dairy	25	22	-3	-1	0	
Muskit Enterprises	Dairy	34	19	-15	-10	-5	0
Waka Dairies(Revised)	Dairy	23	25	+2	n/a		

Farm Name	Farm type	N- loss (kg/ha/yr)					
		Current (whole farm)	Table 13.2 Year 1 target	Difference	Residual at end Year 2	Residual at end Year 3	Residual at end Year 4
Janssen	Dairy	28	21	-7	-5	-2	0
Johnston	Dairy	25	19	-6	-2	-2	0
Byreburn	Dairy	28	27	-1	0		
Hokio Farm	Dairy	26	25	-1	0		
Whirokino Farm	Dairy	18	19	+1	n/a		
Moutoa M Farm	Dairy	32	27	-5	-3	-1	0
Martyn	Dairy	16	27	+11	n/a		
Ivo Farms	Dairy	18	26	+8	n/a		
Koot	Dairy	13	22	+9	n/a		

The proposed new rule and farms with rainfall >1,500mm and >50% LUC classes 4 or greater

31. Ms Barton proposes that farms with rainfall >1500mm and >50% of LUC classes 4-8, can, by employing best management practices, work more gradually toward achieving their cumulative nitrogen leaching maximum. Of the 18 FARM Strategy test farms, two would qualify: Jala Enterprises and Janssen (TEB, Volume 4, Table 11, page 1790). Interestingly, one of the farms voluntarily converting to dairy under the cumulative nitrogen leaching maximum regime meets these criteria (Te Tarata Trust, Table 5) and had to employ a significant mitigation option of wintering 63% of the cows off the farm for 10 weeks to achieve its N–loss target.

Table 5: Proportions of LUC relative to other farm data

Farm	Rainfall (mm)	Effective farm area(ha)	Stocking Rate over effective farm area	%Total LUC classes 1-3	%Total LUC classes 4-8	Farming at their N leaching maximum	Already using mitigation options
Hare	980	364	3.3	93	7	Yes	No
McArley	1082	122	2.0	66	34	No	No
Murdoch	1180	76	3.0	39	61	Yes	Yes
Oliver	943	117	3.0	100	0	No	No
Richfield and Gee	1000	89	3.0	95	5	Yes	No
Seymour	949	99	3.0	94	6	No	No
Sievwright	1000	82	2.4	87	13	No	No
Smyth	1200	46	2.2	70	30	Yes	No
Te Tarata Trust	1508	328	1.9	40	60	Yes	Yes

Discussion

32. Ten of the 18 FARM Strategy dairy farm test farms, under Ms Barton's proposed Rule Regime, would need to reduce N leaching. Three of these farms would achieve this by the end of year one, two by the end of year two, leaving five to be compliant by the end of the third year. The range of reductions required is 1 to 11kg N/ha/yr. For the majority of these farms achieving these reductions should be relatively easy. For two farms it would be moderately difficult but feasible. It would be increasingly difficult and perhaps very difficult for three farms, where their financial situations would likely dictate the extent to which they could comply. Accepted mitigation techniques (page 8-47, Decisions on Submissions to the Proposed One Plan) can, either individually or in combination, reduce N leaching. I presented various N mitigations and the effect of these on the farms listed in Table 4 (TEB, Volume 4, Table 12, page 1791). It shows reductions of between 5 and 10kg N/ha/yr are possible depending on the farm.

33. I presented data on rainfall and proportions of LUC Class 4-7 (TEB, Volume 4, Table 11, page 1790) and discussed the implications of this on 18 FARM Strategy farms (TEB, Volume 4, paragraphs 107 and 108, page 1794). The purpose of this was to show that existing farms in such circumstances would have greater difficulty achieving N-loss targets than farms not in such circumstances. Under Ms Barton's proposed Restricted Discretionary Rule, two of the FARM Strategy test farm farms would qualify and would be presented with an alternative regime of working to reduce N leaching.

Conclusions

34. In my opinion, based on the information in my TEB, Volume 4, pages 1757-1824, five of the ten FARM Strategy farms that would need to reduce their N leaching would comfortably meet the cumulative nitrogen leaching maximum as proposed by Ms Barton. For two farms it is possible but more difficult, and for three farms likely very difficult.

35. Two farms are located where rainfall is >1,500mm and their LUC is 50% class 4 or greater. Their ability to achieve an N leaching limit is, in my opinion, reasonably feasible for one farm but very difficult for the other.

36. The mitigation options to reduce N leaching are available and the comparative efficiency of them can be modelled. It is the individual farms financial ability to implement these options which is unknown.

PETER TAYLOR
MANAGER RURAL ADVICE

Attachment 1

Rule 13-B Conditions Template

RULE 13-1B CONDITIONS TEMPLATE

General

1. This consent authorises the use of the property legally described as X, Y, Z located at approximate NZMS260 map reference < xxx-xxx >, for a dairy farming operation.

2. The consent holder shall undertake the activity in general accordance with the Nutrient Management Plan submitted to the Manawatu-Wanganui Regional Council (hereafter referred to as the Regional Council) on **< date >**.

   Advice Note: The purpose of the Nutrient Management Plan is to satisfy the Regional Council that the consent holder can operate in a way that will achieve the requirements of the Rule and therefore the conditions of consent. It is not intended that there will be enforcement of any specific management practices as it is acknowledged these can vary depending on, particularly, climatic conditions. Rather, it is an assurance that the framework within which the farm will operate will not be altered to the extent that may compromise the ability of the consent holder to achieve compliance with the following conditions.

3. The cumulative nitrogen leaching maximum on the land authorised under this consent must not be greater than < xx > kilograms of Nitrogen per hectare, per year (< xx > kgN/ha/yr).

4. The consent holder shall ensure that the maximum number of lactating or dry dairy cows (hereafter referred to as the herd) on the property does not exceed < xx > cows.

Stock exclusion

5. The consent holder must ensure that dairy cattle are excluded from:

   i. Wetlands and lakes that are rare or threatened habitat; or
   ii. Beds of rivers that are either permanently flowing or have an active bed width greater than one metre, except for where access is required for animals to cross the river.

   Advice Note: Rivers include streams, creeks and modified watercourses. Active bed means the bed of a river that is intermittently flowing and comprises sand, gravel, boulders or similar material.

6. The consent holder must ensure that permanently flowing rivers or rivers with an active bed greater than one metre, which are crossed by more than 1350 dairy cattle movements per week, must be bridged or culverted and any runoff from the bridge or culvert must be discharged in accordance with a current resource consent.

   Advice Note: A movement is considered one way across the river, not across and back.

   Advice Note: A separate resource consent may be required to install a bridge or a culvert. Please contact the Consents Team on 0508 800 800 to discuss whether another consent is necessary.

Reporting

7. **Prior to mid June each year**, and beginning after the first full dairy season of this activity being undertaken, the consent holder must complete and submit to the Regional Council's Environmental Protection Manager, a new Nutrient Management Plan which details the farm management practices undertaken over the previous 12 month period and which demonstrates compliance with condition 3 of this consent.

8. As part of the Nutrient Management Plan process outlined in condition 7, the consent holder must submit the following information to the Regional Council's Environmental Protection Manager:

    a. Records of all fertiliser and feed supplements purchased and used (including any invoices and/or receipts of purchase) on the property described in condition 1.

    Advice Note: For the purposes of this resource consent, invoices and receipts to be provided to the Regional Council need to have the suppliers name and the amount of product visible (i.e. tonnes of supplement), but do not need to have any further details. Other details (i.e. cost of product, bank details) can be removed from the documents (i.e. blacked out, whited out or electronically removed).

Review

9. The Regional Council, under section 128 of the Act, may initiate a review of all conditions of this resource consent during July in the year **<year >** for the purpose of reviewing the effectiveness of these conditions in avoiding or mitigating any adverse effects on the environment. The review of conditions shall allow for:

    a. deletion or amendments to any conditions of this resource consent to ensure adverse effects are appropriately mitigated; or
    b. addition of new conditions as necessary, to avoid, remedy or mitigate any unforeseen adverse effects on the environment; or
    c. if necessary and appropriate, the adoption of the best practicable options to avoid, remedy or mitigate any adverse effects on the environment.

Attachment 2

Sievwright Consent Application and Nutrient Management Plan

Application

for change of land use activities for dairy farming conversion

RECEIVED
10 NOV 2011
Horizons Regional Council

Consent holder: Sievwright Farming Co Ltd

Contact person: Jonathan Sievwright

Postal address: 85 Levett Line, R.D.7 FEILDING

Phone no: 06 3289062 **Mobile no:** 0272960628 **Fax no:** 06 3289063

Email address: sievwrig@xtra.co.nz **Best contact time:** _____

Location and property address of activity: 2119 SH54, Waituna West

Legal description / valuation number of property: 13830/25000

Do you own this property? Yes ☑ No ☐

If the answer is no, then who does own the property? _____

Contact details of landowner: _____

Please note that written approval is required from this landowner and should accompany this application

Please attach to this application a copy of your Nutrient Management Plan. Please note - if your Nutrient Management Plan is not included your application will not be accepted

Fees and charges

A lodgement fee of $920 (incl GST) is required with your application. Failure to send the lodgement fee may result in rejection of your application.

Signature of applicant: _____ **Date:** 10.11.11

(or person authorised to sign on behalf of the Applicant)

Contact person

If you have already dealt with a consents team staff member please advise their name? Peter Taylor

Ring Horizons Regional Council's consents team on freephone 0508 800 800 if you require assistance.

The information provided on this form will be used to process the consent application and, if granted, to monitor the exercise of the consent. The information requested is required by the Resource Management Act 1991. Horizons Regional Council may disclose the information if a request is made by another party, under provisions of the Local Government Official Information and Meetings Act. Horizons Regional Council may also publicly disclose some of this information in circumstances where consent conditions have been breached. Under the Privacy Act 1993, you have the right of access to personal information about you held by Horizons Regional Council and you are also entitled to request information about you to be corrected.

horizons regional council

Farm Details and Nutrient Management Plan

Sievwright Farming Company Ltd

2119 SH 54, Waituna West

Report Prepared by JOHN STANTIALL, B Agr Sc; M Appl Sc
AGRICULTURAL CONSULTANT

November 2011

Table of Contents

Contact Details:

Farm Owner / Operator / Manager

Jonathan and Linda Sievwright
Sievwright Farming Company Ltd
85 Levitt Line
RD 7
Feilding 4777

Ph 06-328-9062

Cell 027-296-0628
sievwrig@xtra.co.nz

Nutrient management consultant

John Stantiall
Agricultural Consultant
Stantiall Keeling & Partners Ltd
PO Box 524
FEILDING 4740

Ph 06-323-8314
Fax 06-323-8049
Cell 0274-769-428
Email: john @skpltd.co.nz

1. Summary

A 85.6ha (82.0 ha effective) seasonal supply, non-irrigated dairy farm conversion located at 2119 SH 54, Waituna West, Northern Manawatu, on mainly loess soils, 45 km from the coast; 300 m a.s.l; latitude 40° 04" south. Average rainfall is 943 mm/year (Sandon Rd, Feilding). Planning to milk a maximum of 200 Friesian-Jersey Cross cows (2.4 cows/grazed hectare) through a 28 bail rotary shed and producing 70,000 kg MS (350 kg MS/cow/yr; 854 kg MS/grazed ha/yr). Production performance is about average. All replacements (40 R 1yr, 40 R 2 yr) to be grazed off from weaning (end December). Approx. 8 ha to be sown in forage crop annually for feeding in January-March and hay (4.2t DM) and silage (35.5t DM) made on the property will be fed on the property. In June, July all cows except 40 will be grazed off. Up to 10.5 t hay DM may be purchased annually. Up to 20 tonne cereal grain can be fed annually when pasture growth is poor such as a drought or cold, wet spring.

Projected N-loss via leaching and runoff is estimated at 16 kg N/ha. Horizons Regional Council N-loss limits were calculated at 27 kg N/ha/yr. N-loss limits (based on farm-scale mapping by Landvision Ltd). The farm will be compliant with N-loss targets. Phosphorus runoff risk (P-loss) is rated as LOW.

Farm features include several shallow natural depressions which run through the farm, limiting the placement of effluent. The farm has no permanently flowing natural water.

No other compliance requirements were identified at present. The check should be re-done in October 2013 once the new infrastructure is in place and the cows are being milked.

2. Farm Goals

Economic	To have a self-sufficient dairy farm operation that will support our family.
Production	70,000 kg milksolids with an all-grass system
Environmental	Protect water ways, use minimal bagged nitrogen. Avoid the drift of dust, odour, fertiliser and effluent across the boundary.
Social	Balance work and lifestyle with family. Support the local community.

3. Farm Description

3.1 Legal Description

Legal Description	Area
Lot 2-4 DP 74222 PT SECS 325 326 Town of Sandon BLK III ORO, UA SD-PT SEC 326 SUBJ to & LOT 3 INT IN R/W	85.6254 ha

The property is defined by the following valuation roll number: **13830/25000**

Dairy Supply Number: Not yet allocated

Water Management Zone: Kiwitea, Makino Streams

3.2 *Land and Stock*

A 85.6ha (82.0 ha effective) seasonal supply, non-irrigated dairy farm conversion planning to milk a maximum of 200 Friesian-Jersey Cross cows (2.4 cows/grazed hectare) and producing 70,000 kg MS (350 kg MS/cow/yr; 854 kg MS/grazed ha/yr). All replacements (40 R 1yr, 40 R 2 yr) to be grazed off from weaning (end December). Approx. 8 ha to be sown in forage crop annually. Up to 10.5 t hay DM may be purchased annually. In June, July all cows except 40 will be grazed off. Up to 20 tonne cereal grain can be fed annually when pasture growth is poor such as a drought or cold, wet spring.

The major topography classes are Class I, flat 57.9 ha (67%) and Class III, gently rolling contour 17.3 ha (20%). See Map 1 with the Land Use Capability* (LUC) classes. LUC classes are based farm-scale mapping (1:6,000, Landvision Ltd). The LUC classes and descriptions are summarized in the table below:

Description of Land Use Capability (LUC) classes on the farm

LUC Class	Area (ha)	Contour	Comments
Ic2	57.7	Flat to gently undulating terraces	Friable yellow-brown loam intergrade soils. A soil complex of mainly Kiwitea and Halcombe soils.
IIIe3	17.3	Undulating and rolling downlands	Soils developed from loess and weathered tephra. Mainly Halcombe and Marton soils.
IVe4	1.6	Rolling to strongly rolling downlands	Yellow-grey earth soils developed on loess. Seasonal soil moisture deficiencies and a subsurface pan impede drainage are limitations to cropping. Ohakea soils.
VIe2	9.0	Strongly rolling to moderately steep short hill slopes and terrace scarps.	Yellow-grey earth soils and yellow-brown earths derived from loess. Kiwitea hill soils.

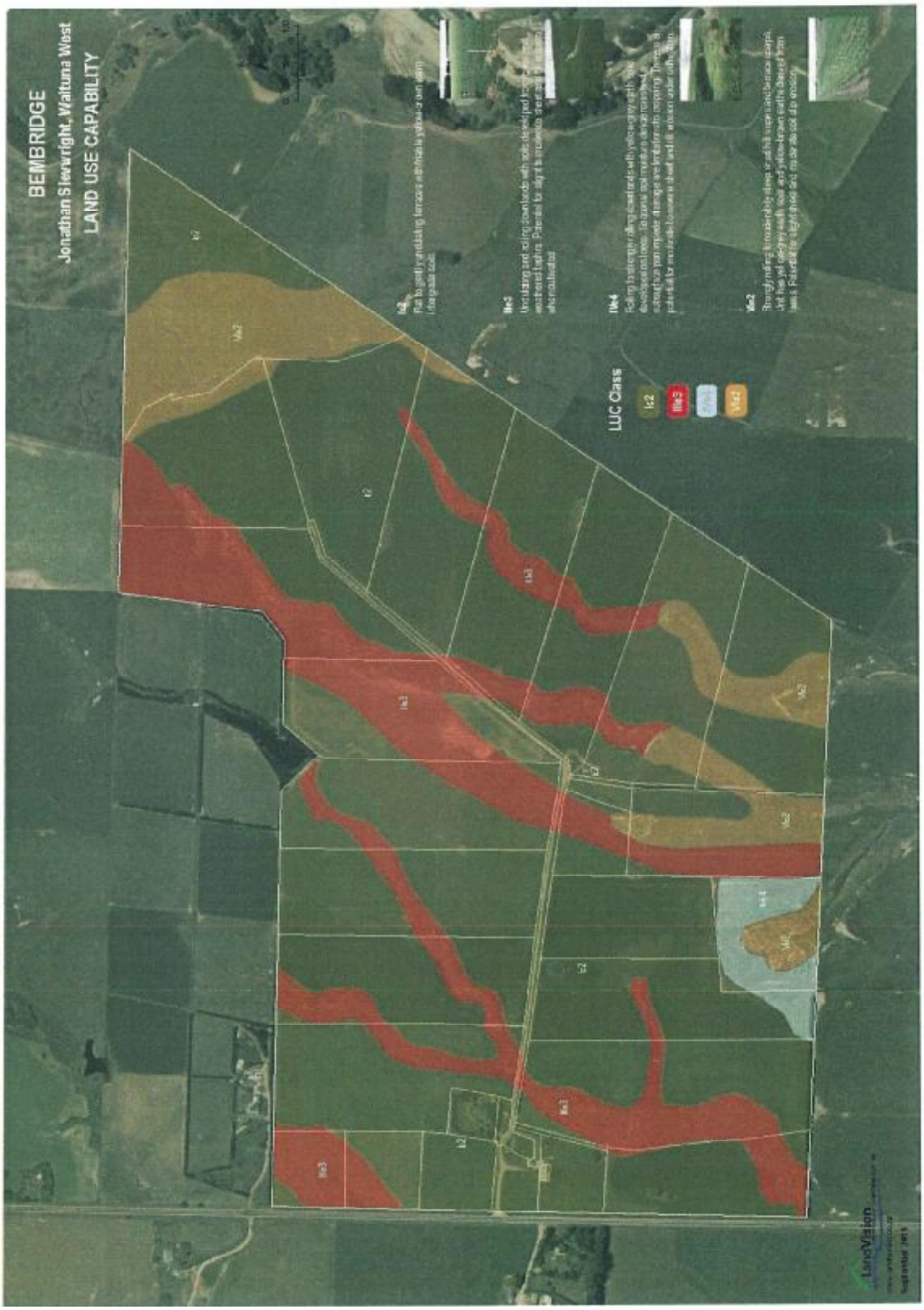
*Land Use Capability (LUC) is "...land categorised into eight classes according to its long-term capability to sustain one or more productive uses." "Classes I-IV are classified as arable land, while LUC Classes V-VIII are non-arable. The limitations or hazards to use increase, and the versatility of use decreases, from LUC Class I to LUC Class VIII". "This can be thought of as a rating of 'best' to 'worst ' land for common productive purposes."
Ref: Land Use Capability Survey Handbook, 3rd Edition.(This document is available on www.landcareresearch.co.nz)

Rainfall
Average rainfall is 943 mm/year, based on the Sandon site in Feilding (obtained from the Dairy Effluent Storage Calculator). Map 2 show features of relevance to farm nutrient management plan.

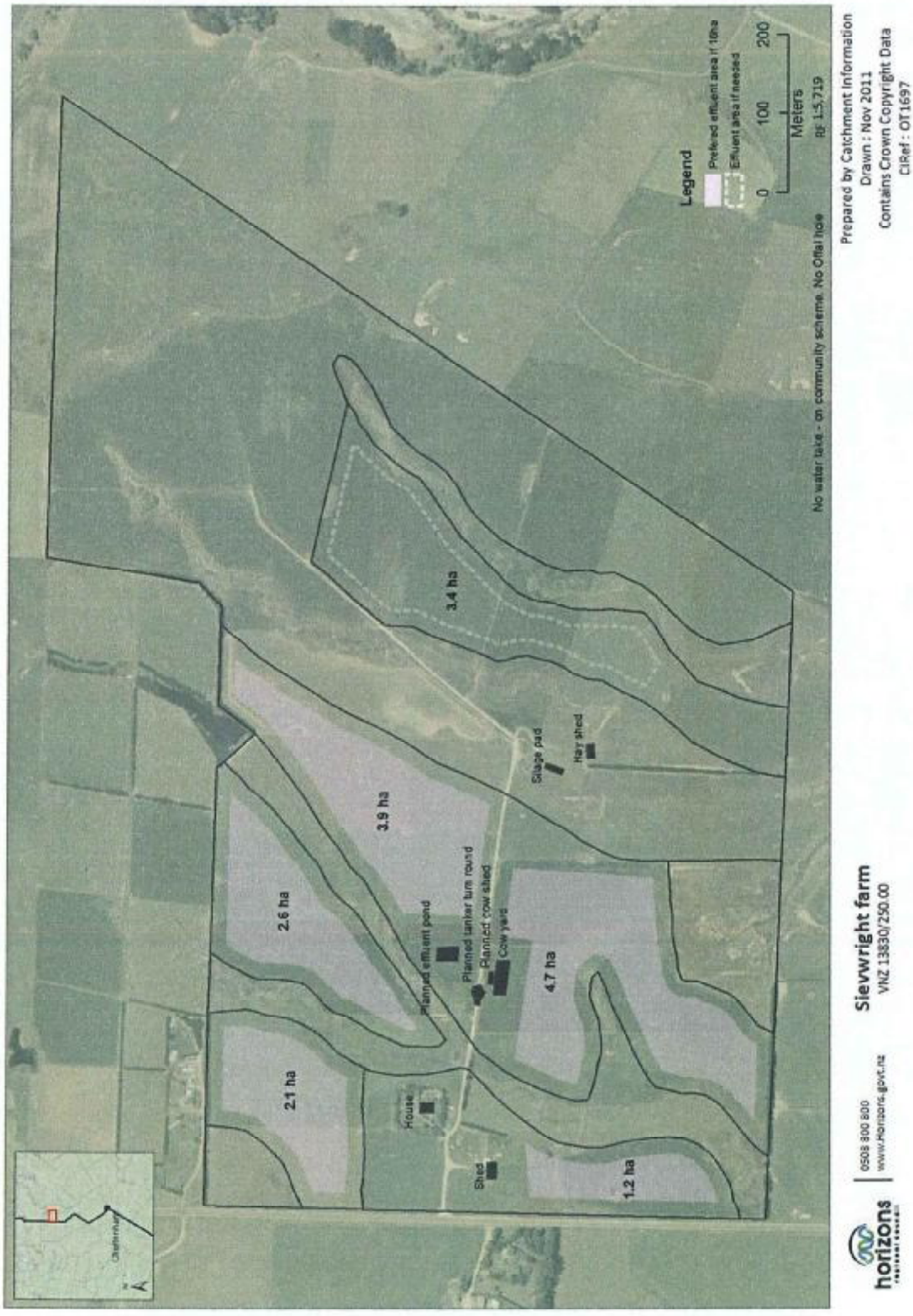
Class Ic2, flats
A mix of Kiwitea and Halcombe soils.

Class IIIe2, rolling
A mix of Halcombe and Marton soils.

Map 1: Property map showing Land Use Capability Classes



Map 2: Property map showing features of relevance to this Nutrient Management Plan



3.3 *Nutrient Management Blocks*

Land Use Capability (LUC) classes by contour and land use

LUC Class	Total Area (ha)	Flat-Rolling	Flat-Rolling	Flat-Rolling Effluent	Strongly rolling – moderately steep	Houses, sheds, races, waste
		Pasture	Crop	Pasture		
I	**57.7**	33.9	8.0	14.0		1.8
III	**17.3**	17.3				
IV	**1.6**				1.6	
VI	**9.0**				8.9	
Total	**85.6**	**51.2**	**8.0**	**14.0**	**10.6**	**1.8**

Based on land contour and land use, four main nutrient blocks (plus the crop area) were identified for modeling with Overseer Nutrient Budgets (v 5.4.8.0).

The nutrients blocks used in Overseer:

LUC Class		Area (ha)
Class I & III	Main	51
Class I	Effluent	14
Class I	Crop	8
Class IV & VI	Rolling & Hill	11
Houses, sheds, races		1
Total		**85**

The soils on the main block area a mix of Kiwitea (Soil Order: Brown) and Halcombe or Marton (Soil Order: Pallic). The soil order is set at Brown as this generates a greater leaching loss of the two. Hence the leching loss may be slightky over estimated rather than under-estimated.

All model inputs and assumptions used in Overseer are detailed in Appendix 1 (signed off as being true and correct). Key output tables are included as Appendix 2.

Silage pit and hay shed

4 Permissible N-loss limits

Permissible N-loss limits are calculated from the area of Land Use Capability (LUC) classes present on a farm. The Horizons Regional Council Proposed One Plan (Chapter 13, Discharges to land and water) summarises the N-loss limits by LUC Class in Table 13.2 (reproduced below).

Table 13.2 Cumulative nitrogen leaching maximum by Land Use Capability Class (LUC)

LUC I	LUC II	LUC III	LUC IV	LUC V	LUC VI	LUC VII	LUC VIII
30	27	24	18	16	15	8	2

Based on these figures, the cumulative nitrogen leaching maximum for the farm is summarised in the following Table:

LUC Class	Area of each LUC on Farm (ha)	Max. N leaching by LUC (kgN/ha/yr)	Max. N leaching for farm (kgN/yr)	
I	57.7	30	1,731.0	
III	17.3	24	415.2	
IV	1.6	18	28.8	
VI	9.0	15	135.0	
Total	**85.6 ha**		**2,310.0**	**kgN/year**
N leaching max./ha/yr			**27**	**kgN/ha/year**

The cumulative nitrogen leaching maximum for the farm is 27 kgN/ha/year

Predicted Nitrogen Leaching

The input data for Overseer is included in the attached Parameter Report.
The key data is summarized in the Table below, and further details are included in Appendix 1.

Key Inputs for Overseer

Number of cows	200
Production	70,000 kgMS/year
Replacement stock on farm	All replacements (40 R 1yr, 40 R 2 yr) to be grazed off from January
Area cropped	8 ha brassica fodder crop to be sown November and fed January-March, then re-grassed in April.
Nitrogen use	Up to 50 kgN/ha/yr on the non-effluent area
Cow Wintering	All cows except 40 grazed off June and July.
Supplements used	35.0 tonne DM grass balage and up to 10.0 tonne DM hay made on the property. During drought or other period of poor pasture growth up to 100 tonnes of PKE, hay or cereal grain may be fed in the paddock.
Effluent area	14 ha (17% of the pastoral area)

The Overseer Model results in a predicted leaching loss of 16 kg N/ha/year, which will make the farm compliant. The Nitrogen concentration in drainage ranges from 4.4 to 4.5 ppm, which is well below the recommended limit of 11.3 ppm.

The N Block report is included in Appendix 2.

5 Phosphorus runoff risk

Overseer estimates total P-loss at 0.2 kg P/ha/year, resulting in an overall LOW P-loss risk.

The P Block report is included in Appendix 2.

6 Farm Dairy Effluent Management

6.1 *Water Use*

Water use has been estimated at 40 litres/cow/day.
Factors taken into account to arrive at this figure include:

- Cooling water will go into a tank for yard washing.
- Green water will be recycled to flood-wash the cow yard.

The calculations for water use are included in Appendix 3 and effluent volume calculations are included in Appendix 4.

6.2 *Pond Design*

The "Farm Dairy Effluent Storage Calculator" designed by Massey University and Horizons Regional Council was used to calculate the required effluent pond size. Based on the parameters used, the required pond size is 800 m3 (see Summary Report in Appendix 5).

It is intended to line the pond with plastic or rubber to meet the permeability standard of rule 13.6 of the Horizons Proposed One Plan and to have this certified by the installer. A leak detection will be installed to comply with the consent conditions. This leak detection system will be available to be inspected and sighted by Horizons consent staff during construction. A concrete weeping wall will be used to separate the solids, which will be cleaned out as required and spread on land outside the effluent area.

6.3 *Effluent Application System*

The effluent will be pumped from the pond to the travelling irrigator. The application volume will be controlled by a timer and/or a flow-rate switch in combination with the auto shut-off valve on the irrigator. The application rate will be controlled by the speed setting or nozzle size on the travelling irrigator.

6.4 *Nutrient application*

The effluent area is confined to the Class I land which is flat with a mix of Kiwitea silt loam, and Halcombe silt loam soils. These are defined as high-risk soils (Dairy Effluent Storage Calculator database). An area of 16 ha has been targeted for irrigation, but potentially over 25 ha of Class I land could have effluent applied.

A nitrogen content of 0.45 kgN/m3 has been used for the nitrogen loading calculations. This is the value for fresh effluent provided by M Longhurst of AgResearch. The reason for selecting this value is because frequent

irrigation is likely.

Based on irrigating a maximum of 30m3 per application with a nitrogen content of 0.45 kgN/m3, and spreading it over 3,900 m2, the nitrogen application rate is estimated to be 34.3 kgN/ha (Appendix 4). This is within the 50 kgN/ha per application limit.

If the daily effluent produced is 8.0 m3/day for 290 days = 2,320 m3 effluent/year with a nitrogen content of 0.45 kgN/m3 which is 1,044 kgN/year spread over 16 ha = 65 kgN/ha/year. The Overseer calculation is 70 kgN/ha/year. Although Horizon's limit is 200 kgN/ha/year for this locality, the applicant is keen to stay within 150 kgN/ha/year. The situation outlined is well within the annual limit.

Soil nutrient status will be monitored by regular soil testing.

Target Nutrient Levels

	Phosphorus	Potassium	Sulphur	pH
Existing Average Nutrient Levels	29	16	13	6.1
Target Nutrient Levels	29	above 8	above 10	6.0

Maintenance fertiliser will be applied to the farm except for the effluent area (see paragraph 11.5 for details). The effluent area may receive some phosphorus if required (based on soil test results), but is unlikely to require extra potassium.

6.5 *Effluent Management Systems*

- Runs for the irrigator will be measured out, marked on a map and numbered.
- The volume of effluent pumped will be controlled by a timer and/ or flow-rate switches.
- Each day the site number(s) and pump running time will be recorded.

Once the system is installed and running smoothly, a calibration test will be undertaken to check the actual volume being applied. If necessary, the maximum volume being applied will be adjusted if required by changing the pump running time. (This check may be repeated each year or two.)

The irrigator will have an automatic cut-off switch when it reaches the end of its run.

Effluent solids will be removed from the solids side of the weeping wall every two or three months and will be spread on any of the Class I land outside of the effluent area, and possibly applied to the paddock to be cropped that season.

7 Contaminant minimisation strategies

7.1 *Circumstances and intended practice*

A number of circumstances and intended management practices will result in minimal environmental impacts on the farm including:

- A feed pad will not be installed in the immediate future.
- Minimal nitrogen applications will be made (max. 50 kg N/ha/year) and nitrogen will not be applied during the winter months.
- A list of Contaminant Mitigation Options which have been considered as part of the consent application process is included in Appendix 6

7.2 *Impact of changes to the farming system*

- Base system: N leached = 16 kg N/ha/year

Production parameters for both the base and the maximised systems were obtained from modelling the systems in Farmax Dairy. The N leaching figures have been obtained from modelling the systems in Overseer Nutrient budget (v 5.4.8.0).

Management factor	Option	Value	Second factor	Value	N leached whole farm
Cow Number	Base	200			16
	Incr Cow No. only	250	kg MS	70,000	18
	Cows & kg MS	250	kg MS	80,000	19
Milk Production	Base	70,000			16
	Incr MS only	80,000			17
	Maximised	90,000	All*		23
Cows wintered-on	Base	40			16
	Base	60			17
	Base	100			17
	250 Cows	40	kg MS	80,000	18
	250 Cows	60	kg MS	80,000	18
	250 Cows	100	kg MS	80,000	19
Date crop area re-grassed	Base	Apr			16
	Base	May			17
	250 Cows	Apr	kg MS	80,000	18
	250 Cows	May	kg MS	80,000	19
Area of crop	Base	8 ha			16
	Base	12 ha			16
	250 Cows	8 ha	kg MS	80,000	18
	250 Cows	12 ha	kg MS	80,000	18
Nitrogen amount (kg N/ha) - Main & Rolling Blks	Base	50			16
	Base	150			19
	250 Cows	50	kg MS	80,000	18
	250 Cows	150	kg MS	80,000	22
Nitrogen timing	Base	Nil May-Jul			16
	Base	50 kg May			16
	Base, 150 kg N	50 kg May			20
	250 Cows	Nil May-Jul	kg MS	80,000	18
	250 Cows	50 kg May	kg MS	80,000	19
	250 Cows, 150 kg N	50 kg May	kg MS	80,000	23

"All" includes: 250 cows, 90,000 kg MS, 60 cows wintered on, 100 t Grain DM and 100t hay DM imported; 150 kg N/ha on the Main Block (Nil in May-July); 8 ha crop, re-sown May.

Management factor	Option	Value	Second factor	Value	N leached whole farm
Imported Grain & Hay - tonnes of each (fed in paddock)	Base	50 t			15
	Base	100 t			15
	250 Cows	100 t	kg MS	80,000	18
	250 Cows	210 t	kg MS	80,000	17
Imported grass silage only (fed in paddock)	Base	50 t			16
	Base	100 t			16
	250 Cows	100 t	kg MS	80,000	18
	250 Cows	210 t	kg MS	80,000	18

Factors which have a big impact on nitrogen leaching include: cow number and production level (combined); the number of cows wintered on at high stock numbers; delayed re-grassing date at high stock numbers; high levels of fertiliser nitrogen, and applying it between May and July.

8 Compliance Checklist

A completed compliance checklist is included as Appendix 7.
Because the dairy shed and effluent pond and system are not yet in place, many of the items have been marked as "Not applicable". The check should be re-done in October 2012 once the new infrastructure is in place and the cows are being milked.

9 Requests for the consent conditions

- Application of pond slurry to the cropping area
  It is requested that from time-to-time, pond slurry may be applied to a paddock on the Class I area that is about to be used for the crop.

10 Conclusion

The farm will be compliant under the current rules for Horizons Regional Council cumulative nitrogen leaching maximum N-loss limits.

The farm currently meets the requirements of the Compliance Checklist that are applicable.

11 Appendix 1: Overseer inputs and assumptions

11.1 Production inputs

- 200 Friesian-Jersey Cross cows producing 70,000 kg MS/yr.
- All replacements grazed off after 1 January.
- 35.0 tonne DM grass balage and 10.0 tonne DM hay made on the property.
- Up to 100 tonne PKE or cereal grain may be fed during periods of poor pasture growth.
- All supplements are fed on the paddocks.
- Fodder crop: 8 ha turnips followed by new grass.

11.2 Effluent management

- There will be a weeping wall, which will also act as a Stone trap. The liquid will flow into the pond from where it will be irrigated. The pond will have 800 m3 capacity storage.
- The solids from the weeping wall will be cleaned out every two or three months or as needed and spread onto Class I soils outside of the effluent area.

11.3 Resource information

- Farm located 45 km from coast
- Annual rainfall is 943 mm.
- Classes I and III are classed as FLAT and Classes IV and VI as EASY HILL according to Overseer topography categories.
- The farm will operate four nutrient blocks – The Main area - Class I and III; the Effluent area (14 ha) Class I, the Crop area (8 ha) on Class I and the steeper areas on Class IV and VI. The Overseer model has been run on these four blocks (as per the Table in paragraph 2.3 above).
- Effluent solids pumped from the pond every two or three years will be spread on any of the land, and possibly the crop paddock (on Class I) however, Overseer does not have a facility for applying pond sludge to the crop area.

11.4 Soil fertility

Soil Test Results as per report 1 March 2011, ARL.

Block	Olsen P	Qt K	S04	Org. S	Qt Ca	Qt Mg	Qt Na	pH
Ist Right	36	12	6	16	9	26	12	6.0
4th Right	29	17	16	19	8	20	8	6.0
2nd Left	23	21	21	14	12	24	11	6.1
3rd Left	27	14	10	17	12	22	11	6.2
Average	**29**	**16**	**13**	**17**	**10**	**23**	**11**	**6.1**

Soil nutrient levels (especially P, K, S) and the pH are all at optimum. Annual maintenance fertiliser only is required.

11.5 Fertiliser

- For maintenance on the Main area and Rolling Blocks: 30 kg P/ha; 30 kg K/ha, 30 kg S/ha eg 400 kg/ha 15% Potassic Super annually.
- On areas cut for hay or silage apply an ***extra*** 20 kg P/ha; 30 kg K, 20 kg S/ha eg 300 kg/ha 20% potassic super.
- If potassium levels start dropping as indicated by soil test results, apply 50 kg K/ha/year (eg 100 kg/ha potassium chloride).
- Tactical applications of urea between August and December or April if required, up to 50 kg N/ha.
- Turnip crop to receive a dressing of crop fertiliser (45 kg N/ha; 30 kg P/ha; 30 kg K/ha, 0 kg S/ha)
- No inhibitors used.

11.6 Pasture management

- All pastures have been classified as DEVELOPED.
- Clover levels have been set at MEDIUM (the Overseer default).
- Pasture utilisation is estimated at an annual average of 80% (Overseer default is 85%).

11.7 Assurance statement

To the best of our knowledge, the information provided above is true and correct at the time the revised Overseer analysis was undertaken (November 2011)

Farm owners, operator or manager

Name: Jonathan and Linda Sievwright on behalf of Sievwright Farming Co Ltd

Date: 10-11-11

Signed:

Nutrient Management Consultant

Name: John Stantiall

Date: 1 November 2011

Signed:

J.D. Stantiall

12 Appendix 2: Overseer output reports

Nutrient Budget

Farm Budget for: Current farm

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser and lime	63	28	25	27	156	2	0	-7.8
House block imports	0	0	0	0	0	0	0	0.0
Atmospheric/clover N	81	0	2	4	2	4	15	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	12	16	3	5	6	0.0
Supplements imported	1	0	0	0	0	10	0	0.0
Outputs								
Product	57	10	14	3	12	1	4	0.0
Effluent removed	0	0	0	0	0	0	0	0.0
Supplements removed	0	0	0	0	0	0	0	0.0
Atmospheric	39	0	0	0	0	0	0	0.0
Leaching/runoff	16	0	40	43	59	7	28	-0.9
Net immobilisation/absorption	32	21	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	-16	0	91	13	-11	-6.9

* Acidity - kg H+/ha

Nutrient Budget

Block Budget for: Current farm Block: Main

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser and lime	80	30	30	30	175	2	0	-8.8
Effluent added	5	3	4	1	5	3	1	-0.5
Atmospheric/clover N	83	0	2	4	2	4	16	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	10	0	3	5	6	0.0
Supplements imported	3	0	2	0	1	11	0	0.0
Outputs								
Product	57	9	14	3	12	1	4	0.0
Net transfer by animals	28	3	29	2	5	3	1	-0.7
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	35	0	0	0	0	0	0	0.0
Leaching/runoff	14	0	42	45	59	7	29	-0.9
Net immobilisation/absorption	36	22	0	-15	0	0	0	0.0
Change in inorganic soil pool	0	3	-37	0	110	14	-12	-7.7

* Acidity - kg H+/ha

Nutrient Budget

Block Budget for: Current farm Block: Rolling & Hill

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser and lime	80	30	30	30	175	2	0	-8.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/clover N	69	0	2	4	2	4	16	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	10	0	3	5	6	0.0
Supplements imported	0	0	0	0	0	11	0	0.0
Outputs								
Product	46	8	11	2	10	1	3	0.0
Net transfer by animals	24	2	24	2	4	3	1	-0.5
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	32	0	0	0	0	0	0	0.0
Leaching/runoff	12	0	41	46	57	7	28	-0.7
Net immobilisation/absorption	35	19	0	-17	0	0	0	0.0
Change in inorganic soil pool	0	4	-34	0	109	12	-11	-7.5

* Acidity - kg H+/ha

Nutrient Budget

Block Budget for: Current farm Block: Effluent

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser and lime	0	20	0	30	175	2	0	-8.8
Effluent added	61	1	109	5	1	2	3	-0.9
Atmospheric/clover N	100	0	2	4	2	4	16	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	6	0	3	5	6	0.0
Supplements imported	0	0	0	0	0	11	0	0.0
Outputs								
Product	55	9	13	3	12	1	4	0.0
Net transfer by animals	27	3	28	2	5	3	1	-0.6
Supplements sold	6	1	7	1	2	1	0	0.0
Atmospheric	30	0	0	0	0	0	0	-0.1
Leaching/runoff	14	0	51	46	59	7	29	-0.9
Net immobilisation/absorption	29	21	0	-13	0	0	0	-0.1
Change in inorganic soil pool	0	-11	18	0	105	12	-9	-8.0

* Acidity - kg H+/ha

* Maintenance nutrient requirements for this block take account of nutrients added in effluent.

Nutrient Budget

Block Budget for: Current farm Block: Crop

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser and lime	45	30	30	0	0	0	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/clover N	60	0	2	4	2	4	16	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	70	4	37	28	3	5	6	0.0
Supplements imported	0	0	0	0	0	0	0	0.0
Outputs								
Product	89	15	22	5	19	2	6	0.0
Net transfer by animals	43	4	42	3	7	5	2	-0.9
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	16	0	0	0	0	0	0	0.0
Leaching/runoff	27	1	3	24	66	6	25	-1.8
Net immobilisation/absorption	0	15	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	1	0	-86	-4	-12	2.7

* Acidity - kg H+/ha

Nitrogen report

Based on pastoral farm area

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		81
Fertiliser N	kg N/ha/yr		63
Other N	kg N/ha/yr		1
Environmental losses			
Leaching loss	kg N/ha/yr	**30-50**	16
Direct winter fertiliser N leaching losses	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr	**3-5**	0
N_2O emissions	kg N/ha/yr		4.5
Indices			
Farm N surplus	kg N/ha/yr	**100-180**	87
N conversion efficiency	%	**25-40**	40
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**5-10**	na

na : N in drainage not calculated for farms with easy and steep blocks or non-pastoral blocks.

Phosphorus report

Based on pastoral farm area

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Fertiliser P	kg P/ha/yr		28
Other P	kg P/ha/yr		3
Indices			
Average surplus inorganic P in soil	kg P/ha/yr		0
Farm P surplus	kg P/ha/yr	**20-50**	22
P loss from effluent pond to waterways	kg P/ha/yr	**0.5-0.8**	0.0
P runoff risk			Low
Soil loss factor			Low
Fertiliser loss factor			Low
Spray effluent loss factor			n/a

Effluent report

Based on pastoral farm area

	Units	Current farm
Current effluent area		
Area of effluent blocks	ha	14.0
% of pastoral farm area	%	16.7
Area of farm to apply effluent to achieve rates of:		
150 kg N/ha/yr	ha	5.7
Maintenance K	ha	27.8
100 kg K/ha/yr	ha	15.2
Source of N applied to effluent blocks		
Average effluent applied	kg N/ha/yr	61
Effluent from farm dairy	%	100
Effluent from wintering pad	%	0
Effluent from feed pad	%	0
Average fertiliser N	kg N/ha/yr	0
Average other effluents	kg N/ha/yr	0

The areas shown above is for liquid effluent only and excludes the effect any solid effluent or fertiliser N may have

Summary report

Whole farm report

	Units	Average NZ farm	Current farm
Nutrient loss indices (whole farm)			
Nleached	kg N/ha/yr	30-50	16
Loss from effluent pond to waterways (farm equivalent)	kg N/ha/yr	3-5	0
	kg P/ha/yr	0.5-0.8	0.0
P runoff risk			Low
Farm Surplus	kg N/ha/yr	100-180	87
	kg P/ha/yr	20-50	22
N conversion efficiency	%	25-40	40
Average nitrate conc. in drainage (+/- 30%)	mg N/L	5-10	na
Production efficiency indices			
$ fertiliser per kg milksolids (approximate)		0.3-0.6	0.37
kg CO_2 equivalent per kg milksolids		11-13	8.8
Effluent - area of pastoral farm			
Currently receiving effluent	ha		14

Block nitrogen report

For: Current farm

Block name	N in drainage * (ppm)	N leached (kg N/ha/yr)	N surplus (kg N/ha/yr)	Added N ** (kg N/ha/yr)	% reduction in wetland
Main	4.5	14	114	85	0
Effluent	4.4	14	100	61	0
Crop	na	27	86	45	0
Rolling & Hill	na	12	103	80	0
Non-Effective	na	25	25	23	0
Overall farm	na	16	87		

* Estimated N concentration in drainage water at the bottom of the root zone. Maximum recommended level for drinking water is 11.3 ppm (note that this is not an environmental water quality standard).

** Sum of fertiliser and external factory effluent inputs.

na : N in drainage not calculated for easy and steep blocks.

Block phosphorus report

For: Current farm

Block name	P loss factors				P lost (kg P/ha/yr)	% P removed by filter strip
	Soil	Fertiliser	Effluent	Overall		
Main	Low	Low	n/a	Low	0.1	n/a
Effluent	Low	Low	n/a	Low	0.1	n/a
Crop	n/a	n/a	n/a	n/a	n/a	n/a
Rolling & Hill	Low	Low	n/a	Low	0.3	n/a
Non-Effective	n/a	n/a	n/a	n/a	n/a	n/a
Overall farm	Low	Low	n/a	Low*	0.2 *	

* Includes P loss from ponds to waterways

13 Appendix 3: Calculations for daily water use

Estimated water use
Source: Waituna West Community Scheme

Allocation: 20 m3/day

Daily Water Requirements

	Numbers		Allocation (litres/day)		Totals (litres)
Domestic					
(No. permanent residents)	4	x	0	=	0
USE RAINWATER					
Livestock					
(No. head)					
Dairy: Milking Cows*	200	x	60	=	12,000
Milking & washdown					
Volume/cow/milking	200		40		8,000
Total daily requirement					20,000 litres
Total daily requirement				=	20.0 m3

*Peak Daily Demand as per Stewart G. & Rout, R (2007).
Reasonable Stock Water Requirements
Guidelines for Resource Consent Applications
Technical Report prepared for Horizons Regional Council

14 Appendix 4: Calculations for effluent volumes

Effective area	82 ha		
Effluent area	14 ha	(17.1 %)	of area
Number of cows	200		
Water used/cow/day	40 l/cow/day		
Total volume/day	8,000 litres/day		
=	8.0 m3/day		
The system must be capable of pumping at least		*35 m3/day*	
(Refer to Dairy Effluent Storage Calculator)			
Maximum application rate		*8 mm*	
(Refer to Dairy Effluent Storage Calculator)			

Objectives:	**1. Pump daily input**	**2. Empty pond when full**
Volume to pump/day (m3)	**8.0 m3/day**	**35.0 m3/day**
Maximum application rate	10 mm	8 mm
Volume pumped per day		
Pump capacity	36 m3/hour	36 m3/hour
if 500 m pipe,		
est. flow rate at irrigator	18 m3/hour	18 m3/hour
Nozzle flow rate	18 m3/hour	18 m3/hour
Run time/day	*0.4 hours/day*	*1.9 hours/day*
Volume/day (m3)	**8.0 m3**	**35.0 m3**
Application Depth		
No. Irrigators	1	1
Width	30 m	30 m
Length	*34 m*	*150 m*
Area/pass (m2)	1020 m2	4500 m2
=	0.10 ha	0.45 ha
Depth = Volume/Area	0.0078 m	0.0078 m
	x 1000	x 1000
Application Depth	**7.8 mm**	**7.8 mm**
Irrigator speed	77 m/hour	77 m/hour
Nitrogen Loading/Application		
Nitrogen loading @	0.45 kgN/m3	0.45 kgN/m3
Nitrogen/application	**35.3 kgN/ha**	**35.0 kgN/ha**
Target Maximum per pass	*50 kgN/ha*	*50 kgN/ha*
Annual nitrogen loading		
Effluent Area	14 ha	N/A
Area/day	0.10 ha	Max. flow only needed
No. Days for 1 rotation	137 days	to empty pond when
Lactation Length	290 days	it is full.
No. Rotations required	2.1 rotations	
Total N application/year	**75 kg N/ha**	
Target maximum:	*150 kgN/ha*	

15 Appendix 5: Summary Report, Dairy Effluent Storage Calculator

Dairy Effluent Storage Calculator
Summary Report

Regional authority:	Horizons Regional Council
Authorised agent:	John Stantiall
Client:	Sievwright Farming Company Ltd
Program version:	1.32
Report date:	Thursday, 10 November 2011
General description:	

Climate

Rainfall site:	Feilding (Sandon Rd)
Mean annual rainfall:	943 mm/year

Effluent Block

Area of low risk soil:	3.0 hectares
Area of high risk soil:	11.0 hectares

Wash Water

Yard wash:

- No. of cows milked in spring:	200 cows
- Milking time:	3 hrs/day
- Yard wash volumes:	Custom average daily values (cubic metres/day)
- Season start:	01 August
- Season end:	31 May

Month	Wash Volume (cubic metres)
January	8.0
February	8.0
March	8.0
April	8.0
May	8.0
June	0.0
July	0.0
August	8.0
September	8.0
October	8.0
November	8.0
December	8.0

Irrigation

Winter-spring depth:	8 mm
Spring-autumn depth:	10 mm
Winter-spring volume:	35 cubic metres
Spring-autumn volume:	30 cubic metres
Irrigate all year?	Yes

Catchments

Yard area:	360 square metres
- diverted away from pond?	Yes
- diversion start:	15 May
- diversion end:	14 May
Shed roof area:	200 square metres
- diverted away from pond?	No
Feedpad area:	0 square metres
- covered?	No
- diverted away from pond?	No
Other areas:	0 square metres

Storage Ponds

Pond/s present?	No
Likely area for pond:	3.0 sqm per cow
Emergency storage period:	5 days

Outputs

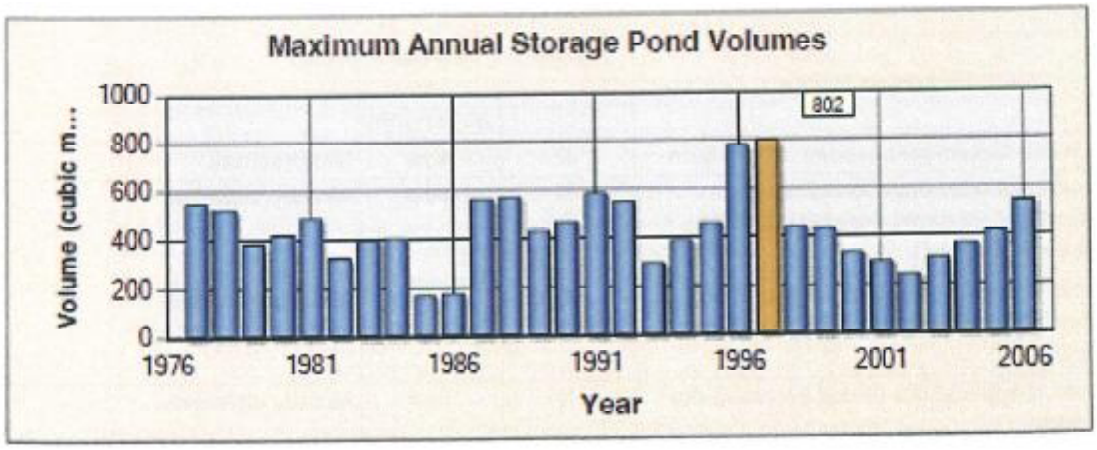
Maximum pond volume:	802 cubic metres
During the period from:	01 July 1976
To:	30 June 2006

Declaration

I agree that the information used in this calculation is correct and accurately reflects the management, practices, size and rates of the dairy operation and farm dairy effluent system.

Signed: [signature] Dated: 10.11.11

Name: Jonathan Sierwright Position: Director



16 Appendix 6: Contaminant Mitigation Options

For reference, a list of recognised best practices have been included below. The listed mitigation practices are generally geared towards nitrogen, but with recognition that many also affect P-loss, faecal microbes, and sediment loss.

Relevance of common N-loss mitigation options (+ P-loss & faecal microbes)			
Mitigation options	**Issue**	**Relevance or opportunity**	**Notes**
Avoid winter (May, June, or July) N-applications.	N	Low	Intended
Ensure effluent application area is large enough to keep N-loading <150 kg/N/ha/yr.	N, bugs, P	High	The use of 16 ha will result in acceptable nutrient loadings (kg nutrient/ha).
Use supplements with N-concentrations that are lower than pasture (or higher energy content - e.g. maize).	N	Low	Could be used, but not necessary because of large buffer already.
Replace fertiliser N with equivalent supplement-N.	N	High	Can be used tactically to if required.
Ensure other nutrients are non-limiting (optimal) for max yield per kg N input.	N	Low	Soil test results indicate levels for major nutrients are near optimum or above.
Decrease the use of N-fertiliser.	N	High	N-fertiliser levels are already intended to be low
Decrease stocking rate.	N, bugs	Low	Would result in significant reduction of productivity.
Change stock type or class.	N	Low	Not applicable
Reduce imports of supplementary feed.	N	Low	Low imported feed use intended
Graze cattle off during winter (May, June, July).	N, Bugs, P, sed.	High	Most cows will be grazed off.

N = nitrogen loss, P = phosphate loss, bugs = faecal microbes, sed = sediment

Mitigation options	Issue	Relevance or opportunity	Notes
Increase supplement exports off the farm.	N	Low	Not practical.
Avoid high rate, single dressings of N-fertiliser. Use split dressings (20-50 kg N/ha per dressing).	N	Low	Already intended.
Avoid N-applications when the soils are saturated (leaching /runoff & low plant activity).	N	Low	Already intended.
Avoid N-applications during excessive dry periods.	N	Low	Already intended.
Delay N-applications directly after dry periods until pastures have started recovering.	N	Low	Already intended.
Use urea product treated with urease inhibitor.	N	Medium	Potential to reduce N-Leaching, but science update and costs to be considered at the time.
Ensure all paddocks are supplied with adequate troughs.	Bugs, N, P, sed.	Low	Already in place.
Ensure that there are no major leaks in effluent irrigations systems (e.g. pipe joins).	N, bugs, P	Low	The effluent line to be examined regularly for evidence of major leaks.
Ensure runoff from yards, feed pads, etc does not go directly into waterways.	N, bugs	Low	New system planned to ensure this.
Ensure effluent storage facilities are sealed.	N	Medium	Plastic or rubber liner intended.
Store leachable supplementary feeds (e.g. silage) on a sealed base with an effluent collection/storage/disposal system.	N	Medium	Silage pad to be reviewed.

N = nitrogen loss, P = phosphate loss, bugs = faecal microbes, sed = sediment

17 Appendix 7: Compliance checklist

NA	=	Not applicable. Tick this option if the activity is not undertaken or practiced on the farm.
COMPLIANT	=	Tick this option if you are fully confident that the requirement is being achieved.
NEEDS ATTENTION	=	Tick this option if the requirement is not currently being achieved, and/or further work is necessary to achieve full compliance.
NOT SURE	=	Tick this option if there is some uncertainty regarding compliance status. This is not unusual.
		Some requirements may require technical assessment to clarify actual status.

The checklist is provided as a guide only. Wording has been adapted in some cases to provide context. Please refer to Horizons Regional Council for the definitive descriptions that all consent applications are considered against.

Compliance checklist as at 1 November 2011

Practice	Requirements	NA	COMPLIANT	NEEDS ATTENTION	NOT SURE
The storage and discharge of farm effluent.	8.1 Effluent from yards or pads must not discharge directly to waterways or waterbodies (including seasonally dry waterways or waterbodies).	✓			
	8.2 Effluent from ponds or sumps must not discharge directly to waterways or waterbodies (including seasonally dry waterways or waterbodies).	✓			
	8.3 Stormwater must not discharge to effluent ponds, sumps, or any hard surface that drains into effluent ponds or sumps UNLESS adequate storage has been provided for.	✓			
	8.4 Effluent ponds and sumps must be adequately sealed to avoid seepage and leaks.	✓			
	8.5 Effluent ponds and sumps must have the capacity to store a minimum 7-days of effluent production in the event of equipment failure.	✓			
	8.6 Effluent irrigation pipes and equipment must not have any substantial leaks (e.g. causing local ponding).	✓			
	8.7 A nutrient budget is required to help minimise the risk of elevated effluent-nitrogen loading.		✓		
	8.8 Effluent applications must not be made on days when drift or odour is likely to affect neighbours.	✓			
	8.9 There must be no significant surface ponding of applied effluent.	✓			
	8.10 The area of land receiving effluent must not be located within: • 20 m of public areas, public roads, or residential plots. • 20 m of surface water, bores, or the Coastal Marine Area. • 50 m of ecological or archaeological areas.	✓			
The storage and application of farm effluent to land is a CONTROLLED activity that requires additional detail before the consent application will be considered by the Council. This additional information can be provided in Section 9.					

Practice	Requirements	NA	COMPLIANT	NEEDS ATTENTION	NOT SURE
Storage and feeding of supplements.	8.11 Feed storage areas and feeding-out sites must be adequately sealed to avoid seepage and leaks. Hay storage is exempt. Small areas of silage storage are exempt if total area of unsealed pits and stacks per property is <500 m2.				✓
	8.12 Runoff from feed storage areas or feeding-out sites must be prevented from entering waterways or waterbodies.				✓
	8.13 Runoff into feed storage areas or feeding-out sites must be prevented.		✓		
	8.14 Effluent and leachate from feeding-out sites and feed storage areas must be managed as farm effluent (i.e. according to requirements 8.1 to 8.10)	✓			
	8.15 The storage or feeding out of supplementary feed must not result in any objectionable odour, dust or drift beyond the farm boundary.		✓		
	8.16 Supplementary feed must not be stored or fed-out at locations that are within: • 20 m of surface water, bores, or the Coastal Marine Area. • 50 m of ecological or archaeological areas.		✓		
	8.17 Biosolids or soil conditioners must not be applied or discharged to waterways or waterbodies.	✓			
	8.18 There must be no significant surface ponding if the applied material is liquid, or any runoff into waterways or waterbodies (liquid or non-liquid).	✓			
	8.19 The material cannot contain any human or animal pathogens (harmful bacteria, diseases, etc.), or any hazardous substances.	✓			
	8.20 The material cannot be applied within: • 150 m of public areas or residential plots. • 20 m of surface water, bores, or the Coastal Marine Area. • 50 m of ecological or archaeological areas. • 50 m of the property boundary	✓			
a. Sewage or sludge that has been refined to an Aa grade. b. Substances that alter soil physical qualities (e.g. lime, clay, gypsum, biochar, organic materials like compost, sawdust or bark).					

Practice	Requirements	NA	COMPLIANT	NEEDS ATTENTION	NOT SURE
Preventing faecal contamination of water by stock, and from effluent runoff.	8.21 Stock must be physically prevented from entering waterways and waterbodies at all times. *Please refer to the Reference Guide Glossary for waterway and waterbody definitions.* Permanent fencing is required for regularly flowing waterways. Intermittent waterways need only be fenced when flowing and accessible by stock.		✓		
	8.22 All locations where stock cross waterways must be bridged or culverted.	✓			
	8.23 Runoff from bridges, culverts, tracks and laneways, must not discharge directly to waterways or waterbodies.		✓		
	8.24 Runoff from stock yards, dairy sheds, feed pads, holding areas, or any other stock concentration zone must not discharge directly to waterways or waterbodies.		✓		
The application of fertiliser to farm land.	8.25 Fertiliser must not be applied or discharged to waterways or waterbodies (including groundwater).		✓		
	8.26 Fertiliser must not be applied or discharged into any ecological area (except for the pre-approved purpose of enhancing such areas).		✓		
	8.27 The fertiliser must be applied in accordance with the Code of Practice for Fertiliser Use.		✓		
	8.28 Nitrogen fertiliser applications must be managed with a nutrient budget that accounts for other N-sources and minimises N-leaching risks.		✓		
	8.29 The application of any fertiliser will not result in any objectionable odour or problem-causing drift beyond the farm boundary.		✓		

18 Appendix 8: Reference Document for Effluent Discharge to land and water

(new dairy farm activity)

The Conditions/Standards/ Terms of Horizons Regional Council "Proposed One Plan as amended by Decisions" as at 15 February 2011 is recorded here for reference only. For the definitive wording and latest version, contact Horizons Regional Council.

Rule 13-1B New Dairy Farming land use activities.
Classification: Controlled.

(a) A *nutrient* management plan* must be prepared for the land^, complied with and provided annually to the Regional Council.

(b) The nutrient *management plan** must demonstrate compliance with the cumulative *nitrogen leaching maximum** for the land" used for dairy farming*.

(c) Dairy cattle must be excluded from:
- (i) wetlands" and lakes" that are a rare habitat* or threatened habitat*, and
- (ii) beds" of *rivers"* that are permanently flowing or have an active bed* width greater than I m, other than at any specific location where access is required for dairy cattle to cross the *river"* in which case (d) applies.

(d) Rivers" that are permanently flowing or have an active bed* width greater than I m, that are crossed by more than 1350 dairy cattle movements per week, must be bridged or culverted and run-off originating from the carriageway of the bridge or culvert must be discharged" onto or into land".

(e) The discharge" of fertiliser* onto or into land" and any ancillary discharge" of contaminants" into air must comply with the conditions" of Rule 13-2.

(f) The discharge" of contaminants" onto or into land" from:
- (i) the preparation, storage, use or transportation of stock feed on production land", or
- (ii) the use of a feedpad* and any ancillary discharge" of contaminants" into air must comply with the conditions" of Rule 13-3.

(g) The discharge" of grade Aa biosolids*, soil conditioners" or compost* onto or into production land" and any ancillary *discharge"* of contaminants" into air must comply with the conditions" of Rule 13-4.

(h) The *discharge" of* grade Ab, *Ba or* Bb *biosolids** onto or into production land" and any ancillary discharge" of contaminants" into air must comply with the *conditions"* of Rule 13-4A.

(i) The *discharge" of poultry* farm litter'" onto or into *production land" and any* ancillary *discharge" of* contaminants" into air must comply with the conditions" of Rule 13-4B.

(j) The *discharge" of farm animal effluent** onto *or into* production land" including:
- (i) effluent from dairy sheds and feedpads*
- (ii) effluent received from piggeries
- (iii) sludge from farm effluent ponds
- (iv) poultry farm effluent and any ancillary discharge" of contaminants" into air must comply with the conditions", standards and terms of Rule 13-6.

(^ = defined in RMA; * = defined in Horizons Regional Council "One Plan" Document.)